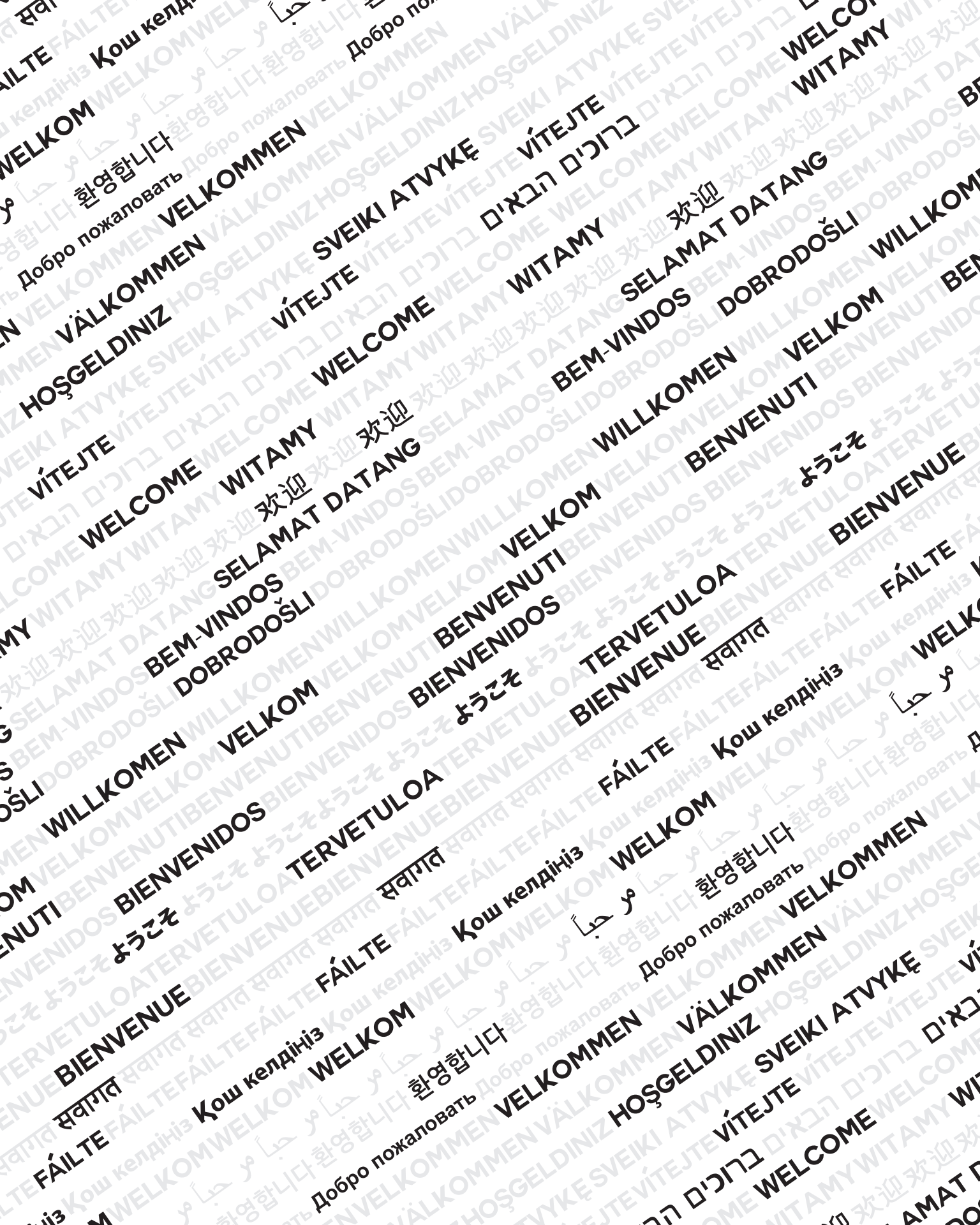
WELCOME
WITAMY
欢迎
SELAMAT DATANG
BEM-VINDOS
DOBRODOŠLI
WILLKOMEN
VELKOM
BENVENUTI
BIENVENIDOS
ようこそ
TERVETULOA
BIENVENUE
स्वागत
FÁILTE
Қош келдіңіз
WELKOM
환영합니다
Добро пожаловать
VELKOMMEN
VÄLKOMMEN
HOŞGELDINIZ
SVEIKI ATVYKĘ
VÍTEJTE
ברוכים הבאים

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WELCOME

Welcome to the 2015 Giant Jamboree.

Thank you to the students and instructors. You are iGEM. Your effort, your creativity, and your commitment make your projects successful and make iGEM worth it. Thank you to the Track, Safety, and Judging committee members, and all of our volunteers, for supporting the teams and preparing for the Jamboree. Thank you to our corporate sponsors for providing special technologies to the teams and support to iGEM Headquarters. Special thanks to the team of more than 130 Judges. The Jamboree will be intense hard work for everyone. Please take time for a deep breath and remember the rewarding summer that brought us here.

The problems of the world and the opportunities for Synthetic Biology are often found in local settings. They are seen and appreciated by those who live and work there. For that reason, iGEM delights in the geographic diversity of the teams. Last year, we had Sumbawa, this year we welcome Egypt. Wherever they come from, iGEMers have a shared experience of challenge, hard work, teamwork, and learning at a pace not found in normal programs. The Jamboree provides the opportunity to meet future collaborators, business partners, and colleagues.

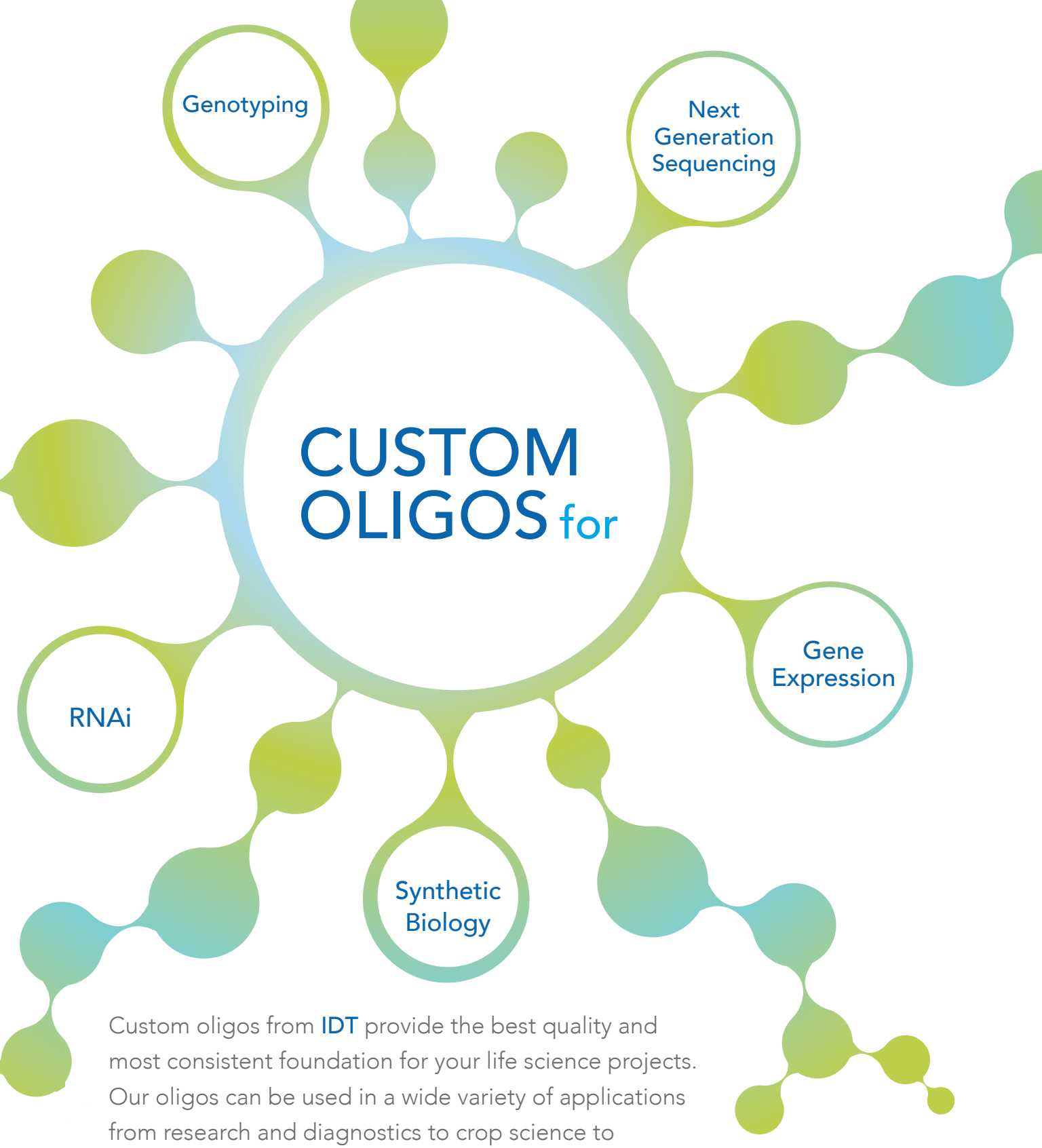
This year, iGEM broke through the physical DNA barrier. For the first time every team was given access to 20,000 bases of free synthetic DNA. Thank you, IDT. This weekend, we will see what the teams accomplished with that DNA. Gen9 helped as well, providing high-quality, clonal replacements for some of the most popular parts in the iGEM Repository.

Not new for this year, but changed significantly: The high school teams are at this Jamboree for the first time, the Interlab Measurement program continues to be popular, and our safety program is being cited as an exemplar of good practice, our Judging infrastructure is ready.

So, what happens after iGEM? Synthetic Biology has become a strong and important field. In academia, new faculty positions are open and new centers continue to be funded. The investment community now accepts Synthetic Biology as one of the most important technologies of this century. Governments and NGOs are bringing more focus to the field and are offering opportunities in policy, outreach, and publication. Everywhere you look, you see iGEM students, instructors, and advisors.

The goal of Synthetic Biology is to establish fluent control over matter - a technological revolution of the 21st century. iGEM introduces students, faculty, and advisors to the field. It shows them the excitement and challenges, the opportunities and risks they will face in the future. iGEM is not just what the students did this summer. It is the beginning of what they will do for the rest of their lives.

Thank you,
Randy Rettberg
President and Founder
iGEM Foundation



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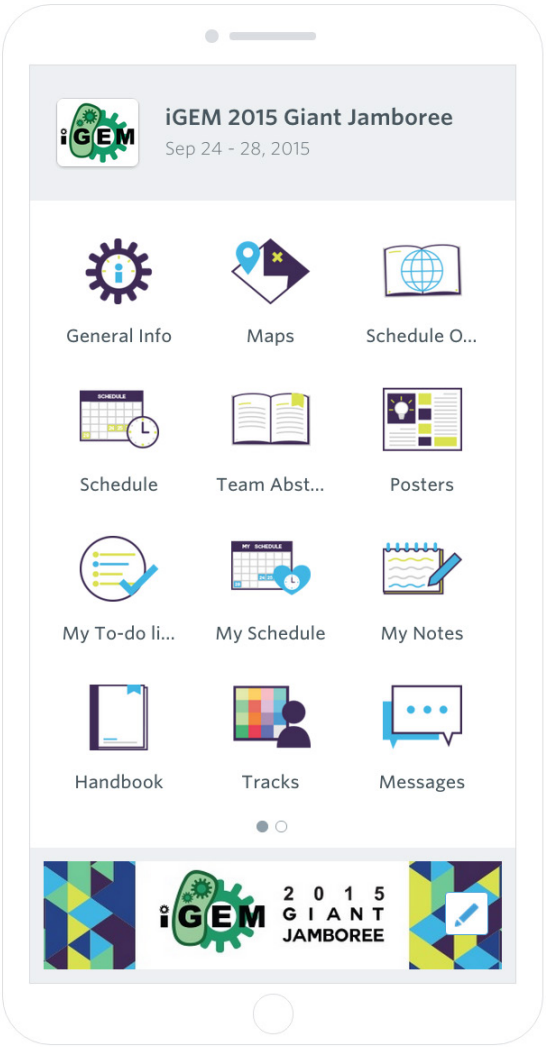

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- Click **“BCEC Wireless Network”** or **“Hynes Wireless Network”**

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guidebook

ABOUT

The International Genetically Engineered Machine (iGEM) Foundation is an independent, non-profit organization dedicated to education and competition, the advancement of synthetic biology, and the development of an open community and collaboration.

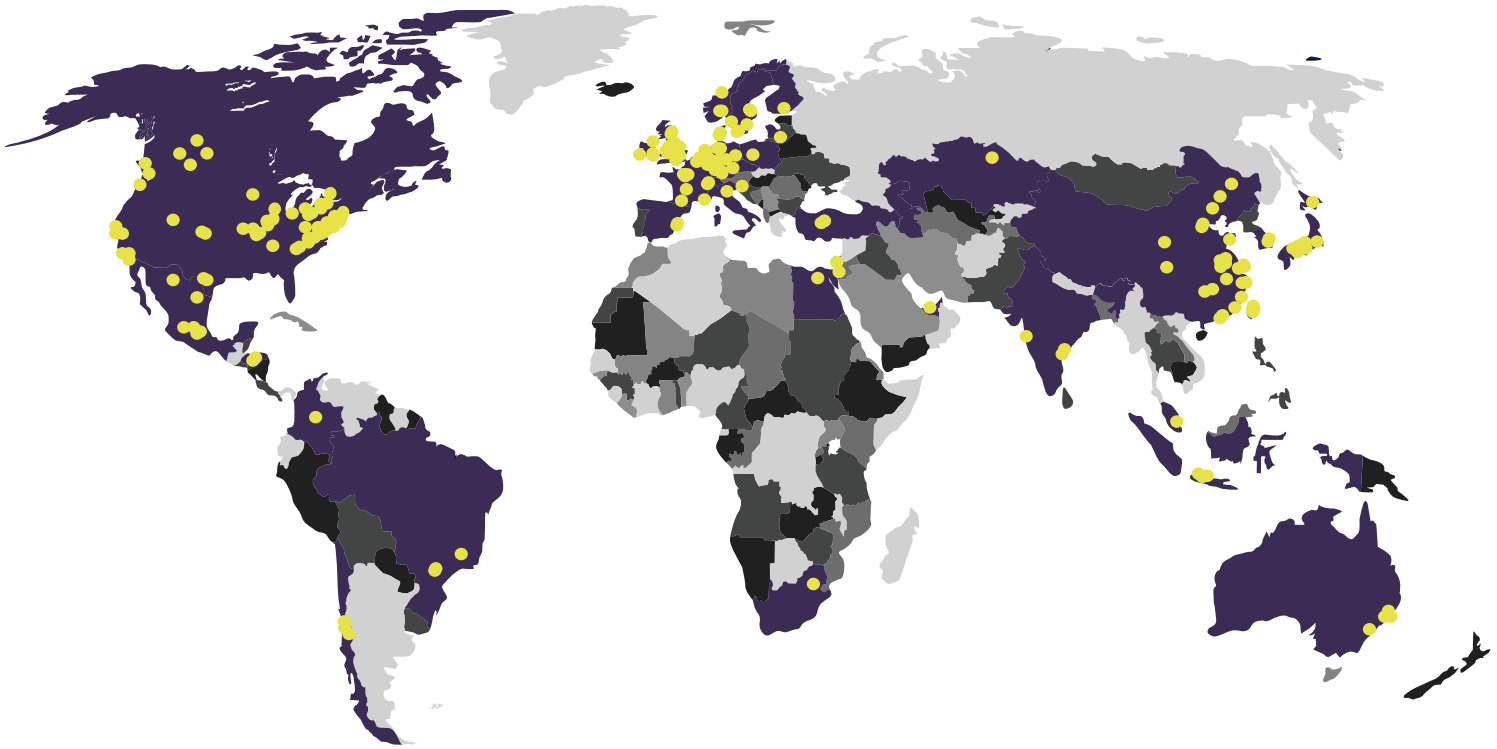
iGEM runs three main programs: the iGEM Competition - an international competition for students interested in the field of synthetic biology; the Labs Program - a program for academic labs to use the same resources as the competition teams; and the Registry of Standard Biological Parts - a growing collection of genetic parts for building biological devices and systems.

The iGEM competition is an annual, worldwide, synthetic biology event aimed at undergraduate university students, as well as high school and graduate students. Multidisciplinary teams work all summer long to build genetically engineered systems using standard biological parts called Biobricks. iGEM teams work inside and outside the lab, creating sophisticated projects that strive to create a positive contribution to their communities and the world.

iGEM began in January 2003 as an independent study course at the Massachusetts Institute of Technology (MIT) where students developed biological devices to make cells blink. This course became a summer competition with 5 teams in 2004 and continued to grow to 13 teams in 2005; it has now expanded to 280 teams in 2015, reaching more than 30 countries.

The competition was originally aimed at college students but it has grown to include post-college and high school students. The competition's projects have also grown in complexity. Tracks were introduced to the competition to give teams focus areas for their projects and Regional Jamborees and World Championships were held in the past. Past projects have ranged from a rainbow of pigmented bacteria, to wintergreen scented bacteria, to the development of an arsenic biosensor to screen drinking water.

iGEM Around the World



AUSTRALIA - BELGIUM - BRAZIL - CANADA - CHILE - CHINA - COLOMBIA - CZECH REPUBLIC
DENMARK - EGYPT - FINLAND - FRANCE - GERMANY - HONDURAS - HONG KONG - INDIA
INDONESIA - IRELAND - ISRAEL - ITALY - JAPAN - KAZAKHSTAN - KOREA - LITHUANIA - MEXICO
NETHERLANDS - NORWAY - POLAND - SINGAPORE - SLOVENIA - SOUTH AFRICA - SPAIN
SWEDEN - SWITZERLAND - TAIWAN - TURKEY - UNITED ARAB EMIRATES - UNITED KINGDOM
UNITED STATES

CONTRIBUTORS

iGEM Board of Directors

King Chow

Richard Johnson

Thomas Knight

Randy Rettberg

Pamela Silver

iGEM Headquarters Staff

President
Randy Rettberg

Vice President
Meagan Lizarazo

iGEM Generalist
Vinoo Selvarajah

iGEM Generalist
Kitwa Ng

iGEM Fellow
Kim de Mora

Communications
Maria Bartolini

iGEM Junior Fellow
Ana Sifuentes

iGEM Generalist, Biosafety
Kelly Drinkwater

iGEM Science & Technology Fellow
Traci Haddock

iGEM Judging Committees

Director of Judging
Pete Carr

Executive Judging Comittee
Beth Beason
Janie Brennan
Pete Carr
Terry Johnson

Judge Emeritus
Pete Carr
Karmella Haynes
Thomas Knight
Tom Richard

Responsible Conduct Committee

Pete Carr
King Chow
Karmella Haynes
Roman Jerala

Jamboree Advisory Committee

King Chow
Corinne Dorel
Marc Facciotti
Louise Horsfall
Anne Meyer
Carlos Nunes da Silva
Jenna Rickus
Hans-Joachim Wieden

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Art & Design Chair
Dan Grushkin

Community Labs Chair
Romie Littrell

Hardware Co-Chair
Will Canine

Hardware Co-Chair
Dave Kong

High School Chair
Janet Standeven

High School Co-Chair
Jude Clapper

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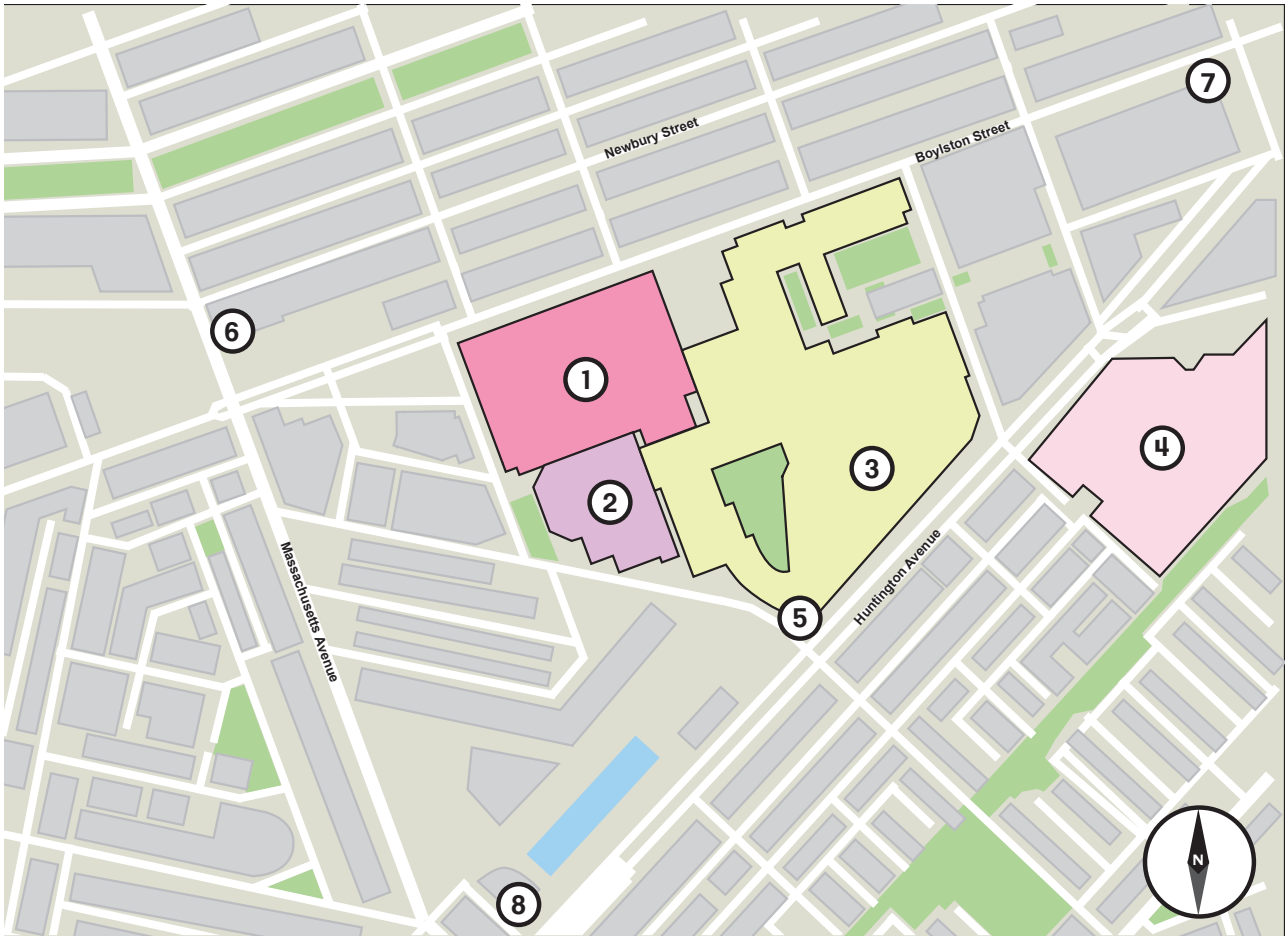
CARIBOU BIOSCIENCES

Exhibitors

- Agilent
- Autodesk
- Biobuilder
- BioBricks Foundation
- FBI
- Integrated DNA Technologies (IDT)
- MathWorks
- Museum of Science, Boston
- New England Biolabs (NEB)
- OpenTrons
- Public Library of Science (PLOS)
- SGI-DNA
- Synberc
- SynBioBeta
- Synenergene
- Twist Biosciences

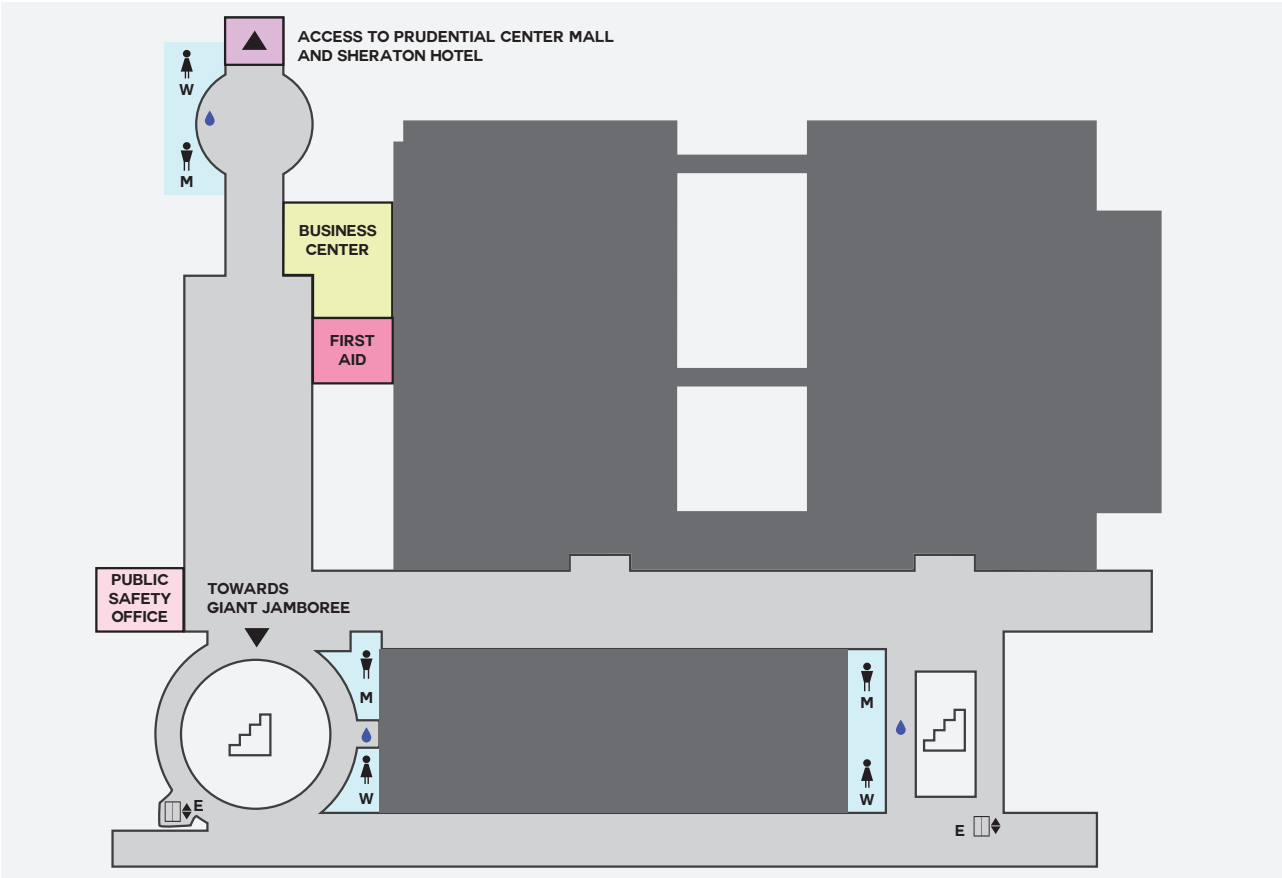
See map on page 18 for details.

MAPS



Area around the
Hynes Convention Center

1. Hynes Convention Center
2. Sheraton Hotel
3. Prudential Center Mall
4. Copley Plaza Mall
5. T - Prudential Subway Station
6. T - Hynes Convention Center Subway Station
7. T - Copley Subway Station
8. T - Symphony Subway Station



Hynes Convention Center

Plaza Level

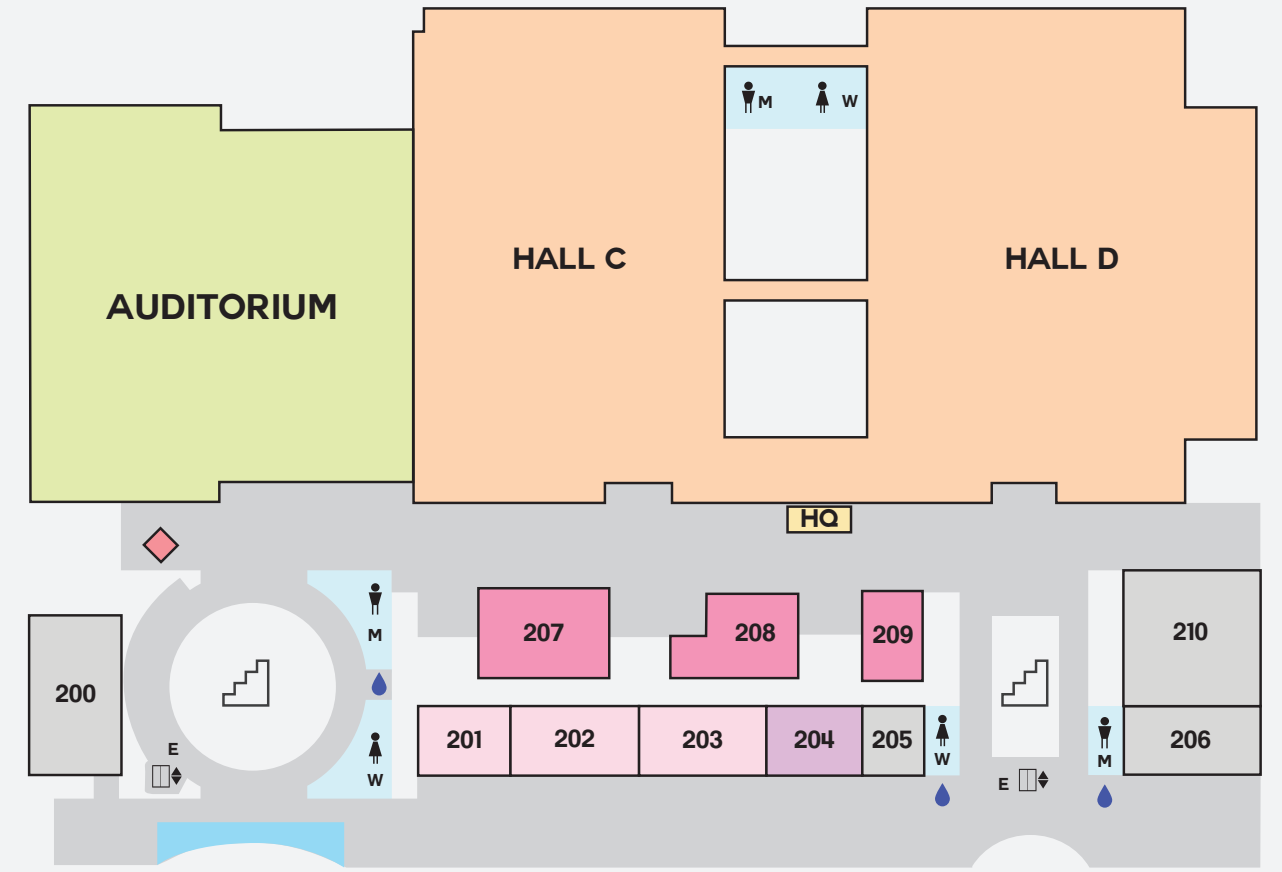
Business Center (Printing Services)

Prudential Plaza Entrance

First Aid

Public Safety Office

Water Fountain



Hynes Convention Center

Second Level

Auditorium
- Opening Ceremony
- Awards Ceremony
- FBI Talk

Hubs
- Hall C and D

Interactive Rooms
- 207 - Looking Back: Hall of Fame
- 208 - Looking Ahead: After iGEM
- 209 - Brainstorming Room: Gender Diversity

iGEM HQ table

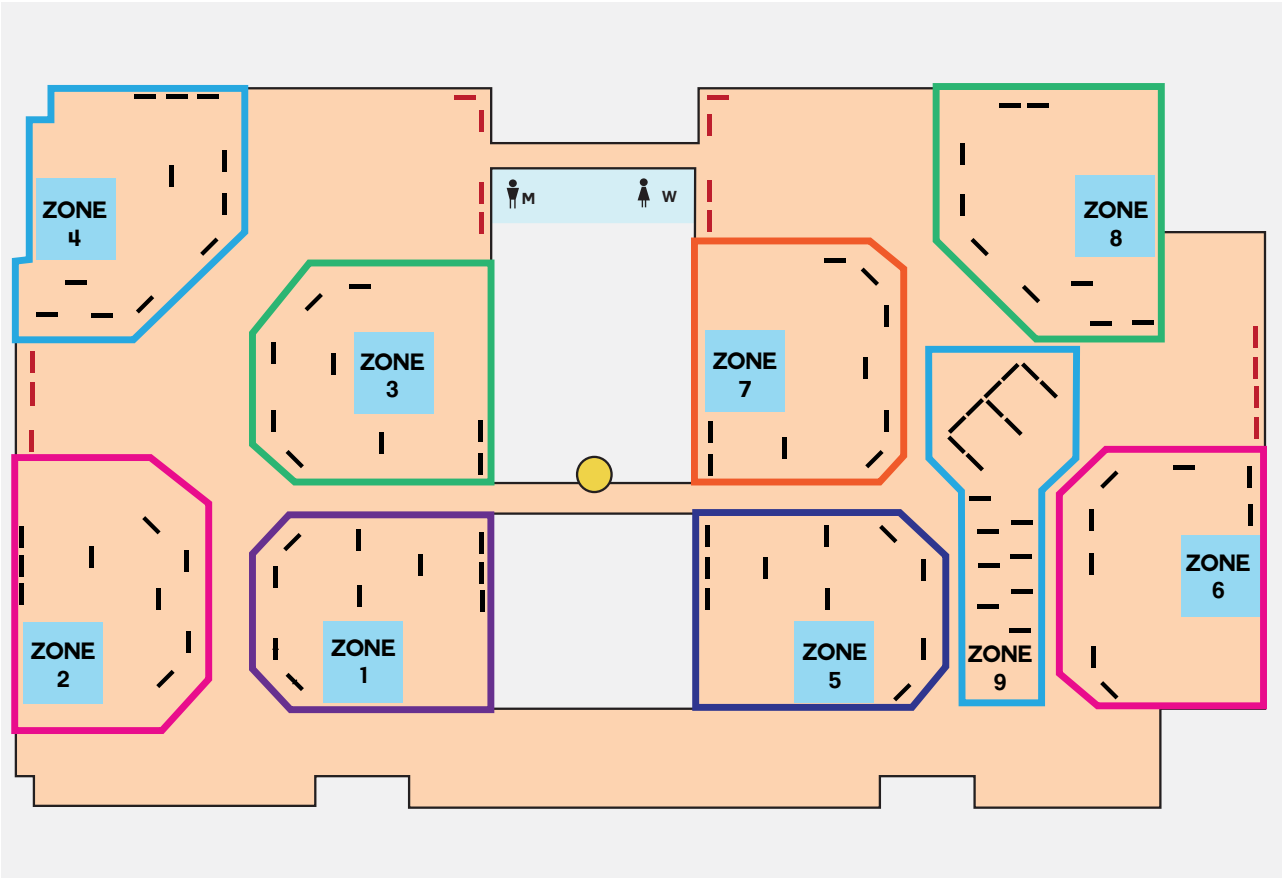
Unconference Rooms
- 201
- 202
- 203

Registration

Quiet Room - 204

Water Fountain
(Water also available in presentation rooms)

Snack Kiosk



Hynes Convention Center

Hubs

Food, Lounges, Sponsors, Posters, Seating areas

Hall C

Zone 1
Posters 1 - 34

Zone 2
Posters 35 - 64

Zone 3
Posters 65 - 96

Zone 4
Posters 97 - 134

Charging station

Exhibitors

Hall D

Zone 5
Posters 135 - 168

Zone 6
Posters 169 - 196

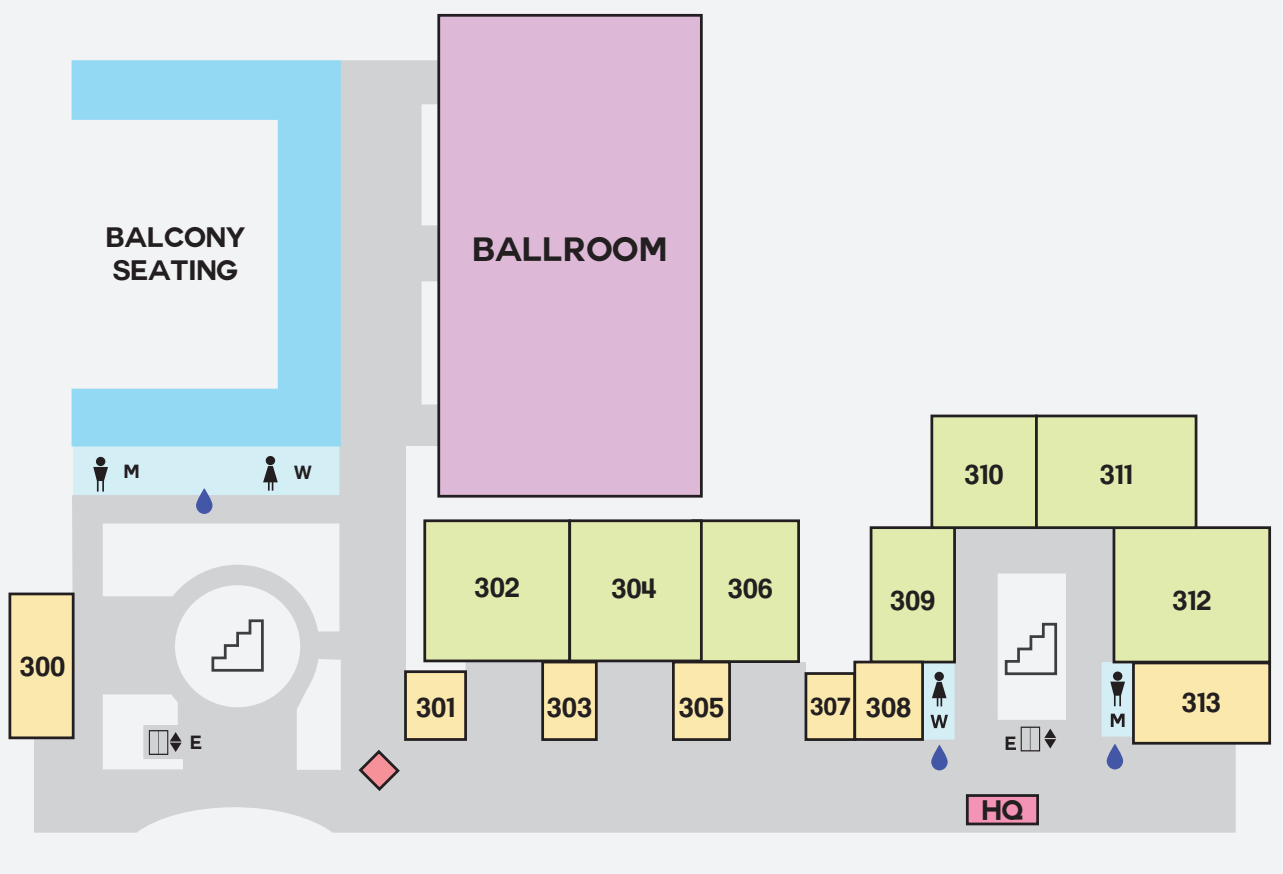
Zone 7
Posters 197 - 228

Zone 8
Posters 229 - 259

Zone 9
Art and Design Gallery

Hardware Exhibition

Software Showcase



Hynes Convention Center
Third Level

Presentation Rooms
- 302
- 304
- 306
- 309
- 310
- 311
- 312

Ballroom
- Instructor Social
- Seating Area

iGEM HQ table

Streaming Rooms
- 301 (Streaming Room 302)
- 303 (Streaming Room 304)
- 305 (Streaming Room 306)
- 307 (Streaming Room 309)
- 300 (Streaming Room 310)
- 308 (Streaming Room 311)
- 313 (Streaming Room 312)

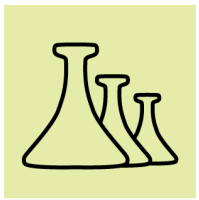
Balcony Seating

Water Fountain
(Water also available in presentation rooms)

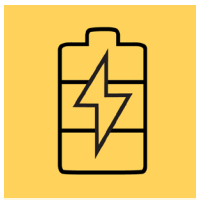
Snack Kiosk

SCHEDULE

Art and Design



Community Labs

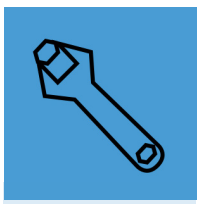


Energy

Environment

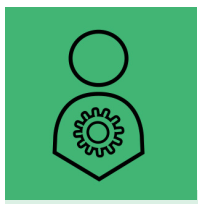
Food and Nutrition

Foundational Advance



Hardware

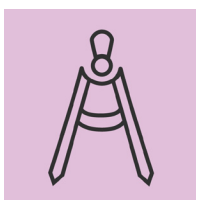
Health and Medicine



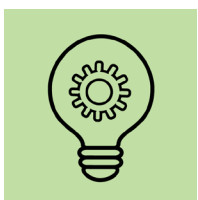
High School

Information Processing

Manufacturing



Measurement



New Application

Software

Each team presentation slot will be 30 minutes long.

OVERVIEW

	THURSDAY September 24	FRIDAY September 25	SATURDAY September 26	SUNDAY September 27	MONDAY September 28	
8:00						8:00
8:30		Opening Ceremony			Kickoff	8:30
9:00		Presentation Sessions	Presentation Sessions	Presentation Sessions	Finalist Presentations	9:00
9:30						9:30
10:00						10:00
10:30		Coffee Break	Coffee Break	Coffee Break	iGEM from Above	10:30
11:00		Presentation Sessions	Presentation Sessions	Presentation Sessions	Finalist Presentations	11:00
11:30						11:30
12:00					Refreshment Break	12:00
12:30		Grab & Go Lunch	Grab & Go Lunch	Grab & Go Lunch		12:30
1:00		Special Events	Special Events	Special Events	Awards Ceremony	1:00
1:30	Registration					1:30
2:00	Registration & Practice Presentation Sessions & Poster Setup	Presentation Sessions	Presentation Sessions	Presentation Sessions		2:00
2:30						2:30
3:00						3:00
3:30		Coffee Break	Coffee Break	Coffee Break		3:30
4:00		Presentation Sessions	Presentation Sessions	Presentation Sessions		4:00
4:30						4:30
5:00 - 5:30			Special Events	FBI Talk		5:00 - 5:30
6:00 - 6:30		Special Events	Poster Session	Poster Session		6:00 - 6:30
7:00						7:00
7:30						7:30
8:00				Social Events		8:00
8:30						8:30
9:00 to 1:00						9:00 to 1:00

Visit the **Hall of Fame** (Room 207) and the **Brainstorming Room** (Room 209), open all day from Friday to Sunday.

FRIDAY

		Room 302 Streaming 301	Room 304 Streaming 303	Room 306 Streaming 305
8:30 - 9:00		**Opening Ceremony -** Auditorium		
9:00 - 10:30	Presentations	High School SDA-Encinitas Shiyan SY China TecCEM HS	Health and Medicine Tufts NCTU Formosa Cork Ireland	Food and Nutrition Lethbridge METU Turkey Columbia NYC
10:30 - 11:00		**Coffee Break -** Hubs		
11:00 - 12:30	Presentations	Manufacturing SDU-Denmark Utah State Santa Clara	High School Nanjing NFLS Shenzhen SFLS BroadRun-NorthernVA	Health and Medicine CGU Taiwan IISER Pune Leicester
12:30 - 1:00		**Grab & Go Lunch -** Hubs		
1:00 - 2:00	Workshops	**AlumniGEM Mentorship** Room 208	**SynBio at Science Museums** Room 302	**Taking SynBio Visions to the Next Level: Part I** Room 304
2:00 - 3:30	Presentations	Health and Medicine UMass-Dartmouth CityU HK GeorgiaTech	Foundational Advance Tec-Chihuahua Warwick Concordia	Environment Uppsala Bordeaux Brasil-USP
3:30 - 4:00		**Coffee Break -** Hubs		
4:00 - 6:00	Presentations	Foundational Advance Penn Vilnius-Lithuania Fudan Minnesota	Manufacturing Sydney Australia ITB INDONESIA Northeastern Boston UFSCar-Brasil	High School WLSA Shanghai Lambert GA Slovenia HS Liceo Eugenio Hostos
6:00 - 7:00	Workshops	**Networking Bingo** Room 208	**Brainstorming Room: Gender Diversity in iGEM** Room 209	

Room 309 Streaming 307	Room 310 Streaming 300	Room 311 Streaming 308	Room 312 Streaming 313
Opening Ceremony - Auditorium			
New Application **Dundee** **SYSU CHINA** **Chalmers-Gothenburg**	Foundational Advance **Tuebingen** **Austin UTexas** **Harvard BioDesign**	Environment **HUST-China** **ZJU-China** **IIT Delhi**	Manufacturing **Tec Guadalajara** **Aachen** **UCLA**
Coffee Break - Hubs			
Foundational Advance **Amoy** **KAIT Japan** **CAU China**	Health and Medicine **Missouri Columbia** **NU Kazakhstan** **Hamburg**	Energy **Reading** **Macquarie Australia** **LaVerne-Leos**	New Application **TecCEM** **Glasgow** **Exeter**
Grab & Go Lunch - Hubs			
Mammalian Synbio Room 309	**College & High School Meet and Greet** Room 310	**Assembly in iGEM** Room 311	**Conflict Resolution** Room 312
Manufacturing **UAM Poznan** **CSU Fort Collins** **NUDT CHINA**	High School **H4Z-Hangzhou** **AUC TURKEY** **HSNU-TAIPEI**	New Application **Pretoria UP** **Michigan** **NAIT Edmonton**	Health and Medicine **NYU-AD** **NTU-LIHPAO-Taiwan** **TCU Taiwan**
Coffee Break - Hubs			
New Application **BABS UNSW Australia** **Tec-Monterrey** **TU Eindhoven** **Goettingen**	Environment **UMBC-Maryland** **CU Boulder** **FAFU-CHINA** **Missouri Rolla**	Health and Medicine **SCUT-China** **UNAM-CU** **WLC-Milwaukee** **Virginia**	Energy **Purdue** **Groningen** **TJU** **UCSC**
CRISPR Workshop Room 302	**Taking SynBio Visions to the Next Level: Part II** Room 304	**Startup Showcase** Room 311	**Design and Run Experiments in Automated Labs** Room 312

SATURDAY

		Room 302 Streaming 301	Room 304 Streaming 303	Room 306 Streaming 305
9:00 - 10:30	**Presentations**	Food and Nutrition **WashU StLouis** **NEFU China** **NRP-UEA-Norwich**	High School **Rock Ridge Virginia** **Elan Vital Korea** **OLS Canmore AB CA**	Health and Medicine **SZU China** **SPSingapore** **Queens Canada**
10:30 - 11:00		**Coffee Break** - Hubs		
11:00 - 12:30	**Presentations**	Health and Medicine **Birkbeck** **Peking** **HokkaidoU Japan**	Environment **BNU-CHINA** **Cornell** **Toulouse**	New Application **PacificU-Oregon** **Technion Israel** **Tianjin**
12:30 - 1:00		**Grab & Go Lunch** - Hubs		
1:00 - 2:00	**Workshops**	**Paving the Way to Graduate School** Room 302		**Modeling Biology with SimBiology** Room 304
2:00 - 3:30	**Presentations**	Information Processing **Uniandes Colombia** **UT-Tokyo** **XJTLU-CHINA**	Health and Medicine **BIT** **IIT Madras** **UNA Honduras**	Energy **Westminster** **Aalto-Helsinki** **Amsterdam**
3:30 - 4:00		**Coffee Break** - Hubs		
4:00 - 5:30	**Presentations**	Health and Medicine **Stony Brook** **Nankai** **FAU Erlangen**	Environment **Tokyo-NoKoGen** **UAI-Chile** **UiOslo Norway**	New Application **UChicago** **Kent** **WPI-Worcester**
5:30 - 6:30	**Workshops**	**Synthetic Dance-ology** Room 302	**Latin America Workshop** Room 304	**Multi-Omics Solutions for SynBio Workflows** Room 306
6:30 - 8:00	**Poster**	**Poster Session** - Hubs		

Room 309 Streaming 307	Room 310 Streaming 300	Room 311 Streaming 308	Room 312 Streaming 313
New Application: Linkoping Sweden UMaryland KU Leuven	Foundational Advance: Duke ANU-Canberra UNC-Chapel Hill	Environment: British Columbia Pasteur Paris York	Manufacturing: MIT Dalhousie Halifax NS Stanford-Brown
Coffee Break - Hubs			
High School: Central Calgary San Andres METU HS Ankara	Food and Nutrition: AHUT China Paris Bettencourt Scut-Champion-Park	Manufacturing: RHIT Georgia State Information P.: HZAU-China	Health and Medicine: Evry Edinburgh TU Dresden
Grab & Go Lunch - Hubs			
Communicating Your Project Room 306	**Women in Science** Room 311	**A SynBio Approach to Novel Molecular Bio** Room 312	
New Application: China Tongji Hamilton McMaster NJAU China	High School: Technion HS Israel LASATX Mingdao	Environment: UC Davis Paris Saclay SCU China	Foundational Advance: Waterloo BostonU Measurement: LZU-China
Coffee Break - Hubs			
Health and Medicine: DTU-Denmark UCL ATOMS-Turkiye	High School: HAFS-Korea SKLBC-China GenetiX Tec CCM	Information Processing: Tokyo Tech EPF Lausanne WHU-China	Measurement: OUC-China William and Mary UC San Diego
Human Practices Showcase Room 309	**Plant Synthetic Biology** Room 310	**InterLab Study** Room 311	**Building with Biology** Room 312
Poster Session- Hubs			

SUNDAY

		Room 302 Streaming 301	Room 304 Streaming 303	Room 306 Streaming 305
9:00 - 10:30	Presentations	New Application: NEAU-China; BIT-China; Washington	High School: Danzi Kesh 8; Consort Alberta; Lethbridge HS	Food and N.: Marburg Software: Michigan Software; HFUT-China
10:30 - 11:00		**Coffee Break** - Hubs		
11:00 - 12:30	Presentations	Software: SJTU-Software; UESTC Software; Toronto	Health and Medicine: Tsinghua-A; Oxford; Stockholm	Community Labs: Wellesley TheTech; London Biohackspace; SF Bay Area DIYBio
12:30 - 1:00		**Grab & Go Lunch** - Hubs		
1:00 - 2:00	Workshops	**Career Fair** Room 208 (Runs until 4:00 pm)	**New Track: Software** Room 302	**New Track: High School** Room 304
2:00 - 3:30	Presentations	Hardware: TU Delft; TU Darmstadt; Tsinghua	Environment: Berlin; Gaston Day School Community L.: Genspace	Health and Medicine: UI Indonesia; NJU-China; Cairo Egypt
3:30 - 4:00		**Coffee Break** - Hubs		
4:00 - 5:30	Presentations	Health and Medicine: Manchester-Graz; TrinityCollegeDublin; UB Indonesia	Food and Nutrition: SJTU-BioX-Shanghai; Nagahama; IIT Kharagpur	Energy: CHINA CD UESTC; UNITN-Trento; NTU-Singapore
5:30 - 6:30	Workshops	**FBI: Safeguarding Science and the Future** Auditorium		
6:30 - 8:00	Poster	**Poster Session** - Hubs		
8:00 - 1:00		**Instructor Social** - Ballroom (8:00 pm - 11:00 pm)		

Room 309 Streaming 307	Room 310 Streaming 300	Room 311 Streaming 308	Room 312 Streaming 313
Art and Design: NYU Shanghai SVA-NYC BIOSINT Mexico	Health and Medicine: UFMG Brazil Czech Republic BGU Israel	Information Processing: IONIS Paris UIUC Illinois UCSF	Environment: NYMU-Taipei SCUT Aix-Marseille
Coffee Break - Hubs			
High School: SKLBC-DGSYZX SZMS 15 Shenzhen CCA SanDiego	Environment: HKUST-Rice Jilin China Bielefeld-CeBiTec	Health and Medicine: Pitt uOttawa WHU-Pharm	Hardware: Sherbrooke Cambridge-JIC Cooper Union
Grab & Go Lunch - Hubs			
New Track: Measurement Room 306	**New Track: Community Labs** Room 309	**New Track: Art and Design** Room 311	**New Track: Hardware** Room 312
Software: USTC-Software SYSU-Software Korea U Seoul	Measurement: NTNU Trondheim Carnegie Mellon UGA-Georgia	Foundational Advance: Heidelberg Vanderbilt Yale	High School: Hangzhou-H14Z TAS Taipei Colegio EmelinaU
Coffee Break - Hubs			
Hardware: USTC High School: TP CC-SanDiego Information P.: Valencia UPV	New Application: Gifu Hong Kong HKU Hong Kong-CUHK	Environment: UNIK Copenhagen UChile-OpenBio Nanjing-China	Health and Medicine: ETH Zurich Freiburg SVCE Chennai
FBI: **Safeguarding Science and the Future** Auditorium			
Poster Session - Hubs			
Jillian's Boston (8:00 pm - 1:00 am)		**Blue Man Group** (8:00 pm - 10:30 pm)	

MONDAY

All events will be held at the Auditorium.

8:30 - 9:00		**Kickoff**
9:00 - 10:30	**Presentations**	**Finalist Presentations**
10:30 - 10:45		**iGEM from Above**
10:45 - 12:15	**Presentations**	**Finalist Presentations**
12:15 - 12:45		**Refreshment Break -** Hubs
12:45 - 1:45	**Awards**	**Awards Ceremony**

SPECIAL EVENTS

Thursday

Registration

Thursday 1:30 pm - 9:00 pm
Open Friday through Sunday
Boylston Hallway, 2nd Floor

Check in at the Hynes Convention Center starts at 1:30 pm and ends at 9:00 pm on Thursday and will remain open throughout the weekend. Registration will be located on the 2nd Floor, see map for details. At Registration, each attendee will pick up a registration booklet, name badge, and other important and useful information. Keep in mind that registration check-in is on an individual basis, instead of by team as in previous years. Check in at Registration by the last name on your registration record.

Practice Sessions

Thursday 2:00 pm - 9:00 pm
Rooms 201, 202, 203, 204, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313

Teams are allowed to practice their presentation on site. Note that there will NOT be any A/V (audio/visual) support staff on duty. All rooms will be unlocked and you should use them and leave them as you found them.
Be sure to bring necessary computer equipment with you, such as chargers and adapters, as these will not be provided.

Friday

Opening Ceremony

Friday
Auditorium
8:30 am - 9:00 am

Welcome to the iGEM 2015 Giant Jamboree! The entire iGEM community is invited for the first official session where special announcements, opening remarks and the official welcome will be delivered.

AlumniGEM Mentorship

Friday
Room 208
1:00 pm - 2:00 pm

Come learn about the AlumniGEM Mentorship Pilot Program! We paired twelve mentors with six teams that were mostly either brand new to iGEM or had participated for the first time last year.

These teams and mentors will share their experiences, and we will use their comments and yours to expand and improve upon our pilot program for iGEM 2016. We'll start the session off with a short summary of what the program has accomplished, hear from those who participated in it this year, discuss the future of the mentorship program, and then host an open discussion of iGEM mentorship in general.

If you are looking to start or continue a new team, share iGEM mentorship ideas, and give back to the iGEM community, then we highly encourage you to attend!

SynBio at Science Museums

Friday
Room 302
1:00 pm - 2:00 pm

Hosted by Synberc
The Boston Museum of Science, Synberc (the Synthetic Biology Engineering Research Center), and AAAS (the American Association for the Advancement of Science) are partnering to engage scientists and members of the public in activities and multi-directional conversations about the societal implications of engineering biology at science museums around the United States. iGEM attendees will test out hands-on activities created through collaborations between museum developers and research scientists and learn about opportunities for participating in "Building With Biology" events that will take place at 200 sites in the summer of 2016.

Taking SynBio Visions to the Next Level: (Part I & II)

Friday
Room 304
Part I 1:00 pm - 2:00 pm
Part II 6:00 pm - 7:00 pm

Hosted by Synenergene
How will SynBio change the world around us, and how can we prepare for it? How do we respond to moral dilemmas and enhance opportunities for the public good?

In order to ensure that developments in science and technology better align with views and values in society, increasingly more efforts are being made to organize societal dialogue. Discussing the potential impact and desirability of synthetic biology is quite a challenge, since the field is still largely confined to the laboratory. So, how can we facilitate a meaningful dialogue on synthetic biology without too much speculation?

Future scenarios have proven a useful tool. Scenarios can visualize a future situation in which synthetic biology is plausibly applied and make us aware of potential moral issues. To this end, the EU-funded project Synenergene – dedicated to responsible research and innovation in synthetic biology – teamed up with iGEM. Eight iGEM teams were funded and assisted by Synenergene to develop a future scenario based on their very own iGEM project.

This workshop will present and discuss the scenarios developed by these iGEM teams. The teams will share their experiences on the developing and using future scenarios as part of their project.

- **Matti Sonck and Laurens Landeweerd**
Delft University of Technology, The Netherlands
- **Ana Delgado and Kjetil Rommetveit**
University of Bergen, Norway

Mammalian SynBio

Friday
Room 309
1:00 pm - 2:00 pm

Mammalian Synthetic Biology at iGEM: Peril and Promise. Undertaking a mammalian synthetic biology project as an iGEM team is not for the faint of heart: there are fewer well-characterized parts available, the assembly steps can be more demanding, and maintaining, transfecting and characterizing mammalian cells is resource-intensive. On the other hand, mammalian synthetic biology is at the cutting edge of biomedical research, allowing iGEM teams to address problems in health and medicine that would be difficult to approach in prokaryotic or single-cell eukaryotic systems. This workshop will begin with a summary of our experiences leading several iGEM teams that have undertaken mammalian synthetic biology projects, followed by an extended period for questions and conversation between those working in the mammalian SynBio space and those considering entering it.

College and High School Meet and Greet

Friday
Room 310
1:00 pm - 2:00 pm

Hosted by Lambert High School and the iGEM High School Committee
The workshop aims to create a pipeline for the next generation of Synthetic Biologists in universities and is a networking session for high school students and collegiate instructors and advisors. High school students can meet with collegiate team instructors and advisors to learn about the synthetic biology communities at different colleges and universities. Collegiate team members are also encouraged to attend to share their experiences with the high school team members.

Assembly in iGEM

Friday
Room 311
1:00 pm - 2:00 pm

Being able to easily and reliably assemble DNA Parts into devices is crucial in synthetic biology and particularly for iGEM teams. Over the years, teams have utilized numerous methods to construct their devices, from BioBricks assembly to Gibson. Come join us for a discussion on DNA assembly in iGEM and learn about how iGEM is thinking about assembly for 2016 and beyond.

Conflict Resolution

Friday
Room 312
1:00 pm - 2:00 pm

Hosted by Boston University's Office of the Ombuds
To be a successful researcher, you will need to rely not only on your scientific ability, but also on your skill in managing and leading others. This session will focus on the "human" factors that contribute to successful team science. Presented from the perspective of two professionals with extensive experience in conflict management within research university settings, the session will cover:

- Factors contributing to the success of research team
- Tips on establishing and maintaining successful research teams
- Managing conflict constructively in a team science context.

The session will include time to address questions from the attendees.

Brainstorming Room: Gender Diversity in iGEM

Instructional Session:
Friday
Room 209
6:00 pm - 7:00 pm

Open all day Friday through Sunday

This year, we are introducing a new type of interactive space to the Giant Jamboree: a Brainstorming Room! The focus for 2015 will be Gender Diversity in iGEM. We're asking teams, instructors, and Jamboree participants to help us understand the gender issues that iGEM teams encounter around the world by sharing your ideas and experiences, and to help brainstorm ways that both members of iGEM Headquarters and rest of the iGEM community can help address these issues and promote gender diversity in teams.

This room will remain open throughout the Jamboree and we invite you to stop by to add your thoughts and experiences to our interactive walls. Printed instructions and materials will be provided in the room throughout the weekend. We also invite you to join us for an instructional session on Friday evening to help kick off the brainstorming!

Hall of Fame

Open all day Friday through Sunday
Room 207

Come walk through the history of iGEM in our first ever Hall of Fame exhibit! Learn about the history of the competition and see the previous projects that have won Grand Prize. Highlights will also include other milestones, including specific BioBricks, as well as the start-ups that spun out of iGEM projects. You'll also have a chance to insert yourself in iGEM history through an interactive wall where attendees can sign their names!

Networking Bingo

Friday
Room 208
6:00 pm - 7:00 pm

After a successful event in 2014, Networking Bingo will return during the Friday evening special events session! If you're looking for an opportunity to meet many fellow iGEMers, team advisors and industry affiliates, you should plan to attend this session. Participants will be given Bingo sheets with questions about iGEM and it will be your mission to get answers for all of them from someone else in the room. You will need to find someone from another team that meets each requirement and get them to sign your sheet.
Prizes will be awarded!

CRISPR Workshop

Friday
Room 302
6:00 pm - 7:00 pm

CRISPR gene editing: utilization, impact and implications.

CRISPR has rapidly become the genome editing tool of choice for many different disciplines within the life sciences. Join genome editing pioneers and experts to discuss how to use CRISPR technology in the lab, its impact on the field, and the most important issues facing our field and our society.

- **Dr. Andy Baltus** - Associate Director of Business, Addgene
- **Dr. John Doench** - Senior Group Leader Broad Institute
- **Dr. Kevin Esvelt** - Technology Development Fellow, Wyss Institute of Biologically Inspired Engineering
- **Mr. Edward Perello** - Chief Business Officer, Desktop Genetics

Startup Showcase

Friday
Room 311
6:00 pm - 7:00 pm

Celebrate the entrepreneurial side of iGEM, at the Startup Showcase. If you have ever been curious if your iGEM project could take the next step, take this opportunity to hear from synthetic biology entrepreneurs and those who have transitioned from iGEM to industry.

Design and Run Experiments in Automated Labs

Friday
Room 312
6:00 pm - 7:00 pm

Hosted by Autodesk
At Autodesk, we have been working on tools to accelerate scientific discovery. In this workshop, we will explore visual tools to create, execute and analyze automated lab experiments.

Saturday

Paving the Way to Graduate School

Saturday
Room 302
1:00 pm - 2:00 pm

Hosted by Synberc
After iGEM and undergraduate studies, the next step for many on the synthetic biology research career path is to attend graduate school to pursue a Ph.D. This workshop will guide you through the graduate school application process, including how to get great letters of recommendation, how to emphasize research experiences, and how to find the program that's right for you. The presentation gathers together wisdom from students, professors, and admissions experts to help you to apply to graduate programs in synthetic biology related disciplines. Learn what you need to do to gain acceptance into your dream graduate school!

Note: this workshop concentrates on admissions at U.S. research institutions.

Modeling Biology with SimBiology

Saturday
Room 304
1:00 pm - 2:00 pm

Hosted by MathWorks
Mathematical modeling is an indispensable component of synthetic biology, and the iGEM competition. Modeling and simulation enables synthetic biologists to test the feasibility of their designs prior to fabrication, thus cutting down on trial and error. Every year, iGEM teams successfully use modeling as a tool to guide and optimize the design of their genetic assemblies. In this workshop, we will introduce iGEM teams to SimBiology, a MATLAB-based tool for modeling, simulating and analyzing biological systems.

Using an example from synthetic biology, we will demonstrate key features, including:

- Block diagram model building environment
- Model exploration methods, including sensitivity analysis
- Parameter estimation techniques
- Advanced analysis via custom analysis tasks written in MATLAB.

Communicating Your Project

Saturday
Room 306
1:00 pm - 2:00 pm

Organized by the Alan Alda Center for Communicating Science
General principles in how to craft short, clear, conversational statements, intelligible to non-scientists, about what you do and why it matters. Session consists of an interactive presentation and discussion on interpreting technical material using examples and analogies to illuminate unfamiliar concepts to your audience. The plenary will address problems and solutions in public interactions as well as peer-to-peer communication. Participants will practice clarity in speaking to non-scientists about their work and may be actively engaged in improv exercises or explaining scientific material to lay people.

Women in Science

Saturday
Room 311
1:00 pm - 2:00 pm

This workshop will highlight issues and solutions for diversity in the scientific community with a focus on women participating in iGEM. There will be lightning talks, personal experiences from the panel members, and a discussion session with the audience members.

Panelists:
- **Professor Anne Meyer**, TU Delft (Moderator)
- **Aude Bernheim**, Institut Pasteur
- **Professor Karmella Haynes**, Arizona State University
- **Dr. Kim de Mora**, iGEM Foundation
- **Dr. Louise Horsfall**, University of Edinburgh
- **Professor María Mercedes Roca Sánchez**, Tecnológico de Monterrey

A SynBio Approach to Novel Molecular Bio

Saturday
Room 312
1:00 pm - 2:00 pm

Hosted by Agilent
Molecular Biology is undergoing a revolution, fueled by the promise of Synthetic Biology.

Join us to see emerging technologies that accelerate the design, build, test, and analyze cycle: SureVector Next Generation Cloning System, allowing you to combine standard DNA components with your own gene of interest to build your own customized vector in a 20 minute reaction. QuikChange HT Protein Engineering System, enabling rapid creation of libraries of rationally designed mutants, precisely targeting and mutating from 1 to 20x50 consecutive or discreet AA with up to 120,000 user-defined sequences at a fraction of the cost of a synthetic variant library.

Early access to Agilent genome editing products. See how free SureVector kits are being used by iGEM Teams! Join us to see emerging next gen cloning, protein expression, and genome editing technologies that accelerate the design, build, test, and analyze cycle. Up to 3 Teams will be chosen to speak about their use of SureVector in their projects.

Synthetic Dance-ology

Saturday
Room 302
5:30 pm - 6:30 pm

Hosted by Synberc
Synthetic Dance-ology is a performance activity that uses dance to engage public audiences about synthetic biology.

In this workshop, a professional dancer and a scientist will work with one or more iGEM teams to break down their iGEM projects into parts. We will then use movement as a metaphor to illustrate how those parts (translated into dance movements) are created, remixed, and strung together to build a complete iGEM project (dance routines).

Through this method, workshop attendees will learn how their iGEM projects and other research activities can be translated into movement to illustrate synthetic biology concepts and engage diverse audiences. Through movement, participants explore synthetic biology in a unique and fun way that reinforces learning, sparks questioning, and promotes interaction with each other in an informal setting. Everyone is welcome to the workshop, but please submit an abstract if you would like your project to be danced at the Jamboree! Learn more at dance.synberc.org.

Latin America Workshop

Saturday
Room 304
5:30 pm - 6:30 pm

Open to all.
A session to discuss the future of the Latin America region. Teams will brainstorm and plan for the new Latin America committee and will learn about “SynBio sin fronteras” from Professor María Mercedes Roca Sánchez.

Multi-Omics Solutions for SynBio Workflows

Saturday
Room 306
5:30 pm - 6:30 pm

Hosted by Agilent
Synthetic biology requires multi-disciplinary approaches in the discovery of enzymes, pathways and suitable organisms, the building of efficient production strains and their validation, and finally the creation and monitoring of a bioprocess. Agilent's broad portfolio of solutions and tools in molecular biology, analytical instrumentation, as well as bioinformatics solutions for data analysis and integration enable researchers to overcome challenges in their workflows from discovery, through the engineering cycle, to the final bioprocess.

Human Practices Showcase

Saturday
Room 309
5:30 pm - 6:30 pm

How can we continue to make Human Practices better? This session will invite iGEM teams and advisors to reflect on their experiences with the Human Practices aspects of their projects - what has excited you most about HP? What challenges have you faced in doing your HP work? What are your hopes are for the future of HP in iGEM? The Human Practices committee, representatives from iGEM HQ, and other special guests, will be there to listen to your experiences and respond to your ideas!

Plant Synthetic Biology

Saturday
Room 310
5:30 pm - 6:30 pm

Synthetic Biology offers the prospect of reprogrammed plants for improved and sustainable bioproduction, a technological perspective with enormous potential benefits. Plants are globally cultivated at extremely low cost, harvested on the giga-tonne scale, and routinely used to produce the widest range of biostuffs, from fibres, wood, oils, sugar, fine chemicals, drugs to food. These are exciting times for Plant Synthetic Biology. The technologies enabling genome editing or multigene engineering are opening an avenue of new genome engineering capacities.

Moreover, engineering plant genomes is not a difficult task anymore, as new technologies are becoming increasingly efficient and versatile. The development new transformation and vector systems, the availability of open source, low-cost hardware resources and the introduction of Synthetic Biology-inspired modular genetic engineering tools are contributing to democratize Plant Biotechnology. This workshop will provide a forum for discussion of recent technical advances in plant sciences, which promise to speed and democratize botanical engineering.

These include (i) the development of a common syntax for plant gene assembly, (ii) fast new chassis for transgenic plant work (iii) rapid transient assay systems and (iv) the description of inspiring examples of plant SynBio projects. Participants at the workshop will also discuss what additional resources might be required to facilitate work with plants in iGEM.

InterLab Study

Saturday
Room 311
5:30 pm - 6:30 pm

The iGEM interlab studies are the largest scientific replication project in all of synthetic biology. They are intended to be both a significant collective scientific project and a fun educational experience. In this workshop, we will discuss the goals and implementation of this year's interlab study, with the aim of figuring out how to make it even better next year. This workshop invites all teams who participated in the interlab study, are interested in participating in the future, or who are interested in issues around scientific replication to come and share your thoughts!

Building with Biology: SynBio Engagement at Science Centers

Saturday
Room 312
5:30 pm - 6:30 pm

Hosted by the Museum of Science, Boston
The NSF-funded "Building with Biology" project has created a suite of hands-on activities and conversations to create conversations between scientists and the public about synthetic biology and its implications at 200 science museums around the US. Come try out some of these activities and find out how to get involved!

Poster Sessions

Saturday & Sunday
Hubs
6:30 pm - 8:00 pm

The poster sessions are an opportunity for teams to share their posters with the other Giant Jamboree attendees. Judges may also take this time to visit team posters and ask questions related to the poster, presentation, or overall project. Please note that the majority of poster judging occurs outside of the poster sessions.

The poster sessions take place in the Hall C and the Hall D, and include light refreshments.

See page 49 for poster details.

Sunday

Career Fair

Sunday
Room 208
1:00 pm - 4:00 pm

As part of the iGEM 2015 Giant Jamboree weekend, iGEM is hosting a career fair event on Sunday, September 27 to foster relationships within the synthetic biology community. This unique opportunity offers top employers a chance to meet with iGEM participants and discuss career opportunities. This event features a career fair format with the opportunity for employers to address attendees at the start of the event with their company's message and needs.

Be sure to bring plenty of copies of your CV.

Exhibitors:
- Caribou Biosciences
- FBI
- Ginkgo Bioworks
- Monsanto
- Synberc
- Twist Biosciences
- Zymergen

New Track: Software

Sunday
Room 302
1:00 pm - 2:00 pm

Building better tools: a retrospective and way forward for iGEM software. Whether it is through the dedicated software track, or from wetlab teams building their own tools, each year the Jamboree sees new software tools being developed. The iGEM Software Committee has been discussing major reforms to the way that software tools are developed, hosted and iterated upon within, and beyond, iGEM.

We are also considering ways to get "traditional software developers" (non-biologists) to join the competition in future years. We invite all interested parties to join an open discussion to review iGEM software policy, and to enhance our ability to build better tools for our field.

New Track: High School

Sunday
Room 304
1:00 pm - 2:00 pm

This workshop is for High School team instructors and advisors who want to enrich their students' experience. Topics covered will include: judging, how to incorporate iGEM into the curriculum and tips on how to grow a successful program. The workshop will end with a question and answer session.

New Track: Measurement

Sunday
Room 306
1:00 pm - 2:00 pm

This workshop aims to discuss the goals and implementation of the iGEM Measurement Track. Great measurement gives us a clear window into the systems we are engineering, while poor measurements lead to spurious results, lack of reproducibility and an inability to build on past work. Ultimately, if we are to know whether our genetic parts are performing as we would expect, if our protocols are delivering as they should, and our equipment isn't malfunctioning, we need methods of clear, quantitative, universal measurements of all of the relevant output of our methods and biological systems. In short: how do you know if you've built what you hope you've built?

This workshop is a chance for iGEMers passionate about these problems and opportunities to get together and share their experiences, solutions, problems and thoughts for the future. How can we drive the measurement of synthetic biology forward, both at iGEM and in the field as a whole? Come and share your thoughts.

New Track: Community Labs

Sunday
Room 309
1:00 pm - 2:00 pm

The iGEM Community Labs Track supports projects focused on democratizing the use and practice of synthetic biology. If your project helps new practitioners use synthetic biology tools for traditional ends (education, research, business) or is a new synthetic biology product or tool for users beyond academia and industry, your team should consider attending. During our workshop we'll discuss what was successful this year and continue building a framework to encourage future teams.

New Track: Art and Design

Sunday
Room 311
1:00 pm - 2:00 pm

Join the Art & Design committee in a workshop to discuss the latest developments in bioart and design. We'll discuss how this year's track went, and pinpoint areas for improvement, areas for further development, and areas that succeeded. We'll also save time to review the Applied Design Prize. One lucky participant will win a numbered edition of the CUT/PASTE/GROW bioart catalogue.

New Track: Hardware

Sunday
Room 312
1:00 pm - 2:00 pm

We will overview the purpose and logistics of the track. Each Hardware Track committee member will bring a demo of some kind to share at the workshop. Finally, we will hold a panel discussion with all committee members and discuss the importance and role of hardware in advancing the field of synthetic biology.

FBI: Safeguarding Science and the Future

Sunday
Auditorium
5:30 pm - 6:30 pm

Hosted by the FBI
Meet with the FBI and participate in a discussion on the shared responsibility to protect the life sciences as a member of law enforcement or the synthetic biology community (whether you're an iGEMer, scientist, biohacker, investor, business person, or all of the above). Find out what it means to be a guardian of science.

Social Events

Blue Man Group

Sunday
74 Warrenton St, Boston, MA 02116
8:00 pm - 10:30 pm

Blue Man Group is an interactive theatrical performance combining art, technology, and music. The performance is at the Charles Playhouse in Boston, and performance attendees should arrive at the Playhouse by 8PM. Tickets will be available for all high school team attendees. **Each high school group should send an instructor or chaperone to the iGEM store desk by 1:00pm on Sunday to pick up tickets for their entire team.**
A set number of tickets will be available on a first-come, first-served basis to all other attendees through the Giant Jamboree.

Any high school tickets which are not picked up by Sunday by 1:00pm will also become available on a first-come, first-served basis.

See Ticket Box Office for more details (page 50).

Instructor Social

Sunday
Ballroom
8:00 pm - 11:00 pm

An instructor social event will take place on Sunday evening in the third floor ballroom of the Hynes Convention Center.
Light refreshments will be served.

Jillian's Boston (18+ only)

Sunday
145 Ipswich St, Boston, MA 02215
8:00 pm - 1:00 am

This event is 18+ only
Jillian's Boston is a 3-story entertainment venue in Boston that has a dance floor, arcade games, pool tables, bowling lanes, and lounge areas. With so many options to choose from, there is something for everyone. Beverage and snack refreshments will be provided, you will need your badge to enter.
A cash bar will also be available for attendees (21+) who wish to order alcoholic beverages. The third floor of Jillian's has bowling lanes, a lounge area, and dance floor, and will be a designated dry floor for attendees who do not wish to be around alcohol.

Please note: the legal drinking age in the United States is 21. Attendees interested in ordering alcoholic beverages will need to bring a passport (international or U.S.) or a driver's license (U.S. only) to be able to order an alcoholic drink. Attendees under the age of 21 cannot order alcoholic drinks, and cannot have another person order for them.

Monday

Awards Ceremony

Monday
Auditorium
8:30 am - 1:45 pm

The closing session will celebrate the team's hard work. After the kickoff message, the six finalists will be announced and they will deliver their presentations. The first round of presentations will be followed by the iGEM from Above photograph and after the second block of presentations and the judge's final deliberation, the awards will be announced.

Workshop List

Not sure which workshops to check out? Here are all the Giant Jamboree workshops grouped by topic. For workshop descriptions, see page 31.

"After iGEM" Workshops

You have spent the past several months working with your team on your iGEM project. Now what? Being an iGEMer does not end after the Jamboree. Check out these workshops featuring topics that will help you in life after your first Jamboree.

- **Communicating your Project**
  Saturday 1:00 - 2:00PM – Room 306
- **Startup Showcase**
  Friday 6:00 - 7:00PM – Room 311
- **Networking Bingo**
  Friday 6:00 - 7:00PM – Room 208
- **AlumniGEM Mentorship**
  Friday 1:00 - 2:00PM – Room 208
- **Career Fair**
  Sunday 1:00 - 4:00PM – Room 208

Technical Workshops

Can't get enough science? Come learn about a techique you're interested in, or share your experience in a topic you're familiar with!

- **CRISPR Workshop**
  Friday 6:00 - 7:00PM – Room 302
- **Mammalian SynBio**
  Friday 1:00 - 2:00PM – Room 309
- **Assembly in iGEM**
  Friday 1:00 - 2:00PM – Room 311
- **Plant Synthetic Biology**
  Saturday 5:30 - 6:30PM – Room 310
- **InterLab Study**
  Saturday 5:30 - 6:30PM – Room 311

Community Workshops

The iGEM community represents a wide range of groups and interests. Here are some workshops organized for the general iGEM community.

- **Conflict Resolution**
  Friday 1:00 - 2:00PM – Room 312
- **Women in Science**
  Saturday 1:00 - 2:00PM – Room 311
- **Brainstorming Room: Gender Diversity in iGEM**
  Friday 6:00 - 7:00PM – Room 209
- **Hall of Fame**
  Friday – Sunday (all-day) Room 207
- **College and High School Meet and Greet**
  Friday 1:00 - 2:00PM – Room 310
- **Latin America workshop**
  Saturday 5:30 - 6:30PM – Room 304
- **Human Practices Showcase**
  Saturday 5:30 - 6:30PM – Room 309

New Track Workshops

Did you participate in a New Track in iGEM 2015? Interested in the status of the track for 2016? The New Track workshops are open to everyone.

- **Art and Design**
  Sunday 1:00 - 2:00PM – Room 311
- **Community Labs**
  Sunday 1:00 - 2:00PM – Room 309
- **Hardware**
  Sunday 1:00 - 2:00PM – Room 312
- **High School**
  Sunday 1:00 - 2:00PM – Room 304
- **Measurement**
  Sunday 1:00 - 2:00PM – Room 306
- **Software**
  Sunday 1:00 - 2:00PM – Room 302

Sponsor Workshops

- **SynBio at Science Museums (Synberc)**
  Friday 1:00 - 2:00PM – Room 302

- **Taking SynBio Visions to the Next Level: Part I (Synenergene)**
  Friday 1:00 - 2:00PM – Room 304

- **Taking SynBio Visions to the Next Level: Part II (Synenergene)**
  Friday 6:00 - 7:00PM – Room 304

- **Design and Run Experiments in Automated Labs (Autodesk)**
  Friday 6:00 - 7:00PM – Room 312

- **A SynBio Approach to Novel Molecular Bio (Agilent)**
  Saturday 1:00 - 2:00PM – Room 312

- **Modeling Biology with SimBiology (Mathworks)**
  Saturday 1:00 - 2:00PM – Room 304

- **Paving the Way to Graduate School (Synberc)**
  Saturday 1:00 - 2:00PM – Room 302

- **Building with Biology: SynBio Engagement at Science Centers (Museum of Science)**
  Saturday 5:30 - 6:30PM – Room 312

- **Multi-Omics Solutions for SynBio Workflows (Agilent)**
  Saturday 5:30 - 6:30PM – Room 306

- **Synthetic Dance-ology (Synberc)**
  Saturday 5:30 - 6:30PM – Room 302

- **Safeguarding Science and the Future (FBI)**
  Sunday 5:30 - 6:30PM – Auditorium

HANDBOOK

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Accessibility

The Hynes Convention Center is fully wheelchair accessible. A limited number of wheelchairs are available free-of-charge through the First Aid Station on the first floor (see map), and there are elevators on both ends of the building near the escalators. Please contact iGEM Headquarters for assistance with other accessibility requests, or locate a staff member in a blue shirt for assistance.

Anti-harassment Policy

iGEM Foundation prohibits harassment, including sexual harassment, of any kind, and will take appropriate and immediate action in response to complaints or knowledge of violations of this policy. For purposes of this policy, harassment is any verbal or physical conduct designed to threaten, intimidate or coerce another individual. Harassment can be verbal or nonverbal, and includes offensive comments, distribution, display or discussion of offensive material. To report an incident, please visit the iGEM Headquarters desk outside of room 208 and room 308.

Awards Ceremony

Monday
Auditorium
8:30 am - 1:45 pm

The closing session will celebrate the teams' hard work. After the kickoff message, the six finalists will be announced and they will deliver their presentations. The first round of presentations will be followed by the iGEM from Above photograph and after the second block of presentations and the judge's final deliberation, the awards will be announced.

Awards Ceremony Representative

The number of Jamboree attendees increases every year, and the balcony seats on the third floor are open to attendees this year. To assist with award presentations, each team should choose two team members as Award Representatives.

Award Representatives have a designated seating area on the main floor and are the only team representatives allowed to retrieve award trophies on stage.

Each team will be provided with **two colored wristbands** at registration, and the Awards Representatives from each team should wear their wristbands on Monday.

Badges

You will receive your name badge as part of your registration materials, as long as you have submitted your general release form. Please wear your badge at all times during the Jamboree and make sure it is clearly visible. Badges will be necessary for entrance into presentation rooms, for access to refreshments, and for the iGEM social event. If you do not have a badge, you must register in order to obtain one.

Contact Information

If you need to get in touch with anyone at iGEM Headquarters (HQ) for an urgent matter, you may contact the following people:

Meagan Lizarazo + 1 - 617 - 949 - 6421
Kitwa Ng + 1 - 646 - 250 - 1012

If there is an emergency (medical emergency, fire, police, etc.) please contact the Boston Police from a cell phone or pay phone by dialing:

911

There will also be a nurse on staff for the entire event. If needed, ask at the registration desk or talk to a volunteer in a blue shirt.

Electrical Power

Power outlets are available in multiple locations within the Hynes Convention Center to allow you to charge your devices. Every presentation room has a power strip with multiple sockets in the back of the presentation room, as well as outlets at various locations along the walls. There is also a charging station in the middle hallway between Hall C and Hall D.

Please note: USA power outlets supply electricity between 110 and 120 volts. This is compatible with most modern devices, such as laptops and cellphones, but we recommend you confirm the acceptable range for your device before plugging it in. If you need an adapter, these are available for purchase at the Walgreens convenience store at 841 Boylston Street, across the street from the Hynes Convention Center.

Event App

Be sure to download the Giant Jamboree event app! It includes all the information found in the program book, such as schedules, maps, and presentation descriptions. The app allows users to create a customized schedule and share photos. You can also link it to your Twitter account.

iOS and Android users:

- Download the Guidebook app from iTunes or the Play Store
- Type “Giant Jamboree” in the search box
- Click on “Get this Guide”
- The guide will download on your phone and can be used offline

Tablet and other devices:

- Go to guidebook.com/browse/ on your browser
- Type “Giant Jamboree” in the search box
- Click on “Get this Guide”
- The guide will download on your device and can be used offline

Exhibition Gallery

Make sure to stop by the exhibition gallery in Zone 9 located in Hall D where the Art and Design, Hardware, and Software teams will be showcasing their work! The exhibition gallery will be open all day Friday through Sunday. Teams should set up their exhibits on Thursday by 9:00 pm and remove them by Monday afternoon at 1:00 pm.

Facet Boards

Teams can express their artistic sides through the iGEM facet boards! Each facet board represents a component of iGEM, and teams are encouraged to add their team name, project name, or other signature to the board. Boards are scattered throughout Hall C and Hall D, and come equipped with special markers for teams to use. Please return the markers to the holder at each facet board so that other teams can use them after you.

Follow us on Twitter!

We’ll be tweeting news, updates, and answering questions as well:

@igem
#iGEM2015
#GiantJamboree

General Release Form

The iGEM 2015 Giant Jamboree will be a multimedia event. We will be uploading photos and videos from the entire event so others can get an idea of what iGEM and the Jamboree is like. In order to comply with the law, all participants attending the Giant Jamboree must agree to the terms of the general release form on the registration website.

Note: There will also be blank copies available at registration if you did not agree online prior to the event or if you are registering on site. If you have any questions or need further clarification, feel free to ask an iGEM staff member.

Guestbook

Sign the Guestbook located between Rooms 207 - 208!

Hall of Fame

Open all day Friday to Sunday
Room 207

Come walk through the history of iGEM in our first ever Hall of Fame exhibit! Learn about the history of the competition and see the previous projects that have won Grand Prize. Highlights will also include other milestones, including specific BioBricks, as well as the start-ups that spun out of iGEM projects. You'll also have a chance to insert yourself in iGEM history through an interactive wall where attendees can sign their names!

Hubs

Hall C and Hall D are the Hubs of the Giant Jamboree. Hubs are the main activity area in the Hynes Convention Center and will have the following:

- Team posters
- Food stations
- Seating
- Facet boards
- Art & Design gallery
- Hardware exhibition
- Software showcase
- Exhibitor booths

iGEM HQ Table & Information Desk

Want to know which room a presentation will be in? Have questions about the special events?

If you have a question or need help at any point during the Jamboree, you can visit the HQ Information Desks located outside of room 208 on the second floor and outside of room 308 on the third floor.

iGEMers' Prize

Vote for your favorite iGEM team! This year we are continuing the tradition of the iGEMers' Prize. One ballot will be provided to each team. Completed ballots can be dropped off at the HQ Desks on the 2nd and 3rd Floor Hallways. Be on the lookout for your prize ballot and be sure to vote by Sunday night at 8:00pm, at the end of the Poster Session.
Questions? Ask a volunteer.

Internet

Wireless internet is provided by the Hynes Convention Center. To join the Hynes Wireless Network

- Go to "settings" on your mobile device
- Select the Wi-Fi option
- Click "BCEC Wireless Network" or "Hynes Wireless Network"

Meals and Snacks

Lunch is provided on Friday, Saturday, and Sunday. There are two beverage breaks per presentation day, one in the morning and one in the afternoon. Light refreshments of snacks and beverages are provided in the poster sessions on Saturday and Sunday. Refreshments are also being provided at the social event at Jillian's Boston on Sunday evening, and between events on Monday. Snacks, such as granola bars, sandwiches, and cookies, are available for purchase at two kiosks within the Hynes Convention Center. The snack kiosks are open from 9:00AM to 12:00PM and 2:30PM to 5:30PM on Friday, Saturday, and Sunday. Special meals will be provided in a designated location.
Attendees can pick up their lunch at one of the three food stations in their designated Hall, as indicated on your lunch ticket.

Medals and Awards

Medals and awards will be presented at the awards ceremony on Monday, September 28. Each team that wins an award will receive one trophy for the team as well as award certificates for each team member. These award certificates are separate from the participation certificates that all teams receive. Awards and medals are awarded at the judges' discretion at the Giant Jamboree. Medals, award certificates, and award boxes to safely transport your crystal trophies will be available for pickup after the Awards Ceremony at the Awards Table next to Registration on the 2nd Floor Boylston Hallway.
Award certificates will be mailed to teams after the Giant Jamboree.

Participation Certificates

Every team member listed on the official team roster will receive a participation certificate. To collect your participation certificates, please send ONE team representative to the Awards Table in the Registration area near Room 200 after the Awards Ceremony on Monday.

Posters

Each team is required to present a poster at the Giant Jamboree to judges and Jamboree attendees. Poster locations have been randomly assigned between the poster areas. Please see the poster information pages in the program booklet for your team's specific poster location. The poster must be no larger than 1.219m x 1.219m (4ft x 4ft). Each team may only put up ONE poster. All teams should set up their posters on Thursday evening by 9:00 pm.
All teams must remove their posters by Monday afternoon at 1:00 pm. Any remaining posters will not be saved. Poster judges will be evaluating throughout the Jamboree on Friday, Saturday, and Sunday. There are poster sessions on Saturday and Sunday.

Practice Sessions

Teams will be allowed to practice on Thursday night September 24 at the Hynes Convention Center, beginning at 2:00pm. You can practice your presentation, and get to know fellow iGEM members. There are a limited number of rooms available, so please sign up online to reserve a room and time slot. The presentation rooms are 201, 202, 203, 204, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313. Practice sessions will run until 9:00 pm. We cannot match the practice room with your actual presentation room. Remember, other teams will be practicing as well, so be sure to leave your practice room on time! Please leave all presentation rooms in the condition that you found them. Note: There will NOT be technical staff on hand to help with audio/visual equipment. Be sure to bring any equipment, such as laptops and adaptors, with you.

Presentations

At the Giant Jamboree, there will be seven presentation rooms throughout the Hynes Convention Center. Your team's scheduled presentation time slot, session, and room have all been randomly assigned. Please see the program booklet for information on when and where your team will be presenting. Presentations will take place on Friday, Saturday, and Sunday. The schedule for presentations is divided into sessions based on track. If you are attending a presentation, please be courteous, stay for the whole session, and only leave the room during the scheduled breaks. Each team has 20 minutes of presentation time, 5 minutes for questions and answers, and 5 minutes to switch with the next presenters. Note: Please be sure to bring the necessary equipment for your presentation, such as your laptop, cables/adaptors, and power supply, as iGEM will not provide these.

Quiet Room

Room 204 has been designated as the quiet room during the iGEM 2015 Giant Jamboree. The quiet room has chairs and tables so attendees may work quietly or simply take a break from all the Giant Jamboree excitement. Please be respectful of others and keep conversation and other sounds to a minimum when you are in this room.

Registration

Thursday 1:30 pm - 9:00 pm
Open Friday through Sunday
Boylston Hallway, 2nd Floor

Check-in at the Hynes Convention Center starts at 1:30 pm and ends at 9:00 pm on Thursday and will remain open throughout the weekend. Registration will be located on the 2nd Floor, see map for details. At Registration, each attendee will pick up a registration booklet, name badge, and other important and useful information. Keep in mind that registration check-in is on an individual basis, instead of by team as in previous years. Check in at Registration by the last name on your registration record.

Social Events

After a full weekend of presentations and workshops, there are social events on Sunday evening so attendees can relax!

Instructor Social

Sunday
Hynes Convention Center Ballroom
8:00 pm - 11:00 pm

An instructor social event will take place on Sunday evening in the third floor ballroom of the Hynes Convention Center.
Light refreshments will be served.

Blue Man Group

Sunday
74 Warrenton St, Boston, MA 02116
8:00 pm - 10:30 pm

Blue Man Group is an interactive theatrical performance combining art, technology, and music. The performance is at the Charles Playhouse in Boston, and performance attendees should arrive at the Playhouse by 8PM. Tickets will be available for all high school team attendees. **Each high school group should send an instructor or chaperone to the iGEM store desk by 1:00pm on Sunday to pick up tickets for their entire team.**
A set number of tickets will be available on a first-come, first-served basis to all other attendees through the Giant Jamboree.

Any high school tickets which are not picked up by Sunday by 1:00pm will also become available on a first-come, first-served basis.

See Ticket Box Office for more details (page 50).

Jillian's Boston (18+ only)

Sunday
145 Ipswich St, Boston, MA 02215
8:00 pm - 1:00 am

This event is 18+
Jillian's Boston is a 3-story entertainment venue in Boston that has a dance floor, arcade games, pool tables, bowling lanes, and lounge areas. With so many options to choose from, there is something for everyone. Beverage and snack refreshments will be provided, you will need your badge to enter.
A cash bar will also be available for attendees (21+) who wish to order alcoholic beverages. The third floor of Jillian's has bowling lanes, a lounge area, and dance floor, and will be a designated dry floor for attendees who do not wish to be around alcohol.

Please note: the legal drinking age in the United States is 21. Attendees interested in ordering alcoholic beverages will need to bring a passport (international or U.S.) or a driver's license (U.S. only) to be able to order an alcoholic drink. Attendees under the age of 21 cannot order alcoholic drinks, and cannot have another person order for them.

Store

Want to add an iGEM sweatshirt to your wardrobe? Stop by the iGEM store next to the registration area on the second floor! The store will be open during Registration hours and is your opportunity to pick up some comfortable and wearable iGEM souvenirs.

Streaming Lounges

Each presentation room has an assigned streaming lounge room. Team presentations are streamed directly into the assigned streaming lounge so attendees have two viewing options: the presentation room, or the nearby streaming room. This also means that attendees can hear presentations even when the presentation room has filled to capacity! The streaming lounge has been set up with tables and chairs.

Streaming Lounges:
Presentation room 302 – streaming lounge 301
Presentation room 304 – streaming lounge 303
Presentation room 306 – streaming lounge 305
Presentation room 309 – streaming lounge 307
Presentation room 310 – streaming lounge 300
Presentation room 311 – streaming lounge 308
Presentation room 312 – streaming lounge 313

Team presentations are being recorded, and will be available online after the Giant Jamboree.

Team Banners

If your team submitted a banner for print and display, you can take it home after the event. Please retrieve your banner at the iGEM HQ table near room 208 after the Awards Ceremony.

Ticket Box Office

This year, we have two separate social events for the teams. For the Blue Man Group event, tickets will be available for all High School track teams, with a limited number of tickets available for Collegiate teams and other attendees. You must pick up a ticket to attend the Blue Man Group show. (Tickets are not required for the Jillian's social event.)

Tickets can be picked up at the iGEM Store, located next to the Registration desk on the second floor.

High School teams must pick up their tickets by 1:00pm on Sunday. Each High School team should have their instructor or chaperone pick up the tickets for their team.

A limited number of tickets will also be available for the other attendees and can be claimed at any time. These tickets are available on a first-come, first-served basis.
Any tickets not claimed by the High School teams by 1:00pm on Sunday will be released to the rest of attendees. iGEM attendees should check in on Sunday at 1:00pm to see if more tickets are available if they were unable to get a ticket beforehand.

Transportation

The city of Boston and the surrounding suburbs have a public transportation system that is comprised of buses and subways. It is a convenient and inexpensive way to travel around the city. There are one-way fare options and day passes are available.
You can find more information about the MBTA at **www.mbta.com**.
The Giant Jamboree will be held at the Hynes Convention Center, located at the Hynes Convention subway station on the MBTA Green Line. It is accessible via the B, C, and D branches of the Green Line.

Unconference Rooms

This year, rooms 201, 202, and 203 will be available for teams to use for small breakout sessions and meetings. Teams must sign up to use the rooms at the HQ Desk located across from Room 208. Sign-up times are available in 30-minute increments from 9am-12:30pm and 2-5:30pm on Friday, Saturday, and Sunday. Teams can only sign up for two 30-minute slots (1 hour) total. Please note: there is no audio/visual equipment available in these rooms, but there will be tables and chairs in each room.

Volunteers

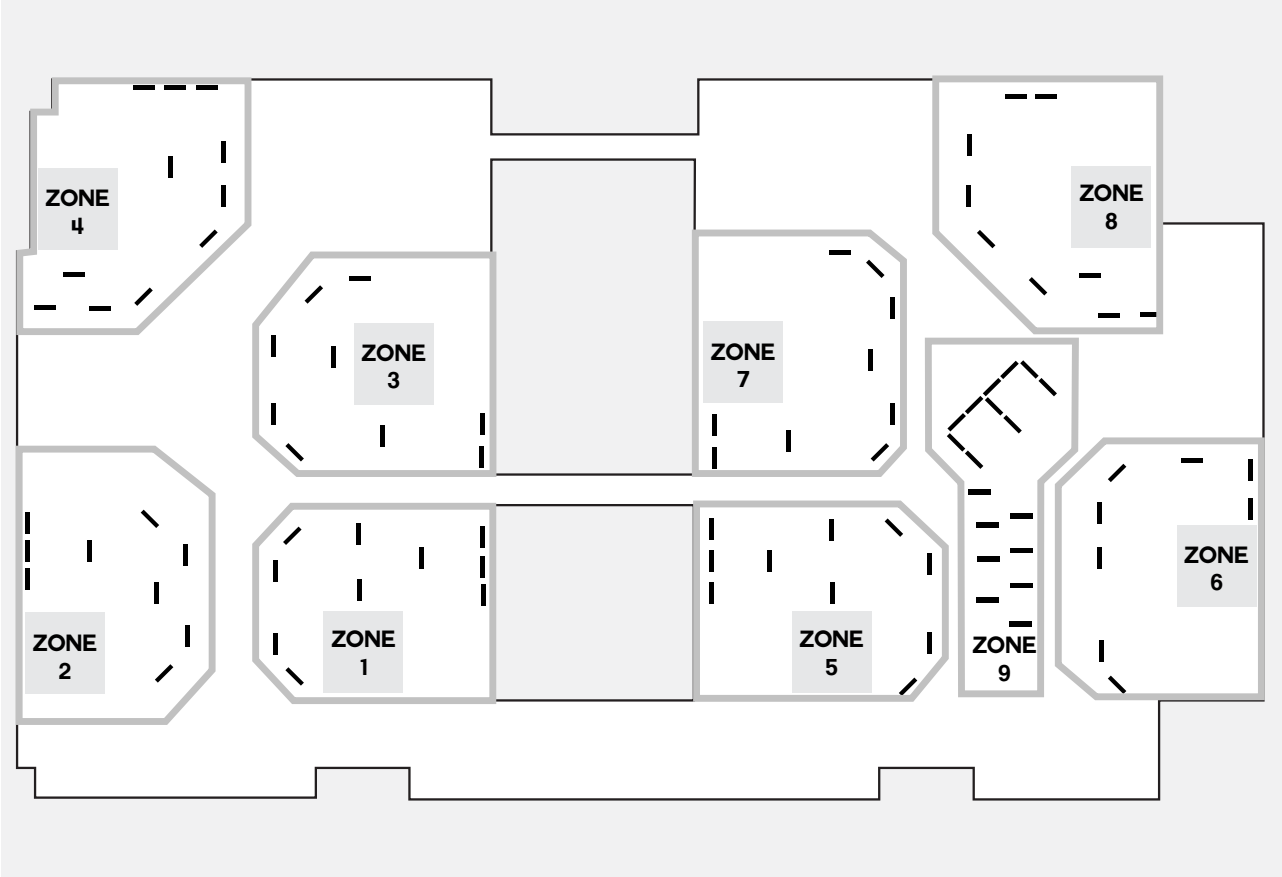
Have questions throughout the event?
Look for help from an iGEM volunteer in the blue sweatshirts.

Water Bottles and Stations

This year, every attendee receives a Giant Jamboree branded reusable water bottle. Be sure to remove the instruction slip and carabiner ring inside, and rinse the bottle before use.

You can refill your water bottle at multiple water stations within the Hynes Convention Center. Each presentation room has a water station in the back of the room, and water stations can also be found outside of the bathrooms, which are near the escalators on both sides of the building. See the map for details.

POSTERS



Hall C

Zone 1
Posters 1 - 34

Zone 2
Posters 35 - 64

Zone 3
Posters 65 - 96

Zone 4
Posters 97 - 134

Hall D

Zone 5
Posters 135 - 168

Zone 6
Posters 169 - 196

Zone 7
Posters 197 - 228

Zone 8
Posters 229 - 259

Zone 9
Art and Design Gallery

Hardware Exhibition

Software Showcase

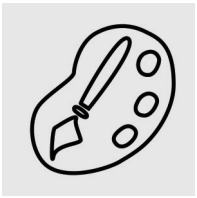
Aachen	172	**Colegio EmelinaU**	171
Aalto-Helsinki	200	**Columbia NYC**	7
AHUT China	167	**Concordia**	23
Aix-Marseille	77	**Consort Alberta**	66
Amoy	161	**Cooper Union**	141
Amsterdam	216	**Cork Ireland**	160
ANU-Canberra	1	**Cornell**	202
ATOMS-Turkiye	100	**CSU Fort Collins**	226
AUC TURKEY	113	**CU Boulder**	15
Austin UTexas	32	**Czech Republic**	92
BABS UNSW Australia	16	**Dalhousie Halifax NS**	99
Berlin	90	**Danzi Kesh 8**	41
BGU Israel	74	**DTU-Denmark**	186
Bielefeld-CeBiTec	111	**Duke**	251
BIOSINT Mexico	212	**Dundee**	5
Birkbeck	191	**Edinburgh**	18
BIT	64	**Elan Vital Korea**	188
BIT-China	235	**EPF Lausanne**	203
BNU-CHINA	40	**ETH Zurich**	222
Bordeaux	246	**Evry**	223
BostonU	14	**Exeter**	243
Brasil-USP	129	**FAFU-CHINA**	38
British Columbia	44	**FAU Erlangen**	49
BroadRun-NorthernVA	65	**Freiburg**	193
Cairo Egypt	84	**Fudan**	8
Cambridge-JIC	140	**Gaston Day School**	116
Carnegie Mellon	122	**GenetiX Tec CCM**	37
CAU China	245	**Genspace**	4
CCA SanDiego	79	**Georgia State**	30
Central Calgary	85	**GeorgiaTech**	147
CGU Taiwan	187	**Gifu**	255
Chalmers-Gothenburg	108	**Glasgow**	43
CHINA CD UESTC	35	**Goettingen**	120
China Tongji	72	**Groningen**	135
CityU HK	162	**H4Z-Hangzhou**	121

HAFS-Korea	156	**Macquarie Australia**	155
Hamburg	206	**Manchester-Graz**	153
Hamilton McMaster	36	**Marburg**	240
Hangzhou-H14Z	205	**METU HS Ankara**	80
Harvard BioDesign	75	**METU Turkey**	164
Heidelberg	225	**Michigan**	237
HFUT-China	175	**Michigan Software**	174
HKUST-Rice	150	**Mingdao**	78
HokkaidoU Japan	209	**Minnesota**	13
Hong Kong HKU	12	**Missouri Columbia**	238
Hong Kong-CUHK	233	**Missouri Rolla**	82
HSNU-TAIPEI	105	**MIT**	136
HUST-China	11	**Nagahama**	68
HZAU-China	182	**NAIT Edmonton**	254
IISER Pune	234	**Nanjing NFLS**	227
IIT Delhi	117	**Nanjing-China**	51
IIT Kharagpur	103	**Nankai**	60
IIT Madras	124	**NCTU Formosa**	114
IONIS Paris	218	**NEAU-China**	207
ITB INDONESIA	183	**NEFU China**	19
Jilin China	102	**NJAU China**	42
KAIT Japan	89	**NJU-China**	154
Kent	134	**Northeastern Boston**	47
Korea U Seoul	173	**NRP-UEA-Norwich**	231
KU Leuven	252	**NTNU Trondheim**	128
Lambert GA	208	**NTU-LIHPAO-Taiwan**	56
LASATX	220	**NTU-Singapore**	148
LaVerne-Leos	73	**NU Kazakhstan**	10
Leicester	104	**NUDT CHINA**	26
Lethbridge	98	**NYMU-Taipei**	22
Lethbridge HS	31	**NYU Shanghai**	210
Liceo Eugenio Hostos	249	**NYU-AD**	132
Linkoping Sweden	52	**OLS Canmore AB CA**	95
London Biohackspace	127	**OUC-China**	71
LZU-China	199	**Oxford**	229

PacificU-Oregon	242	**SVCE Chennai**	190
Paris Bettencourt	192	**Sydney Australia**	76
Paris Saclay	221	**SYSU CHINA**	110
Pasteur Paris	214	**SYSU-Software**	178
Peking	97	**SZMS 15 Shenzhen**	248
Penn	69	**SZU China**	257
Pitt	123	**TAS Taipei**	29
Pretoria UP	253	**TCU Taiwan**	217
Purdue	139	**Tec Guadalajara**	118
Queens Canada	250	**Tec-Chihuahua**	137
Reading	215	**Tec-Monterrey**	213
RHIT	6	**TecCEM**	107
Rock Ridge Virginia	93	**TecCEM HS**	196
San Andres	195	**Technion HS Israel**	57
Santa Clara	130	**Technion Israel**	185
SCU China	131	**Tianjin**	33
SCUT	106	**TJU**	54
Scut-Champion-Park	170	**Tokyo Tech**	67
SCUT-China	138	**Tokyo-NoKoGen**	149
SDA-Encinitas	228	**Toronto**	177
SDU-Denmark	241	**Toulouse**	201
SF Bay Area DIYBio	256	**TP CC-SanDiego**	101
Shenzhen SFLS	126	**TrinityCollegeDublin**	219
Sherbrooke	143	**Tsinghua**	146
Shiyan SY China	230	**Tsinghua-A**	46
SJTU-BioX-Shanghai	184	**TU Darmstadt**	145
SJTU-Software	179	**TU Delft**	142
SKLBC-China	27	**TU Dresden**	39
SKLBC-DGSYZX	152	**TU Eindhoven**	28
Slovenia HS	258	**Tuebingen**	53
SPSingapore	244	**Tufts**	168
Stanford-Brown	165	**UAI-Chile**	239
Stockholm	83	**UAM Poznan**	17
Stony Brook	34	**UB Indonesia**	25
SVA-NYC	211	**UC Davis**	48

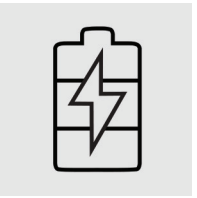
UC San Diego	87
UChicago	86
UChile-OpenBio	151
UCL	91
UCLA	224
UCSC	125
UCSF	189
UESTC Software	180
UFMG Brazil	24
UFSCar-Brasil	158
UGA-Georgia	112
UI Indonesia	159
UiOslo Norway	247
UIUC Illinois	197
UMaryland	59
UMass-Dartmouth	109
UMBC-Maryland	169
UNA Honduras	194
UNAM-CU	181
UNC-Chapel Hill	50
Uniandes Colombia	21
UNIK Copenhagen	62
UNITN-Trento	58
uOttawa	88
Uppsala	63
USTC	144
USTC-Software	176
UT-Tokyo	163
Utah State	232
Valencia UPV	236
Vanderbilt	157
Vilnius-Lithuania	133
Virginia	115
Warwick	96
Washington	94
WashU StLouis	70
Waterloo	204
Wellesley TheTech	198
Westminster	3
WHU-China	119
WHU-Pharm	81
William and Mary	45
WLC-Milwaukee	166
WLSA Shanghai	55
WPI-Worcester	2
XJTLU-CHINA	20
Yale	61
York	9
ZJU-China	259

ABSTRACTS



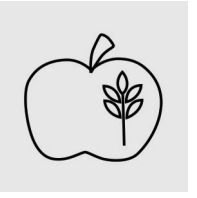
Art and Design

Community Labs



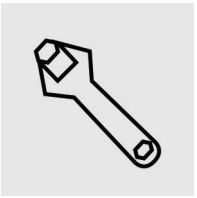
Energy

Environment



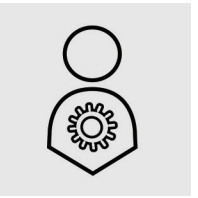
Food and Nutrition

Foundational Advance



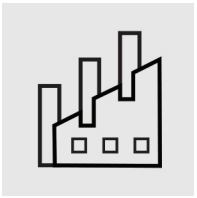
Hardware

Health and Medicine

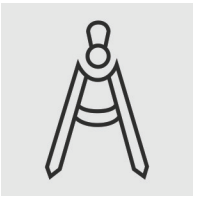


High School

Information Processing



Manufacturing



Measurement

New Application

Software

Aachen

Europe - Germany

Poster:
172 - Zone 6 - Hall D
Presentation:
Friday - Room 312 - 9:30 AM

Upcycling Methanol into an Universal Carbon Source

Nowadays, mankind uses 94 million barrels of oil per day. But as agreed on by various nations, we have to get independent from fossil resources during the next decades. Therefore not only fuels, but many other products including drugs, fine chemicals and plastic will have to be produced from renewable carbon sources. In parallel, we observe shrinking arable land per capita and more frequent droughts. But even by increasing agricultural productivity, plants will not be able to meet our massive demands. Therefore, we are developing an alternative route to sustainably produce complex carbon which significantly reduces the space and water needs. By using new synthetic pathways, we are upcycling a simple, renewable chemical into a universal carbon source.

Aalto-Helsinki

Europe - Finland

Poster:
200 - Zone 7 - Hall D
Presentation:
Saturday - Room 306 - 2:30 PM

Fuel for the Future: E. coli producing renewable propane from cellulose

Climate change is argued to be one of the greatest challenges faced by mankind. Its primary cause is believed to be man-made CO2 emissions from transportation and electricity production. To tackle the issue of transportation emissions, we want to produce sustainable propane in Escherichia coli using cellulosic feedstock. The pathway is a patchwork of 10 different enzymes from different organisms, such as Mycobacterium marinum and Bacillus subtilis. We built a model of the pathway to identify its bottlenecks and concentrate our engineering efforts on them. To elevate our propane from a food crop -based first generation biofuel to the second generation, we are integrating a secretion system for cellulose hydrolysing enzymes. To innovatively enhance our production system, we are bringing the two final enzymes of our pathway into close proximity by fusing them with micelle-forming amphiphilic proteins. This increases theoretical yield, bringing us one step closer to commercially viable biopropane.

AHUT China

Asia - China

Poster:
167 - Zone 5 - Hall D
Presentation:
Saturday - Room 310 - 11:00 AM

Nutrition Commander:A bio-device can control the APeGs of the plant metabolism

Acyl Phenylethanoid Glycosides (APeGs) plays a very important role in various plants that can bring benefits to human beings through their physiological activity. However, in natural plants, APeGs' low production and great difference have led to great disparity of food quality, making it hard to be effectively used. In order to control and ensure the quality of products more effectively, we have used biotechnology to look into physiological metabolic pathways of APeGs, and influences on the products exerted by the regulation and control of different key enzymes. Thus plants whcih contain more stable APeGs can be gained to benifit human beings in a better way.

Aix-Marseille

Europe - France

Poster:
77 - Zone 3 - Hall C
Presentation:
Sunday - Room 312 - 10:00 AM

CHEW FIGHT to eliminate chewing gum pollution.

Nowadays, chewing gum is the second urban pollutant after cigarette butts. To clean chewing gum, specific machines are used but they are heavy and expensive. The time required is long and they use a large quantity of water. Besides economical aspects, chewing gums have an environmental impact. They are dangerous for the wildlife such as birds which thinks that it is bread, eats it and choke. In view of these alarming facts, we have decided to create a new environmentally-friendly way to clean our streets. Our project is to create an E.coli strain that produces enzymes, which can degrade rubber polymers. We will use a combination of three enzymes: a laccase, a lipoxygenase or latex clearing protein (LCP) and a cytochrome C. The laccase known will oxidize the cytochrome C which will be previously light excited. Coupled with this later, the LCP will degrade synthetics polymers.

Amoy

Asia - China

Poster:
161 - Zone 5 - Hall D
Presentation:
Friday - Room 309 - 11:00 AM

Efficient RBS for NADH Production

L-tert-leucine is important in developing chiral pharmaceutically active chemicals.
Many methods have been used in L-tert-leucine synthesis, but products are usually racemic. Scientists developed enzymatic reductive amination to product L-tert-leucine by using leucine dehydrogenase and formate dehydrogenase. Initially, they used isolated enzymes, which can be disadvantageous for that enzymes are always destabilized in the isolation and purification process. What's more, the cofactor-NADH is rather an expensive raw material, which will enhance the cost. So scientists introduced whole-cell bio-catalysts to L-tert-leucine production. Whole-cell biocatalysts could stabilize enzymes and reduce the addition level of co-factor NADH. However, the NADH consumption rate does not equal to its regeneration. The criminal is different strength of enzymes, we regulate the efficiency of RBS to control its strength. With mathematical modeling, we will get the most suitable efficiency of RBS of leucine dehydrogenase to decrease additional NADH.

Amsterdam

Europe - Netherlands

Poster:
216 - Zone 7 - Hall D
Presentation:
Saturday - Room 306 - 3:00 PM

Synthetic Romance - Harnessing the power of Cyanobacteria to construct a sustainable consortia

Researchers are starting to recognize that synthetic ecosystems, consortia of multiple bacterial species, can be used for higher yields, robustness and more diverse purposes. Our goal is to tap into this potential by creating a self-sustaining bio-factory of cyanobacteria - little fellows that need only CO2 and light - and product-producing E. coli, the general workhorse of the synthetic biology world. The cyanobacteria will create sugars from CO2 and sunlight, which it will release and feed to E. coli as a result of our applied synthetic genetic circuits. E. coli will then be engineered to use these sugars to create a product. In our proof-of-concept bio-factory, this product will be fuel.
This platform, however, can be expanded to produce any product E. coli can make - medicine, plastics, commodity chemicals - as long as it is fueled by the cyanobacteria that only needs light and CO2.

ANU-Canberra

Asia - Australia

Poster:
1 - Zone 1 - Hall C
Presentation:
Saturday - Room 310 - 9:30 AM

A PhotoGENEic Approach to Biosynthesis

In the International Year of Light, induction of gene expression using light offers high spatiotemporal resolution and is low cost compared to traditional chemical induction. The Australian National University iGEM team explored the principles of optogenetics, an emerging field in which gene expression can be precisely controlled by light. We developed an application for the CRY2 and CIB1 light-inducible expression system to synthesise NAD in Escherichia coli. NAD is a commercially valuable metabolite, however in large quantities NAD is toxic to E. coli. Our light-inducible expression system enables the accumulation of the NAD precursor, α-iminosuccinic acid in darkness.
Blue-light induction of an irreversible, blue-light activated switch with a split, modular CRY2/CIB1-Cre-recombinase construct enables production of a late-stage biosynthetic enzyme, allowing the rapid production of the toxic metabolite from the accumulated precursor. We have further developed a customisable blue-light source for the activation of our construct under different light conditions.

ATOMS-Turkiye

Europe - Turkey

Poster:
100 - Zone 4 - Hall C
Presentation:
Saturday - Room 309 - 5:00 PM

< Fast & CuR(E)ious >

< Gastric ulcer is a disease that caused by a gram negative bacteria called H. Pylori. As far as we know, ½ of human population is effected with H. Pylori and these people's risk of having ulcer is %80-%85. Furthermore ulcer causes gastric cancer. In our Project, we aimed to build mechanisms to cure both of these diseases, as one is causing each other. We decided to modify E. Coli to cure ulcer by producing Pexiganan(an antimicrobial peptide which is effective on H. Pylori), showing chemotaxis to damaged part of stomach, having a faster flagella for penetration.To cure the cancer, we designed switch system which is based on differences of miRNA concentrations,which are down-regulated or up-regulated in cancer cells leading to the final process of apoptosis. We hope that, our approaches will find new ways about classifying cancer cells and modifying E. Coli to cure ulcer. >

AUC TURKEY

Europe - Turkey

Poster:
113 - Zone 4 - Hall C
Presentation:
Friday - Room 310 - 2:30 PM

Bactocooler 2: The Revenge of Catalase

Heat management and regulation is one of the biggest issues of 21st Century. Especially after the development of the refrigeration technologies, the world has adapted to thermo-regulation systems in real-life application, industry and science. This continuing adaptation has led to the dependence on temperature wise systems and their maintenance. The system we wish design in this occasion hopes to combat the issue of heat regulation that contests scientists and firms alike. ‘Mr. Pyrofrost’ will maintain the temperature of the system at a specific temperature through the functioning of two inversely affecting reactions regulated by the temperature of the system itself. The system stimulates an endothermic reaction pathway in higher temperatures and an exothermic reaction pathway in lower temperatures with one system inhibiting the other during function. The heat conditions of the system will both affect the functioning of ‘Mr. Pyrofrost’ and also be regulated by ‘Mr. Pyrofrost’.

Austin UTexas

North America - United States

Poster:
32 - Zone 1 - Hall C
Presentation:
Friday - Room 310 - 9:30 AM

Evolutionary Stability of Genetic Devices

After an organism is reprogrammed with a genetic device, the device will often mutate, or ‘break’, decreasing the metabolic load on the organism and giving it a competitive advantage. This commonly allows the organism with the broken genetic device to dominate the population, undermining the purpose of the original reprogramming. Our goal is to characterize sequences within genes and plasmids that are more likely to mutate, since our research suggests that certain devices are more easily broken than others. We expanded on this research by transforming four E. coli strains with fluorescent protein plasmids. Breaking times varied noticeably between strains, suggesting that the host’s own genetic material also influenced device stability. Based on our findings, we decided to increase the stability of a few genetic devices, including the pDCAF3 plasmid, which the 2012 UT Austin iGEM team designed to allow E. coli to measure caffeine content through caffeine metabolism.

BABS UNSW Australia

Asia - Australia

Poster:
16 - Zone 1 - Hall C
Presentation:
Friday - Room 309 - 4:00 PM

Endosynbio

Intracellular bacterial symbionts are useful allies for a wide range of eukaryotes. Endosynbio aims to lay the groundwork to recreate this powerful relationship for therapeutic use. Endosymbionts endowed with the ability to enter, survive, and replicate stably within the mammalian cytoplasm could provide hosts with in vivo protein production. This technology would have the potential to treat monogenic disorders - in lieu of genome-level modifications - as well as a broad range of peptide-related conditions. This year, we optimised entry of three bacterial species (E. coli, Synechocystis PCC6803 and Lactococcus lactis) into mammalian cells and assayed them for intrinsic compatibility to the cytosolic environment. In the future, endosymbionts will be used as synthetic organelles, enabling a whole new field of synthetic biology - endosynbiology.

Berlin

Europe - Germany

Poster:
90 - Zone 3 - Hall C
Presentation:
Sunday - Room 304 - 2:00 PM

Enzymatic Flagellulose

iGEM Berlin is trying to clear our water of plastics, which pose a threat to our environment. In detail, we are focusing on microplastics present in various everyday products, which find their way into the wastewater treatment plant before ending up in the oceans. Now we are constructing the Enzymatic Flagellulose to degrade microplastics into biodegradable compounds. It consists of a surface made up of cellulose, which acts as a biocompatible carrier, to which bacterial flagella will be immobilized via a cellulose-binding domain. The single flagellum subunits, also known as flagellin, will be interlinked with plastic degrading enzymes. Using flagella as a scaffold for enzymes has two major advantages. Firstly, it enables the creation of a three-dimensional reactive nanostructure that has an increased specific surface with highly catalytic activity. Secondly, flagella may consist of various different active sites, which will enable the combination of multiple enzymatic steps in close proximity.

BGU Israel

Asia - Israel

Poster:
74 - Zone 3 - Hall C
Presentation:
Sunday - Room 310 - 10:00 AM

The Boomerang system engineering logic gate genetic device for detection and treatment of cancer

Despite recent treatment advancements, cancer is still a major cause of mortality worldwide. One of the fundamental problems preventing the development of effective therapy is the difficulty to target cancer cells exclusively. In Boomerang, we're engineering a genetic device based on a simple concept of AND logic gate: the activation of our CRISPR/Cas9-based system is dependent on the existence of two cancer-specific promoters that control the expression of Cas9 and gRNA, and the combination of these two will occur only in cancer cells. CRISPR/Cas9 system allows several applications of Boomerang: 1) disruption of genes essential for cancer survival; and 2) activation of suicide genes, or color proteins for cancer cell detection (e.g., for complete surgical removal). Our system can be potentially designed according to unique characteristics of a patient's tumor, paving the way to personalized medicine.
We hope that our strategy will change the approach to cancer treatments.

Bielefeld-CeBiTec

Europe - Germany

Poster:
111 - Zone 4 - Hall C
Presentation:
Sunday - Room 310 - 12:00 PM

Cell-free Sticks - It works on paper

We developed cell-free biosensors which can be used as paper-based test strips. These offer significant advantages over conventional biosensors regarding biosafety, sensitivity and output signal.
We created two technical approaches built upon self-made E.coli cell extract and our newly established Plasmid Repressor Interaction Assay (PRIA). Both can be immobilized on paper. The fluorescence signal is detected via smartphone. With these novel biosensor designs we tackle the problem of date rape drug intoxications, which is of increasing relevance in our area, by detecting a common ingredient. Another major problem is the contamination of water with heavy metals. Heavy metal sensors designed by previous iGEM teams as well as new biosensors are combined to a modular cell-free test strip for simultaneous detection. All in all, we are providing an extensible biosensor on paper as a valuable tool for water quality analysis for everyone.

BIOSINT Mexico

Latin America - Mexico

Poster:
212 - Zone 7 - Hall D
Presentation:
Sunday - Room 309 - 10:00 AM

No title

No abstract

Birkbeck

Europe - United Kingdom

Poster:
191 - Zone 6 - Hall D
Presentation:
Saturday - Room 302 - 11:00 AM

Medical diagnostic system based on modular bacteriophage lambda chassis

Many diseases remain endemic in the developing world due to a lack of advanced laboratory equipment and trained medics. Although diseases such as multi-drug resistant TB (MDR-TB), leprosy and syphilis primarily pose a threat to those living in the world's poorest countries at present, increasing globalisation is rapidly transforming these diseases into a worldwide problem. This issue can only be addressed by developing an affordable diagnostic method that requires minimal training. Enterobacteria phage lambda is a well-characterised virus of Escherichia coli, which has previously been used in the development of biotechnological tools. We aim to use this bacteriophage as the basis of a modular chassis with a variable host range. To facilitate identification of host cells in patient samples, these bacteriophages will deliver a chromoprotein gene into cells and drive expression, allowing diagnosis of a range of bacterial diseases by the simple observation of different colour changes.

BIT

Asia - China

Poster:
64 - Zone 2 - Hall C
Presentation:
Saturday - Room 304 - 2:00 PM

Disease Alarm [When Matchmaker Comes to Help]

This project is aiming at using synthetic biological engineering bacteria, connected with the aptamers, to make engineering bacteria able to detect the macromolecules, thus providing biological solutions in the field of medical science, biology, chemistry, and so forth. Comparing with current chemical or physical detecting method, biological detecting method has the following advantages. One is that the cost of microorganism is much lower, and it reproduces efficiently. On the other hand, the genetic circuit, which is modified based on the synthetic biology, is able to amplify the micro signals, and improve the accuracy. Most importantly, it's more convenient for users to operate with our hardware. In the future, the project will focus on detecting accuracy, detecting range and detecting type. The detecting method will be applied to POCT and be launched on the market ultimately.

BIT-China

Asia - China

Poster:
235 - Zone 8 - Hall D
Presentation:
Sunday - Room 302 - 9:30 AM

pH-Controller

Precise artificial pH control is a worldwide concern because fluctuation of pH can tremendously influence the cells' performance. So BIT-CHINA designed an intelligent pH-Controller inside the cell. Our pH-Controller contains two sub-systems. One is resistance system, and the other is fine-regulation system. Resistance system can make bacteria survive in an expanded range of pH. Fine-regulation system is used to adjust the environmental pH by synthesis of acid or alkali. Several kinds of recombinase were applied in this sub-system to achieve various regulation effectiveness. The two sub-systems working together allows for lowered artificial pH regulation costs in industrial fermentation, meanwhile the two systems also can regulate the pH of soil, because the hosts with our pH-Controller will maintain high efficiency when the environmental pH is not optimal and they can adjust the environmental pH as we expect. Combined with the projects we did before, our project can achieve more functions.

BNU-CHINA

Asia - China

Poster:
40 - Zone 2 - Hall C
Presentation:
Saturday - Room 304 - 11:00 AM

Synthetic Intelligent Ranger E. coli for Nematodes (SIRENS)

Diverse kinds of chemical pesticides were used in last decades because pests are seriously detrimental to crops. However, these pesticides can pollute the environment and increase the pest resistance substantially.
Such that, environment-friendly biological pest control methods are needed badly.
Our project, which concerns mainly on the crucially pathogenic organism nematode first, intends to build a kind of novel engineering bacteria which contain a switch promoter that controlled by the light intensity. It means that our bacteria will express organics to allure pests at night, and synthesis specific toxin to kill the pests after they devour them during the day. Furthermore, the bacteria will initiate suicide to avoid the damage to environment. After a sophisticated nematode trap system is built, we will continue and expand our systems for other kinds of agricultural pests, aiming at building the bait and the toxin database of various pests.

Bordeaux

Europe - France

Poster:
246 - Zone 8 - Hall D
Presentation:
Friday - Room 306 - 2:30 PM

Cur'd vine

European vineyards are threatened by an oomycete called Plasmopara viticola, which infects and drains the resources of grapevine tissues, mainly through leaves and creates irreparable lesions. The most common preventive treatment is called 'Bouillie Bordelaise' and is composed of copper sulfate but has toxic effects on the surrounding soils. Our team proposes to produce an alternative ecological treatment called Curdlan in two host organisms. This β1,3 glucan stimulates the plant's immune system therefore protecting it from mildew attacks. In Saccharomyces cerevisiae we plan on overexpressing the Curdlan synthase gene (FKS1) to maximize production, while in Escherichia coli we will be inserting three genes: the Curdlan Synthase gene (crdS), and two genes which assist the transportation of nascent polymers in the cell (crdA and crdC). We then plan on optimizing the production and sulfating the Curdlan molecules since it has been shown that this enhances its protective capacities.

BostonU

North America - United States

Poster:
14 - Zone 1 - Hall C
Presentation:
Saturday - Room 312 - 2:30 PM

Developing conditionally dimerizable split protein systems for genetic logic and genome editing applications

The field of synthetic biology seeks to engineer desirable cellular functionalities by developing molecular technologies that enable precise genetic manipulation. A promising solution is to reliably control proteins that naturally execute genetic modifications. Current strategies to regulate activity of such proteins primarily rely on modulating protein expression level through transcriptional control; however, these methods are susceptible to slow response and leaky expression. In contrast, strategies that exploit post-translational regulation of activity, such as conditional dimerization of split protein halves, have been demonstrated to bypass these limitations. Here, we compare the relative efficiency of previously characterized dimerization domains in regulating activities of three important genetic manipulation proteins - integrases and recombination directionality factors for genetic logic applications, and saCas9 for in vivo genome editing applications. We also establish guidelines to rationally identify promising protein split sites. Our characterization of these systems in mammalian cells ultimately paves way for important biomedical applications.

Brasil-USP

Latin America - Brazil

Poster:
129 - Zone 4 - Hall C
Presentation:
Friday - Room 306 - 3:00 PM

RubberBye Degrading rubber to fuel

The accumulation of waste tires and rubber products represents a significant environmental problem worldwide. Current recycling techniques demand high energy consumption, and are completely overwhelmed by the annual amount of rubber waste. In addition, natural rubber degradation may take up to 1000 years. Here we aim to accelerate natural rubber degradation by genetically engineering Escherichia coli expressing two enzymes: RoxA (Rubber oxygenase) and Lcp (Latex clearing protein). For degradation of vulcanized rubber, the project includes a pre-treatment using Acidithiobacillus ferrooxidans, a bacterium that naturally devulcanizes rubber. Both of these processes will be scaled up in bioreactors. The major resulting compound of the designed process is ODTD (12-oxo-4,8-dimethyl-trideca-4,8-diene-1-al), a triisoprene unit that we are working to transform in fuel, a product of high commercial interest. Consequently, besides enabling faster rubber degradation and decreasing final pollutant emission, our project also grants the final product a considerable economic interest.

British Columbia

North America - Canada

Poster:
44 - Zone 2 - Hall C
Presentation:
Saturday - Room 311 - 9:00 AM

Pro-bee-otics: Alleviating Pesticide Impacts on Honeybee Health

Honeybee Colony Collapse Disorder (CCD) is a serious problem, given the ecological and economical importance of honeybees. Experts estimate that honeybees pollinate $14 billion worth of crops per year in United States. Though the mechanisms which CCD occur are many fold and remain uncertain, neonicotinoid pesticides have been implicated. Gilliamella apicola is a bacterium that natively resides in the bee midgut. Our project aims to engineer Gilliamella to metabolize imidacloprid, a common neonicotinoid, into harmless organic compounds using three cytochrome P450 enzymes: CYP6CM1vQ, CYP6G1, and HUMCYPDB1. Though 6-CNA, the breakdown product of imidacloprid, displays significantly lower toxicity, it still induces sublethal effects. As such, we have also incorporated a pre-existing 6-CNA degradation pathway from Pseudomonas putida for complete breakdown of imidacloprid. We believe honeybees that harbour this engineered bacterium in probiotic form will become less susceptible to common field doses of imidacloprid; thus, significantly reducing the risk of CCD.

BroadRun-NorthernVA

North America - United States

Poster:
65 - Zone 3 - Hall C
Presentation:
Friday - Room 304 - 12:00 PM

No title

No abstract

Cairo Egypt

Africa - Egypt

Poster:
84 - Zone 3 - Hall C
Presentation:
Sunday - Room 306 - 3:00 PM

ABC, Azurin & Breast Cancer: Unleashing the suicidal potentials!

Breast cancer is the main cause of cancer related death among women. Conventional anticancer therapies are toxic to normal tissues & have incomplete tumor targeting. E.coli can selectively colonize solid tumors, providing a selective colonization in tumor tissue. Azurin blocks breast cancer cell proliferation and induces apoptosis.
lUX qurom sensing system will be integrated into E.coli K12 expressing Azurin. A standard curve with known concentrations of dead cells and their relative color intensities (Digitally; RGB values) will be settled up to detect dead cells different concentrations. The generated data will be saved as a library in a microprocessor. A device will be fabricated using a color sensor to detect cell's death rate. This will allow a selective expression of Azurin in the tightly packed colonies present within tumors, inducing apoptosis to tumor cells. Then creating a simple, Cheap & harmless device that measure the cell's death rate almost instantaneously.

Cambridge-JIC

Europe - United Kingdom

Poster:
140 - Zone 5 - Hall D
Presentation:
Sunday - Room 312 - 11:30 AM

OpenScope - Open-source, 3D printable fluorescence microscope

Fluorescence microscopy has revolutionised Synthetic Biology, bringing with it high costs. Cheap, adaptable, and compact; OpenScope is a novel alternative. It is a 3D-printable, low-cost digital microscope powered by Raspberry Pi© and Arduino©. The microscope supports bright-field and fluorescence modes with a resolution of four microns. OpenScope is suitable for teaching, use in developing countries and incorporation into laboratory systems. OpenScope is accompanied by a versatile, user-friendly software package. MicroMaps integrates the microscope on a remodeled, motorised translation stage. The software utilises a simple user interface similar to Google Maps©, designed by exploiting background image processing, annotation, and stitching; providing autonomous cell screening.
The project was initially tested with Marchantia. Users will easily be able to create and customise programs for other organisms and screening criteria. OpenScope and MicroMaps are easily reproducible following the open source documentation.

Carnegie Mellon

North America - United States

Poster:
122 - Zone 4 - Hall C
Presentation:
Sunday - Room 310 - 2:30 PM

BEAM, Biosensor Emission Analysis Machine

Biological systems contain diverse receptors that can be coupled to a reporter and a device to measure output. To enable the design and fabrication of DIY biosensors we are creating schematics, a parts list and detailed instructions on how to build a low cost luminometer and fluorimeter. The precision, accuracy, and sensitivity of the instrument will be demonstrated using a set of luciferase and fluorescent protein reporters. An estrogen biosensor was constructed that responds to 17-β-estradiol at concentrations ranging from 1nM to 100uM. The system was then modeled in BioNetGen to inform lab experiments. The luminometer is a simple photodiode detector with the signal being integrated using an Arduino and output data being processed with open source software.
The fluorimeter is an extension that includes an LED light source and emission/excitation filters appropriate for the fluorescent protein to be analyzed. The entire device is encased in a 3D printed shell.

CAU China

Asia - China

Poster:
245 - Zone 8 - Hall D
Presentation:
Friday - Room 309 - 12:00 PM

Herbicide vs Herbicide Resistant Gene

Every year numbers of pesticide is used in agricultural industry.large part of the pesticide is herbicide. However,the weeds have somehow developed to be resistant to the herbicide because of the more and more extensive use of the herbicide. Therefore, people have to raise the amount of herbicide used in agricultural industry year by year, but the increased amount of herbicide have caused a lot of harmful effect such as toxic substance remaining, crop growth being inhibited and so on. In order to solve the problem, a novel use of herbicide has been figured out the mix of herbicide. The mix use of the herbicide has plenty of benefits including decreasing the dose, increasing the efficacy, decreasing the poison residual and expanding the weed control spectrum. In order to adapting the novel use of herbicide, our team created four new genes, all of which have the resistance to two different herbicide.

CCA SanDiego

North America - United States

Poster:
79 - Zone 3 - Hall C
Presentation:
Sunday - Room 309 - 12:00 PM

No title

No abstract

Central Calgary

North America - Canada

Poster:
85 - Zone 3 - Hall C
Presentation:
Saturday - Room 309 - 11:00 AM

Antiangiogenic Tumor Growth Cessation

Our mission is to create a bacterium that through the secretion of an anti-angiogenic protein will starve cancer. This will be done by secreting angiostatin into the tumour microenvironment which will cut off the blood supply to the tumour.
Anti-angiogenetic therapies currently used are achieving modest successes, and we believe that synthetic biology may produce more positive results.

CGU Taiwan

Asia - Taiwan

Poster:
187 - Zone 6 - Hall D
Presentation:
Friday - Room 306 - 11:00 AM

Yes! eYE DO: Engineered Yeast and E. coli for Detecting Oral Cancer

Oral cancer is a common cancer worldwide. One of the major problems of oral cancer is that early malignancy could only be detected by clinical oral examination from health care professionals, and there are no clinical tests at the molecular level. Recently, there are several Proteins and mRNAs reported as promising potential non-invasive biomarkers in saliva for oral cancer. Our team wants to establish simple, objective and quantifiable non-invasive detection system for those biomarkers. Our system includes two aims : Major : engineered yeasts that express a reporter activated by IL-8, which is one of the most statistically significant protein biomarkers in oral cancer saliva samples. Minor : synthetic toehold switch gene regulators as RNA sensors to detect specific mRNA biomarkers. These efforts will provide the groundwork for new molecular diagnoses in oral cancer.

Chalmers-Gothenburg

Europe - Sweden

Poster:
108 - Zone 4 - Hall C
Presentation:
Friday - Room 309 - 10:00 AM

A study in Scarlet

Biologically based manufacturing can produce numerous types of complex products. One of the biggest problems is the robustness of the system. Great progress has been made with industrial production techniques, but contaminations are still a considerable problem the industry faces. Insufficient control of contaminations in bioreactors could compromise entire batches, resulting in high expenses. Team Chalmers Gothenburg will solve the contamination problem once and for all using a novel strategy to detect and combat contaminations in yeast based bioreactors. The solution involves two genetic systems, one signaling and contamination detection system and one repair system for survival after contamination termination. These two systems are made from innovative uses of ESDSA repair, CRISPR technology and MAPK cascades. The two systems also set the foundation for a whole range of new applications, from DNA assembly to laboratory markers. More will be revealed in this study in scarlet.

CHINA CD UESTC

Asia - China

Poster:
35 - Zone 2 - Hall C
Presentation:
Sunday - Room 306 - 4:00 PM

The magical magnetotactic E.coli (MTE) generating electricity

The magical bacterium-magnetotactic bacterium(MTB) with the property of magnetotaxis has attracted many scientists'interest to explore its application value.But most of MTB are anaerobic. The hard culture condition and complex operation in molecular level makes it difficult to be put into use. Our project is to create a magnetotactic E.coli (MTE) through synthetic biology methods.The previous researches have confirmed that the four main operons are essential for the magnetosome formation in other organisms! Firstly,we clone the relevant genes from genome-wide of Ms. gryphiswaldense strain MSR-1.Then we construct two plasmids containing the four operons.
Finally co-transforming them into E.coli lead to magnetotaxis.The magnetotactic E.coli has a variety of applacations, such as targeted therapy,dealing with environmental pollution and so on.We focus on the application of microbial fuel cell(MFC).Fixing the laccase protein on the MTE membrane can make the laccase adhere to cathode stronger. Therefore we can replace the conventional platinum anode with biology catalyst.

China Tongji

Asia - China

Poster:
72 - Zone 3 - Hall C
Presentation:
Saturday - Room 309 - 2:00 PM

C.elegans' fancy world---controlling C.elegans

In our project, we practice the technology of optogenetic on C.elegans and use the light source assembled by ourselves to construct a movement controlling system and bulid an amusement park of C.elegans. We design parts to express channalrhodopsin in specific C.elegans' neurons with the help of special promoters and cre-loxp system. We not only use the traditional channalrhodopsin,chR2, but some novel ones which have never been tested in C.elegans such as Blink. Then we use computer controlling our DIY light source to regulate channelrhodopsin's activity and control the behaviours of C.elegans such as moving forwards or twisting effectively.
We also express GFP,YFP, mcherry in E.coli. By combining the colorful microorgasims and C.elegans, we construct some interesting scenes to form a C.elegans' fancy world. This technology will help in researches on neuron's function and interaction. It may also be used in mechanical controlling system and the theraphy of movement defect.

CityU HK

Asia - Hong Kong

Poster:
162 - Zone 5 - Hall D
Presentation:
Friday - Room 302 - 2:30 PM

‘Breaking Lac’ - a remedy for lactose intolerance

Lactose intolerance is a digestive condition associated with the inability to fully digest lactose (a sugar found in milk products), and affects ~ 5 billion people worldwide. The symptoms include bloating, stomach cramps, diarrhea and nausea. In this project, we propose to use a synthetic biology approach to achieve 2 major aims: (1) design and construct an Escherichia coli probiotic strain (Lac Breaker) to tackle the lactose intolerance problem which involves high expression of the beta-galactosidase enzyme (driven by expression vector A) and its release from the E. coli cell by autolysis (using a lysis gene cassette on vector B); and (2) evaluate different ‘lysis gene cassette’ constructs as an effective means to extract high value-added recombinant proteins in biotechnology. This is an improvement of the iGEM project of the 2008 Caltech team (Curing Lactose Intolerance) with greater emphasis on the design, construction and evaluation of various ‘lysis gene cassettes’.

Colegio EmelinaU

Latin America - Chile

Poster:
171 - Zone 6 - Hall D
Presentation:
Sunday - Room 312 - 3:00 PM

‘UV WRISTBAND PREVENTION IS BETTER THAN CURE’

While scientists strive to find a cure for skin cancer we seek to prevent it. We focus on creating a signal to alert citizens and they can protect themselves from danger of these rays. All this under the approach of synthetic biology, not using plastic silicone or other contaminants. In Chile in the last 5 years there have been 20-25 cases of skin cancer per 100 inhabitants. One of the main factors is Ultraviolet (UV) radiation which causes severe cell damage when a certain amount is exceeded. Our team proposes a system that alerts the intensity of UV radiation.
The project is represented by a wristband that is composed by genetically modified bacteria that detects ultraviolet light and according to intensity/danger, a coloration is generated. This will enable people to protect themselves from UV rays when its intensity is detrimental to cells.

Columbia NYC

North America - United States

Poster:
7 - Zone 1 - Hall C
Presentation:
Friday - Room 306 - 10:00 AM

Engineering a Synthetic Consortia of Gut Hormone Secreting Probiotics

Microbial consortia plays an essential role in nature - being involved in processes ranging from biogeochemical cycling to immune system development. The shared characteristic these consortia is the specialization of individual populations of microbes within the community. Given the specialization and regulatory controls available, a greater range of tasks and durability is made available.
After all, cooperation and division of labor is the driving force behind emergent properties. Here, we present a method to engineer a synthetic consortia of probiotics, namely, Escherichia coli 'Nissle' and Lactobacillus reuteri, to express PYY, Ghrelin, and GLP1 - gut hormones involved in regulating appetite and insulin production.
Such an undertaking involves establishing a secretion system via signal peptides and an intra- and inter- species communication mechanism via AHL-based quorum sensing. It is to be noted that such a system is designed to be versatile with a gut consortia being one of many potential uses.

Concordia

North America - Canada

Poster:
23 - Zone 1 - Hall C
Presentation:
Friday - Room 304 - 3:00 PM

Scaffococcus: Foundational advance in bacterial extracellular enzyme display

Through the introduction of optimized genes from *Clostridium thermocellum*, we engineered a strain of *Lactococcus lactis* to express an extracellular platform, which can bind and harbor a seemingly endless variety of enzymes. By using the protein products known as cohesins and dockerins, we were able to create an organized and customizable array of enzymes on the outer surface of the cell. The cohesins are single elements orderly arranged as part of the scaffold and act as highly-specific bays for the display of the proteins of interest. The dockerins act as adaptors for the enzymes to be displayed, and allow them to anchor themselves onto the cohesin elements.
For each type of cohesin element, there exists a complementary dockerin that binds specifically to it, which makes the scaffold a very powerful tool in the biotechnology landscape.

Consort Alberta

North America - Canada

Poster:
66 - Zone 3 - Hall C
Presentation:
Sunday - Room 304 - 9:30 AM

ECOS - Detecting Crude Oil Contamination One Bead at a Time

Our project, ECOS, is a biological sensor designed to detect aromatic hydrocarbons found in soil. Due to human error, oil leakage is bound to occur, and because agriculture and the oilfield are closely intertwined, contamination is a cause for concern. ECOS, alginate beads containing modified E. coli, detects crude oil in a sample of soil or water. Detection of oil spills is a major issue because if oil contamination goes unchecked, the carcinogens found in oil can damage the crops and health of animals in the area. The current system for oil detection takes weeks before a sample is tested and returned. By this point, the result is invalid. ECOS allows detection of contamination on site and is easy to use. Testing can be done simply and accurately, allowing us to take action quickly and minimize health hazards in communities worldwide.

Cooper Union

North America - United States

Poster:
141 - Zone 5 - Hall D
Presentation:
Sunday - Room 312 - 12:00 PM

Loomino: Your personal DNA synthesizer.

Loomino is an enzyme based DNA synthesizer that combines the de novo synthesis capabilities of the enzyme TdT (terminal deoxynucleotidyl transferase), along with the controllable addition of 3' reversible protective group nucleotides (3' RPG-dNTPs). By programming Loomino to perform sequential addition, decoupling and wash steps with user specified 3' RPG-dNTPs, an ssDNA molecule can be synthesized de novo, to the user's specifications. The synthesized ssDNA can be readily flanked with 3' and 5' ends containing BioBrick compatible sequences, along with universal primer sites, enabling the final formation of a user defined RFC compatible dsDNA product.

Cork Ireland

Europe - Ireland

Poster:
160 - Zone 5 - Hall D
Presentation:
Friday - Room 304 - 10:00 AM

Basehunter: Bacterial based DNA Detection System

Our project is a novel bacterial method of DNA detection. We've developed a customisable, linearised, double stranded plasmid with two sticky overhangs. When the sticky overhangs come into contact with a target sequence, the binding of the DNA sequence to the overhangs circularises the plasmid. The circularised plasmid is then transformed into competent E. coli cells. Bacterial growth of green fluorescent colonies indicates a positive result, confirming presence of complementary DNA target sequence. This system could act as a cheap alternative to digital and real time PCR, as target DNA fragments are amplified in living cells without use of a costly PCR machine. This system could potentially be used as a diagnostic or screening tool for viral and/or bacterial infection such as Human Papilloma Virus, Mycobacterium tuberculosis. By improving sensitivity and specificity this system could also be used for detection of genetic mutations resulting in disease such as cystic fibrosis.

Cornell

North America - United States

Poster:
202 - Zone 7 - Hall D
Presentation:
Saturday - Room 304 - 11:30 AM

fishPHARM: A Genetically Engineered Solution to Bacterial Coldwater Disease in Salmonid Fish

Salmonid fish are among one of the leading agricultural exports worldwide. Unfortunately, thousands of these otherwise viable or edible fish are wasted each year to bacterial coldwater disease (BCWD). BCWD is a potentially lethal bacterial infection that currently lacks an effective industrial solution and is caused by the pathogen *Flavobacterium psychrophilum*. Our fishPHARM system offers a comprehensive treatment for BCWD and is composed of a biologically synthesized peptide integrated into a fish tag drug delivery mechanism to safely administer our treatment to infected fish without environmental harm. Recent research has shown that the entericidin B peptide provides resistance against *F. psychrophilum*, thereby acting as a curative agent for infected fish. In order to determine the most effective BCWD biological treatment, we aim to engineer *E. coli* for the production of over twenty different entericidins and to test their activity against *F. psychrophilum*.

CSU Fort Collins

North America - United States

Poster:
226 - Zone 7 - Hall D
Presentation:
Friday - Room 309 - 2:30 PM

Using frying oil to produce terpenoids in an engineered strain of Escherichia coli

Terpenoids are produced by plants in low concentrations, which can limit commercial usage. Our Escherichia coli has been genetically engineered to produce terpenoids. The strain digests spent frying oil, a carbon source with high-energy molecules that can be broken down via beta oxidation. The rate limiting step of beta-oxidation is Acyl-CoA synthetase (FadD). Increased transcription of FadD will allow our strain to better utilize frying oil waste. Terpenoid production will then be achieved via the methylerythritol phosphate (MEP) pathway which is endogenous to E. coli. By increasing flux through the MEP pathway we will increase product yields. Safety considerations have been incorporated into the project through design of cellular level biocontainment. A kill switch, KillerRed, has been improved from previous years. When KillerRed protein is produced the cell turns red. Upon interaction with green light, the cell produces reactive oxygen species which damage the cell, resulting in cell death.

CU Boulder

North America - United States

Poster:
15 - Zone 1 - Hall C
Presentation:
Friday - Room 310 - 4:30 PM

Biosensing naphthalene using logic gates and cell to cell signaling: A big fracking deal

Fracking is a common method for extracting natural gas and other fossil fuels from the ground, but it requires the use of many hazardous and carcinogenic compounds. In Colorado, ground water contamination from fracking has endangered many communities' safe drinking water. To address this environmental health issue, we developed a biosensor to detect naphthalene, a common reagent in fracking. Naphthalene detection and output signal amplification can be achieved using the Lux promoter and the Bxb1 integrase. Our biosensor uses a naphthalene induced promoter located upstream of the BxB1 integrase. Once expressed, Bxb1 acts on a logic gate to express RFP. A Lux cell-cell signaling system from V. fischeri will enable our system to be more sensitive at low concentrations.
Our biosensor could be housed within a stake-shaped device, containing a pump to obtain ground water and a live culture box kept at homeostatic conditions.

Czech Republic

Europe - Czech Republic

Poster:
92 - Zone 3 - Hall C
Presentation:
Sunday - Room 310 - 9:30 AM

THE IOD BAND

The IOD band is a general diagnostic test enabling early detection and mapping of tumor mobility. Over a billion unique tests are made accessible to field experts outside of synthetic biology with a unique clone-free assembly feature. Tumor mobility is incredibly difficult to diagnose due to the rarity of circulating tumor cells (CTCs) and the complexity of surface marker combinations. The IOD band strives to make it easy.
The central players are processing units called Input Output Diploids or IODs. IODs use antigen recognition and intercellular communication to create a logical network by which even single cells carrying the desired marker profile can be identified in a background of millions. Affirmative CTC localisation triggers a global response manifested by IOD initiated clumping at levels visible to the naked eye. As such, IOD bands do in a test tube what normally requires days to do in the lab.

Dalhousie Halifax NS

North America - Canada

Poster:
99 - Zone 4 - Hall C
Presentation:
Saturday - Room 312 - 9:30 AM

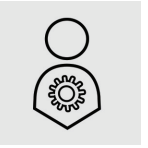
Engineering delphinidin synthesis in Escerichia coli

Flavonoids such as anthocyanins have multiple health benefits and potential to use as natural health products and colorants. The anthocyanin delphinidin is plentiful in ripened blueberries and is responsible for giving them their blue color. Our goal is to engineer a biosynthetic pathway in the model organism Escherichia coli that produces delphinidin. Nine genes are required for the conversion of phenylalanine, which occurs naturally in E. coli, to delphinidin. We have cloned or synthesized all nine plant genes.
Our approach is to assemble the nine plant-derived genes into 3 operons and express them in E. coli. Production of specific enzymes will be verified by immunoblotting and production of intermediate compounds will be monitored by liquid chromatography mass spectrometry. Production of delphinidin in E. coli will provide a robust phenotype that may be exploited to identify factors that can increase production of useful pigments such as delphinidin and also related compounds.

Danzi Kesh 8

Asia - Israel

Poster:
41 - Zone 2 - Hall C
Presentation:
Sunday - Room 304 - 9:00 AM



AlergIn Project

The Project's Goal: Develop an innovative biological method for identifying gluten in food. The focus is on developing a gluten binder protein. Principles - A protein changes conformation in response to ligand binding coupled to a reporter gene. The Gln_H protein is a protein which is able to detect glutamine. The two ends join a half-reporter enzyme called HAD. each half of the enzyme is attached a molecule such as color coded GFP. When the Gln H comes into contact with glutamine the closed ends, when the two halves of HAD enzyme connect the enzyme becomes active, followed by a color reaction which can be seen by the human eye. The source HAD enzymes comes from TERMOTOGA MARITIMA ,This bacteria is found in regions of hot springs and is therefor an extra Thermopile bacteria, and its enzymes are very stable.

DTU-Denmark

Europe - Denmark

Poster:
186 - Zone 6 - Hall D
Presentation:
Saturday - Room 309 - 4:00 PM

The Synthesizer Development of antibiotic libraries through Multiplex Automated Genome Engineering

Non-ribosomal peptides have important anti-bacterial, anti-cancer, and immunosuppressive biological activities. They are synthesized by modular, high molecular weight enzymes that assemble more than 500 different amino acid substrates in an assembly line manner. For this reason, synthetic biologists have tried to engineer these proteins and to switch modules to create analogs and novel natural products, but with little success.
Despite being modular, the interactions between modules have evolved to be highly specific, making synthetic Non-Ribosomal Peptide Synthases (NRPS) a challenge to engineer. Instead of switching modules we introduced a recombination system targeting oligo integration in Bacillus subtilis.
We used the recombineering system to alter the active sites determining substrate specificity, thereby creating variants of antibiotics. Our focus was the tyrocidine antibiotic, which cannot be used intravenously due to its toxicity.
Our goal is to create new analogs through multiplex automated genome engineering to reduce toxicity.

Duke

North America - United States

Poster:
251 - Zone 8 - Hall D
Presentation:
Saturday - Room 310 - 9:00 AM

No title

No abstract

Dundee

Europe - United Kingdom

Poster:
5 - Zone 1 - Hall C
Presentation:
Friday - Room 309 - 9:00 AM

CSI Dundee: The Synthetic Forensic Toolkit

Forensic science is key partner in the modern world of law and civil liberties. The field now requires new trustworthy, quantitative technologies that complement DNA-based evidence in court. Our project will tackle this urgent need by employing synthetic biology approaches to build ‘The Synthetic Forensic Toolkit’. Our discussions with law makers, law enforcers, and forensic scientists inspired three specific areas. First, the ability to pinpoint exactly when a fingerprint was made would have serious implications for delivering justice. We have designed a synthetic enzyme-based system to tackle this. Second, detection of different types of bodily fluids at a crime scene, while leaving DNA uncontaminated, would be of benefit. We therefore designed a cell-free synthetic spray to highlight traces of blood, semen, saliva, and nasal mucus on surfaces. Finally, the quantification of traces of stainless steel on bone. For this, a chromate sensor form a previous iGEM project has been adapted.

Edinburgh

Europe - United Kingdom

Poster:
18 - Zone 1 - Hall C
Presentation:
Saturday - Room 312 - 11:30 AM

Class-A-fiED: Looks Safe On Paper

In 2015 it was estimated that over 80 million adult European citizens had tried an illicit drug, with 20 million of these cases occurring in the UK alone.
Of these drugs, opiates contribute to the most deaths due to acute poisonings, whilst a number of contaminants in so-called 'party drugs' have recently been implicated in a spate of fatalities in Scotland. It is the aim of The University of Edinburgh iGEM team to develop a multiplexed, enzyme-based biosensor to semi-quantitatively measure heroin levels, detect PMA in MDMA and DNP in diet pills. With this biosensor the team hopes to contribute to the efforts in harm reduction related to illicit drug use.
We have engaged with both Drug Consumption Rooms and pill testing services with the goal to have them utilise our biosensor in their attempts to lessen morbidity and mortality.

Elan Vital Korea

Asia - Republic of Korea

Poster:
188 - Zone 6 - Hall D
Presentation:
Saturday - Room 304 - 9:30 AM

Quorum sensing over status quo: developing faster detection of antibiotic-resistant bacteria

Antibiotic-resistant bacteria are a serious problem in the medical community. Detecting antibiotic resistance quickly is crucial to determine the correct treatment for different patients and for setting up quarantines to prevent spreading. We hypothesized that is possible to use quorum sensing (QS) to devise a rapid way for cells to report the existence of antibiotic-resistant bacteria. Here, we developed a reporter cell that expresses GFP in the presence of the QS signaling molecule acyl homoserine lactone (AHL). Our test cells (which act as a simulation of antibiotic-resistant bacteria) express lactonase, which breaks down AHL. In our experimental system, test cells should signify their presence by breaking down AHL and preventing GFP expression in reporter cells. Therefore, our project serves as a proof of principle and we hope that our work will serve as a basis for developing similar, more sophisticated quorum sensing-based detection systems in the future.

EPF Lausanne

Europe - Switzerland

Poster:
203 - Zone 7 - Hall D
Presentation:
Saturday - Room 311 - 4:30 PM

Bio LOGIC: Biologic Orthogonal gRNA-Implemented Circuit

Engineering transcriptional logic gates to program cellular behavior remains an important challenge for synthetic biology. Currently, genetic circuits reproducing digital logic are limited in scalability and robustness by output discrepancies and crosstalk between transcriptional pathways. We propose to address these issues using RNA-guided dCas9 fused to a transcription activation domain as a programmable transcription factor. Fusion dCas9 targeted upstream of the transcription starting site (TSS) recruits RNA polymerase.
Yet, dCas9 may also sterically hinder transcription initiation if bound too close to the TSS. The guide RNA acts as a 'biological wire': it determines dCas9's binding site and enables specific regulation of homogenous synthetic promoters. Exploiting these properties we aim to build biocompatible transistor-like elements whose assembly may allow for the creation of chainable and parallelizable bio-logic gates. Ultimately, we hope to create a toolkit facilitating the design and implementation of bio-logic circuits thereby enabling more complex decision-making in cells.

ETH Zurich

Europe - Switzerland

Poster:
222 - Zone 7 - Hall D
Presentation:
Sunday - Room 312 - 4:00 PM

MicroBeacon: A Microbial Beacon for Cancer Detection

Circulating Tumor Cells (CTCs) are indicators of the initial stages of metastasis. However, most state-of-the-art detection methods target only a few cancer-type-specific markers. We developed a bacterial signal processing system for sensitive and selective single-cell detection of CTCs in blood samples. We start by selectively inducing apoptosis in CTCs using sTRAIL before adding our engineered Escherichia coli, called MicroBeacons. Through the expression of the Annexin V protein on their outer membrane, MicroBeacons bind to the apoptotic CTCs. Upon binding, MicroBeacons detect the increased lactate production of the CTCs via a lactate sensor and trigger quorum sensing between each other, which results in expression of fluorescent protein. Overall, the MicroBeacons selectively generate stronger fluorescence on the surface of sTRAIL-sensitive and lactate-secreting tumor cells compared to healthy cells.
We anticipate our device to be a reliable, fast, and cheap method for the detection of metastasis for a wide range of cancers.

Evry

Europe - France

Poster:
223 - Zone 7 - Hall D
Presentation:
Saturday - Room 312 - 11:00 AM

The YEasT Immunotherapy project (YETI)

Cancer thrives by preventing the immune system from targeting tumor cells. While current immunotherapies use dendritic cells to activate T-cells towards specific tumor antigens, they remain expensive and of variable efficiency against tumor immunosuppressive environment. To address these issues, our team mainly focused on engineering a *S. cerevisiae* yeast immunotherapy that was ultimately tested *in vivo* on mice presenting melanoma. Three complementary strategies were combined: First, in order to modulate the tumor environment, yeast secreting immune modulators, GM-CSF and IFNgamma, were encapsulated into alginate beads and injected in tumors. Secondly, to break the immune tolerance against cancer cells, T4 and T8 lymphocytes were elicited by a yeast antigen display system. Last, to deliver cytotoxic compounds solely in the tumor environment, a yeast hypoxia bio-sensor was designed. A side project consisted in engineering *E. coli* to drive MAIT lymphocytes against cancer cells instead of their original targets, parasitized cells.

Exeter

Europe - United Kingdom

Poster:
243 - Zone 8 - Hall D
Presentation:
Friday - Room 312 - 12:00 PM

Design and adaptation of toehold riboswitches to detect specific RNAs with immediate application to M.bovis

Toehold switches are a novel type of RNA riboregulator that binds a specific trigger RNA sequence. Binding causes conformational changes, revealing an RBS and allowing the expression of a reporter. We aim to design a toehold collection with varying reporters including chromoproteins, fluorescent proteins and bioluminescent luciferase. Our project therefore set out to create a diagnostic test to detect a given RNA sequence in a safe, low-tech and cost-effective manner.
The trigger-recognition region of the toehold can be altered to bind different specific RNA targets, changing the application. Our project is tailored towards detection of RNA from Mycobacterium Bovis. A problem prevalent in the southwest UK, it is the cause of bovine TB with current testing unable to distinguish between Mycobacterium strains. Expression of our toeholds will utilise S30 cell-free kits and reporter data will be collected using FACS/TECAN. This data will be used for simulation and model fitting.

FAFU-CHINA

Asia - China

Poster:
38 - Zone 2 - Hall C
Presentation:
Friday - Room 310 - 5:00 PM

CSBV.silencer

Sacbrood virus(SBV) is one of the main causes of the significant honeybee colony losses. FAFU-China team aims to investigate the possibility of controlling this disease through silence of CSBV's RdRp (RNA-dependent RNA polymerase) gene by using RNA-interference technology.
We have created two recombinant plasmids and transformed them into brewer yeast. This yeast is responsible for the production of dsRdRp fragment. After being cut by the dicer, the dsRNA become siRNA (Small interfering RNA), which cause silence of RdRp gene, and the goal of virus control can be achieved.

FAU Erlangen

Europe - Germany

Poster:
49 - Zone 2 - Hall C
Presentation:
Saturday - Room 302 - 5:00 PM

SpyCatcher-Associated, Tal-effector-Transmitted Euchromatin Regulation (SCATTER)

Histone remodeling complexes including e.g. deacetylases or acetylasetransferases are fundamental for the control of gene expression by regulating the chromatin structure. Therefore a DNA-binding and a histone modification domain are required. Up to now, these domains are connected pre-transcriptional as fusion proteins. Alternatively, our team is developing a modular system consisting of SpyCatcher and SpyTag that forms a post-translational covalent isopeptide bond.
To ensure sequence specificity, we fused a SpyTag to three different TAL effectors. For the epigenetic modification RPD3 was chosen, a histone deacetylase from *S. cerevisiae* highly conserved among eukaryotes, to which the corresponding SpyCatcher was added. Compared to established methods, this technique greatly simplifies the epigenetic applications that require the control of several gene loci simultaneously.

Freiburg

Europe - Germany

Poster:
193 - Zone 6 - Hall D
Presentation:
Sunday - Room 312 - 4:30 PM

DiaCHIP - Enlightening Diagnostics

In modern medicine, fast detection and differentiation of diseases is a crucial and fundamental task. Typical ELISA-based assays are time-consuming and expensive. We propose an advanced procedure for the simultaneous detection of various diseases in a fast and inexpensive manner, the DiaCHIP. Our approach is based on the interaction of antibodies with their respective antigens. Different antigens are immobilized on a protein array generated by cell-free protein expression, using the corresponding DNA array as a template. Placed in a microfluidic chamber, the protein array is incubated with a patient's blood sample. The interaction between an antibody in the sample and the corresponding immobilized antigen results in a local change of the optical thickness of the surface. This change can be detected using a label-free and real-time measurement technology called iRIf (imaging Reflectometric Interference).
Offering simultaneous screening for several diseases, our DiaCHIP has strong potential to improve future diagnostics.

Fudan

Asia - China

Poster:
8 - Zone 1 - Hall C
Presentation:
Friday - Room 302 - 5:00 PM

Cyclize it!

Circular RNA is a type of RNA which forms a covalently closed loop. They are known to be resistant to RNases due to lack of ends, and thus have extraordinary stability. Recently several naturally generated circular RNAs are found to act as miRNA sponges, and they are a new type of tumor suppressors, because the miRNA the regulate are linked to cell proliferation and cancer.
Our team has designed fusion proteins to promote miRNA sponge circularization, which can make miRNA sponges more stable and potent. Our circular RNA sponges can be used as a new tool to regulate gene expression, and in the future, it may be used as a new type of anti-cancer drug.

Gaston Day School

North America - United States

Poster:
116 - Zone 4 - Hall C
Presentation:
Sunday - Room 304 - 2:30 PM

No title

No abstract

GenetiX Tec CCM

Latin America - Mexico

Poster:
37 - Zone 2 - Hall C
Presentation:
Saturday - Room 310 - 5:00 PM

PseudoColi: Denitrification & O2 Biosensor

Xochimilco, one of the most important aquatic systems in Mexico City, has a huge environmental and social importance. It is home to many endemic species, as well as the main economic drive of the southern area. Due to its historical background, it is considered World Heritage by UNESCO since 1987. Currently, it presents several pollution issues such as an excessive amount of nitrites and nitrates, which in turn causes an overpopulation of Nymphaea, and thus anoxic conditions. As a consequence, flora and fauna endemic to the lake are dying.
Our biosystem will activate a denitrification pathway taken from Pseudomonas stutzeri whenever O2 levels in the water are sensed as critical, using an O2 promoter.
This enhances water conditions by reducing NO2 and NO3 into N2, and therefore algae and water lilies. Successfully implementing our biosystem will lead to a better future for the biodiversity in Xochimilco.

Genspace

North America - United States

Poster:
4 - Zone 1 - Hall C
Presentation:
Sunday - Room 304 - 3:00 PM

SuperFUNd Gowanus!

The Gowanus Canal is a heavily polluted waterway that runs through Brooklyn NY. A designated superfund site, it is slated for cleanup but nearby residents are concerned about the results. Our team is developing a biosensor for waste pollution, giving the community real time access to data on the health of the canal. Additionally we have mined the canal for extremophiles with interesting properties.

Georgia State

North America - United States

Poster:
30 - Zone 1 - Hall C
Presentation:
Saturday - Room 311 - 11:30 AM

Protein Products from Plants and Pichia: Novel Manufacturing of Analgesics and Cannabinoids

Cannabinoids and opiates are widely used classes of pharmaceuticals; unfortunately, these drugs have strong psychoactive effects or can be addictive. Our project consists of two ideas, both revolving around utilizing bioengineered microorganisms to create non-psychoactive cannabinoids and non-addictive analgesics. To achieve this we developed two projects: (1) Manufacturing a protein expression system to produce CBDA synthase in tobacco plants using agrobacterium, (2) Engineering the pGAPα vector system to express the mambalgin in Pichia Pastoris as a continuation of the 2014 GSU iGEM project. Simultaneously, we developed a proof of concept using horseradish peroxidase. By the end of this project we hope to have produced a synthetic biological system to manufacture pharmaceutical alternatives for patients that suffer from diseases such as epilepsy, cancer, or chronic severe pain.

GeorgiaTech

North America - United States

Poster:
147 - Zone 5 - Hall D
Presentation:
Friday - Room 302 - 3:00 PM

A Solution That Clicks!

The copper-catalyzed azide-alkyne cycloaddition (CuAAC) reaction has been widely used in the laboratory for tagging or labeling biological molecules, but it cannot be directly applied in living organisms because of the toxicity associated with excess or free copper ions. No enzyme exists to catalyze the CuAAC reaction, but its development would perfectly complement the growing ability of scientists to introduce azide- and alkyne-labeled molecules into biological systems. Our goal is to discover a protein to bind Cu ions safely *in vivo* and perform the CuAAC reaction. We will attempt this by generating a large library of Cu-binding proteins, developing a reliable phage display system to screen for the desired CuAAC activity, and evolving any active enzymes for improved function.

Gifu

Asia - Japan

Poster:
255 - Zone 8 - Hall D
Presentation:
Sunday - Room 310 - 4:00 PM

Circular mRNA ver.2.0

In last year, we succeeded in designing the sequence which synthesizes circular mRNA and long chain protein in *Escherichia coli*. In this year, we had 2 purposes in our study. One was an efficiency of the circularization. The efficiency was lower in our previous study. This was why the splicing was hard to happen because two sequences to act as ribozyme for splicing were far each other. So we incorporated **complementary sequences** around the ribozyme regions. We thought that the treatment brought two regions close and the efficiency of the circularization improved. The other was to synthesize useful proteins. In our previous study, synthesized long-chain proteins lose their function because the folding of the proteins was broken. So we incorporated **linker sequences** into circular mRNA to synthesize the functional long-chain protein.

Glasgow

Europe - United Kingdom

Poster:
43 - Zone 2 - Hall C
Presentation:
Friday - Room 312 - 11:30 AM

GlasGlow: Engineering Glow in the Dark Biology

Our project is centered on using bioluminescence as a light source in *Escherichia coli*. After brainstorming with a designer, we decided to make toy nightlights for children. We believe this would be a good way to get the public talking about synthetic biology, and to ignite a passionate interest for science and synthetic biology in children. To make the nightlight more interactive, we decided that the children should care for the monster-styled toy during the day, so it will glow at night, protecting them from any bedtime monsters. To turn off the *Aliivibrio fischeri* bioluminescence *lux* operon during the day, we are using a UVA light sensor system from *Synechocystis* sp. PCC6803, and an inverter based on TetR family repressors from *Pseudomonas*.
We are refactoring the *lux* operon for optimal performance using BioBrick assembly and a ribosome binding site library for each gene in the operon.

Goettingen

Europe - Germany

Poster:
120 - Zone 4 - Hall C
Presentation:
Friday - Room 309 - 5:30 PM

FLEXOSOME - Placing Enzymes Where They Should Be!

Many industrial and biological processes require a range of different enzymes. Our aim is to provide a powerful tool to combine these enzymatic processes. The Flexosome is a multi-enzymatic complex, which ensures higher efficiency and yield from enzymatic reactions. Our construct takes multiple dockerins from a variety of bacteria and connects exchangeable enzymes to a scaffoldin base through automatic assembly. The combination of the catalytic forces of enzymes, derived from different sources, onto one common molecular base creates a synergistic effect. This drives a cascade in which the product of one reaction acts as the substrate for the consecutive one. In the future the Flexosome could, for instance, be used to combine enzymes in washing detergents or even link enzymatic cascades for the production of biofuels. It can therefore be applied from industrial over pharmaceutical to environmental setups.

Groningen

Europe - Netherlands

Poster:
135 - Zone 5 - Hall D
Presentation:
Friday - Room 312 - 4:30 PM

Blue Bio Energy

IGEM Groningen 2015 wants to harvest the energy of salt water, also known as ‘Blue Energy’. Blue energy uses ion exchange membranes to separate the sodium and chloride ions found in sea water. The currently used ion exchange membranes are expensive and their efficiency degrades over time . We aim to overcome these disadvantages by replacing those membranes with a bacterial biofilm. The biofilm completely consists of our modified Bacillus Subtilis. One of the two types of currently used ion membranes, the cation exchange membrane, only allows passage of positively charged sodium ions. A characteristics of this membrane is its negative charge. In order to generate blue bio energy, we aimed to overexpress genes whose encoding extracellular proteins provide the biofilm with an negative charge and increased rigidity. In result, our biofilm resembling the cation exchange membrane should be able to generate blue energy.

H4Z-Hangzhou

Asia - China

Poster:
121 - Zone 4 - Hall C
Presentation:
Friday - Room 310 - 2:00 PM

Cell-fate decision making

Microtubule associated protein light chain 3(LC3) is a ubiquitin-like protein that binds to autophagosomes (AVs). We engineered this marker as a Bio-Brick Part which can be used in tracking and following the fate of AVs in the cell and to measure autophagic flux. We constructed the plasmid in E.coli.

HAFS-Korea

Asia - Republic of Korea

Poster:
156 - Zone 5 - Hall D
Presentation:
Saturday - Room 310 - 4:00 PM

Engineering an E.coli that transforms cellulose to alcohol by using gene from trichoderma reesei

In solving the dilemma of the ‘Food Versus Fuel Debate’, an approach that uses bioengineering to utilize the potential ubiquity and adaptability of microorganisms has not been made in prior. Here, we suggest and test a method that creates a new type of E. coli combined with the genetic characteristics of the Trichoderma reesei. Combining the Lpp gene sequence, ompA gene sequence (from E. coli), bgl I gene sequence (from Trichoderma reesei), and the signal sequence, we aim to create a particular strand that enables the E. coli to ultimately produce cellulase through a cell membrane protein. Nco I and Hind III with the sequence signal-lpp-ompA were inserted in the given vector.

Hamburg

Europe - Germany

Poster:
206 - Zone 7 - Hall D
Presentation:
Friday - Room 310 - 12:00 PM

Flu Fighters

The honeysuckle plant (Lonicera japonica) has been used against influenza infections in traditional chinese medicine for hundreds of years, but only last year the active compound, the microRNA 2911, has been identified. The mechanism remains to be verified, but it seems to interfere with genes from most influenza A virus strains, inhibiting their replication. While the traditional way of producing the compound is to grow the plant, dry the leaves, cook a bitter decotion from them and drink that decotion, we want to establish a biotechnological production in E. coli. The production shall furthermore be induced by light, for which we plan to use BioBricks from the Registry like the Cph8-EnvZ system. After our bacteria have produced enough of the miRNA, we want them to lyse themselves after a heat-induction.
We plan on using the GroEL promoter in combination with a lysing cytotoxin, which remains to be chosen.

Hamilton McMaster

North America - Canada

Poster:
36 - Zone 2 - Hall C
Presentation:
Saturday - Room 309 - 2:30 PM

No title

No abstract

Hangzhou-H14Z

Asia - China

Poster:
205 - Zone 7 - Hall D
Presentation:
Sunday - Room 312 - 2:00 PM

The Preservation and Cleanse of Lithic Cultural Relics with Mineralisation Method in Hangzhou

The Inscriptions on Precipice are one of the greatest traditional Chinese relics. Due to having been carved in open areas plus the exposure to sunshine and acid raindrops, the Inscriptions are weathered readily. Currently methods to solve this phenomenon are not used properly sometimes which occasionally cause the damage to the Inscriptions. We aim at using microorganism method, which is putting a plasmid that has the ability to convert bio-oriented Oxaloacetic Acid to Oxalate Acid into the E.coil, inducing the cell and reacting with one component of the Inscriptions--Calcium Carbonate--to generate nearly insoluble Calcium Oxalate Monohydrate to adhere to the Inscriptions for protection. Another E.coil with the ability to secrete lipase has also been constructed; adding this cell when we cleaning the Inscriptions will resolve the oil substance on the surface. By constructing these products, we are able to protect the relics both from human errors and from natural damnification.

Harvard BioDesign

North America - United States

Poster:
75 - Zone 3 - Hall C
Presentation:
Friday - Room 310 - 10:00 AM

BACTOGRIP

Even under shear stress, pathogenic E. coli bacteria manage to invade the gut to cause disease every day. The secret to their success is a hair-like appendage called Type 1 Pili which is remarkably adept at binding to human epithelial cells in rough conditions. Inspired by nature, our team has adapted this system in a non-pathogenic strain to make E. coli into a specific binding machine for customizable targets. We will use it to address colon cancer. By fusing heterologous peptides to the adhesin domain, we first show that our mutant E. coli can be regulated to grab heavy metals like Nickel out of water. Next, we show a knock-out of the adhesive domain's pathogenic binding activity and introduce a peptide known to bind to colon cancer. We imagine our system might be used to localize an anti-cancer drug or toxic compound to early-stage cancerous growths within the colon.

Heidelberg

Europe - Germany

Poster:
225 - Zone 7 - Hall D
Presentation:
Sunday - Room 311 - 2:00 PM

Catch it if you can

Like Proteins, RNA folds into a unique, functionally relevant 3D structure as a catalytic ribozyme or an aptamer detecting and selectively binding a ligand. To obtain these functional RNAs, simple transcription of a DNA sequence is sufficient. Yet finding the few functional sequences has so far been challenging and has impeded its widespread use in synthetic biology. As a part of our project, we develop a software that drastically reduces both required resources and effort of directed evolution, as it creates aptamers for virtually any molecule through computational simulation. With the goal to provide the iGEM community with the power of RNA, we develop a toolbox consisting of easy to use standards for in vitro RNA usage, practical readouts and means for mRNA editing. To reach the end user with our work, we create straightforward tests for the detection of numerous noxious substances.

HFUT-China

Asia - China

Poster:
175 - Zone 6 - Hall D
Presentation:
Sunday - Room 306 - 10:00 AM

BioDesigner

For a long time, Synthetic Biology experts are struggling with the decision of BioBricks and the efficiency of gene expression. These two things should be done with a better methodology. And that is what BioDesigner provides. BioDesigner is a design system for Synthetic Biology, with which the user can search and check parts, design device and system, get recommendations and simulations. For additional assistance, BioDesigner provides part and system recommendations, which can be a great assistant for user while designing their own Synthetic system. Recommendations are generated based on existed data and user's behavior. User can also get simulation about the gene expression process. Synthetic Biology is a creative, forward thinking work, and BioDesigner is a creative assistant tool.

HKUST-Rice

Asia - Hong Kong

Poster:
150 - Zone 5 - Hall D
Presentation:
Sunday - Room 310 - 11:00 AM

Potassium, Phosphate and Nitrate Biosensors

To ensure healthy growth of crops, farmers must carefully control the levels of macronutrients (nitrogen (N), phosphorus (P), potassium (K)) in their soil. Currently, farmers monitor soil macronutrient levels with chemical assays. We hypothesize that PNK biosensors based on genetic circuits refined through millions of years of evolution will measure the nutrients available to a growing plant more accurately. We are building on the work of previous iGEM teams on soil biosensors and characterizing new parts. We have developed and tested new nitrate-, phosphate-, and potassium-responsive promoters to produce a colorimetric output in a low input environment and added these parts to the registry. We are working on deploying our NPK biosensor in a colorimetric cell-free system and in biofertilizer strains of bacteria. It is our hope that this NPK biosensor technology can be used to optimize the farming and fertilizing process.

HokkaidoU Japan

Asia - Japan

Poster:
209 - Zone 7 - Hall D
Presentation:
Saturday - Room 302 - 12:00 PM

Microbusters

Main immune system of insects, antimicrobial-peptides (AMPs), is known to have very high potentials and work toward wide range of microbes. Thanks to AMPs, insects prosper around the world even without complex acquired immunity like we humans. Good point of AMPs is that it has less chance of getting resistant microbes since they affect on cell membrane. Our project this year is 'Microbusters'. Microbusters are biological device which secretes AMPs. They can be applied to making anti-microbial products or foods. Characteristics of each Microbuster depend on what AMP it secretes, so Microbusters with variety of functions can be designed. We designed two Microbusters.
One is *Escherichia coli* that secrete thanatin, a kind of AMP while it is toxic to its chassis. Second is *Lactobacillus casei* with α-defensin, which only attacks non-residential flora. Microbusters are going to be a new way to avoid harm from microbes.

Hong Kong HKU

Asia - Hong Kong

Poster:
12 - Zone 1 - Hall C
Presentation:
Sunday - Room 310 - 4:30 PM

Controllable cell death and DNA degradation by CRISPR cas system

While the future of synthetic biology hinges upon overcoming biosafety concerns, the accidental escape of synthetic organisms due to unpredictable behaviours can pose a major threat to our environment. Hence, a tightly regulated switch is needed to induce suicide by the leaked organisms, ultimately leading to destruction of undesired genetic material. In our project we design and engineer two biological circuits based on the versatile CRISPR Cas systems as replaceable killing switches. To minimize basal expression, arabinose and tryptophan help repress the expression of Cas associated proteins, gRNA and crRNA. In order to achieve biosafety, destruction of essential genes will be activated when the synthetic organisms leave their specified working environment. We sought to investigate the regulation of the circuits and compare the killing efficiency of the two Cas systems using E. Coli BL21 DE3 as the chassis.

Hong Kong-CUHK

Asia - Hong Kong

Poster:
233 - Zone 8 - Hall D
Presentation:
Sunday - Room 310 - 5:00 PM

Magneto-bacter vinelandii Magnetosome-forming *Azotobacter vinelandii* with Downstream Applications

Magnetosome, an organelle encapsulating magnetic iron crystal (magnetite), originates from magnetotactic bacteria. However, with the difficulty to maintain micro-aerobic condition under normal setting for optimal growth, we aim to **produce magnetosome in a rapidly grown aerobe**, ***Azotobacter vinelandii***, which provides **an intracellular anaerobic environment**. Not limited in migrating biogenesis machinery to foreign organism, we also developed **TWO new downstream applications**:

(1) Fusing recognition elements with transmembrane protein tightly bound on magnetite Example includes **metal-binding peptides** for removing heavy metals from polluted water by biomagnets.

(2) Controlling *Azotobacter* by external magnetic force as a component in microbial fuel cell (MFC)
We designed a self-sufficient system by producing hydrogen with mutated nitrogenase, while releasing electron to anode and recycling protons for ATP production by membrane-bound hydrogenase. We expect an electricity production at 30 mA in 0.83 m^2 electrode surface area, a 2-fold increase compared to a stainless-steel-mesh bio-cathode MFC.

HSNU-TAIPEI

Asia - Taiwan

Poster:
105 - Zone 4 - Hall C
Presentation:
Friday - Room 310 - 3:00 PM

The Evengers-Biosensors of the recycled cooking oil

Our goal is to detect recycled cooking oil. There are several substances like Aflatoxin, Benzo[a]pyrene, heavy metals, which are exist in recycled cooking oil. We want to make an easy and convenient biosensor for people to detect whether the food is safe. But not with large, heavy machines and wasting several days for detection.

HUST-China

Asia - China

Poster:
11 - Zone 1 - Hall C
Presentation:
Friday - Room 311 - 9:00 AM

Euk.cement

With the expanding of human settlements and the development of civil engineering, the demand of novel cementation material is increasing rapidly. To echo such demand, we developed Euk.cement: a live eukaryotic cell based auto-cementation kit. By surface displayed silica binding peptides and secreted flocculating proteins, Euk.cement will target onto any silica containing particles, such as sands and rocks, and stick them together. This system will be automatically initiated only in dark with a light operated switch. While carbon dioxide released from the metabolism of cells will finally complete the calcium carbonate sedimentation. This economical and ecological friendly innovation can be utilized for a wide range of industrial or environmental applications, such as construction and restoration of building foundations, bridge piers, or even artificial reefs for aquaculture.
Since we have exploited a new kind of marine yeast as chassis, the application field of eukaryotic synthetic biology has then been considerably broadened.

HZAU-China

Asia - China

Poster:
182 - Zone 6 - Hall D
Presentation:
Saturday - Room 311 - 12:00 PM

Mixed-Reality Cell: Bidirectional coupling between real and virtual bio-oscillators

With the ability to create a virtual reality by computer simulation, a mixed-reality era is coming! In this project, we are working on creating a new kind of life form, mixed-reality cells (MR. Cell), which are half-real and half-virtual. To demonstrate our idea, a genetic oscillator was built in E. coli as the real part and an e-oscillator was simulated in a computer as the virtual part. The two parts could interact with each other through an interface device composed of microfluidic chip and chemical/optical modulator. At the beginning, the two oscillators work independently in a dual-reality state. With their interaction, they would gradually adjust to each other without human interference to a strongly coupled and synchronized mixed-reality state. A prototype of MR. Cell was demonstrated in this project which has great potential in a wide range of the future biological research.

IISER Pune

Asia - India

Poster:
234 - Zone 8 - Hall D
Presentation:
Friday - Room 306 - 11:30 AM

Mycobacterium Revelio : Overclocking the Cell Cycle

Tuberculosis, an infectious disease caused by Mycobacterium tuberculosis, affects nearly two billion people all over the world. India has the highest burden of TB with World Health Organisation statistics for 2013 giving an estimated incidence of 2.1 million cases of active TB. Culture-based detection requires 4 weeks, hindering rapid detection in patient samples. We aim to develop a robust and self-sustained genetic device for rapid diagnostics, with the speed of PCR combined with the robustness of a growth assay, even in resource poor settings. With a joint approach of experimental testing and modeling, we are targeting factors that regulate the cell cycle of M. smegmatis and E. coli as model organisms. Our genetic device, comprising of Detector, Oscillator and Terminator modules, will reduce the time span for TB diagnosis from weeks to hours in a cost-effective manner.

IIT Delhi

Asia - India

Poster:
117 - Zone 4 - Hall C
Presentation:
Friday - Room 311 - 10:00 AM

Eco Coli

According to a recent WHO report, about 15-20 million people in India are asthmatic. It has been found that oxides of Nitrogen and Sulphur oxides are important air pollutants and the culprits behind a large number of respiratory. ‘Eco.coli’ is a system of genetically engineered E.coli bacteria, equipped with genes to combat NO2, NO, SO2 and N2O, all of which are major components of air pollution. This bacteria is to be placed in a bioreactor prototype which takes in any polluting exhaust (e.g. from a diesel generator, automotive engine, or chimney) with a controllable flow rate. This is then passed through the media containing our genetically engineered bacteria, which reduces all the above mentioned harmful gases to harmless by-products. Bubbling of the exhaust through water before going into the bioreactor also takes care of soot and other unburnt hydrocarbons.

IIT Kharagpur

Asia - India

Poster:
103 - Zone 4 - Hall C
Presentation:
Sunday - Room 304 - 5:00 PM

Detection of Food Spoilage Using Quorum Sensing Systems in E. coli

Problems like food spoilage are a major concern in our lives mainly because they have a direct impact on the health of a person. Food spoilage renders a product undesirable for consumption and is the outcome of the biochemical activity of a microbial community. It is known that bacteria often communicate with each other through quorum sensing, where the communication is through certain signal molecules (auto-inducers) that freely diffuse into the environment.The enzymatic activities that account for quality degradation of food products are regulated by quorum sensing activity. Our engineered organism can be used as a marker of freshness in different kinds of food (dairy and other packaged products) by detecting the presence of Acyl Homoserine Lactones using the Lux operon system in E. coli and rendering a visible colour change (through lycopene production), thus preventing the consumption of such food and aiding healthy living.

IIT Madras

Asia - India

Poster:
124 - Zone 4 - Hall C
Presentation:
Saturday - Room 304 - 2:30 PM

A system to tackle anti-biotic resistance leveraging the power of natural selection

Our iGEM project aims to tackle the emerging problem of antibiotic resistance by leveraging the power of natural selection. It is known that higher exposure to antibiotics leads to the resistance against that antibiotic in bacterial populations. Here, we come up with a solution to this problem. We will synthesize a bacterial system that:

1.- Senses the cell density of pathogenic bacteria
2.- Releases anti-microbial peptides(to mimic anti-biotics) which kill pathogens, when it has sensed high cell density
3.- As the population goes down we release a peptide that neutralizes the activity of anti-microbial peptides, resulting into a stress free environment.

The stress-free environment would be favourable to the wild type pathogen compared to the mutant pathogens which have developed antibiotic resistance, hence eliminating antibiotic resistence from the pathogenic population.

IONIS Paris

Europe - France

Poster:
218 - Zone 7 - Hall D
Presentation:
Sunday - Room 311 - 9:00 AM

THE BIO CONSOLE: BactMan's Adventures

BactMan's Adventures will make you explore and understand the field of synthetic biology in a playful and educational way.
The first part of BactMan's adventure take place in a real synthetic biology gaming console: the 'Bio-Console'. In this game, you have to guide BactMAN, our engineered bacteria sensible to optogenetic signals to avoid lasers all along the circuit. Bact'MAN, our yellow fluorescent bacteria located in a microfluidic chip connected to a computer interface, will need your help to survive!
The second part of BactMan's adventure take place in our mobile application game. Through his trip you will learn about several concepts of Biology, Synthetic Biology & Safety. Our goal is to make this field accessible to everyone by using a playful & entertaining tool. Whether with the Bio Console or with the mobile application, progress, explore and help Bact'man along his trip to overcome the challenges on your way.

ITB INDONESIA

Asia - Indonesia

Poster:
183 - Zone 6 - Hall D
Presentation:
Friday - Room 304 - 4:30 PM

RhamCOLIpid: Engineered E. coli producing rhamnolipid for green enhanced oil recovery

Surfactant is a compound that lowers surface tension between to liquids (e.g. oil-water) or liquid-solid. One example of naturally occurring surfactant is rhamnolipid. Rhamnolipid has a broad application, starting from enhanced oil recovery, oil spill and pollutant management, to industries such as food, cosmetic, and health care. But unfortunately this biosurfactant is produced by opportunistic pathogen Pseudomonas aeruginosa. Thus, ITB_Indonesia utilises optimised rhlAB gene from Pseudomonas aeruginosa for rhamnolipid production, combined by LacI control and reporter protein for controllable and observable production in E. coli. This rhamnolipid-producing E. coli is named RhamCOLIpid. Produced rhamnolipid is further tested for one of its usages, Enhanced Oil Recovery (EOR). EOR using rhamnolipid is expected to serve as a green alternative to increase oil production in Indonesia.

Jilin China

Asia - China

Poster:
102 - Zone 4 - Hall C
Presentation:
Sunday - Room 310 - 11:30 AM

Formaldehyde Terminator

Formaldehyde is one of the most dangerous cancerogen which can be easily found in newly decorated houses or new cars. Because there is no simple and convenient way to detect and degrade formaldehyde, we hope to design biobricks to solve this problem by using microorganism.
We find that there is a special promoter called hxlR in Bacillus subtilis, which can be induced by formaldehyde and express downstream genes. First, we use special features of pET vectors to express two key enzymes, named formate dehydrogenase (FDH) and formaldehyde dehydrogenase (PADH). Then we add the gene of T7 RNA polymerase in the downstream of promoter hxlR in PSB1C3. Finally, when T7 polymerase is expressed, Vector pET-DUET can express PADH and FDH. In this way, the whole system can be induced by formaldehyde and express PADH and FDH to degrade it.

KAIT Japan

Asia - Japan

Poster:
89 - Zone 3 - Hall C
Presentation:
Friday - Room 309 - 11:30 AM

Control protein activity by light

Controlling protein activity by light is important for analyzing protein function and controlling synthetic biology system. However, previous methods require co factor or use toxic blue light. Fluorescent proteins such as a Green Fluorescent Protein are widely used as optical sensor. We forcused on Dronpa in them. Dronpa is a green fluorescent protein which is cloning from Echinophyllia sp.This is a photswitcable fluorescent protein, it can reversibly change On state and Off state. We used mutant of Dronpa, Dronpa145N. Dronpa 145N switches on under 400nm light and forms a tetramer, and switches off under 500nm light and forms monomer. Fuse target protein with Dronpa 145N. Dronpa 145N domain reversibly change monomer and tetramer by light, the target protein between Dronpa 145N domain can change active conformation and inactive conformation. In this way, we can control protein activity by light. This method does not require co factor and use blue toxic light.

Kent

Europe - United Kingdom

Poster:
134 - Zone 4 - Hall C
Presentation:
Saturday - Room 306 - 4:30 PM

Envirowire: Conducting nanowire self-assembled using cytochrome-linked functional amyloid.

Our project aims to produce self-assembling conductive nano-wires using a functional amyloid system synthesised by E.coli. We use the export machinery of the endogenous curli amyloid system of E.coli, normally responsible for biofilm formation, to produce functional extracellular amyloid nano-fibrils composed of the amyloid-forming domain of the yeast prion protein Sup35. Our engineered BioBrick plasmid will contain the amyloid-forming domain of Sup35, Sup35NM, linked to the curli signal sequence for extracellular amyloid protein export, and also to cytochrome b562 to allow for electron transport. Once exported, the Sup35NM monomers will polymerise to form the amyloid fibrils decorated with cytochrome b562. Exogenous addition of haem will allow cytochrome b562 on Sup35NM fibrils to fold into its active conformation, allowing electron transport along the length of the amyloid fibres. Our project has the potential to provide a source of both renewable nano-material and energy.

Korea U Seoul

Asia - Republic of Korea

Poster:
173 - Zone 6 - Hall D
Presentation:
Sunday - Room 309 - 3:00 PM

The pathfinder for Synthetic Biologists

Our team's goal is to make a handy tool for synthetic biologists. We made a program named 'Gil' which helps you with finding and constructing bio-chemical pathways. Given only reactants and final products, you can get several possible pathways using our program. It has significant feature of biological scoring system that based on meaningful compounds in energy such as ATP, number of carbon, and NADP. This scoring system can guide you like navigation to find the most efficient pathway or to build a plausible de novo pathway. Our program also provides gene sequence information of the pathways so it will be more easy to synthesize your pathway. Using this program, we designed a wetlab experiment, making an agar utilizing EFC. We found a pathway that starts from agarose to galactose, producing NADH during its process. This NADH is then oxidized by diaphorase and produces electricity.

KU Leuven

Europe - Belgium

Poster:
252 - Zone 8 - Hall D
Presentation:
Saturday - Room 309 - 10:00 AM

Spot E.Shape: Pattern Forming Bacteria as a Foundation for New Applications

Pattern formation is omnipresent in nature, nevertheless the underlying cellular and molecular mechanisms are poorly understood. Attempting to explain this phenomenon, a genetic circuit that couples cell motility and chemotaxis in *Escherichia coli* was built. The transmembrane receptor dependent chemotactic signaling pathways in *E. coli* are well described. But so far, most of the pattern formation research focused on the Tar receptor together with its attractant aspartate. Here however, the attention goes to the function of another chemoreceptor, the Tsr receptor and its corresponding repellent - leucine. This novel approach, in combination with the controlled expression of the motility regulating protein CheZ, enables precise steering of the swimming behavior. All together, this system allows the formation of periodic circles and stripes of high-low cell densities. Based on theoretical analysis, the formation of spatial structures arising from the aggregation process of cells A and intermediate stripes of cells B is expected.

Lambert GA

North America - United States

Poster:
208 - Zone 7 - Hall D
Presentation:
Friday - Room 306 - 4:30 PM

No title

No abstract

LASATX

North America - United States

Poster:
220 - Zone 7 - Hall D
Presentation:
Saturday - Room 310 - 2:30 PM

A Fragrance-Producing Carbon Monoxide Detector

Carbon monoxide (CO) is a toxic colorless and odorless gas that results in thousands of fatalities a year, yet most detectors are based upon sight and sound that exclude the blind and the deaf. Furthermore, current sensors rely upon upon the presence of electricity and power, and are thus unable to act in scenarios of natural disasters when CO leaks are most likely.
This project introduces a CO-sensing mechanism into *E.coli* using a CooA transcription activator and corresponding pCoof promoter to regulate the expression of a methyl salicylate pathway (pchBA and BSMT genes). The pathway converts the endogenous molecule chorismate into salicylic acid then methyl salicylate, producing a wintergreen smell in the presence of CO. This CO sensor has implications for not only the disabled, but also commercial use in cases of natural disaster due to its cost efficiency and transportability.

LaVerne-Leos

North America - United States

Poster:
73 - Zone 3 - Hall C
Presentation:
Friday - Room 311 - 12:00 PM

Using Zeaxanthin and Tocopherol to protect cyanobacteria from the toxic effects of free fatty acids

Free fatty acids are biofuel precursors. We focused on using zeaxanthin to counter the toxic effects of increased free fatty acids in an altered Synechococcus elongatus 7942 strain. Zeaxanthin acts as an antioxidant, stabilizes the membrane, and is needed for electron transport chain function. To increase the concentration of zeaxanthin and its precursors, we introduced a circuit containing parts of the zeaxanthin synthesis pathway. The La Cañada subset of our team focused on tocopherol, a metabolite that has similar properties to zeaxanthin in cyanobacteria. Tocopherol acts as an antioxidant, protects the cell from lipid peroxidation, and enhances photosynthesis. A circuit was made with the gene p-hydroxyphenylpyruvate dioxygenase to catalyze the formation of homogenistic acid, the rate limiting step of tocopherol synthesis. In an attempt to further increase the production of fatty acids, both zeaxanthin and tocopherol circuits are dynamically regulated, utilizing a fatty acid-sensitive promoter-repressor system, pLR and FadR.

Leicester

Europe - United Kingdom

Poster:
104 - Zone 4 - Hall C
Presentation:
Friday - Room 306 - 12:00 PM

NAD+/NAD(H) Increased through Colonisation of E. coli

Neurodegenerative disorders show decreased levels of NAD+/NAD(H). Using E. coli to colonise the gut, NAD+/NAD(H) levels could be increased by upregulating nadD, nadE and PncB enzymes in the E. coli cytosol; these gene products will be tagged and exported into the periplasm via the tat system to produce NAD+/NAD(H), which will be exported into the gut. The genes and killswitch will be inserted into E. coli, whilst the remaining aspects of the project will be theoretical due to ethical and safety restrictions. Speculatively, increased NAD+/NAD(H) could treat neurodegenerative disorders by mitigating the destruction of neurons and help with muscle fatigue. Regeneration of muscle fibres to restore strength and overall energy levels would be achieved by increased oxidative phosphorylation triggered by NAD+/NAD(H). This treatment provides low-cost NAD+/NAD(H) as part of an autonomous system; increasing the patients' quality of life.

Lethbridge

North America - Canada

Poster:
98 - Zone 4 - Hall C
Presentation:
Friday - Room 306 - 9:00 AM

RNAiCARE

Fusarium head blight (FHB) is a fungal disease that reduces grain yields and seed quality across the world. Fusarium's airborne spores land on spikelets of flowering crops, producing trichothecene mycotoxins that inhibit cell processes. Gastrointestinal problems and feed refusal in livestock also occur if ingested. However pesticides controlling diseases like FHB have numerous economic and environmental costs.
Our project represents a species specific and widely applicable solution to global agriculture problems using the synthesis of highly pure dsRNA as a topical fungicide.
It has been shown that insect midgut cells taking up double-stranded RNA (dsRNA) are processed into small interfering RNAs (siRNAs) by the Dicer enzyme. If the siRNA is complementary to a certain gene, RNAi can silence its expression. This project will target and silence essential Fusarium genes. Our design involves a scaffold where any dsRNA sequence of interest may be inserted for gene targeting within a specific species.

Lethbridge HS

North America - Canada

Poster:
31 - Zone 1 - Hall C
Presentation:
Sunday - Room 304 - 10:00 AM

Biofilms and BEEyond: Tackling Biofilms and Colony Collapse Disorder

Bees A phenomenon called Colony Collapse Disorder (CCD) is destroying bee colonies worldwide. One factor contributing to CCD is the parasitic mite Varroa destructor, which feeds on bee larva. Current methods used to control V.destructor are inefficient and resistance is developing in treated populations. Using synthetic biology, we designed E.coli that produce the miticide oxalic acid in the bee gut. This method targets V.destructor by directly delivering oxalic acid into the mites, creating mite-proof bee populations. Biofilms Bacterial biofilms are the cause of 65% of all hospital acquired infections. Biofilms grow on surfaces of surgical tools and medical implants and are composed of a plaque of bacteria hidden in a matrix of extracellular DNA and sugars. Currents methods used to destroy biofilms are expensive, harsh, and often ineffective. We have created a cocktail of Nuclease and Dextranase designed to degrade the biofilm matrix, allowing for the safe elimination of biofilms.

Liceo Eugenio Hostos

Latin America - Chile

Poster:
249 - Zone 8 - Hall D
Presentation:
Friday - Room 306 - 5:30 PM

No title

No abstract

Linkoping Sweden

Europe - Sweden

Poster:
52 - Zone 2 - Hall C
Presentation:
Saturday - Room 309 - 9:00 AM

Go nuts, without peanuts!

Peanut allergy is the deadliest food allergy. We aim to help those suffering from peanut allergy by designing a portable and intuitive detector available to anyone. The detection system utilizes a protein complex which recognizes the peanut allergen *Arah1*. It is composed of our own constructed protein attached to an *Arah1* specific antibody conjugated to FITC. The constructed protein consists of epitope 2 from *Arah1* and RFP. *Arah1* has higher affinity than epitope 2 towards the binding site. Therefore, the constructed protein will be replaced and leave the antibody, if *Arah1* has contaminated the food sample. We can measure if the constructed protein is attached by using FRET, a mechanism utilized to determine if two different fluorofores are at a close distance, in our case FITC and RFP. The different wavelengths emitted is measured and processed by electrical components. We also have a side project, replacing RFP with a quencer.

London Biohackspace

Europe - United Kingdom

Poster:
127 - Zone 4 - Hall C
Presentation:
Sunday - Room 306 - 11:30 AM

DIY Brew Kit - Synbio Brewery

Our project aims to develop brewing yeast strains that produce different flavours, scents, colours, nutrients and bioluminescent proteins. Biosynthetic pathways will be developed in lab strains of *S. cerevisiae* however we will be exploring the use of existing brewing strains as chassis suitable for Synthetic Biology. The Synbio Breweries DIY Brew Kit aims to become an accessible kit containing a variety of engineered yeasts for use in homebrewing. The kit will allow the user to experiment with combinations of different flavours and other properties, added by the engineered yeasts, in their brewed product. The DIY Brew Kit project is a community lab project and therefore involvement in its development is open to all. Further to the inclusive and accessible nature of the project's development, the resulting product aims to provide a hands on introduction to synthetic biology to a broader audience through the world of homebrewing.

LZU-China

Asia - China

Poster:
199 - Zone 7 - Hall D
Presentation:
Saturday - Room 312 - 3:00 PM

Micro Holmes A Novel device for Monitoring Heavy Metal Ions

As the global industrialization has been developed, heavy metal ions became assignable factors of water pollution, which may cause serious damage to human health. However, the measurements for the concentration of heavy metals are complex and expensive. In our project, we have applied several transcription factors which are sensitive to the concentration of copper ions and chromium ions to regulate the expression of protein ribB. The existence of ribB will enhance the production of riboflavin. Moreover, riboflavin, as the electron carrier, could improve the electricity producing performance of the Microbial Fuel Cells (MFCs). So in this way, we successfully correlated the concentration of heavy metal ions together with the output voltage of the MFC. What's more, we further created a convenient deviceMicro Holmes (a combination of MFC and electronic components), to monitor heavy metal ions of water sample any place any time.

Macquarie Australia

Asia - Australia

Poster:
155 - Zone 5 - Hall D
Presentation:
Friday - Room 311 - 11:30 AM

Solar Synthesisers: Engineering the chlorophyll biosynthesis pathway and photosystem II in E. coli

Photosynthesis is a key biological pathway utilized by plants and algae to generate useable energy from sunlight. Chlorophyll is a green pigment in photosynthetic organisms that aids in the manufacture of energy. Our aim is to engineer and express 13 genes of the chlorophyll-a biosynthetic pathway from Chlamydomonas reinhardtii in E. coli. While this pathway has been well characterised, reproduction of this process in non-photosynthetic organisms has not been successful. Our second goal is to synthetically engineer Photosystem II in E. coli, which consists of 17 genes. Photosystem II is a multi-subunit protein complex that generates oxygen and electrons, by oxidation of water molecules. Transferring these electrons to a hydrogenase would potentially lead to production of hydrogen on an industrial scale. Our goals are the first step towards clean and sustainable hydrogen production as a viable future energy source.

Manchester-Graz

Europe - United Kingdom

Poster:
153 - Zone 5 - Hall D
Presentation:
Sunday - Room 302 - 4:00 PM

DopaDoser: The Self-Regulating, L-DOPA-Producing Gut Bacteria

iGEM Manchester-Graz's aim is to take the first steps in the development of a novel technology for drug delivery by developing self-regulating, drug-producing bacteria. In the future, they could be incorporated into patients' gut microflora to secrete medicines directly inside the body. We focused on the treatment of early stages of Parkinson's disease, for which the current treatment involves oral administration of L-DOPA. To control the bacterial L-DOPA production in the gut, we plan to develop a multidimensional, cell density-dependent auto-regulation system that could also be used to control other multistep enzyme pathways. Since Manchester-Graz is an inter-European Team, the Manchester sub-team is working on L-DOPA biosynthesis in *E. coli* BL21(DE3) and Nissle 1917, while the Graz sub-team is developing the regulation system in the aforementioned strains. The project will be combined in a way that the regulation system would control the rate of biosynthesis for the accurate dosage.

Marburg

Europe - Germany

Poster:
240 - Zone 8 - Hall D
Presentation:
Sunday - Room 306 - 9:00 AM

NUTRInity: Make the gut a better world!

To tackle malnutrition and overconsumption of food represent one of the major challenges of humankind. The iGEM Team Marburg addresses these issues in a holistic approach by developing modular tools. Engineered, cell-based particles produce dietary supplements to alleviate malnutrition. A cell-free protein matrix with a functionalized surface targets specific nutrients to lower their concentration in the human gut. Furthermore, we engineer a contact-dependent delivery system that modifies the human gut microbial community. Taken together, we provide innovative solutions for improving and balancing nutrition at the interface of the human microbiome and gut.

METU HS Ankara

Europe - Turkey

Poster:
80 - Zone 3 - Hall C
Presentation:
Saturday - Room 309 - 12:00 PM

Repellent Effect of Cinnamaldehyde on Varroa

Bees are one of the major organisms of ecosystem because of their role on pollunation, food chain and sustainability of life. Varroas attack the honey bees; Apis cerena and Apis mellifera. The European Commission laboratories reported Varroa as the largest single cause of bee mortality. This parasitic mite sucks bees' hemolymph. The hemolymph contains Juvenile Hormone which helps development and reproduction of Varroa mite so it can maintains it's life cycle. There are many drugs for Varroasis treatment but they have some disadvantages; like bee deaths, colony collapses or changing taste of the honey. The purpose of our study is to repell the mites by synthesizing essential oils by Escherichia Coli to get cheaper and more natural solution. Transforming winter green, lemonene, pinene and cinnamyl alcohol (C9H10O) to cinnamaldehyde (C9H8O) are four pathways of our project. The efficacy of each pathway was compared.

METU Turkey

Europe - Turkey

Poster:
164 - Zone 5 - Hall D
Presentation:
Friday - Room 306 - 9:30 AM

Gluten, You Shall Not Pass!

People with celiac disease have to consume gluten free food because gluten creates an auto-immune response in their body. However, gluten free food is a lot more expensive than normal food. That is why, we decided to find a solution to this problem by taking kumamolisin and putting it in a vector of yeast that has alpha secretion factor then putting the plasmid in yeast.
The yeast will produce and secrete kumamolisin enzyme to its external environment and will destroys gluten while the bread continues to be fermented.
We also prepared a gluten detection kit using green fluroscent protein in PQLP aminoacid sequence. If kumamolisin cuts the gluten it will have cut GFP as well so there will be no colour but if it does not cut the gluten than it also has not cut GFP so green color will be observed.

Michigan

North America - United States

Poster:
237 - Zone 8 - Hall D
Presentation:
Friday - Room 311 - 2:30 PM

Aptapaper - Detecting Any Protein On Paper Test Strips

In the past year, paper-based transcription and translation, reconstituted from freeze-drying, have been adapted in a variety of ways and shown to be effective after a year of storage at room temperature. However, currently, this technology is severely limited in its applications because protein detection requires a different strategy for each individual protein. Aptapaper uses the targeting specificity of aptamers to create a modular protein detection system that can easily be adapted to any protein.
A DNA aptamer is bound to a DNA trigger and becomes unbound in response to its protein of specificity. This frees the DNA trigger to turn on an RNA toehold switch, resulting in a 40 fold change in reporter protein expression, with more results to come. This system, when freeze-dried on paper, is cheap and portable, making it well suited to tackle the unmet needs for disease detection in remote areas.

Michigan Software

North America - United States

Poster:
174 - Zone 6 - Hall D
Presentation:
Sunday - Room 306 - 9:30 AM

ProtoCat: Increasing Reproducibility Through Protocol Sharing And Review

Choosing apt and reliable protocols for new experiments is a problem that wet labs routinely face due to the difficulty in anticipating which protocols will produce the best results. Experimental practices may differ immensely across laboratories and precise details of these practices may be lost or forgotten as skilled faculty or students leave the lab to pursue other endeavors. Furthermore, there are few well-defined protocols that are generally agreed upon by the scientific community, in part due to the lack of a system that can supply a measure of a protocol's acceptance. In order to address these problems, we set out to build a database that integrates a crowd-sourced ratings and comments system to serve as a protocol curator that enables wet lab investigators to compare various protocol efficacies, quantify a protocol's acceptance within the scientific community, and provide an avenue through which experiential knowledge can be communicated.

Mingdao

Asia - Taiwan

Poster:
78 - Zone 3 - Hall C
Presentation:
Saturday - Room 310 - 3:00 PM

Fire Retardant Bio-Coating

Fire can kill life when it gets out of control. Fire is an oxidation-reduction reaction of chemical process. Flame combustion starts from three main elements, so-called fire triangle, that is, heat, oxygen and fuel.
Fire can expand further by the chain reaction induced by active free radicals made from the combustion. Fire retardant materials have wide applications to slow or even stop the fire. However, the major of these materials are synthesized from chemicals, and many of them have been proven as toxic.
As a result, natural biomaterials with fire retardant properties are increasingly important. Casein and wool have been reported as effective fire retardant biomaterials. This year, we are going to analyze the components in casein and wool as well as figure out why they can retard the fire. By this knowledge, we can design and genetically engineer the bacteria to be novel fire retardant biomaterials without toxicity.

Minnesota

North America - United States

Poster:
13 - Zone 1 - Hall C
Presentation:
Friday - Room 302 - 5:30 PM

Eukaryotic Expression: Microscopic Translation to Macroscopic Communication

Both technical and social obstacles hinder widespread use of synthetic biology approaches. One technical challenge is optimization of multi-enzyme pathway gene expression. Viral 2A sequences can improve translational efficiency of polycistronic encoded proteins. Here we demonstrated the utility of this technology in yeast by expressing genes to produce compounds in the beta carotenoid pathway.
Furthermore, we have developed a mathematical model to estimate gene order for optimal biosynthetic production using 2A sequence and present it as a community tool to streamline future applications.
Finally, accurate and widespread public knowledge regarding the use of genetically modified organisms is vital for increasing social acceptance of synthetic biology.
We have correlated word usage to opinions regarding biotechnology to inform future efforts to engage the public.

Missouri Columbia

North America - United States

Poster:
238 - Zone 8 - Hall D
Presentation:
Friday - Room 310 - 11:00 AM

No title

No abstract

Missouri Rolla

North America - United States

Poster:
82 - Zone 3 - Hall C
Presentation:
Friday - Room 310 - 5:30 PM

Defending Against WNS

North American bats are suffering from an emerging fungal disease called White Nose Syndrome. During the crucial winter months, the fungus wakes bats from hibernation. Affected hibernacula often face mortality rates in excess of 80%, an unsustainable loss in animals which only have one offspring per year. As it spreads, the disease impacts many bat species with roles in pest control and pollination. Anti-fungal agents are typically indiscriminate, affecting native species which may be beneficial to the bat, while creating a strong selective pressure for future resistance. We have instead decided to develop a system using compounds which slow and inhibit the fungus, giving bats a better fighting chance.
We are modifying E. coli to produce ocimene, a terpene compound in orange fragrance, which has been shown to have inhibitory effects against fungi. We plan to explore enzyme inhibitors and fungal sensing for next year's competition.

MIT

North America - United States

Poster:
136 - Zone 5 - Hall D
Presentation:
Saturday - Room 312 - 9:00 AM

Population Control in Synthetic Microbial Co-cultures for Consolidated Bioprocessing

Relative to commonly used monocultures, microbial co-cultures can better handle consolidated bioprocessing (CBP) - the conversion of substrates to products in a single reactor - by dividing the metabolic load among multiple species. However, problems regarding stability and efficiency must be overcome to implement co-cultures for CBP on an industrial scale. We aim to produce a robust co-culture by ensuring stable, efficient ratios of bacteria using synthetic intercellular communication.
Our co-culture converts agricultural waste, lignocellulose, into a useful product, biodiesel. It consists of Cytophaga hutchinsonii, a cellulolytic bacterium, and Escherichia coli, which is engineered to produce biodiesel. We introduce the LuxI/LuxR/AHL quorum sensing system as the communication pathway between the bacteria. To predict bacterial interactions and design the communication network, we model the dynamics of our co-culture using whole-genome scale metabolic models with dynamic flux balance analysis.
Our project makes co-cultures more viable for industrial consolidated bioprocessing.

Nagahama

Asia - Japan

Poster:
68 - Zone 3 - Hall C
Presentation:
Sunday - Room 304 - 4:30 PM

‘’香蔵庫’’ Flavorator : New food preservation method by rose odor *E. coli*

Food preservation is an important factor of the food problem. We considered a new food preservation method ‘Flavorator’ to solve the food problem. ‘Flavorator’ is a method of preserving food in an antimicrobial volatile substances (terpenoid :geraniol and farnesol) derived from plants. *E. coli* has a non-mevalonate pathway. therefore, The *E. coli*, there are metabolic pathway for synthesizing a precursor of farnesol and geraniol. *E. coli* can synthesize ‘geraniol’ by introducing Ocimum basilicum geraniol synthase (*ObGES*). *E. coli* can synthesize ‘farunesol’ by introducing the enzyme reaction rate-limiting step (*ispDF*, *idi*, *dxs*, *ispA*).
A non-mevalonate pathway device is the enzyme reaction rate-limiting step operon. Gene involved in the enzyme reaction rate-limiting step to be introduced towards the *E. coli*. *MarA* is introduced towards *E. coli* in order to increase the antibacterial substance resistance.
‘Flavorator’ is a way to solve food storage problem.

NAIT Edmonton

North America - Canada

Poster:
254 - Zone 8 - Hall D
Presentation:
Friday - Room 311 - 3:00 PM

Development and Characterization of Protein Motifs to Generate Colours upon Interaction with Silver Staining Reagents

SDS-PAGE is a very popular technique used to separate proteins based on their size. Embedded proteins, invisible to the naked eye, are then visualized by staining. Among the various staining techniques, silver staining is easy to perform and highly sensitive. However, the outcome is a series of monochromatic protein bands. Previously, we observed that some proteins inherently produce different hues post-staining. We hypothesized that specific amino acid configurations yield coloured bands after reacting with silver staining reagents. To test our hypothesis, we created numerous amino acid motifs to elucidate the sequences that would generate specific colours following silver staining. Our findings will let us generate a molecular weight marker with the innate capacity of providing users colour-coded bands post-staining without the use of impregnating dyes. Our technology will also pave the way for new types of colorimetric assays using synthetic proteins.

Nanjing NFLS

Asia - China

Poster:
227 - Zone 7 - Hall D
Presentation:
Friday - Room 304 - 11:00 AM

No title

No abstract

Nanjing-China

Asia - China

Poster:
51 - Zone 2 - Hall C
Presentation:
Sunday - Room 311 - 5:00 PM

Metallosniperinnovative total solution for heavy metals

Global problems concerning heavy metals, including metal contamination and metal recovery, have become increasingly significant in the aquatic environment. Among numerous heavy metals, such as toxic metals, noble metals and radioactive metals which can be viewed as potential resources, we focus on lead, gold and uranium. Here by using Bacillus subtilis as a bioreactor, we are working to devise a way to absorb and retrieve heavy metals. A ‘Metallosniper’ targeted at lead, gold and uranium has been successfully engineered. With the feature of producing endospores, we have made it possible for B. subtilis to absorb heavy metals under both benign conditions and adverse circumstances. In a gesture to further improve the efficiency of binding metals, biofilm, cell surface-display system and degradable materials for immobilization are applied in our project. We have also combined all these elements into a unique device for future industrial applications.

Nankai

Asia - China

Poster:
60 - Zone 2 - Hall C
Presentation:
Saturday - Room 302 - 4:30 PM

Pudding Health Kit --Construct a metabolic flux controllable strain to increase poly-γ-glutamic acid production

Poly-γ-glutamic acid (γ-PGA) is an important, naturally occurring polyamide which has been widely used in foods, medicine, cosmetics and agriculture. We improved γ-PGA production in Bacillus amyloliquefaciens LL3 and the produced γ-PGA was made into drug releasing hydrogel. In this study, two strategies were employed to improve B. amyloliquefaciens LL3 γ-PGA production. First, we constructed a metabolic toggle switch to control the expression of odhA (encoding 2-oxoglutarate dehydrogenase), thus interrupting the TCA cycle and favoring the metabolic flux toward γ-PGA precursor-glutamate synthesis. Second, in order to balance the increase of endogenous glutamate production, we optimized the expression level of pgsBCA genes (responsible for γ-PGA synthesis) by replacing its native promoter with seven different promoters with various transcriptional activities. We finally constructed a γ-PGA production improved B. amyloliquefaciens strain. In the meantime, the drug releasing hydrogel, Pudding Health Kit, functioned well protecting the exposed skin and healing the wounds.

NCTU Formosa

Asia - Taiwan

Poster:
114 - Zone 4 - Hall C
Presentation:
Friday - Room 304 - 9:30 AM

The APOllO E.Cotector

Targeted therapy is a kind of cancer treatment that uses medicine or other substances to more precisely identify biomarkers and attack cancer cells. Currently, several targeted therapies are simultaneously used to accurately treat cancer patients. Thus in our project, we established a multiple targeting detection platform. We modified *Escherichia coli (E. coli)* to display single chain fragment variable (scFv) antibodies from targeted drug monoclonal antibodies on the cell membrane to bind with epidermal growth factor receptor (EGFR), vascular endothelial growth factor (VEGF), or human epidermal growth factor receptor 2 (HER 2) antigens.
The three separate anti-EGFR, anti-VEGF, and anti-HER2 E. coli systems can be unified to apply a multi-marker concept before, during, and after treatment. This novel detection approach can help medical professionals by generating more accurate diagnoses, which leads to a better prescription for patients.

NEAU-China

Asia - China

Poster:
207 - Zone 7 - Hall D
Presentation:
Sunday - Room 302 - 9:00 AM

Enzyme BrickScaffold Protein-mediated Assembly of Immobilized Enzyme

Immobilized enzyme technology is a far more efficient process which allows enzymes to be held in place throughout the reaction, therefore,they are easily separated from the products and is widely used in industry for enzyme catalysed reactions.
Cellulosome are muti-enzyme complex present by a variety of cellulases, hemicellulases relying on the specific interaction of cohesion-dockerin.
Based on the cellulosome structure, we propose a method: cellulose as immobilization substrate,
CBM (cellulose-binding module) as fixed labels, using three pairs of specific cohesion-dockerins to build scaffolding protein structure in order to improve the amount of enzyme immobilization, increase the catalytic efficiency of the immobilized enzyme and reduce the cost of purification enzyme. The project is not only a new attempt of immobilized enzyme technology, but also for building multi-immobilized enzyme complex to explore new avenues.

NEFU China

Asia - China

Poster:
19 - Zone 1 - Hall C
Presentation:
Saturday - Room 302 - 9:30 AM

Yogurt Guarder

Yogurt gets bacteria contamination more easily when stored with improper approaches. In this case, shelf-life is not that reliable. Considering the adverse effect that may be caused by bad yogurt, our team aims to create a handy detector for pathogenic bacteria in yogurt. Autoinducer2 (AI-2), a signal molecule in quorum sensing system, serves as the key of our project. We constructed the AI-2 response pathway of Salmonella in Lactobacillus. Produced by pathogenic bacteria, the extracellular AI-2 will enter the cytoplasm of our engineered bacteria, and then lead to the expression of the report gene. As pathogenic bacteria produce AI-2 constantly, our engineered bacteria will make the existence of pathogenic bacteria visible to naked eyes. Furthermore, our genetically engineered Lactobacillus can be used directly in yogurt fermentation, which will make the detecting process even more convenient.

NJAU China

Asia - China

Poster:
42 - Zone 2 - Hall C
Presentation:
Saturday - Room 309 - 3:00 PM

The Horcrux

The most cellular memories are limited to protein levels currently, which are transient, instantaneous and unapparent. To overcome these shortcuts, we design a system to achieve the storage of information by a transient stimulation but use a long-lasting response. The two processes are divided into separated bacterial strains to play as the ‘Recorder’ and the ‘Saver’. The system is designed to be activated and deactivated via light- regulated fusion proteins, which then active protein synthesis to complete the process. The information storage would be accomplished by conjugation, which cannot be carried out in usual time because of the specific gene deletion. When the memory needs to be erased, the CRISPR-Cas9 system in the ‘Saver’ would be activated. By design such a cellular memory technology, we make a bacterial memory storage device. And together with biological transistor and other bio-electronic component, we can preview the prototype of the biological computer.

NJU-China

Asia - China

Poster:
154 - Zone 5 - Hall D
Presentation:
Sunday - Room 306 - 2:30 PM

The Opioid War

Opioids and opiates top the list of illicit drugs and cause the most burden of disease and drug-related deaths worldwide.
The goal of this project is to develop a strategy to treat opioid addiction.
We prepared exosomes (nano-sized vesicles secreted by endogenous cells) from cell factory that was engineered to express a rabies viral glycoprotein peptide (specifically recognize and target neuronal cells) on the exosomal membrane surface. By filling the exosomes with siRNA of the mu opioid receptor (MOR, a primary target for opioids) and injecting the exosomes into mouse bloodstream, we detected efficient passage of the siRNA through blood-brain barrier and specific accumulation of the siRNA in mouse brain. Consequently, siRNA-loaded exosomes significantly reduced MOR mRNA and protein levels in mice. To show the therapeutic potential, siRNA-loaded exosomes strongly restrained morphine-induced conditioned place preference in mice. This project may open up new avenues for future treatment of drug addiction.

Northeastern Boston

North America - United States

Poster:
47 - Zone 2 - Hall C
Presentation:
Friday - Room 304 - 5:00 PM

Standardization of Antibody Production

Northeastern's team will attempt to standardize the production of research and therapeutic antibodies. Part of this will come from the creation of a plasmid for nuclear transformation of microalgae to make glycosylated antibodies, and the other will be from the production and characterization of single-chain fixed variable regions (fused to fluorescent proteins) in E coli. Cumulatively, the project will open the door to new means of manufacturing.

NRP-UEA-Norwich

Europe - United Kingdom

Poster:
231 - Zone 8 - Hall D
Presentation:
Saturday - Room 302 - 10:00 AM

Engineering nutrition to increase colonic butryrate

Colon cancer is the second most common cause of cancer deaths with 30,000 cases diagnosed every year in the United Kingdom. Studies suggest that resistant starches may reduce colon cancer by enabling colonic bacteria to produce short-chain fatty acids, including butyrate. Our project took two approaches to increase colonic butyrate. The first approach was to develop a screen for enzymes that could transfer acyl/butyryl groups to alpha 1,4 carbohydrates in bacteria and plants. To support this we modelled and modified carbohydrate branching. Enzymatic modification of carbohydrates could also provide environmentally-friendly methods for the production of modified starches used in a wide range of industries. The second approach aimed to transfer the butyrate biosynthetic pathway to Escherichia coli. Our work could be applied to the production of butyrylated starches for consumption as prebiotics or butyrate-producing probiotics. We also investigated and compared the feasibility of testing these products for efficacy in humans.

NTNU Trondheim

Europe - Norway

Poster:
128 - Zone 4 - Hall C
Presentation:
Sunday - Room 310 - 2:00 PM

Alginate Encapsulated Glucose Sensors

Team NTNU Trondheim is constructing a novel glucose sensing system, in which the soil bacterium Pseudomonas putida expresses the red fluorescent protein mCherry upon glucose detection (as a proof of concept). To achieve this, the promoters of operons commonly found in P. putida are used. These are negatively controlled; the release of the repressor and thus the expression of subsequent genes is initiated by derivatives of glucose. Further, the engineered bacteria are encapsulated in alginate, a polysaccharide from brown algae. The capsule properties are tailored to best suit our engineered cells and possible applications. Agent-based modeling is conducted to model genetic networks, multiple-physics and growth models. In addition, the iGEM Matchmaker tool is deployed and enhanced with new functionalities.

NTU-LIHPAO-Taiwan

Asia - Taiwan

Poster:
56 - Zone 2 - Hall C
Presentation:
Friday - Room 312 - 2:30 PM

Appetite Controller

Our bacteria will live inside the small intestine and produce a fusion protein composed of cell penetrating peptide and peptide YY. Because of the cell penetrating peptide, the fusion protein will be able to get through the villi and get into the blood vessels.
The special linker between these two components will be cut by the thrombin in the blood. That makes peptide YY still able to combine with Y2R to decrease appetite and help over-weighted people get back to fine diet.

NTU-Singapore

Asia - Singapore

Poster:
148 - Zone 5 - Hall D
Presentation:
Sunday - Room 306 - 5:00 PM

BioElectricity

The world is facing an impending energy crisis due to our over-reliance on fossil fuels, which are rapidly being depleted.
Hence, there is an urgent need to explore alternative energy sources that are renewable and affordable.
A microbial fuel cell (MFC) is an attractive solution to the global energy crisis. It is a device that utilizes microorganisms to convert chemical energy stored in various organic or inorganic compounds to electrical current. In our project, we seek to explore the usage of Shewanella bacteria in MFCs. We are performing flux balance analysis on the metabolic network of Shewanella and are genetically perturbing different nodes in the network to determine if the power output of the MFC can be enhanced.
Additionally, we are developing and characterizing new genetic parts to aid us in our engineering of the Shewanella bacteria.

NU Kazakhstan

Asia - Kazakhstan

Poster:
10 - Zone 1 - Hall C
Presentation:
Friday - Room 310 - 11:30 AM

Prevention of Dental Caries by Targeting Streptococcus Mutans

Streptococcus mutans is the most widely accepted cause of dental caries.
ComX stimulates the transcription of the genes essential for competence. However, there is a chance to reduce ComX level by overexpressing its novel antagonist, XrpA. The highly expressed level of XrpA protein leads to decreased biofilm formation.
Our project aims two goals. The first one is to overexpress the production of XrpA in order to cease the production of ComX protein. The second one will implement CRISPR-dCas9 system in order to block the transcription of VicK gene. VicK is the gene of VicK/VicR signal transduction system in S.mutans that is responsible for acidity tolerance in bacteria. Thus, second system will combine sgRNA for VicK and dCas9 to reduce lactic acid production. Smart systems will be eliminated by blue light safety regulation system that targets origin of replication of the plasmid constructs.

NUDT CHINA

Asia - China

Poster:
26 - Zone 1 - Hall C
Presentation:
Friday - Room 309 - 3:00 PM

Engineering of an multi-enzymatic reaction accelerator based on TALE

Prokaryotic cells have been widely applied in synthetic biology and bio-engineering as the host organism. However, lacking of the compartmentation of the heterologous metabolic enzymes may cause a low production or efficacy of the product, especially when producing through a complex multi-enzymatic cascade. In this study, we developed a new method to accelerate a multi-enzymatic reaction by integration of a TALE-based scaffold system into the bacteria chassis. In this system, different TALE proteins, which could specifically target the corresponding DNA binding motifs, were generated and fused with fragmented GFP or multi-enzymes (e.g., IAAM and IAAH).
The results showed that TALE-based scaffold system could not only efficiently guide the fragmented GFP around the DNA scaffolds and display strong fluorescence, but also promote the rate of IAA production.
To our knowledge, this technique might provide a powerful way in synthesizing multi-enzymatic reaction programs in prokaryotic chassis for a wide range of application.

NYMU-Taipei

Asia - Taiwan

Poster:
22 - Zone 1 - Hall C
Presentation:
Sunday - Room 312 - 9:00 AM

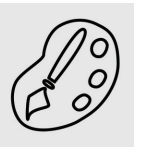
Fight the Blight

Phytophthora infestans is the causal agent of late blight disease of several members from the Solanaceae family. Potato, the third most important food crop in the world and a source of major agricultural income in many countries, easily falls victim to P. infestans. Yet most existing approaches are ineffective and have certain drawbacks.
This year, the NYMU-Taipei iGEM team creates a systematic disease control method that can prevent, detect, and cure potato late blight. Inspired by competitive inhibition in pharmacology, we designed a ligand with higher affinity to block the entrance of P. infestans effector proteins.
To detect infection in the plant, we devised a soil-based microbial fuel cell (SMFC) detecting salicylic acid emission and producing oscillating current.
We also characterized a new defensin to inhibit nutrient absorption and further growth of the oomycete. Our goal is to provide an easily-practiced standard procedure for anyone involved in the production line.

NYU Shanghai

Asia - China

Poster:
210 - Zone 7 - Hall D
Presentation:
Sunday - Room 309 - 9:00 AM



SYNTH

This Bacterial Music Generator translates the color and positions of bacteria colonies on a plate into sound composition. Integrating the unpredictable nature of life with digital technology, we aim to introduce new forms of bio-data into the sound domain. We engineered E.coli expressing chromoproteins, fluorescent proteins, or luciferase to produce colors visible under white light. Processing converts an image of the bacterial plate into binary data and grid-form. Using the grid as a step sequencer, we can generate patterned sounds.

NYU-AD

Asia - United Arab Emirates

Poster:
132 - Zone 4 - Hall C
Presentation:
Friday - Room 312 - 2:00 PM

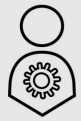
Self-sustaining, E. coli-based mosquito trap

The NYUAD iGEM team aims to create a self-sustaining mosquito trap. The trap attracts mosquitoes by secreting indole and lactic acid, both of which are highly attractive to a broad range of mosquitoes. Indole is produced from tryptophan by E.coli with the genes tnaA and tnaB. Similarly, lactic acid is produced from fructose by E.coli with the gene lldD. After being attracted by the two organic compounds and flying into the trap, the mosquitoes will be stunned and electrocuted by an electric mesh. They will fall onto the medium containing the E.coli. The hard exoskeleton of the mosquitoes is digested by chitinase (produced by the gene ChiA in E.coli). With the hard outer exoskeletons removed, the mosquitoes serve as a carbon source to maintain E. coli's growth, hence creating a self-sustaining system. We hope that this trap will provide a cheap, sustainable alternative to current mosquito traps.

OLS Canmore AB CA

North America - Canada

Poster:
95 - Zone 3 - Hall C
Presentation:
Saturday - Room 304 - 10:00 AM



The BreaKERs - Developing Bacterial Keratinase Expression to Degrade Human Hair and Chicken Feathers

Optimizing keratinase expression provides a great opportunity to impact the management of the estimated 8.5 billion tons of poultry feather from farms globally as well as the tons of human hair clogging up waste water treatment facilities worldwide. Also, bio-degraded keratin from chicken feathers has been shown to be useful for commodity products such as fertilizers and livestock feeds. Our team is developing two keratinase-producing E. coli bacteria using the KERA and KERUS genetic sequences found naturally in the Bacillus genera. The KERA and KERUS sequences will be optimized for expression in E. coli, synthesized into plasmid rings, and ligated into a standard biobrick backbone for submission to the iGem parts registry. An IPTG-inducible promotor (part BBa_J04500) from the standard registry of parts will then be added to each KER gene to express this protein.

OUC-China

Asia - China

Poster:
71 - Zone 3 - Hall C
Presentation:
Saturday - Room 312 - 4:00 PM

Magthero coli

This summer, we are trying to design a platform responsed to electromagnetic signal. This platform is composed of 2 sessions: magnetic receiver and thermosensitive regulator. For magnetic receiver, we chose ferritin, the iron-storage protein in organisms, which could synthesize ferric oxihydroxide core in its hollow protein shell. When exposed to electromagnetic field, the ferric oxihydroxide core would be heated, which would trigger thermosensitive regulator. For thermosensitive regulator, we chose RNA thermometer and constructed a thermosensitive T7 RNA polymerase. RNA thermometer is a structured RNA which could expose RBS only when heated. The thermosensitive T7 RNA polymerase is a normal T7 RNA polymerase at the selected locus of which was inserted by a temperature-sensitive intein, which could self-splice at specific temperature.

Oxford

Europe - United Kingdom

Poster:
229 - Zone 8 - Hall D
Presentation:
Sunday - Room 304 - 11:30 AM

Release of biofilm-disrupting and antimicrobial proteins from E.coli via targeted secretion and host cell lysis

The project aims to investigate how bacterial biofilm-disrupting and antimicrobial proteins can be exported from E. coli, to include an analysis of their respective functions against pathogenic bacteria. The proteins Dispersin B, Microcin S, DNase, and Artilysin will be expressed from commercial pBAD expression vectors with N-terminal fusion tags to target them for export via the DsbA (Sec), YebF (Porin), and flagellar export pathways in E. coli. Additionally, the holin gene will be expressed under the control of bacterial quorum sensing-responsive promoters in conjunction with the Artilysin to cause host cell lysis and release of these proteins from the cytoplasm on detection of a target cell density.

PacificU-Oregon

North America - United States

Poster:
242 - Zone 8 - Hall D
Presentation:
Saturday - Room 306 - 11:00 AM

Creation of Novel Construction Materials from Insect Cuticle Proteins

We are investigating the use of several insect cuticle proteins for use as a novel, 3D printable protein matrix to be used in construction and consumer products. Insect exoskeletons have a wide variety of properties and strengths that make them ideal for use in construction, particularly those found in the beetle elytra.
Some elytra have been measured to have a greater strength-to-weight ratio than concrete, and at sufficient density make for formidable armor. Our research has shown that by controlling the expression of phenoloxidases, the hardening of the cuticle proteins can be indirectly controlled. This provides us with a mechanism to harden a 3D printed cell suspension into a high-density concrete-like protein matrix.

Paris Bettencourt

Europe - France

Poster:
192 - Zone 6 - Hall D
Presentation:
Saturday - Room 310 - 11:30 AM

Ferment It Yourself

Food fermentation is practiced by every culture in the world, and is especially widespread throughout the Indian subcontinent. Although fermentation enriches foods with some essential vitamins and amino acids, many regions of the subcontinent still suffer from high malnutrition. We are addressing this problem by engineering *S. cerevisiae* and lactobacilli, commonly found in Indian fermented rice dishes, to enrich foods with vitamins A, B2, and B12, and bioavailable iron.
We also implemented a differentiation system for reducing the fitness cost of over-expression of multiple pathways, and an easy E. coli sensor for measuring vitamin concentration using a riboswitch.
Our user-centered approach incorporates a low-cost and open hardware framework, both for growing and distributing starter cultures, and for quality control. This will give local affected populations power over their own food, as opposed to other GMO nutritional enrichment strategies, by allowing them to grow their own source of vitamins.

Paris Saclay

Europe - France

Poster:
221 - Zone 7 - Hall D
Presentation:
Saturday - Room 311 - 2:30 PM

SafetE.coli

The iGEM competition is the birthplace to many innovative ideas aimed at improving processes in synthetic biology by working with Genetically Engineered Organisms (GEO). However, most projects involve a risk of **GEOs dissemination** outside the laboratory, which raises environmental issues. To prevent such a risk, we designed a biosafety system that would prevent or at least dramatically limit the chances of accidental GEO spreading. The system consists in both a **physical confinement** which still allows the GEO to carry out its main function, and a **temperature-based containment** which ensures the survival of the organism in a restricted temperature range. *Escherichia coli* was chosen to implement the temperature based system due to its wide use in the iGEM projects. Thus, our system dubbed **SafetE.coli** could provide the iGEM teams with a 'safer' chassis which is less likely to contaminate the environment.

Pasteur Paris

Europe - France

Poster:
214 - Zone 7 - Hall D
Presentation:
Saturday - Room 311 - 9:30 AM

PlastiCure, or the unexpected virtue of bottles

What if plastic could cure people?
Today, scientists are looking for new ways to synthesize drugs. As one of the major pollutants, plastic waste is a growing resource with **25 million tons** produced in 2014 in Europe alone. Because of their composition, plastics have a very slow degradation rate and produce persistent organic pollutants. This leads to an increase of **plastic pollution** and an accumulation of plastic microparticules in our ecosystem, especially in the oceans. **PlastiCure** is a biological system designed in *E.coli* to degrade **polyethylene terephthalate** and use the degradation products to synthesize a commonly used antibiotic: **Erythromycin A**. For this, exogenous DNA sequences are integrated in multiple operons to express the **biodegradation** pathway (22kb) and the **biosynthesis** pathway (55kb). PlastiCure is a very innovative project to address an environmental issue, plastic pollution, by degrading plastic into a profitable transformation product and thus increase efforts in plastic recycling.

Peking

Asia - China

Poster:
97 - Zone 4 - Hall C
Presentation:
Saturday - Room 302 - 11:30 AM

Fighting Against Tuberculosis: Making Invisible Visible

Tuberculosis (TB), caused by *Mycobacterium tuberculosis*, remains one of the world's most serious public health problems.
Although tuberculosis is curable and the treatment success rate is high, it is still the second most common cause of death from infectious disease. Most of the deaths occur for lack of effective identification of those in need of therapy. Case detection is currently the rate-limiting step in TB control. A diagnostic tool with high sensitivities and specificities is desired urgently, and it is supposed to be used at the point-of-care within a clinic or in the community.
To obviate such problems, Peking iGEM is developing a novel *Mycobacterium tuberculosis* detection system that can transform biomarkers of TB into optical signal or electric signal. Combined with our work in software and hardware development, this new advanced system can be turned out as a powerful tool in TB diagnosis, with high sensitivities and specificities.

Penn

North America - United States

Poster:
69 - Zone 3 - Hall C
Presentation:
Friday - Room 302 - 4:00 PM

The Language of Light: A Biological Analog of the Optocoupler

Communication between cells is instrumental in coordinating population-level activity. In a process known as 'quorum sensing,' bacteria both secrete and sense autoinducer signaling molecules to enable synchronization of group gene expression paradigms.
The synthetic biology community has rapidly adopted these quorum signaling pathways for use in programmed circuitry.
However, chemical signals must diffuse between sender and receiver cells, limiting such communication to a common environment. In electronics, when electrical signals must be transferred between two circuits operating at incompatible voltages, electrical engineers use optocouplers, components that transfer information between isolated circuits via light.
The 2015 Penn iGEM team presents a biological analog of the optocoupler, a cell-to-cell communication system in which a 'sender' cell generates light via bioluminesence and a 'receiver' cell expresses photoreceptors to enable light-dependent physiological responses. We show that light elicits a response in light-sensitive receivers and illuminated potential applications for this alternative form of cell communication.

Pitt

North America - United States

Poster:
123 - Zone 4 - Hall C
Presentation:
Sunday - Room 311 - 11:00 AM

Paper-based synthetic gene networks for point-of-care diagnostics.

We aim to create inexpensive at-home point-of-care diagnostics that can provide users with rapid clinical diagnosis for various medical conditions similar to that of the at-home pregnancy test. Our project is based on the recently reported paper-based sensing platform in which cell-free extracts were freeze-dried on paper with synthetic gene networks. Previous sensors were shown to be stable for over a year with refrigeration and able to give a readable gene output within 1hr. Our group is using this framework to sense new classes of biomolecules from human samples including hormones, proteases, and antibodies specifically, estrogens in water sources, matrix metalloproteinases found in urine of patients with kidney, prostate, and colorectal cancers; Mucin 1-specific antibodies in human serum, a prognostic marker for colorectal, breast, and pancreatic cancer outcomes.
Finally, we are also creating higher-order signal processing devices allowing conversion of analog gene circuit signals to a digital yes/no output.

Pretoria UP

Africa - South Africa

Poster:
253 - Zone 8 - Hall D
Presentation:
Friday - Room 311 - 2:00 PM

Switch-coli

Transcriptional switches form an integral part of synthetic biology. In the absence of positive feedback loops these systems are unstable since they require the maintained presence of a regulator. DNA switches based on heritable genetic modifications can allow for a permanent change in gene expression even in the absence of the initial signal. The Cre-Lox recombinase system from the P1 bacteriophage has been successfully used in genetic manipulation to excise targeted DNA fragments. Our aim is to use the Cre-Lox recombinase system to trigger a heritable genetic switch that allows for irreversible ON/OFF programming as an alternative to positive feedback loops. We are testing different approaches relying on the inversion and excision of lox-flanked DNA parts.
Our long term goal is to integrate this system with signals from quorum sensing and a logic gate to program conditional chemotaxis in motile E. coli.

Purdue

North America - United States

Poster:
139 - Zone 5 - Hall D
Presentation:
Friday - Room 312 - 4:00 PM

Dead Ligmen Tell No Tales: Development of Synthetic Yeast for Enzymatic Pretreatment of Lignocellulosic Biomass

The production of some biofuels is inhibited by lignin, a complex organic polymer which physically blocks carbohydrate substrates and inhibits biomass degrading enzymes (BDEs).
A common biofuel practice is to sequester lignin using energy-intensive thermal pretreatment. The recent development of a synthetic yeast that spatially separates lignin degradation products from vulnerable BDEs enables an efficient lignin breakdown system to reduce the energy input for biofuel production. By expressing enzymes from lignin-degrading species (termites and white rot fungi), we aim to establish a novel enzymatic pretreatment system in a yeast chassis. Six enzymes were selected for their ability to operate at room temperature and standard pH. The expressed enzymes were evaluated individually and in combination for lignin-degradation efficiency. Furthermore, we designed an additional vector to contain our genetically modified yeast using an oxygen-repressed killswitch.

Queens Canada

North America - Canada

Poster:
250 - Zone 8 - Hall D
Presentation:
Saturday - Room 306 - 10:00 AM

Breaking the Ice: Improving Antifreeze Proteins for Practical Use

Each year, increasing numbers of individuals are added to organ wait lists worldwide. This is met with an ongoing shortage of donor organs, in part, limited by preservation technologies.
A human heart can currently be stored for 6 hours before significant tissue damage results in a non-viable organ. QGEM aims to use antifreeze proteins (AFPs), natural proteins that enable certain organisms to survive in sub-zero climates, to rectify this limitation. We have engineered two classes of AFPs focused on improving protein function and stability, respectively.
Our primary objective has been the development of an anchoring system to increase local concentration of AFPs by attachment to a self-assembling scaffold. This system increases the probability of favorable interaction with ice surfaces thereby improving AFP activity.
Our secondary project structurally modifies an AFP, enabling the protein to withstand a more diverse chemical environment. This increases potential industrial applications in food and energy sectors.

Reading

Europe - United Kingdom

Poster:
215 - Zone 7 - Hall D
Presentation:
Friday - Room 311 - 11:00 AM

Innovating living photovoltaics: Renewable energy from Cyanobacteria

Conventional photovoltaics provide a clean source of renewable energy but have the disadvantages of being expensive and containing toxic materials. This years iGEM project was to develop a cheaper, non-toxic, alternative to conventional fuel cells; using synthetic biology. Biological photovoltaics (BPV) are a promising candidate to provide an alternative. Our BPV uses the Cyanobacterium Synechocystis sp. PCC 6803 as the electron source.
Using a purpose built fuel cell and Synechocystis, which has been genetically modified to improve interactions between the bacterium and the anode surface, enables the BPV to generate a greater voltage. This BPV will be considered for large scale usage in homes and communities worldwide as a cheap, simple and clean alternative to conventional energy sources.

RHIT

North America - United States

Poster:
6 - Zone 1 - Hall C
Presentation:
Saturday - Room 311 - 11:00 AM

MitochONdriOFF: Controlling Aerobic Respiration

The yeast *Saccharomyces cerevisiae* is used industrially to produce valuable products via fermentation. Many of these products are produced under anaerobic conditions, when the electron transport chain in mitochondria lacks the terminal electron acceptor and oxidative phosphorylation ceases. The goal of our project is to control aerobic respiration by manipulating the expression of mitochondrial ribosomal protein S12. This protein, which is encoded by the nuclear MRPS12 gene, is essential for the function of mitochondrial ribosomes and the synthesis of key components of the electron transport chain. We propose that the production of secondary metabolites in yeast could be optimized by purposefully regulating aerobic respiration during industrial fermentations.

Rock Ridge Virginia

North America - United States

Poster:
93 - Zone 3 - Hall C
Presentation:
Saturday - Room 304 - 9:00 AM

A Living Vaccine to Combat Insect-Borne Diseases

Lyme disease is carried by the Lyme bacteria. The ability of Lyme to adapt to its different hosts' environments has made this disease difficult to treat and detect. Our project, uses this ability to specifically target Lyme when it is found in Ticks. Our construct expresses three proteins: OspA, which binds to the tick's TROSPA in the gut and prevents Lyme infection, Wolbachia Surface Protein, which allows for vertical transmission of the Live Vaccine bacteria and it also tempers the insect's immune system, and GFP, which is used as an indicator protein. The construct is transfected in DH5Alpha E. Coli and it is tested in Drosophila (to check for vertical transmission) before being inserted into ticks. Since Lyme disease is not the only vector-born disease originated in insects, this Live Vaccine can be used for other diseases such as West Nile Virus, Dengue, Malaria, Yellow Fever etc .

San Andres

Latin America - Chile

Poster:
195 - Zone 6 - Hall D
Presentation:
Saturday - Room 309 - 11:30 AM

No title

No abstract

Santa Clara

North America - United States

Poster:
130 - Zone 4 - Hall C
Presentation:
Friday - Room 302 - 12:00 PM

Achieving greater microbial aciduricity through the *Escherichia coli* cyclopropane fatty acid system.

Cyclopropane fatty acid (CFA) synthesis is triggered as a response to acid stress in *Escherichia coli* in order to chemical modify its lipid bilayer and decrease its permeability to surrounding acids. The addition of the cyclopropane ring to fatty acid chains creates a sterically hindered path for acidic compounds attempting to cross the plasma membrane, thereby reducing the passive entrance of unwanted acids. We are aiming to standardize this acid defense system so that it may be implemented in other microorganisms to increase their survival under low pH conditions. By utilizing acid-resistant microbes, it is possible to decrease the running costs of bioreactors that are hindered by acid buildup from metabolic processes. Moreover, given that microbes often transition to stationary phase during acid stress, this CFA system may enable higher cell densities and biosynthetic yields in cell cultures because genetically modified microorganisms may more readily tolerate acidic conditions during growth.

SCU China

Asia - China

Poster:
131 - Zone 4 - Hall C
Presentation:
Saturday - Room 311 - 3:00 PM

E. pangu: The Pioneer of Mars

The discovery of Kepler-452b called public attention on space migration again. As a matter of fact, the immigration to Mars, the most earthlike planet in solar system, still should be considered as priority. It is noticeable that CO2 and N2 occupy almost 98% of Martian atmosphere. Thus, we engineered two types of E.coli, which carry out anaerobic carbon fixation with Acetyl-CoA Synthetase/Carbon Monoxide Dehydrogenase(ACS/CODH) system, and nitrogen fixation with Paenibacillus nitrogenase respectively. Based on this purpose, they are called E. Pangu collectively, which is named after the creator of universe, Pan Gu in Chinese mythology. E. pangu is designated to play the role of pioneer organism on Mars immigration. In addition, we used CRISPR-Cas 9 technique to confirm the reliability of our carbon fixation system and verified a promoter part which can be induced by Rhl and repressed by Las.

SCUT

Asia - China

Poster:
106 - Zone 4 - Hall C
Presentation:
Sunday - Room 312 - 9:30 AM

Super Cadmium Ion Killer: Engineering E.coli to adsorb cadmium ion during the sewage treatment process

Cadmium ion pollution has seriously affected people's health, agriculture and graziery from all aspects. This year our team attemps to design a novel and effective device in order to remediate global cadmium ion pollution. To solve this problem, we combine the curli nanofibers CsgA protein on the surface of E.coli with synthetic phytochelatins (ECs), which are analogs of phytochelatins (PCs). ECs are able to chelate with cadmium ion. Our engineered bacteria can also identify different concentrations of cadmium ion turning blue for low concentration and red for high concentration.

Scut-Champion-Park

Asia - China

Poster:
170 - Zone 6 - Hall D
Presentation:
Saturday - Room 310 - 12:00 PM

Research on Biosensor of Tetracycline in food by Synthetic Biology

The misuse of antibiotics is endangering human health and ecological balance. In terms of medicine use, we can develop standards to use antibiotics reasonably. But agricultural uses of antibiotics produce environmental exposures in a variety of reservoirs, which are impossible to be guarded against. Our group has developed a simple, reliable and efficient method to measure the antibiotics.Our Tetracycline biosensor can detect the tetracycline residues in agricultural products (such as: meat, eggs, milk, etc.). Our group constructed the tetracycline inducible expression system. And through plasmid mediated, the system was transfected into Escherichia coli TOP10 and GS115 Pichia pastoris. It can generate a rtTA transcription activation factor in cells. RtTA combining with tetracycline antibiotics can activate the fluorescent protein expression system, which can indicate the residue level of tetracycline by fluorescence detection.

SCUT-China

Asia - China

Poster:
138 - Zone 5 - Hall D
Presentation:
Friday - Room 311 - 4:00 PM

Myocardial Guard

Cardiovascular diseases are the leading cause of death in many developed countries. Cyclic guanosine monophosphate (cGMP) is a critical second messenger molecule involved in myocardial diseases such as hypertrophy.This summer, we try to use synthetic biology to modify the cGMP metabolic pathway in a human cell line. We hope that our work would provide the proof of principle for future gene therapy. cGMP can transduce nitric oxide and natriuretic peptide coupled signaling and remit the myocardial hypertrophy by relaxing the blood vessels. We up-regulate the soluble guanylate cyclase(sGC), an enzyme that synthesize cGMP from GTP, by overexpressing the α and β subunits of sGC in a mammalian cell line. However, elevated level of cGMP leads to the feed-back expression of PDE5A, a cGMP-specific phosphodiesteras that degrades cGMP. Thus, we further modify the pathway by knocking down the PDE5A gene. To achieve controllable up-regulation of cGMP level in the cell, we also propose a hypoxia-inducible operon,HRE,as a switch to up regulate cGMP only in hypoxia situation.

SDA-Encinitas

North America - United States

Poster:
228 - Zone 7 - Hall D
Presentation:
Friday - Room 302 - 9:00 AM

No title

No abstract

SDU-Denmark

Europe - Denmark

Poster:
241 - Zone 8 - Hall D
Presentation:
Friday - Room 302 - 11:00 AM

Petide Aptamer Screening using Two-hybrid system P.A.S.T. is the future

The nowadays production methods of antibodies are not only time-consuming and costly but are at the expense of animal lives. Antibodies have many applications in research, diagnostics, and show great promise in treatment of cancer.
But the advancement is held back due to the expensive and tiresome production. Therefore we propose an alternative to antibodies; peptide aptamers produced in Escherichia coli (E. coli). The variable loop of the peptide aptamer is generated through a random nucleotide library and held together by an enzymatic inactive version of human Thioredoxin (hThx) as a scaffold protein. We are using the bacterial two-hybrid system to screen for functioning peptide aptamers that are able to bind our chosen target proteins (‘antigens’). In this model bacteria expressing a functioning peptide aptamer will express Red Fluorescent Protein (RFP), which enables us to isolate them. To challenge the antibody tradition, we are also proposing a production model.

SF Bay Area DIYBio

North America - United States

Poster:
256 - Zone 8 - Hall D
Presentation:
Sunday - Room 306 - 12:00 PM

BioSunBlock - Evolved Sunscreen for Bacteria

Cyanobacteria and several other organisms have evolved microbial sunscreens to survive in environments with high UV-A and UV-B radiation. These protective compounds, specifically mycosporines and mycosporine-like amino acids, defend against oxidative stress by quenching free radicals and preventing cellular damage. A putative mycosporine-synthesizing gene cluster in the cyanobacteria Anabaena variabilis has been characterized previously. Our team seeks to optimize these genes for high-volume expression in E. coli and study their effects on bacterial survival rates under high-UV environments. The standardization of these genetic components into the iGEM registry will help foster collaborative research into the potential applications of mycosporine-like amino acids as alternatives to toxic synthetic sunscreens, protection for terraforming bacteria in harsh UV environments, and as antibiotic-free selectable markers for genetic engineering.

Shenzhen SFLS

Asia - China

Poster:
126 - Zone 4 - Hall C
Presentation:
Friday - Room 304 - 11:30 AM

Switchgen:effector protein deliverer

Aiming at making drug delivering more accurate and efficient, we constructed a switch-like system called ‘Switchgen’.
Our system is designed to release a fused protein to deliver an effector protein to the targeted cells on which a certain surface antigen is ‘detected’ in the way of binding the specific antibody connected to the fused protein. The specific binding and the short range activating allow our system to perform a high quality of delivering as we expected.
We purposed to use FRET to verify if our idea could be put into practice and believed that we will achieve impressive results.
The value of our project is at the same time demonstrated in its variety. With different effector protein linked to the fused protein, it provides us with infinite choices: to relieve pain, to massacre cancerous cells, to activate downstream reactions venturing a promising thinking in medication.

Sherbrooke

North America - Canada

Poster:
143 - Zone 5 - Hall D
Presentation:
Sunday - Room 312 - 11:00 AM

Biobot - Design and Build an Automated Robotic Platform for Synthetic Biology Protocols

Nowaday, everywhere we look, we constantly see more and more automated equipment and systems. This is true for a lot of technologies and industries. However, this is not really the case for synthetic biology lab. Almost every manipulations are man-made. These manipulations are often really long, repetitive and require precision and dexterity. That would be great tasks to assign to a robot since they can easily meet all the requirements. This is exactly what Biobot project is all about: design and build a robotic platform to automate biology lab protocols. Manipulations included in the protocols and supported by our platform are pipetting, magnetisation, temperature control, turbidity measurement, and centrifuging.

Shiyan SY China

Asia - China

Poster:
230 - Zone 8 - Hall D
Presentation:
Friday - Room 302 - 9:30 AM

pesticide residue killer

With increased agriculture activities around the world, it becomes a common practice to use pesticides to manage pest problem. Runoff can carry field pesticide into aquatic environment while wind can carry them to other fields, potentially affecting other species. Over time, repeated application increases pest resistance and facilitate the pest resurgence. Further, especially in China, toxic pesticide residues on green vegetable and fruits become a major public health problem.
In order to provide a solution, we design an engineered bacterium, secreting the OMP enzyme to degrade the common toxic pesticide residues. Its secretion is under the temperature control and can only be activated at specified temperature. To avoid the secondary pollution, a UV-induced suicide gene is inserted into the bacteria: upon exposure to UV or sunshine, the suicide procedure is induced. This purpose of the design is to remove toxic pesticide safely without affecting the environment.

SJTU-BioX-Shanghai

Asia - China

Poster:
184 - Zone 6 - Hall D
Presentation:
Sunday - Room 304 - 4:00 PM

Cyano Pac-man

This year, we will engineer a recombinant cyanobacteria to achieve ‘biodesalination’, which means to extract sodium chloride from seawater through biological membranes. There are already some methods to convert saltwater into freshwater, such as distillation and reverse osmosis. However, the high energy consumption of these technologies has limited their application. Therefore the development of an innovative, low-energy biological desalination process, by biological membranes of cyanobacteria, would be very attractive. Many cyanobacteria possess salt-tolerance mechanisms, among which sodium export is the most important one. Halorhodopsin is a light-driven inward-directed chloride pump from halobacteria. We will functionally express it in cyanobacteria to drive influx of chloride together with sodium, thus conferring cyanobacteria the ability to absorb salts to a significant degree.

SJTU-Software

Asia - China

Poster:
179 - Zone 6 - Hall D
Presentation:
Sunday - Room 302 - 11:00 AM

BASE: a multi-level biobrick evaluation and visualization system

Many existing biobricks are not well documented, which make it challenging to use them. Here we present a web-based tool BASE (Biobrick Auxiliary Selection Explorer) to search, evaluate and visualize biobricks at part, devise and system levels. At part-level, similar to our work last year, biobrick parts are scored according to their current status, user comments and reviews, times of citation and etc. At device level, features, such as the order of parts and the co-existence frequency of two parts in a device, are added into the scoring system. At system-level, the regulation relationship between devices is added to the scoring system. At each level, the biobricks can be searched, evaluated and ranked according to their scores.
A visualization function is also provided.
In addition, the score can also be calculated according to a user-defined configuration, and an automatic adjusting system is also provided to incorporate users' selection preference.

SKLBC-China

Asia - China

Poster:
27 - Zone 1 - Hall C
Presentation:
Saturday - Room 310 - 4:30 PM

WEiGEM 2.0: 20000+ Bio-bricks in Your Pocket

Bio-brick stands a pivotal status in all iGEM experiments, being the base of synthetic biology. Targeting iGEM community, we upgraded WEiGEM 2.0, a cloud-based bio-brick search engine, by new features including optimizing the search algorithm, personalized search options, auto-addition of prefix and suffix and instant mark-and-share your bio-bricks on your mobile phones. With in-time and well-sifted biology articles, WEiGEM 2.0 serves as an educational and social media center where iGEMers' ideas flow toward biology lovers. We further developed an education tool kit '1kg Bio-Box' to engage potential millions of students in remote areas of China into synthetic biology. In conclusion, we manage to build bridges in connecting thousands of bio-bricks to iGEM community and public.

SKLBC-DGSYZX

Asia - China

Poster:
152 - Zone 5 - Hall D
Presentation:
Sunday - Room 309 - 11:00 AM

Synsketch - An innovative solution for standardized genetic circuits

Genetic circuits display the essence design of an iGEM experiment. However, the diversity in visual styles of circuits not only hinders learners of synthetic biology, but also costs iGEMers lots of time in completion of genetic circuits with current graphic design tools. Synsketch is our solution to design, modify, learn and share standardized genetic circuits easily and efficiently. With additional functions including personal account, multi-language interface and well-classified tags, Synsketch is able to inspire scientific curiosity among the public. We further develop it into an freemium educational business model for self-paced learning in project design of synthetic biology. As a result, in combination of technology and business model, we manage to create a online genetic circuits designing tool bringing iGEM to everyone, everywhere.

Slovenia HS

Europe - Slovenia

Poster:
258 - Zone 8 - Hall D
Presentation:
Friday - Room 306 - 5:00 PM

From waste to fuel: reprogrammed E. coli for sustainable production of biobutanol from butyric acid

Butanol has proven to be effective as a biofuel and can be used in internal combustion engines without modification, thus reducing the need for already scarce oil. In nature, bacteria of Clostridium genus have been shown to produce butanol from butanoic acid. In the present study, C. acetobutylicum metabolic pathway for butanol production was introduced into E. coli via a construct, consisting of three genes (CtfA, CtfB and BdhB). Polypeptide CtfAB converts butyrate to butyryl-CoA, which is then transformed to butanol by means of BdhB dehydrogenase. Butyrate is formed as an intermediate product in a reaction pathway of direct biological conversion of waste.
We successfully composed an optimized system of bioreactors to produce pure butanol and use all side products formed. In the first stage the waste is converted to biogas, natural fertilizer and butyrate, the latter being efficiently transformed to biobutanol in the second stage.

SPSingapore

Asia - Singapore

Poster:
244 - Zone 8 - Hall D
Presentation:
Saturday - Room 306 - 9:30 AM

Controlled missiles: Targeted treatment of tumors with engineered E. coli

Conventional chemotherapeutic drugs are unable to penetrate the tumour core, and a drug delivery vehicle is needed for effective delivery of therapeutics.
Facultative anaerobic bacteria possess the ability to colonise the tumour core, and pose as suitable vectors. To ensure specific control of bacterial vectors, we intend to implement a two switch regulatory system, consisting of an anaerobic-responsive FNR promoter and a quorum-sensing system (QS).
An anaerobic-responsive FNR promoter can be used to localise transcription of the target gene in the hypoxic tumor core. The second switch will use the esa QS system from Pantoea stewartii to activate bacterial density induced transcription of genes. The above two systems could be coupled to drive the expression of invasin and listeriolysin, which facilitate bacterial invasion and endosomal escape into the cell cytosol. The bacteria vehicle would then be able to deliver an encoded therapeutic into the target tumour cells.

Stanford-Brown

North America - United States

Poster:
165 - Zone 5 - Hall D
Presentation:
Saturday - Room 312 - 10:00 AM

biOrigami: A New Approach to Reduce the Cost of Space Missions

Space exploration lies at the inquisitive core of human nature, yet high costs hinder the advancement of this frontier. We are harnessing the replicative properties of biology to create biOrigamibiological, self-folding origamito reduce the mass, volume, and assembly time of materials needed for space missions. biOrigami consists of two main components: manufacturing substrates biologically and bioengineering folding mechanisms.
For substrates, we are developing new BioBricks to synthesize two thermoplastics: polystyrene and polyhydroxyalkanoates.
For folding mechanisms, we are using heat-induced contraction of thermoplastics and the contractile properties of bacterial spores. After consulting with experts, we believe that biOrigami could be incorporated into rovers, solar sails, and more.
In addition to biOrigami, we are creating a novel method to efficiently transform bacteria by using the CRISPR/Cas9 system, benefitting the broader synthetic biology community. Our project integrates and improves manufacturing processes for space exploration on both the micro and macro levels.

Stockholm

Europe - Sweden

Poster:
83 - Zone 3 - Hall C
Presentation:
Sunday - Room 304 - 12:00 PM

ABBBA The Affibody-Based Bacterial Biomarker Assay

Early disease diagnosis still represents one of the most crucial issues in modern medicine. Despite great advances in high-throughput technologies and the discovery of several hundred new disease biomarkers, we are currently still unable to detect diseases specifically and sensitively when they are most vulnerable, at the beginning. We want to develop a transferable, biological detection system for different diseases using HER-2, a breast cancer biomarker, for a proof-of-prinicple. Therefore, we created a novel class of chimeric receptors based on the bacterial osmoregulator EnvZ. We substituted a part of the periplasmic domain of EnvZ with an exchangable, but highly-specific protein binder, an Affibody molecule. Upon antigen binding, the receptor would trigger the OmpR signaling cascade leading to the production of quorom sensing molecules which activate transcription of a fluorescent signal in a separated read-out strain. Taken together, this system could be a transferable method for biomarker detection.

Stony Brook

North America - United States

Poster:
34 - Zone 1 - Hall C
Presentation:
Saturday - Room 302 - 4:00 PM

Nephrotides: Regulating Blood Glucose Levels with Peptide Secreting Microbes

Current treatments for diabetes are effective in the short term but require patients to constantly monitor their blood sugar. We aim to create a durable system that can independently regulate blood glucose levels to prevent hyperglycemic crises and improve the quality of life of type II diabetics. We engineered E. coli that can detect changes in blood osmolarity and release pharmacologically active tripeptides in response. The tripeptides act on the kidneys by inhibiting the SGLT1 and SGLT2, two channels proteins that re-uptake glucose out of the urine. By inhibiting this reabsorption, the body is able to excrete excess glucose to counteract hyperglycemia.
As of now, our system relies on a general sensor for blood osmolarity, but future studies will implement a more specific sensor for glucose through a modification of the lac operon.

SVA-NYC

North America - United States

Poster:
211 - Zone 7 - Hall D
Presentation:
Sunday - Room 309 - 9:30 AM

Soiled

Taking a clue from the tests field technicians perform on soil samples, 'Soiled' applies color as a metric for nutritional analysis. Such sampling assesses the concentration and presence of chemicals vital to optimal growth. In contrast to most of the toxic reagents used in the industry standard, we propose the construction of a device that will utilize biological means to detect nutrient value. What harmful reagents cannot be substituted will be minimized within a microfluidic chip housed in a mobile device with a compatible app, limiting exposure and increasing the accuracy of the results.
The physical manifestation of our project will take the form of a Bio Art Installation, utilizing data taken from NYC backyards.
Various graphic charts and laboratory consumables, light sources and color-aid papers will be employed to form a cohesive aesthetic experience, in keeping with the parameters of New Media art, reflecting recent trends in urban gardening.

SVCE Chennai

Asia - India

Poster:
190 - Zone 6 - Hall D
Presentation:
Sunday - Room 312 - 5:00 PM

MINICINS

In 2009, the WHO estimated that there were 2.5 billion cases of gastrointestinal diseases in children, with most of them from developing countries.
Pathogens have evolved to develop resistance towards antibiotics, which is the common option for treatment. Antibiotic mode of treatment can be replaced by bacteriocins. Bacteriocins are novel peptides synthesised by an organism and have specific detrimental effects on the surrounding microbial community.
These peptides can be produced by minicells which are achromosomal cells formed due to aberrant cell division, in this case induced by the overexpression of ftsZ.
Pseudomonas aeruginosa will be used as the model organism for our studies.
This strategy can also be used against organisms in biofilms. We have planned to study the effect of bacteriocins on Staphylococcus aureus which is the major organism in biofilm. Further we extend our work to a range of applications like strain selection, preventing botulism and animal husbandry.

Sydney Australia

Asia - Australia

Poster:
76 - Zone 3 - Hall C
Presentation:
Friday - Room 304 - 4:00 PM

Synthesising ethylene oxide from ethylene using monooxygenase enzymes in Pseudomonas Putida and E. Coli

The enzyme ethene monooxygenase (EtnABCD) catalyses the epoxide reaction that converts ethylene to ethylene oxide by incorporating a hydroxyl group.
EtnABCD is of great interest for biocatalytic epoxide production to replace current organic chemistry methods which present safety and environmental concerns.
Mycobacterium smegmatis is the only organism that endogenously expresses ethene monooxygenase, yet is a poor cloning host. To enhance the heterologous expression of the EtnABCD enzyme, a mathematical model was developed taking into account the differences in codon frequencies between organisms.
The M. smegmatis gene encoding EtnABCD was modified using this model in order to obtain optimized sequences for expression in both Pseudomonas putida, as an intermediate host, and Escherichia coli.
The altered EtnABCD sequences will be cloned into appropriate vector inserts. Once stable expression of EtnABCD is established in Pseudomonas putida, the E. coli optimized sequence will be expressed to give a high activity monooxygenase enzyme.

SYSU CHINA

Asia - China

Poster:
110 - Zone 4 - Hall C
Presentation:
Friday - Room 309 - 9:30 AM

Micro-Timer

This year, we develop a plug-in for microbes, a system that can build up a living clock for microbes and guide them to live regularly as well as to work efficiently. Also, microbes with the system inserted acquire the concept of life span so that some dangerous bacterias will come to death in time before they cause any biohazard. Inverted components which based on recombinase system are introduced in our system. One inverted component is able to calculate a period of time, while several inverted components comprise of one time cycle. When we combine several time cycles together, a sequence with a timer's function has been successfully formed. Through altering recombinases and their specific sites to different matches, we can get distinctive time cycles. We believe that the system will be of great importance to biological devices with time-related concepts.

SYSU-Software

Asia - China

Poster:
178 - Zone 6 - Hall D
Presentation:
Sunday - Room 309 - 2:30 PM

CORE -- Crowdsourcing Open Redesign Engine

The complexity in biological systems has limited genetic circuit design in synthetic biology. Without co-development and an open, proof-of-principle engineering platform, it is hard for synthetic biologists to manage this complexity.
To address this problem, we developed CORE, an open and extensible software that allows users to design, share and cooperate in synthetic biology. CORE mainly consists of two closely interconnected modules.
One is the open, crowdsourcing platform. It helps users design and redesign, share and reuse previous work according to the principle of modularized design.
The other one is the design module embedded in the platform, which promotes genetic design automation based on ODE (ordinary differential equation) models and assists wet-lab practices through protocol management.
In conclusion, the combination of a crowdsourcing platform and a novel design module makes complex design more accessible to synthetic biologists.

SZMS 15 Shenzhen

Asia - China

Poster:
248 - Zone 8 - Hall D
Presentation:
Sunday - Room 309 - 11:30 AM

Real live models of different stories from various cultures

Our project serves as real live models of different stories from various cultures. Our genetically engineered E. coli bacteria is able to perform a series of reactions visibly and distinctively in order to represent the plot in different stories. We have chose three particular stories to be the basis of our project: ‘The Ugly Duckling’, ‘The Fox and the Grapes’, and ‘Houyi Shoots the Sun’. All of these stories are well known by people.
Our ultimate purpose of our project is to further publicise the idea of bioengineering as well as serve as an educational model for the young to observe and experience.

SZU China

Asia - China

Poster:
257 - Zone 8 - Hall D
Presentation:
Saturday - Room 306 - 9:00 AM

AND GATE genetic circuit based on UAA Orthogonal system to detect bladder cancer

Nowadays,bladder cancer is one of the most urologic tumours in the world. However,theconventional therapy of cancer such as chemotherapy and radiation,have focused on mass cellkilling without specific targeting and often cause side effects and frequent failures. Here we present the Synthesizing AND GATE genetic circuit based on UAA (Unnatural Amino Acid) and Orthogonal system that will detect and induce the apoptosis of bladder cancer cell. The system encompasses two parts. One is the synthesizing gene circuit which only operates in bladder cancer cells that behaves as a logical AND gate on two input promoters.Another part is to insert the synthesized unnatural amino acids in the bladder cancer cell to continue the protein translation at TAG(amber mutation) in order to activate the effectors. This methodology is based on the orthogonal system which enable the unnatural amino acids to generate protein without affecting other parts' work. As a result, the output gene will hinder the tumour growth and induce apoptosis.

TAS Taipei

Asia - Taiwan

Poster:
29 - Zone 1 - Hall C
Presentation:
Sunday - Room 312 - 2:30 PM

To Granzyme B or Not to Granzyme B: Protecting Extracellular Matrix Proteins

Granzyme B is a serine protease that is an essential part of the immune system. In response to inflammation or tumors, Granzyme B is overexpressed and enters target cells to induce apoptosis. However, high levels of Granzyme B also result in random cleavage of extracellular matrix (ECM) proteins, such as elastin and decorin, which help to maintain tissue structure and elasticity. Our team has constructed a system that inhibits Granzyme B activity in the ECM without affecting its intracellular functions. In humans, Antichymotrypsin (ACT) is an extracellular protease inhibitor, which we have modified to allow for Granzyme B inhibition. Of the many diseases associated with ECM degradation, we focus on preventing damage from both arthritis and prolonged wound healing. We've engineered a semipermeable bandage to deliver the Granzyme B inhibitor topically without bacterial contamination. Our system is capable of maintaining a healthy immune system response while protecting ECM proteins.

TCU Taiwan

Asia - Taiwan

Poster:
217 - Zone 7 - Hall D
Presentation:
Friday - Room 312 - 3:00 PM

AMP. coli

When wound appears on the skin. Infection will set in and hinder the healing process. Antimicrobial peptides (AMPs) have an extensive ability to disinfect and facilitate wound healing. We selected two types of AMPs: Epinecidin-1 (Epinephelus coioides) and Signiferin (Crinia signifera) are constructed into a potential material of wound dressing. We use E.coli as host to express these peptides. We attach a signal peptide to facilitate secretion. After purifying, we will test the functions of these two AMPs for their abilities to disinfection and in vitro wound healing. We will carry out in vivo experiments in mice test if these two AMPs work in healing wound in animal.

Tec Guadalajara

Latin America - Mexico

Poster:
118 - Zone 4 - Hall C
Presentation:
Friday - Room 312 - 9:00 AM

Expression of glucose oxidase and gluconolactone oxidase in P. pastoris to synthesize reduced graphene oxide

Graphene is a two dimensional nanomaterial composed only by carbon atoms that merge in hexagonal patterns.
Its molecular structure gives it unique physical and chemical characteristics. One method to synthesize graphene involves the reduction of graphene oxide (GO) into functionalized graphene (rGO).
This method requires the use of dangerous chemicals that threatens the environment and our health so its use is limited only to laboratories that produce it in small scale.
We were able to successfully reduce GO into rGO using an organic molecule derived from glucose and evaluate the physical properties of the obtained rGO. Our plan is to transform P. pastoris GS115 so it can express glucose oxidase (GOD) and gluconolactone oxidase (GLO) enzymes and the reducing agent can be synthesized from glucose. We hope that this project's results allow the production at an industrial level of graphene in order to help trigger the technological revolution of graphene.

Tec-Chihuahua

Latin America - Mexico

Poster:
137 - Zone 5 - Hall D
Presentation:
Friday - Room 304 - 2:00 PM

The Carbon Carriers: Cell Transformation and Transfection by Carbon Nanotubes

The manipulation of genetic material is key to the development of synthetic biology.
The introduction of genetic material into different cell types is indispensable for the creation of genetically modified organisms which provide different benefits to society.
However some techniques used for gene delivery into the cells have low efficiencies, can be expensive, or use complex equipment and are complicated to do.
That is why in recent years it has sought new strategies for effective transformation of cells at low cost. One of these strategies is the use of nanotechnology, which has the potential of crossing cell membranes and increase solubility, stability and bioavailability of biomolecules, thereby improving efficiency of release. Here, we intend to evaluate the efficiencies of gene delivery of DNA-CNTs in Escherichia coli cultures, embryos in early development of Bos taurus and calluses of Nicotiana tabacum and compare them with the traditional methods used in the laboratory.

Tec-Monterrey

Latin America - Mexico

Poster:
213 - Zone 7 - Hall D
Presentation:
Friday - Room 309 - 4:30 PM

Insects join iGEM: Sf9 cells as a new chassis for synthetic biology

The purpose of this project is to introduce the Sf9 cell line (Fall armyworm ovary, Spodoptera frugiperda cells) to synthetic biology and the iGEM Competition, by developing a tool kit of several biobricks for their use in this new chassis. We will use the Sf9 cells as an alternative for the production of proteins with high complexity and post-traductional modifications, because of their flexibility, cultivation time and minor cost compared with other expression systems.
We will characterize functional parts for two main areas: Transfection and Genome Editing. For the first part we will characterize baculovirus mediated transfection and, direct plasmid transfection for the generation of stable cell lines; for the second part we will use the CRISPR/Cas9 system to assay highly specific genome modifications in an effort to improve production and ease of use of this technology.

TecCEM

Latin America - Mexico

Poster:
107 - Zone 4 - Hall C
Presentation:
Friday - Room 312 - 11:00 AM

DNAbots: a self-replicative and self-assembling innovative nanotechnology for capturing lead ions in water

DNAorigami is a technique that allows the self-assembly of strands of DNA to engineer a complex shape; in this sense, the array of the base pairs within these strands changes their 3D conformation.
Scientists have managed to create different designs and have proposed several applications for this tool.
However, all the programmable strands are synthesized by chemical reactions in laboratories. By inserting these stands into a plasmid, transforming a competent bacteria and incubating it with the helper phage, we propose a biological self-replicative and self-assembling way to produce a custom-shaped DNAbot.
This molecule has specific recognition sites for lead ions which when in contact, form a quadruplex structure able to capture the cations. Our work intends to give a new and successful methodology to produce this functional DNA structures and promote the use of DNA itself as a nanotechnology material.

TecCEM HS

Latin America - Mexico

Poster:
196 - Zone 6 - Hall D
Presentation:
Friday - Room 302 - 10:00 AM

SDSeeker: Bioremediation of Lago de Guadalupe

Lago de Guadalupe is the most extensive water body in State of Mexico.
It is surrounded by industrial, agricultural and residential areas, the last one being responsible for 25% of the total contaminants. Among these is SDS (sodium dodecyl sulfate), which is the principal component of detergents used in mexican households. The residues of detergents change the water's pH, turning it into a toxic and dangerous environment for more than 150 species that depend on this lake. Although there have been some studies for its treatment, nothing has been achieved. Our project consists in developing a bioremediation system to lower SDS levels in the water using two immobilized proteins, alkyl-sufatase and ferritin.

Technion HS Israel

Asia - Israel

Poster:
57 - Zone 2 - Hall C
Presentation:
Saturday - Room 310 - 2:00 PM

Precise and flexible autonomous kill-switch for bacteria

Genetically modified organisms, once released into nature, influence the natural diversity of the environment and raise concerns among the public. To reduce this risk, we strive to develop a time-controlled kill switch. By introducing a genetic circuit into *E.coli* we aim to tightly regulate the bacteria's lifetime according to initial conditions set by the user. We base the parameters for the biological characterization on a mathematical model that covers various aspects of our system, including plasmid loss. Furthermore, we develop a tool for simulation of biological circuits hence helping synthetic biologists worldwide setting up experiments.
Given the large number of iGEM projects, we additionally develop a search engine for previous iGEM projects. By providing not only a time-controlled kill switch that deals with fears of the public, but also contributing helpful tools to the iGEM community, we are convinced that future scientists, such as ourselves, will benefit from our project.

Technion Israel

Europe - Israel

Poster:
185 - Zone 6 - Hall D
Presentation:
Saturday - Room 306 - 11:30 AM

Be Bold: Hit baldness at its root

Hair loss affects roughly 1.5 billion people worldwide. The trigger for male pattern baldness is believed to be dihydrotestosterone (DHT), a derivative of testosterone. We have created a system in which two different engineered bacterium are combined in a custom-made comb manufactured in a 3D printer, working together to break down DHT, treating the problem at its root. We engineered Bacillus Subtilis, to secrete 3α-hydroxysteroid dehydrogenase (3-α-HSD), an enzyme which reduces DHT to a non-steroidically active compound, using NADPH and NADH as cofactors. In addition, we genetically engineered Escherichia Coli to overproduce NADPH, enabling the enzymatic reaction to take place and driving it in the right direction. The two strains can be combined easily and cleanly with the help of our comb, providing a user-friendly tool and a novel, promising direction for future hair loss treatments.

Tianjin

Asia - China

Poster:
33 - Zone 1 - Hall C
Presentation:
Saturday - Room 306 - 12:00 PM

JANUS

In ancient Roman myth, Janus is the god of beginnings and transitions, who is depicted as having two faces. Our project is focused on another Janus - hydrophobin the protein, who looks to the hydrophilicity and hydrophobicity. Because of this, a sea of new applications are created. Firstly, we re-designed the structures of two classes of hydrophobins, making expression in E.coli possible.
Secondly, we use its double-sticky-tape-like ability to make two applications.
We take this advantage to fix antibodies on a high-flux tumor detection chip.
Meanwhile, they are used to catch cutinases for plastic degradation. We even make them into a fusion to test if the enhancement could be better. Thirdly, we use its amphipathicity to achieve protein separation, where they act as a special purification tag, and the system could be as simple as polymer, detergent and water. With help of this, we could even achieve recovery of cutinases.

TJU

Asia - China

Poster:
54 - Zone 2 - Hall C
Presentation:
Friday - Room 312 - 5:00 PM

Power Consortia

MFCs are capable of converting the chemical energy stored in the chemical compounds in organic biomass to electrical energy with the aid of microorganisms. However, traditional single-strain MFC faces many practical barriers such as low current density, high cost and unstable electricity output, which seriously impede the future applications.
To solve these problems, extending engineering capabilities from single-cell behaviors to multi-cellular microbial consortia brings us new inspiration.
So we establish a co-cultured MFC system with an elaborate labor division.
Based on our complicated co-cultured system, a rational designed relationship of material, information and energy is being explored. We regulate lactate metabolism, the key point of material flux, through lactate sensing system, orthogonal targeted protease degradation, etc. Additionally, we also make riboflavin as the entry point to regulate energy and information relationship.
Through reconstruction of the co-cultured MFC, a more efficient and robust system is built up.

Tokyo Tech

Asia - Japan

Poster:
67 - Zone 3 - Hall C
Presentation:
Saturday - Room 311 - 4:00 PM

Prisoner's Dilemma

We want to replay the Prisoner's Dilemma, a well-known game analysed in game theory, by using *E. coli*.
This game involves dilemma between cooperation and defection. Although each prisoner knows both player's cooperation mutually benefits each other, one will always defect when the individual is pursuing his or her own benefit. We will express this dilemma by using a genetic circuit centering in quorum sensing. We will also provide various strategies and aim to determine the best strategy in this game. By combining the idea with synthetic biology, we demonstrated this game among students.
We also made our own pay-off matrix.
In our project we will focus on the prisoners' emotions as well. The metaphoric usage of cherry blossoms appears in countless Haikus and Tankas, and expresses the heart of the Japanese. Therefore, we will express the prisoners' emotions using *E. coli*, which will mimic the characteristics of cherry blossoms.

Tokyo-NoKoGen

Asia - Japan

Poster:
149 - Zone 5 - Hall D
Presentation:
Saturday - Room 304 - 4:00 PM

ExTermite coli: A new system to exterminate termites using engineered E. coli and pseudo egg

'ExTermite coli' is a novel system to exterminate termites, which combines an engineered Escherichia coli and a unique pseudo-egg delivery system.
The E. coli was engineered to overexpress glucose-3-dehydrogenase (G3DH), which converts trehalose into the trehalase inhibitor 3,3'-diketo-trehalose (3,3'dkt).
Because trehalose is a major termite blood sugar and trehalase is essential for trehalose metabolism, G3DH essentially converts trehalose into an insecticide.
The pseudo-egg delivery system takes advantage of a habit termites have of carrying their eggs to their nests and licking them. Termites recognize their eggs by sensing β-glucosidase and lysozyme, which act as egg-recognition pheromones.
The pseudo eggs, containing both termite egg-recognition molecules and engineered E. coli, will be delivered to their nests and then licked by the termites present, thus allowing the G3DH produced by the E. coli to convert trehalose into insecticide inside the termite bodies. Consequently ExTermite coli can effectively exterminate termites in their nest.

Toronto

North America - Canada

Poster:
177 - Zone 6 - Hall D
Presentation:
Sunday - Room 302 - 12:00 PM

A Genetically Engineered Solution for Oil Sand Tailings: Enhanced Bioremediation by Toluene Degrading Bacteria

The concentration of toxic chemical by-products from oil sands exploitations has been increasing since 2012. Recent efforts to address environmental pollution converge towards bioremediation as the most promising solution. While endogenous bacteria such as Pseudomonas Putida F1 can degrade toluene, we optimized E. coli to be more efficient at breaking down 3-methylcatechol, a rate-limiting step in the toluene degradation pathway. We did so by creating 2 plasmids that once co-transformed into E. coli would achieve the metabolization of toluene down to water and carbon dioxide. Additionally, a web application for visualizing, manipulating, and comparing genome-scale metabolic models of bacterial consortia was developed and used to analyse the introduction of our synthetic E. coli into the Athabasca river microbiome.
We have created a framework to analyze the optimal solution to the problem present, by considering designs, associated cost profiles, and political risks in the context of Alberta's soil sand industry.

Toulouse

Europe - France

Poster:
201 - Zone 7 - Hall D
Presentation:
Saturday - Room 304 - 12:00 PM

Beware Varroa: ApiColi is guarding the beehive

The parasitic mite *Varroa destructor*, through the detrimental effects it exerts, is one of the main causes explaining the dramatic decline of bee colonies worldwide.
Our project aims at limiting its proliferation in hives, thus we designed a trap adaptable to the hive entrance. In this device, our *Escherichia coli* strain named ApiColi will be used as bait. During the day ApiColi will express butyrate as an attracting molecule to lure *Varroa destructor* in the trap. By night butyrate expression will be replaced by formate production, a deadly molecule for the mite. This circadian rhythm is based on a chimeric red light receptor, which enables our trap to be in line with the honeybee's life cycle and optimizes the lifespan of the device. Completion of this project will provide a solution to tackle the *Varroa destructor* in a way that is both respectful of the environment and the bees.

TP CC-SanDiego

North America - United States

Poster:
101 - Zone 4 - Hall C
Presentation:
Sunday - Room 309 - 4:30 PM

Engineering E. coli Capable of Extracellular Secretion of Chitin Degradation Enzymes

Fungi capable of producing harmful mycotoxins flourish on a variety of widely consumed crops, notably bananas, tomatoes, potatoes, and grains. Such fungal infections significantly reduce sustainability and food production in developing countries, where lack of advanced food storage and mycotoxin exposure are responsible for severe economic losses and 40% of diseases.
As such, our team focused on developing a secretable chitinase capable of hydrolysing the glycosidic bonds which compose the polysaccharide chitin, a key structural component in fungal cellular walls.
By fusing LbCHI31 chitinase-encoding genes with a secretion signal peptide from alpha-amylase, we successfully generated an escherichia coli line that secretes chitinase specific to fusarium oxysporum, a major pathogenic fungi. LbCHI31 extracellular secretion and effectiveness were further quantified through characterization and analysis. This project will allow for easily accessible, cost-effective methods for producing effective chitinases that combat fungal infections, thereby increasing crop yield, stabilizing financial growth, and reducing famine globally.

TrinityCollegeDublin

Europe - Ireland

Poster:
219 - Zone 7 - Hall D
Presentation:
Sunday - Room 302 - 4:30 PM

E.artemisia

Semi-synthetic artemisinin is perhaps the poster-child achievement of synthetic biology. Before its introduction, the sole artemisinin supply was from a plant; Artemisia Annua. The production was expensive and highly variable. Artemisinin is currently the front line treatment for malaria, a disease transmitted in the bites of Anopheles mosquitoes.
One of the deadliest diseases in human history, malaria now claims over 600,000 lives a year. The majority of these lives are young children, and residents of developing countries, where people are unable to afford the drug. Our mission is to investigate the production of affordable antimalarial drugs. Our team is working with artemisinic acid producing e-coli cells, obtained from Amyris, with the support of Zagaya.
We have constructed biobrick components of the system, which should allow for easier research and development in the future.

Tsinghua

Asia - China

Poster:
146 - Zone 5 - Hall D
Presentation:
Sunday - Room 302 - 3:00 PM

Developing light-controlled systems to manipulate genetic information in prokaryotes

We the team Tsinghua 2015 have originated and developed light-controlled systems to manipulate genetic information in prokaryotes by combining the site-specific recombination system with light switchers integrated from red, blue and green light systems.
Through the On/Off commands from light switchers, genetic manipulation can be achieved when diverse combinations of light signal are provided. Specifically, three light-mediated platforms are established: bio-imaging platform, genetic editing platform and information storage platform.
For the first part, the expression of fluorescent protein can be precisely controlled by the incoming light, forming pre-determined image pattern with drastically high resolutions. For the second part, dCas9 and DNA-binding-domain-deleted recombinase are linked together to smoothly alter genetic information without introducing double strand breaks. For the third part, artificial information can be stored and retrieved easily via light-mediated systems.
We designed CRISPR-recombinase screening systems, measured fluorescent protein expression parameters and developed a light-emitting electronic device to support our project.

Tsinghua-A

Asia - China

Poster:
46 - Zone 2 - Hall C
Presentation:
Sunday - Room 304 - 11:00 AM

The Esophageal cancer test paper.

Our aim is to build a convenient and harmless method for early diagnosis of esophageal cancer. Studies have confirmed that miRNA expression is highly concordant cross individuals.Comprehensively considering the performance of each miRNA, we finally chose miR-144 and miR-21 as our biomarkers for esophageal cancer. Our test paper can react to MIR144 and MIR21 present in the saliva whose content are proportional to the cancer. To make our detection quick and convenient, we designed synthetic gene pathways based on paper.
It will only require some saliva to complete the detection, which will do no harm to human body. And this techniques can be expanded to be used in the detection of many other diseases which has specific miRNA expression pattern in saliva.

TU Darmstadt

Europe - Germany

Poster:
145 - Zone 5 - Hall D
Presentation:
Sunday - Room 302 - 2:30 PM

Building with Light

3D-printing has become a highly applicable technique, improving numerous engineering processes including rapid prototyping. The technique allows the production of almost any imaginable structure. A variety of 3D-printing methods have been developed, for instance Stereolithography (SLA) - enabling the realization of many utilization options. We produce monomer compounds in E.coli, nominal xylitol, itaconic acid and ethylene glycol by metabolic engineering. Those compounds were combined by a chemical hydrolysis reaction creating a pre-polymer. The final polymerization reaction is promoted when defined light waves hit the pre-polymer liquid transforming it into a solid polymer. We want to use this technology to advance medical engineering.
In cooperation with Synenergene, we developed an application scenario to identify the best way to provide an accurate on-site matching prosthesis to victims of forced amputations. Fast and accurate production of those parts in one piece could render quick and easy help, especially in crisis areas.

TU Delft

Europe - Netherlands

Poster:
142 - Zone 5 - Hall D
Presentation:
Sunday - Room 302 - 2:00 PM

3D micro(be) printing with do-it-yourself K'NEX printer

Various microorganisms can aggregate and attach to surfaces, thereby forming biofilms. Certain biofilms pose problems in fields such as healthcare and industrial processes. Currently, several methods are used for testing biofilm formation and removal. However, these processes can be improved by adding reproducibility and standardization. Therefore, our goal is to print biofilms in a reproducible and automated way. We achieved this by engineering *E. coli* cells that link to each other through nanowires upon induction and we printed these cells by means of our 'do-it-yourself' K´NEX printer. Next to biofilm-removal testing, this technique can be used for industrial production processes.
For example, as structured printing of microorganisms that catalyze different production steps or enzyme immobilization on the nanowires. To summarize, we aim to develop a new standard for biofilm production, develop our own printer and analyse the market potential of our system.

TU Dresden

Europe - Germany

Poster:
39 - Zone 2 - Hall C
Presentation:
Saturday - Room 312 - 12:00 PM

Evolution through time and SPACE-P

Protein-protein interactions play a key role in biology. Designing and coordinating interactions in order to discover new drugs comes with a host of challenges. Our goal is to modify phage-assisted continuous evolution (PACE), specifically for protein interactions. PACE combines the bacteriophage M13 and *Escherichia coli* in a dynamic scheme whereby M13 only survives if it infects *E. coli*. This is achieved when the viral protein P3 is expressed. **SPACE-P** aims to incorporate a key-lock mechanism that regulates the expression of P3. In our model, the interaction between the protein HER2 and an affibody will be the key to open the lock. Over several phage life cycles, evolutionary pressure will favour the interactions with the greatest yield of P3, thereby increasing that phages virulence and the continued evolution of that particular affibody. Our method will reduce the time and cost of drug discovery and enable the interaction between many choose-able proteins.

TU Eindhoven

Europe - Netherlands

Poster:
28 - Zone 1 - Hall C
Presentation:
Friday - Room 309 - 5:00 PM

Clickable Outer Membrane Biosensors (COMBs): An aptamer-based approach to a universal and modular biosensor platform

Accurate and early diagnosis of diseases is at the forefront of the medical sciences. Although many biosensors have already become available, a universal biosensor platform is lacking. As a first step towards such a platform, we are introducing a transmembrane biosensor which may in the future be incorporated into signaling pathways. The system is characterized by three modules, aptamers as recognition elements, outer-membrane proteins as the scaffold and signaling components which can translate ligand binding into a measurable signal through heterodimerization.
Aptamers can be clicked onto the outer membrane proteins post-translationally using SPAAC click-chemistry, making the system inherently modular. The biosensors can be employed in a wide range of applications: from detecting biomarkers to the overuse of pesticides. We believe that in the future, the system can go beyond its function as a biosensor and may be able to trigger cellular responses.

Tuebingen

Europe - Germany

Poster:
53 - Zone 2 - Hall C
Presentation:
Friday - Room 310 - 9:00 AM

Crellumination - Committing Biosensors to Memory

For this year's project Team Tuebingen designed a system aimed at capturing a snapshot of an expression controlling biosensor. In order to permanently memorise the sensor state of the snapshot time point in cells we use an altered version of the DNA recombinase Cre to switch on a luciferase reporter. The ability to quickly capture the current state of the sensor is achieved by fusing Cre with two copies of the protein Dronpa, that oligomerises after illumination and thereby cages and inhibits the recombinase. Because the oligomerisation of Dronpa is reversible through another wavelength, we can control the activity of the recombinase and fine tune the read out of the luciferase reporter.

Tufts

North America - United States

Poster:
168 - Zone 5 - Hall D
Presentation:
Friday - Room 304 - 9:00 AM

Delivery of the CRISPR-Cas9 gene editing platform into epithelial cells using Clostridium difficile toxin B

Our goal is to functionalize the CRISPR-Cas9 system as a therapeutic for the targeted disruption of deleterious genes in human cell cultures. This will entail the delivery of the Cas9 endonuclease and guide RNAs through the cell membrane and into the nuclei of somatic cells such that double-stranded breaks can be induced at the desired loci. We seek to leverage the cellular penetration capabilities of the atoxic Clostridium difficile toxin B (aTcdB) which very efficiently mediates endocytosis and escapes endosomal capture.
By adding Cas9 upstream of the catalytically inactive glucosyltransferase domain of the toxin, we hope to develop a recombinant fusion protein that will deliver into the cytoplasm an NLS-tagged Cas9 bound to a guide RNA. We aim to express the Cas9-aTcdB protein in Bacillus megaterium, transcribe the guide RNAs in vitro, and incubate this complex with HeLa cell cultures to excise a repressor and allow GFP to be expressed.

UAI-Chile

Latin America - Chile

Poster:
239 - Zone 8 - Hall D
Presentation:
Saturday - Room 304 - 4:30 PM

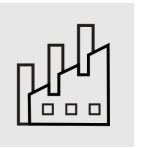
Antifreeze Protein

Biological product to prevent the frosting of fruits and vegetables, by spraying it on the leaves of the plants it will work like an antifreeze protein like the ones that work on plants that have them naturally.
It will have a biosensor that will be activated when the temperature lowers and will produce an antifreeze protein.

UAM Poznan

Europe - Poland

Poster:
17 - Zone 1 - Hall C
Presentation:
Friday - Room 309 - 2:00 PM



EcoFactory, a multipromoter explorer expression system for Escherichia coli

Ideally the expression level should be tuneable, induction non-toxic, mRNA translation free of mistakes, recombinant protein soluble and homogenous, its purification fast and reproducible.
Producing recombinant proteins of high purity and free of toxic compounds is a hallmark. For this purpose we generated a series of constructs with tagged superfolder GFP proteins expressed under the control of promoters for non-toxic sugar inducers: arabinose, melibiose, rhamnose and xylose. We have focused on promoters, because these minimal, independent regulators of expression levels are important tools for synthetic biology to build complex but still compact genetic systems. This experiment was conducted using CPEC cloning method (circular polymerase extension cloning) which is suitable for assembling small contructs from five DNA fragments at the same time. Moreover, we wanted to improve chromatography system by generating rapidly releasing fluorescent proteins produced from our designed vectors in Escherichia coli.

UB Indonesia

Asia - Indonesia

Poster:
25 - Zone 1 - Hall C
Presentation:
Sunday - Room 302 - 5:00 PM

DE(NGUE)TECTIVE

Dengue fever is an infectious disease mediated by mosquitoes with the fastest transmission rate worldwide. In Indonesia, it is estimated that there are more than 120,000 cases with 800 deaths from dengue fever each year. To solve that problem, we will construct scFv (single chain fragment variable) antibody that can detect dengue virus antigen. This scFv can be produced by *E. coli* by means of plasmid transformation that has been fused with OsmY.
That scFv antibody will be put in construction diagnostic kit. The kit will be able to detect dengue virus in the patient's sample rapidly and accurately. The kit will also have an integration with our mobile-based software aimed at supporting the interpretation of detection results from our diagnostic kit and providing data of dengue fever cases in various areas.

UC Davis

North America - United States

Poster:
48 - Zone 2 - Hall C
Presentation:
Saturday - Room 311 - 2:00 PM

Development of a Low Cost, User-friendly Biosensor for Triclosan and a Model for Civic Engagement

We are developing a biosensor for triclosan, an antimicrobial agent whose use has environmental and human health implications. Triclosan inhibits enoyl acp reductase (Fabi). By measuring the rate at which triclosan inhibits Fabi, we can make a standard curve of percent inhibition vs triclosan, and use this standard curve to determine how much triclosan is present in a wastewater sample. We are investigating the activity of the Fabi enzyme from 8 different organisms on a panel of non-native substrates to determine the combination of Fabi and substrate that will yield the best results at the lowest cost. We can then engineer the enzyme to have greater specificity on the non-native substrate through computational design and kunkel mutagenesis. By coupling our biosensor with civic engagement measures, our goal is to raise awareness and accountability around environmental concerns and to empower citizens to participate in decisions being made about chemical use.

UC San Diego

North America - United States

Poster:
87 - Zone 3 - Hall C
Presentation:
Saturday - Room 312 - 5:00 PM

Rapid construction of stoichiometrically controlled metabolic pathways to identify in vivo rate limiting steps

Given the number of possible cellular conditions, existing approaches/mathematical models are limited in how they can predict and optimize metabolic pathways. The ability to stoichiometrically control enzyme levels allows for empirical testing of rate limiting steps. As a proof of principle, we tested our ability to identify rate limiting steps using the bacterial LUX system, a bioluminescent reaction, in Saccharomyces Cerevisiae.
We have expressed several permutations of the bacterial LUX metabolic pathway to empirically determine its rate limiting steps by measuring the resulting light production.
The identification of rate-limiting steps then allows us to optimize the pathway.
Furthermore, with these findings, an improved and experimentally validated mathematical model of the LUX pathway will be constructed. By strategically altering biosynthetic gene expression, we have gained a means to tailor the reporter/sensor to better suit our needs (i.e. make it brighter) and a generalizable method to rapidly optimize metabolic pathways.

UChicago

North America - United States

Poster:
86 - Zone 3 - Hall C
Presentation:
Saturday - Room 306 - 4:00 PM

Transplanting KaiABC: Reduce your jet lag with this one weird trick!

Currently, there exist no working 24-hour oscillator BioBricks. We are addressing this problem by transplanting the circadian rhythm-generating KaiABC system from cyanobacteria into E. coli and optimizing its function by controlling protein stoichiometry and adding accessory proteins.
Such a BioBrick would be important for any application in which gene expression needs to be regulated on a 24-hour schedule.
For example, it is often important to release a drug at a specific time of the day.
As a proof-of-concept application, we implemented this clock as a potential solution to jet lag and sleep disorders by engineering a strain of E. coli that facilitates the production of a melatonin precursor in the gut on a 24-hour cycle. Thus, our project demonstrates the application of a robust KaiABC-based clock in timed drug dosage, as well as introduces an oscillator BioBrick into the synthetic biology community.

UChile-OpenBio

Latin America - Chile

Poster:
151 - Zone 5 - Hall D
Presentation:
Sunday - Room 311 - 4:30 PM

Fighting against plastic pollution through self-regulated production of a biodegradable plastic

Each year, 130 million tons of fossil plastics are produced in the world, which take 500-1000 years to degrade, and pollute the environment; 1,5 millions of marine animals were killed in 2014. A sustainable initiative is to produce biodegradable plastics; however its synthesis process (chemical and biological) is complex and expensive.
The team UChile-OpenBio is designing two populations of *Escherichia coli* to produce a biodegradable plastic called PLA (Polylactic acid) from easy to assimilate renewable resources. The first population will convert glucose into lactate and will self-regulate its production by sensing the pH.
The second population will polymerize lactate into PLA and will export it into the medium. In addition the team is planning to replace the glucose by Chilean brown macroalgae (kelp), a renewable resource to sustainably produce PLA. In this way, the team would help fighting against pollution, contributing to a better world!

UCL

Europe - United Kingdom

Poster:
91 - Zone 3 - Hall C
Presentation:
Saturday - Room 309 - 4:30 PM

Mind the Gut: developing psychobiotics to target the brain-gut-microbiota axis for mental health treatment

Current research suggests that gut microbes secrete neuroactive compounds that act on the gut-brain axis and play an important role in healthy brain function.
The UCL iGEM team has developed novel synthetic psychobiotics that mimic these neuromodulatory strategies identified in endogenous intestinal strains.
We have designed safe therapeutic devices that target metabolic pathways for neurochemical biosynthesis.
Additionally, we have assessed biocontainment and integrated a sensor detecting mood-related physiological changes in the gut environment.
In any year, mental health conditions affect one in four of us and available small molecule treatments have associated stigma and side effects. We believe that, besides aiding in the better understanding of the communication between gut microbiota and brain, our work will also lay a foundation for novel user-friendly treatments for mental health conditions.

UCLA

North America - United States

Poster:
224 - Zone 7 - Hall D
Presentation:
Friday - Room 312 - 10:00 AM

SilkyColi: Reprogramming the physical and functional properties of synthetic silks

Among natural materials, silk fibers boast unparalleled strength and elasticity.
This has made silk ideal for use in apparel, medical sutures, and other high-performance materials. The unique profile of silk arises from the composition of its repetitive protein domains, which varies between species. We aimed to program the physical properties of synthetic silk in two ways: by modularizing spider silk genes and tuning their properties through directed assembly, and by fusing accessory proteins to silkworm and honeybee silks to expand their functionality. To overcome the challenge of creating large, repetitive, GC-rich genes, we adapted Iterative Capped Assembly to ligate spider silk genes in specific ratios, orders, and lengths. The recombinant silks were expressed in *E. coli* then spun via standard wet spinning. This provides a platform for standardizing the customization of synthetic silk fibers, and exploring their potential as multipurpose biomaterials.

UCSC

North America - United States

Poster:
125 - Zone 4 - Hall C
Presentation:
Friday - Room 312 - 5:30 PM

Engineering the Future of Biofuel

The project focuses on designing microorganisms that will be able to convert plant waste into viable replacements for fossil fuels. To achieve this goal our team has four main focuses for the experiment each dealing with specific portions of the project.
Our Breakdown team is dedicated to producing cellulases within our desired microorganisms to convert the cellulose in plant waste to sugars. The Fermentation team is working on altering the fermentation pathways within our microorganism to convert sugars into alcohol products by transformation of genes found in other alcohol producing microbes.
Our Field team is responsible for identifying novel cellulose digesting microorganisms from high saline test sites.

UCSF

North America - United States

Poster:
189 - Zone 6 - Hall D
Presentation:
Sunday - Room 311 - 10:00 AM

Talk Alpha to Me

Cellular communities exhibit both asocial and social behaviors through sensing and secreting the same extracellular molecule, eliciting population-wide behaviors such as quorum sensing, cell differentiation, and averaging. Drawing inspiration from collective behaviors and cellular decision-making in biological systems, our team aims to engineer a synthetic model to understand the factors that play into reshaping community phenotypes. We have engineered novel sense-and-secrete circuits in yeast by repurposing the endogenous mating pathway and using fluorescent reporters to read out individual and community responses to a stimulus. We aspire to understand how intercellular signaling can shepherd noisy individual responses into robust community level behaviors. Particularly, we hope that by tuning parameters such as receptor level, secretion rate, signal degradation, and spatial retention, we will be able to customize communication to model natural systems and elicit distinct community phenotypes.

UESTC Software

Asia - China

Poster:
180 - Zone 6 - Hall D
Presentation:
Sunday - Room 302 - 11:30 AM

Minimal Cell Construct and Analyse Panel

Essential genes are indispensable for the survival of living entities. The minimal cell only contains essential genes and both of them are the cornerstones of synthetic biology. MCCAP (Minimal Cell Construct and Analyse Panel) is a software targeted for screening the essential genes, based on new method which means: if the number of organisms which have this essential gene have reached 50 percent or more, it will be reserved. Then you can utilize the minimal gene set, which consists of the essential genes that the software has filtered, to structure the metabolism network for modularization analysis. What is more charming is its functions in different fields, varying from biological research to pharmacy. MCCAP will inspire your interest by producing antimicrobial drug targets, making the chassis of artificial cell, promoting the synthesis of bacterial strain which is more adapted to the needs and helping determine the last universal common ancestor(LUCA).

UFMG Brazil

Latin America - Brazil

Poster:
24 - Zone 1 - Hall C
Presentation:
Sunday - Room 310 - 9:00 AM

LeishMANIA

UFMG_Brazil iGEM team project aims to create a new system of drug production and delivery based on an attenuated strain of the protozoan Leishmania donovani. This protozoan may be a good new chassis, because of its ability to infect macrophages efficiently and expresses proteins with proper post-translational modifications, delivering these proteins inside macrophages.
INF-β is used to treat autoimmune diseases such as multiple sclerosis, as well as inflammatory joint diseases, such as gout and rheumatoid arthritis.
However, INF-β is an expensive drug, making the treatment costly. Moreover, the current treatment is systemic and has several side effects. Therefore, our team aims to use the non-virulent strain of Leishmania donovani to constitutively produce and deliver INF-β directly at the inflammation site.
Since Leishmania is cultivable in large scale, so it could become an actual pharmaceutical product. Thus, we would decrease the treatment's cost and minimize significantly the side effects.

UFSCar-Brasil

Latin America - Brazil

Poster:
158 - Zone 5 - Hall D
Presentation:
Friday - Room 304 - 5:30 PM

Bug shoo

As different insects with varying habits generate different diseases, repellent becomes an effective solution to combat this insects. The high toxicity related to high concentrations of the current topical insect repellent in the market (DEET) and the relationship between concentration and longevity generate the need for more efficient and durable products. The D-limonene, compound also proven safe for use on human skin. To extend the duration of the limonene, the use of synthetic biology for continuous production was proposed by this project. However, the limonene production in predecessors attempts using bacterial were not efficient, probably due to the fact that the enzyme responsible for the production of geranyl phosphate in limonene was insoluble, the limonene synthase.The gene circuit comprises a promoter activated by osmotic shock inducing production of the enzyme limonene synthase. An osmotic shock is a simple way of inducing the production of chaperones and foldases, creating our repelent.

UGA-Georgia

North America - United States

Poster:
112 - Zone 4 - Hall C
Presentation:
Sunday - Room 310 - 3:00 PM

Genetic and Metabolic Modeling of the Methanogenic Archaeon *Methanococcus maripaludis*

Methanococcus maripaludis is a model organism for Archaea, which affords researchers the beneficial qualities such as (1) producing methane used as biogas and (2) manufacturing isoprenoids as precursors for high-value biochemicals. However, there are few genetic tools available for metabolic engineering Archaea. Our goal is to develop some useful tools for synthetic biology of Archaea. Building on our past *M. maripaludis* projects, which created and characterized a mCherry reporter system and a recombinant mutant making geraniol, our team is now working to (1) create, characterize and model a ribosome-binding site (RBS) library using the mCherry reporter system and (2) model geraniol production of the recombinant *M. maripaludis* using flux balance analyses. Preliminary results have shown varying levels of expression in the RBS library, and increased geraniol yield from some growth substrates. Additionally, our team has initiated an Archaeal InterLab Study to further characterize the reproducibility of our mCherry reporter system.

UI Indonesia

Asia - Indonesia

Poster:
159 - Zone 5 - Hall D
Presentation:
Sunday - Room 306 - 2:00 PM

BaCon (Bacterial Contraception - A New Inovation of Contraception Method Using Synthetic Biology)

Population control is the key to solve the overpopulation problems. One of the factors that limit the application of contraceptive device is the convenience.
Contraceptive pill needs to be consumed every day in the same hour, moreover, there are hormonal side effects to the pill such as obesity. Observing these problems, team UI_Indonesia try to create more convenient contraceptive method, we call it; BaContraception, short for Bacterial Contraception. We sought to add spermicidal property to these Lactobacillus sp. Inhabiting the vagina. Thus, the woman inoculated with our engineered Lactobacillus sp. Are always on contraception. We also sought the device to be able to be switched to not producing the spermicidal protein. Thus, we design a toggle switch circuit that can be switched back and forth between producing the contraceptive protein and not by addition of simple sugars such as lactose and xylose.

UiOslo Norway

Europe - Norway

Poster:
247 - Zone 8 - Hall D
Presentation:
Saturday - Room 304 - 5:00 PM

Methane Incorporated

Methane is the third most prevalent greenhouse gas in the earth's atmosphere. In a time span of 20 years has it a global warming potential that is about 84 times that of carbon dioxide.
Techniques for the reuse of emitted methane are cost and time-intensive and are therefore rarely used. Our goal is to limit the emission of methane by developing an *Escherichia coli (E. coli)* based model that filters methane out of the air and converts it into biomass. The first part involves breaking down methane to methanol with the enzyme complex, soluble methane monooxygenase from *Methylococcus capsulatus*. The second part is converting methanol into biomass by establishing the Ribulose-Monophosphate pathway from *Bacillus methanolicus* in *E. coli*. Lastly, a filter will be created that contains the modified *E. coli* and filters the surrounding air to facilitate methane uptake and breakdown; to be used in any closed air system!

UIUC Illinois

North America - United States

Poster:
197 - Zone 7 - Hall D
Presentation:
Sunday - Room 311 - 9:30 AM

Genetic Tape Recorder: Using SCRIBE to Gather Analog Data from the Environment

Cellular memory devices are currently limited in their scalability and the ability to efficiently utilize the recording capacity of DNA. In order to record analog information in a way that takes advantage of the storage capacity of DNA while maintaining scalability, we are introducing SCRIBE (Synthetic Cellular Recorders Integrating Biological Events) into the iGEM registry. Developed by Dr. Farzadfard and Dr. Lu at MIT, SCRIBE is a modular device that can be engineered to produce single-stranded DNA in vivo in response to transcriptional signals. Furthermore, a recombinase is coexpressed in order to introduce precise mutations across a population of cells, which accumulate as a function of the magnitude and duration of these signals, thereby creating a long-term and stable system for analog cellular recording. We then demonstrate SCRIBE's potential as a biosensor by characterizing constructs that record environmental pollutants.

UMaryland

North America - United States

Poster:
59 - Zone 2 - Hall C
Presentation:
Saturday - Room 309 - 9:30 AM

Safe and Inexpensive Approaches to Advance Synthetic Biology

Alternative methods of plasmid maintenance and PCR amplification accelerate the construction of new biodesigns, reduce cost, and avoid environmental hazards. Plasmids are typically maintained in cells by encoding enzymes that hydrolyze or otherwise detoxify antibiotics added to the medium.
However, this process carries an inherent risk for spreading antibiotic resistance to native bacterial populations through lateral gene transfer. The Hok-Sok toxin-antitoxin system, a natural internal maintenance cassette relying on internal mRNA silencing, presents an alternative to common antibiotic-based methods since it does not rely on exogenous drugs. We are also developing an integrated, microcontrolled thermocycler using common household components. Using nichrome wire and a motorized fan for air circulation, the programmable prototype is an inexpensive, versatile thermocycler or plate incubator. Because the material and construction costs are a fraction of dedicated instruments, the newly developed unit will find broad application among nascent synthetic biologists in underfunded environments.

UMass-Dartmouth

North America - United States

Poster:
109 - Zone 4 - Hall C
Presentation:
Friday - Room 302 - 2:00 PM

Novel inhibition of Helicobacter pylori through peptide-assisted urease suppression

Helicobacter pylori is a stomach dwelling bacterium that inhabits the stomach of more than half of the world's human population. With antibiotic resistance genes spreading among microbial communities, common antibiotics used to treat H. pylori induced gastric distresses are losing efficacy. UMassD proposes to create an alternative. An enzyme released by H. pylori which cleaves urea and releases ammonia as a byproduct creating a pH buffered microenvironment. It has been shown in previous studies that various peptides can inhibit urease activity in vitro. The aim of our project is to engineer E. coli with a plasmid encoding a positively regulated, pH sensitive promoter. The low pH will initiate the transcription of an inhibitory peptide coupled with a twin-arginine translocase leader sequence. As a result, the decreased production of ammonia should inhibit H. pylori's buffering capacity, reducing its ability to persist within the stomach.

UMBC-Maryland

North America - United States

Poster:
169 - Zone 6 - Hall D
Presentation:
Friday - Room 310 - 4:00 PM

Copper Bioremediation Using Genetically Engineered E. Coli

Copper is a major pollutant in a variety of freshwater ecosystems. When copper is oxidized from Cu+ to Cu2+, it often produces a free radical known as a reactive oxygen species (ROS), which is capable of severely damaging biological molecules. E. coli have the ability to uptake copper, but after a certain threshold, the copper becomes toxic to the cell. Due to the toxicity of copper, E. coli quickly saturate and are unable to uptake more than a small amount of copper. Our goal is to increase the efficiency of copper uptake in E. coli for the purpose of bioremediation in freshwater ecosystems. We engineered E. coli to express the yeast CUP1 gene in an attempt to increase copper tolerance. CUP1 encodes a metallothionein protein that binds 11 copper atoms, thereby preventing formation of the ROS. In addition, metallothionein detoxifies hydroxyl radicals with its cysteine groups.

UNA Honduras

Latin America - Honduras

Poster:
194 - Zone 6 - Hall D
Presentation:
Saturday - Room 304 - 3:00 PM

Decoding Dengue Dynamics

Dengue fever is caused by the defensive reaction of the body to the invasion of a virus transmmited by mosquito bite. Is a big problem in developing countries and for over 70 years several attempts to create an effective vaccines have failed; the way to prevent disease is to control vectors: Aedes aegypti. There are at least 4 different virus serotypes which prevalence shifts every year, patients who suffered one particular serotype become immune for life, but getting another serotype, reaction is so severe that dengue becomes hemorrhagic and lethal most of the times. We designed synthetic proteins aimed to produce immunological response against dengue. Using databases and for proteins, epitopes and 3D structures programs we found epitopes for L and T white cells. Then selected a protein and inserted on its chain these epitopes from all serotypes, and 4 proteins containing just one serotype.

UNAM-CU

Latin America - Mexico

Poster:
181 - Zone 6 - Hall D
Presentation:
Friday - Room 311 - 4:30 PM

Proinsulitron: a new device for the treatment of type 1 diabetes.

'Every 7 seconds one person dies from diabetes' (IDF, 2014). Among others, Type 1 Diabetes is the result of a partial or complete lack of insulin production that leads to deregulation of glucose levels in blood. Current available solutions for this disorder are based on complicated and expensive devices of external use. We propose the use of an innovative system based on the construction of a bacterial sensor capable to respond to glucose concentrations; secondly this sensor aims to induce the production of insulin according to glucose levels. The bacteria are going to be contained in a modular device composed by contention, communication, extraction and change sections. For the design of the device, a bio-compatible material was searched. This device is designed specifically to prevent an immune response of the patient. The system designed combines mechanical engineering and biotechnology, ensuring an appropriate and secure insulin dosage for the patient.

UNC-Chapel Hill

North America - United States

Poster:
50 - Zone 2 - Hall C
Presentation:
Saturday - Room 310 - 10:00 AM

Construction of a Tricolor Sensing System for Glucose

This project introduces a novel glucose sensing system in which glucose-responsive promoters drive the expression of three reporter chromoproteins. We designed four novel glucose-sensitive promoters and tested their ability to drive expression of reporter chromoproteins at various glucose concentrations. In conjunction with existing glucose sensitive promoters from the Parts Registry, we used our novel promoters to design a biological device that expresses different combinations of the three different chromoproteins in response to glucose in Escherichia coli. As such, this device can detect a larger dynamic range of concentrations of selected molecules (e.g., glucose). Our project aims to provide a cheaper alternative for diabetics than current, more expensive, glucose-monitoring systems. While driven by this initial problem, continuing work has shown that our approach may have its greatest potential as a more general molecular sensing platform, capable of being easily customized for the sensing of a broad range of relevant compounds.

Uniandes Colombia

Latin America - Colombia

Poster:
21 - Zone 1 - Hall C
Presentation:
Saturday - Room 302 - 2:00 PM

Building a Bio-Electronic Clock

We are currently working on a bio-digital clock as a proof-of-concept project dealing with the integration of biological and electronic circuits. We plan to modify the circadian clock Kai protein system of cyanobacteria Synechococcus elongatus by hooking it to the AHL-producing half of the Lux quorum sensing system of Vibrio fischerii. The sensing portion of the Lux system will reside in modified Shewanella oneidensis, engineered to produce changes in its electrical resistance in response to changing levels of AHL using this species's control of cytochrome production.
Finally, another key component of our project is the design and construction of the eletcronic hardware necessary to measure S. oneidensis's changes in electrical conductance and act as an interface between this biological circuit and any electronic circuit it is to be coupled with, in this example, a digital clock.

UNIK Copenhagen

Europe - Denmark

Poster:
62 - Zone 2 - Hall C
Presentation:
Sunday - Room 311 - 4:00 PM

SpaceMoss: Using synthetic biology for space exploration

Space Moss is working on the quest to colonize Mars by bringing together Astrophysics and Synthetic Biology.
The idea of Martian colonisation have captured our minds for generations. Creating a sustainable environment on Mars where humans could survive, however, is not a trivial problem. Synthetic biology could help provide a solution by creating genetically modified organisms capable of producing essential compounds for Mars-colonist survival. Our first step has been to make moss able to produce compounds essential for it to thrive on Mars. We focus on an antifreeze protein, as it could help the moss to survive the extreme temperatures found on the surface of the planet. Our second step is to produce compounds useful to colonists. Therefore, we have been working on getting it to produce resveratrol, as a proof-of-concept of medical applications.

UNITN-Trento

Europe - Italy

Poster:
58 - Zone 2 - Hall C
Presentation:
Sunday - Room 306 - 4:30 PM

Solar pMFC: a Microbial Fuel Cell with a light-driven *E. coli* engine.

Microbial Fuel Cell (MFC) technology is rapidly evolving due to interest in producing sustainable electricity. Typically, MFCs exploit complex mixtures of microorganisms in which the identity of the microorganisms are unknown. The undefined nature of the source of electrons leads to limitations in the control and optimization of the MFC. We, therefore, attempted to improve the MFC platform by exclusively using *E. coli* engineered to survive under stressful conditions. *E. coli* cells were modified to express a light-driven proton pump, which required the assembly of a cofactor synthesis pathway. The proton gradient generated upon the exposure of light was then used by the bacteria to synthesize ATP, thereby turning *E. coli* into a type of pseudo-autotroph. Furthermore we investigated different genetic approaches to improve the secretion of electrons from *E. coli*. We built an MFC prototype with our engineered bacteria that are driven by light, which we called 'Solar pMFC.'

uOttawa

North America - Canada

Poster:
88 - Zone 3 - Hall C
Presentation:
Sunday - Room 311 - 11:30 AM

Simulating stem cells for tomorrow's treatments

Cell differentiation is the focus of much exciting research, but the current hypothesis on how cells specialize depends on epigenetic modification the activation and suppression of a large part of the genome at once. However, this approach does not explain many complex and finely-tuned phenomena in the cell. We believe that a special genetic network, known as a 'tri-stable switch,' can model cell differentiation. This network would allow a cell to 'specialize' from a quasi-pluripotent state to one of two differentiated states. By repurposing native transcription factors, we can build such a switch in the organism Saccharomyces cerevisiae, or baker's yeast. If this network can indeed achieve tri-stability, it may give us insight on the mechanisms of differentiation in stem cells, and bring us a step closer to construction synthetic stem cells in the lab.

Uppsala

Europe - Sweden

Poster:
63 - Zone 2 - Hall C
Presentation:
Friday - Room 306 - 2:00 PM

Decyclifier - One PAHthway to rule them all

Polycyclic aromatic hydrocarbons (PAHs) are produced by various activities, from grilling meat to coal gasification, and are potent carcinogens. Our project aims to degrade PAHs in industrial waste. The current waste handling method for PAHs is simply to deposit them in landfills where they leak into environment. Our cells need to detect the PAHs for the degradation. But the molecules do not readily pass through the membrane. We solved this predicament by using one of the smaller PAHs as an indicator to degrade the heavier PAHs. The degradation of this small PAH inside the cell relieves repression of genes under the control of the NahR/Psal promoter system. This causes a series of enzymes to get expressed and secreted outside the cell, oxidising and cleaving the ring structures of the carcinogenic compounds, making them available for downstream bio-degradation. To increase the degradation efficiency our system also produces rhamnolipids.

USTC

Asia - China

Poster:
144 - Zone 5 - Hall D
Presentation:
Sunday - Room 309 - 4:00 PM

NDM: Nanomachine Detecting Microbiotics

Abusing antibiotics has caused severe antibiotics contamination and resistance issues worldwide. Therefore, we USTC develop a device NDM with OD detector and optical interference path, recognition program based on RasberryPi and Arduino to detect antibiotics in natural water bodies. In NDM, there are two bacterial systems for measurement: ROSE, an engineered bacterial reporter system integrated with permeability modification, logic amplification circuit and quorum sensing, is able to adjust EGFP expression level, and NDM reads fluorescence intensity from ROSE to send results in high resolution. CACCI, chemotaxis and transmembrane protein-modified bacteria, are chemically covalently adhered to a polymer membrane. Deformation caused by CACCI motility can be recognized with optical interference and the interference pattern recognition program inside NDM will analyze the deformation, thus antibiotic situation in sample can be accurately told. Hope with our project, antibiotics issues can be solved in an accelerated way.

USTC-Software

Asia - China

Poster:
176 - Zone 6 - Hall D
Presentation:
Sunday - Room 309 - 2:00 PM

BioBLESS-Biological Boolean Logic Evaluation & Systematization based on Simulation

Hoping to generate a more direct rational circuit design, we develop BioBLESS that can automatically computes the structure of a digital gene circuit. Instead of looking for a general solution to the computational design challenge, we focus on digital circuits. Given a truth table where the inputs and outputs of Boolean gates take only 0/1 values, we convert it into Boolean Formula and get possible circuit schemes. To get reliable circuits, we select well-behaved circuits with the introduction of fitness scores which sufficiently consider the practical realizablity. Performance simulation and robustness analysis constituting the core of our evaluation module will shed light on how our devised circuits behave and examine the correspondence with truth tables. Moreover, our software keeps the compatibility of various methods or algorithms and reserves the space for users to redesign.

UT-Tokyo

Asia - Japan

Poster:
163 - Zone 5 - Hall D
Presentation:
Saturday - Room 302 - 2:30 PM

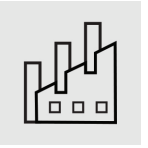
The Pattern Formation Game

How do Zebrafish get their stripes? Why do we have only 5 digits on each hand? Here's one possible answer: Turing Pattern. Turing Pattern is a type of spatial pattern suggested by the British mathematician Alan Turing. He proposed that these patterns could be created by the network of two chemicals which have different diffusion rates. This mechanism has been investigated for a long time. However, it was not easy to analyze patterns found on living systems because of its complexity and technical difficulty. We therefore reconstructed a Turing system using two advantages of synthetic biology; controllability and biological directness. By letting whole E. coli cells, whose motility were controlled, communicate with each other, we designed a system that works more ideally than any previous researches. This project should surely be a great step for understanding more about morphology and some other related fields of science.

Utah State

North America - United States

Poster:
232 - Zone 8 - Hall D
Presentation:
Friday - Room 302 - 11:30 AM



LactoWare

The cheese industry generates billions of dollars each year, and no wondercheese is delicious! One of the greatest difficulties that the cheese industry faces is bacteriophage (virus) infection, which kills bacteria used in the manufacture of cheese. The industry utilizes a variety of approaches to deal with this problem, each having their own drawbacks. The 2015 USU iGEM team is implementing a synthetic biology approach to design and create phage resistant Lactococcus lactis, a commonly-used cheese starter bacteria. The genetic mechanism behind this phage resistance functions by pairing a promoter that is activated in the presence of phage with a kill switch to terminate infected cells before phage are able to propagate.

Valencia UPV

Europe - Spain

Poster:
236 - Zone 8 - Hall D
Presentation:
Sunday - Room 309 - 5:00 PM

AladDNA

Conventional production methods require huge and specialized infrastructures, making the establishment of new production facilities in remote locations complicated. What if we could just send information that could unfold on site? AladDNA is a new revolutionary system able to process genetic information and give a response based on the user's needs just like a genie in a lamp! This system uses DNA to store information inside a plant seed, acting as a miniaturized and flexible biofactory capable of producing a myriad of bioproducts such as interferon alpha or anti-choleric vaccines. Equipped with a multiplexed-optogenetically controlled circuit, AladDNA can activate the production of different high-added value products upon the reception of external signals based on combinations of light stimuli. AladDNA allows bioproduction in any condition avoiding prohibitive costs due to infrastructures.
No matter where you are or what you need, just ask your wish! Because AladDNA has no frontiers!

Vanderbilt

North America - United States

Poster:
157 - Zone 5 - Hall D
Presentation:
Sunday - Room 311 - 2:30 PM

Demons in the Code

Every sequence of DNA hides a secret. Concealed throughout any genetic construct are **mutation hotspots**, DNA motifs prone to high rates of mutation. Once a mutation occurs at one of these sites, a mutant may rapidly overtake the population due to evolutionary selective pressure.
Our team has compiled decades of research into an algorithm that is able to eliminate these hotspots, reducing the risk of mutation for any gene without altering its function.
We have also devised strategies for improving the evolutionary stability of entire genetic circuits, and have created new bacterial strains with their genomes engineered to better resist and repair mutations. Our foundational advance has the potential to revolutionize the way synthetic biologists optimize their genes, by looking beyond simple codon adaptation to consider the stability, safety, and reliability of DNA parts. **Join us as we expose the menaces lurking in your DNA...**

Vilnius-Lithuania

Europe - Lithuania

Poster:
133 - Zone 4 - Hall C
Presentation:
Friday - Room 302 - 4:30 PM

Controlling the Lifetime of GMOs using ColiClock

We are Vilnius iGEM - the first team from Lithuania and the Baltic States. Our goal is to tackle one of the biggest problems of Synthetic Biology the regulation of the spread of GMOs in the environment.
The aim of the ColiClock project consists of creating a bacterium with an integrated ‘count-down timer’ triggering a self-destruction mechanism.
The idea would apply to cells that need to have a limited lifetime outside of a laboratory environment. The mechanism is achieved using the type I-F CRISPR-Cas system, controlled by LuxR and cI, that is navigated to important genes in the genomic DNA.
In addition, we aim to present and discuss this globally relevant topic with Lithuanian industries, policy makers and the general public.

Virginia

North America - United States

Poster:
115 - Zone 4 - Hall C
Presentation:
Friday - Room 311 - 5:30 PM

House of Carbs: A Novel Solution to Minimizing Postprandial Hyperglycemic Spikes

Postprandial glycemic spikes (PGSs) occur when the concentration of blood sugar rises and falls following a meal. For diabetics, complications resulting from PGSs are the leading cause of death.
Of the 100 million U.S. hyperglycemic patients, twenty-six percent regulate spikes through self-administered insulin, which is costly or easily misdosed.
To reduce the amplitude of PGSs, we designed a sugar-concentration-dependent microbial system that delays and reduces the absorption of glucose and fructose from the small intestine.
To show proof of principle, we introduced two genetic devices into E.coli to polymerize glucose into glycogen, to polymerize fructose into levan, and to induce cell lysis to release the polymerized sugar into the gut, thus reducing the amplitude of the glycemic spike. This microbial system, as a one-dose-fits-all solution, dynamically adjusts to glycemic spikes of fluctuating amplitudes. This system is a safer alternative to dosage-dependent drug therapies to stabilize blood sugar levels.

Warwick

Europe - United Kingdom

Poster:
96 - Zone 3 - Hall C
Presentation:
Friday - Room 304 - 2:30 PM

Brixells: cellular building blocks

We aim to provide precision control over spatial arrangement of cells by designing a tool that enables drawing and building with them. Zinc finger proteins are intracellular molecules which recognise and bind unique dsDNA sequences. We have engineered these proteins to be expressed on the surface of an E. coli cell, such that dsDNA can be used as mortar to cement cells together. Producing a library of zinc finger proteins, along with their cognate dsDNA sequences, allows for combining different types of cells. We will demonstrate this principle by assembling fluorescent cells onto a 2D surface and producing microscopic images, with the ultimate goal being to build complex 3D structures comprised of different cell types. This level of control over cellular localisation could potentially revolutionise multiple fields including research into cell-cell interactions in microbial communities, multicellularity, and the construction of 3D cell structures in tissue engineering.

Washington

North America - United States

Poster:
94 - Zone 3 - Hall C
Presentation:
Sunday - Room 302 - 10:00 AM

Lab on a Strip: Developing a Novel Platform for Yeast Biosensors

Biosensors for detecting small molecules have many applications in medicine, food, and the environment. Our project aims to combine the emerging fields of synthetic biology and paper diagnostics to create an affordable and accessible platform for a new class of biological sensors that could detect a wide variety of molecules.
We first developed a paper microfluidic device housing Saccharomyces cerevisiae, which was then modified to accommodate two different biological detection systems.
In one system, the Auxin/IAA-Degron pathway is used in conjunction with beta-galactosidase to produce a visible signal in response to the plant hormone auxin.
In the other system, aptazymes, a combination of RNA aptamers and ribozymes, are used to bind theophylline and allow fluorescent protein to be produced.
Both pathways serve as models for future real-world applications of our device, including the detection of marine biotoxins in the Pacific Northwest.

WashU StLouis

North America - United States

Poster:
70 - Zone 3 - Hall C
Presentation:
Saturday - Room 302 - 9:00 AM

Construction of a minimal nif cluster and computational modeling to optimize nitrogen fixation

Fixed nitrogen is an essential component of artificial fertilizers. However, given the heavy environmental and economic costs of fertilizers, interest in biological nitrogen fixation has recently increased.
One possible alternative to artificial fertilizers is to transfer the highly active Cyanothece sp. ATCC 51142 nitrogen-fixing (nif) cluster to plant chloroplasts. However, further characterization of the cluster is needed before that can be done. We attempted to determine the set of genes from the large Cyanothece nif cluster necessary for nitrogen fixation and inserted our selected genes into two plasmids. In order to further characterize our minimal cluster, we developed CRISPR/dCas9 knockdown plasmids and overexpression plasmids.
Additionally, we studied a genome-scale model of nitrogen-fixing E. coli through flux balance analysis that will help us optimize cofactors necessary for nitrogen fixation. We identified potential genetic interventions and media modifications that could improve cell energy levels, growth, and production of fixed nitrogen.

Waterloo

North America - Canada

Poster:
204 - Zone 7 - Hall D
Presentation:
Saturday - Room 312 - 2:00 PM

CRISPieR: re-engineering CRISPR-Cas9 with functional applications in eukaryotic systems

CRISPR-Cas9 is an exciting tool for synthetic biologists because it can target and edit genomes with unprecedented specificity. Our team is attempting to re-engineer CRISPR to make it more flexible and easier to use. We're making it easy to test different sgRNA designs: restriction sites added to the sgRNA backbone allow 20 nucleotide target sequences to be swapped without excessive cloning. Additionally, we're applying recent research on viable mutations within Cas9's PAM-interacting domain to design (d)Cas9 variants that bind to novel PAM sites, moving towards the goal of a suite of variants that can bind any desired sequence.
We believe our re-engineered CRISPR-Cas9 will give biologists increased ability to optimize targeting in many applications. The application we chose to explore is a proof-of-concept antiviral system defending the model plant Arabidopsis against Cauliflower Mosaic Virus, which would benefit from testing a large number of possible sgRNAs in the viral genome.

Wellesley TheTech

North America - United States

Poster:
198 - Zone 7 - Hall D
Presentation:
Sunday - Room 306 - 11:00 AM

BacPack for New Frontiers: Designing Interactive Museum Exhibits for Synthetic Biology

The Wellesley Human-Computer Interaction lab and the Tech Museum of Innovation in San Jose are collaborating to design an interactive museum exhibit that teaches core synthetic biology principles to a general audience. Featuring both a digital and a wet-lab component, the exhibit's aim is to provide a novel bio-tinkering platform for non-scientists that will foster learning of biological design concepts.
The premise of the exhibit is that museum visitors will take on the role of a scientist and engineer bacteria that can help explorers on scientific missions in extreme environments, including Mars, Antarctica, and the Deep Sea. Museum visitors will tinker with tangible representations of BioBricks from the Registry of Standard Biological Parts to design bacteria that can produce necessary resources. The exhibit will then display the transformation and multiplication of the engineered bacteria, and allow users to deploy and test it in the new environment.

Westminster

Europe - United Kingdom

Poster:
3 - Zone 1 - Hall C
Presentation:
Saturday - Room 306 - 2:00 PM

Energy production in Escherichia coli using exoelectrogenic genes (Mtr-pathway) found in Shewanella oneidensis MR-1

‘Energy is the single most important problem facing humanity today’ as quoted by Richard Smalley, late Nobel laureate, in 2002. Hence, the reason for exploring the use of synthetic biology for modifying Escherichia coli for microbial fuel cells. Shewanella oneidensis MR-1 is a dissmilatory metal reducing bacterium. One of the several electron transport chains found in Shewanella oneidensis is the Mtr pathway. This specific pathway is involved in the accepting of electrons which then carries a potential electrical charge. By cloning this pathway into E.coli, the aim is to produce an efficient electric producing microbial fuel cell (MFC). The efficiency of the MFC is down to the biofilm which is formed when cells adhere to a surface and stick to each other. Shewanella oneidensis is capable of transferring electrons through extensions known as nanowires. We have explored electron transfer through the use of flagella found in E.coli K-12 derivative, DH5-α.

WHU-China

Asia - China

Poster:
119 - Zone 4 - Hall C
Presentation:
Saturday - Room 311 - 5:00 PM

Limbo: Criticality Detector

We intend to construct a threshold detection system which could generate pulse output when the input reaches predefined threshold. This type of module is very important in biology systems, because it can function as a signal filter, a signal multiplier or a time-frequency domain signal convertor (like the Hodgkin-Huxley model in action potential generation). To achieve threshold detection, we set up a red light sensor to obtain input and a negative feedback circuit to generate pulse output with good intensity and modularity. In our case, along with the other two systems we built, the module is proved to have potential application in biological computer and homeostasis maintenance. The former aids in storing addressable binary data in living cells while the latter helps prevent dental caries (tooth decay) by controlling the population of Streptococcus mutans at a satisfactory level.

WHU-Pharm

Asia - China

Poster:
81 - Zone 3 - Hall C
Presentation:
Sunday - Room 311 - 12:00 PM

In Vitro Construction of Glucose-sensitive Drug Synthesis System

Tumor cells are found to have increased ability to consume glucose due to their high growth rate, thus causing the surrounding glucose concentration to drop. Therefore, it is possible to discriminate tumor cells from other tissue cells by detecting the low glucose concentration. Using liposome as a vector, we hope to design a drug expression system with the ability to respond to different glucose level. To achieve this, we combine the CRP activator, a regulatory protein activated by cAMP, with red fluorescent protein (RPF) as a reporter of expression level. Since glucose concentration is reversely related with cAMP level, a change of glucose level can influence the binding of CRP with target operon, thus altering the fluorescent intensity. By expressing our desinged gene circuit with *in vitro* protein expression system, we then test the expression level of the gene and find out how it relates with glucose concentration.

William and Mary

North America - United States

Poster:
45 - Zone 2 - Hall C
Presentation:
Saturday - Room 312 - 4:30 PM

Measurement of Promoter-Based Transcriptional Noise for Application in Gene Network Design

In order to provide teams with information that will be crucial in future gene regulatory network design, William & Mary iGEM is measuring the transcriptional noise inherent to the promoters commonly used in synthetic biology. Through the use of a dual-fluorescent reporter system we are able to quantify the intrinsic noise for each promoter tested. Additionally, we are creating a suite of gRNAs that will allow for CRISPR/dCas9-mediated transcriptional repression.

WLC-Milwaukee

North America - United States

Poster:
166 - Zone 5 - Hall D
Presentation:
Friday - Room 311 - 5:00 PM

tolsee

Antibiotic resistance is a growing problem facing both patients and physicians worldwide. Phage therapy, the focus of WLC-Milwaukee, is a potential alternative to antibiotics. We sought bacteriophages specific to the gram negative protein tolC, an outer-membrane efflux pore protein. TolC is of interest due to its role in certain antibiotic resistances, as bacteria use it to pump antibiotics out. TolC homologs are found in a variety of gram negative bacteria, including those causing diarrheal diseases. We focused on expressing tolC found in pathogenic bacteria, such as Cholera and Salmonella, in E. coli. The transgenic strains of E. coli were used to search for bacteriophages specific human GI tract pathogens. Once bacteriophages are identified for this tolC receptor, we hope to combine this phage therapy with an antibiotic resisted via efflux. Bacteria which become resistant to the bacteriophage through gene downregulation or function-destroying mutation risk increased sensitivity to the antibiotic action.

WLSA Shanghai

Asia - China

Poster:
55 - Zone 2 - Hall C
Presentation:
Friday - Room 306 - 4:00 PM

No title

No abstract

WPI-Worcester

North America - United States

Poster:
2 - Zone 1 - Hall C
Presentation:
Saturday - Room 306 - 5:00 PM

Antifreeze Proteins: Busting Biofilms and Crushing Ice Crystals

Antifreeze proteins (AFPs) have evolved in numerous cold-dwelling species to protect against the formation of cell-lysing ice crystals in subzero temperatures. AFPs have many applications from tissue preservation to food security and more, but recently a novel application has emerged: inhibiting biofilms. Biofilms are problematic in many settings including healthcare, manufacturing, and the environment. The use of AFPs as anti-biofilm factors is intriguing, however, only a single AFP has yet been shown to inhibit biofilms. We built a diverse library of AFPs and characterized both their antifreeze and biofilm-inhibiting properties in E. coli. Our results demonstrate novel biofilm-inhibiting properties for some AFPs and further characterize the freeze protection properties of many AFPs at low subzero temperatures. Our results will inform the design of novel synthetic AFPs optimized for use in E. coli, and provide a valuable new resource for the integration of AFPs into synthetic biology and biotechnology applications.

XJTLU-CHINA

Asia - China

Poster:
20 - Zone 1 - Hall C
Presentation:
Saturday - Room 302 - 3:00 PM

Bacteria World Map Simulates Global Warming

This year, XJTLU_China proposed to design E.coli that can simulate the global warming process on the agar plate. The earth has blue marine, green continent and white polar region, and our E.coli, with implanted RNA thermometer, chromoproteins and signal molecules exchange system, will display the original state and the change of each part under the effect of elevated temperature. As we know, global warming will lead to ice melting, sea level rise and land desertification. When sensing the raised temperature, marine bacteria will open RNA thermometer and release signal molecules to ‘erode’ costal and polar bacteria, gradually making them blue and showing the submersion of these regions. Meanwhile, when inland bacteria get warmed, they will turn yellow from green, showing the process of desertification.

Yale

North America - United States

Poster:
61 - Zone 2 - Hall C
Presentation:
Sunday - Room 311 - 3:00 PM

Developing a Framework for the Genetic Manipulation of Non-Model and Environmentally Significant Microbes

We established a framework for implementing genetic manipulation techniquesspecifically, multiplex automated genome engineering (MAGE) and CRISPR-Cas9 systemsinto non-model, environmentally significant microbes using standard biological parts. The framework involves two components: (1) propagation and selection of cultures and (2) manipulation of cell genomes by MAGE and/or CRISPR. We identified design considerations for both components of the framework, and experimentally validated propagation and selection considerations using cyanobacterial strain Synechococcus sp. PCC 7002 (a fast-growing cyanobacterium capable of lipid biofuel production) and Sinorhizobium tropici CIAT (a nitrogen-fixing rhizobium which forms root nodules in legume plants). We then developed a workflow for the design, construction, and testing of MAGE and CRISPR technologies in non-model prokaryotes. The insights we gained from validating the propagation component of our workflow will serve to improve the versatility and robustness of our framework and will inform the development of tools for genetic manipulation in other non-model organisms.

York

Europe - United Kingdom

Poster:
9 - Zone 1 - Hall C
Presentation:
Saturday - Room 311 - 10:00 AM

Phil Phosphate: Filling *Escherichia coli* with phosphate.

Phosphate pollution from wastewater causes eutrophication, resulting in environmental damage. Current methods routinely used to remove phosphate involve chemical approaches, which themselves can be polluting. Our project builds on the enhanced biological phosphate removal process, using natural bacterial communities as an alternative to these chemicals. We are engineering *Escherichia coli* to enhance its phosphate acquisition. This will be achieved by upregulation of the native phosphate transport and metabolism genes. We will also add heterologous genes from proposed phosphate accumulating species.
Target gene selection is assisted by computer based metabolic modelling.
We are improving assays used to determine the phosphate accumulation levels, achieved by our genetically engineered bacteria.
New European legislation will require water companies to decrease their maximum phosphate concentrations from 3 mg/L to 0.1 mg/L. Here we hope to engineer an organism which helps to achieve this in a clean and economical way.

ZJU-China

Asia - China

Poster:
259 - Zone 8 - Hall D
Presentation:
Friday - Room 311 - 9:30 AM

TERMITE TERMINATOR

The aim of our project is to create a brand-new system to kill termites. We chose two kinds of toxins which are safe and environmentally friendly to eliminate termites. We have cloned genes coding insecticidal toxic proteins from Photorhabdus luminescens TT01, a bacteria poisonous to numerous insects, and express them in E.coli. We enhance the production of Avermectin in S.A. Then, we prepared cellulose nanocrystals (CNC), and generated the nanofibrous microspheres (NCM) self-assembled from CNC as bacteria carriers, in order to reduce the loss, improve transport efficiency, and target the carrying to aimed location and preventing bacteria from releasing into the environment.
Finally, a series of simulation experiments have been conducted.
They can help us to understand the cellulase, and confirm the terminator are efficient. Based on the result of simulation, we improved a device to monitor and terminate termites for better achieving.

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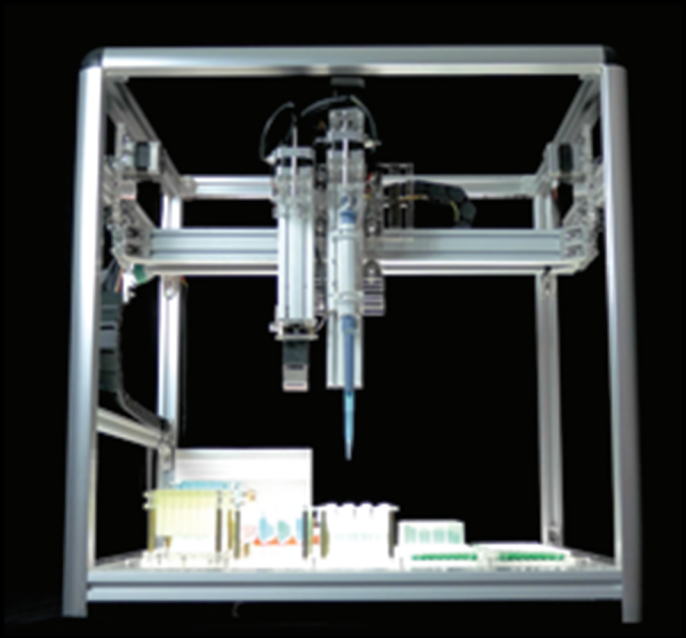

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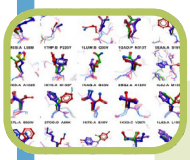
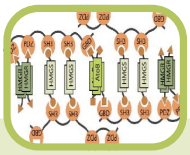
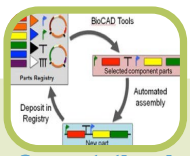

Part design


Genetic scaffolds



Computational design

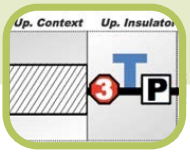

Responsible innovation


Cellular therapies


Green materials


Personal medicine

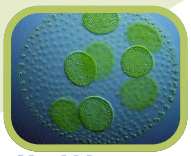

Rapid genome editing

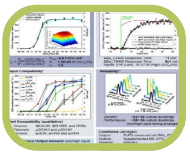


Genetic architecture

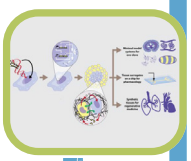

BIOFAB facility

Web of Registries


Algal bioenergy and bioproducts


Standards


Smart fermentation


Tissue engineering

Synberc is a major U.S. research consortium that aims to make biology safer and easier to engineer. Synberc is training the next generation of scientists and engineers to build bio-based solutions to some of our great challenges in health care, energy and the environment. Help us advance synthetic biology responsibly for the greatest public benefit by exploring these undergraduate opportunities:

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SOCIAL EVENTS

SUNDAY
SEPTEMBER 27
8:00 PM

See page 40 for more information

synenergene

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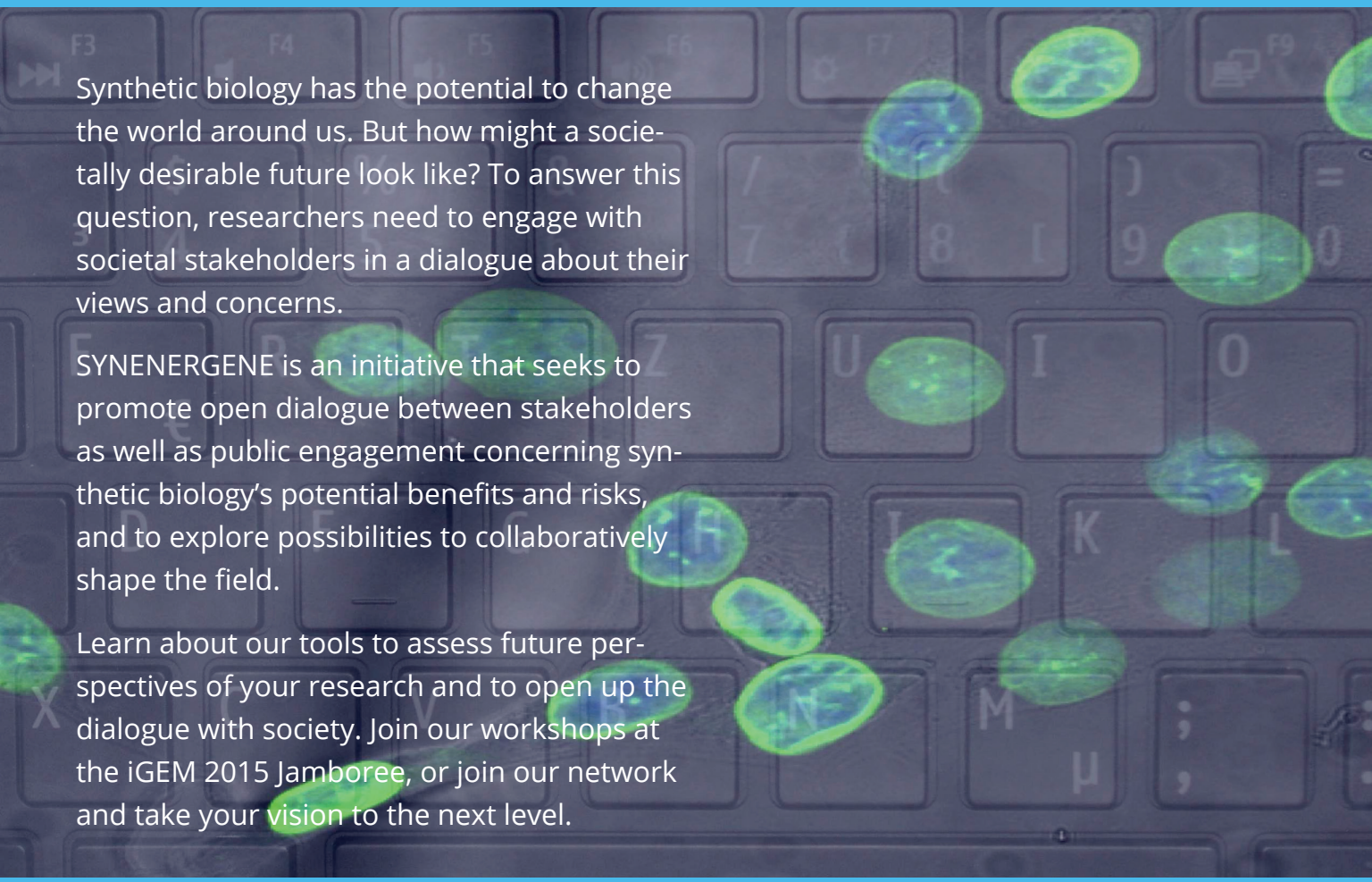

Synthetic biology has the potential to change the world around us. But how might a societally desirable future look like? To answer this question, researchers need to engage with societal stakeholders in a dialogue about their views and concerns.

SYNENERGENE is an initiative that seeks to promote open dialogue between stakeholders as well as public engagement concerning synthetic biology's potential benefits and risks, and to explore possibilities to collaboratively shape the field.

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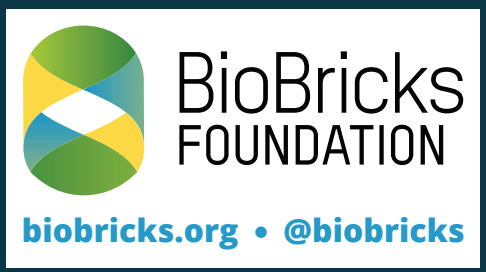

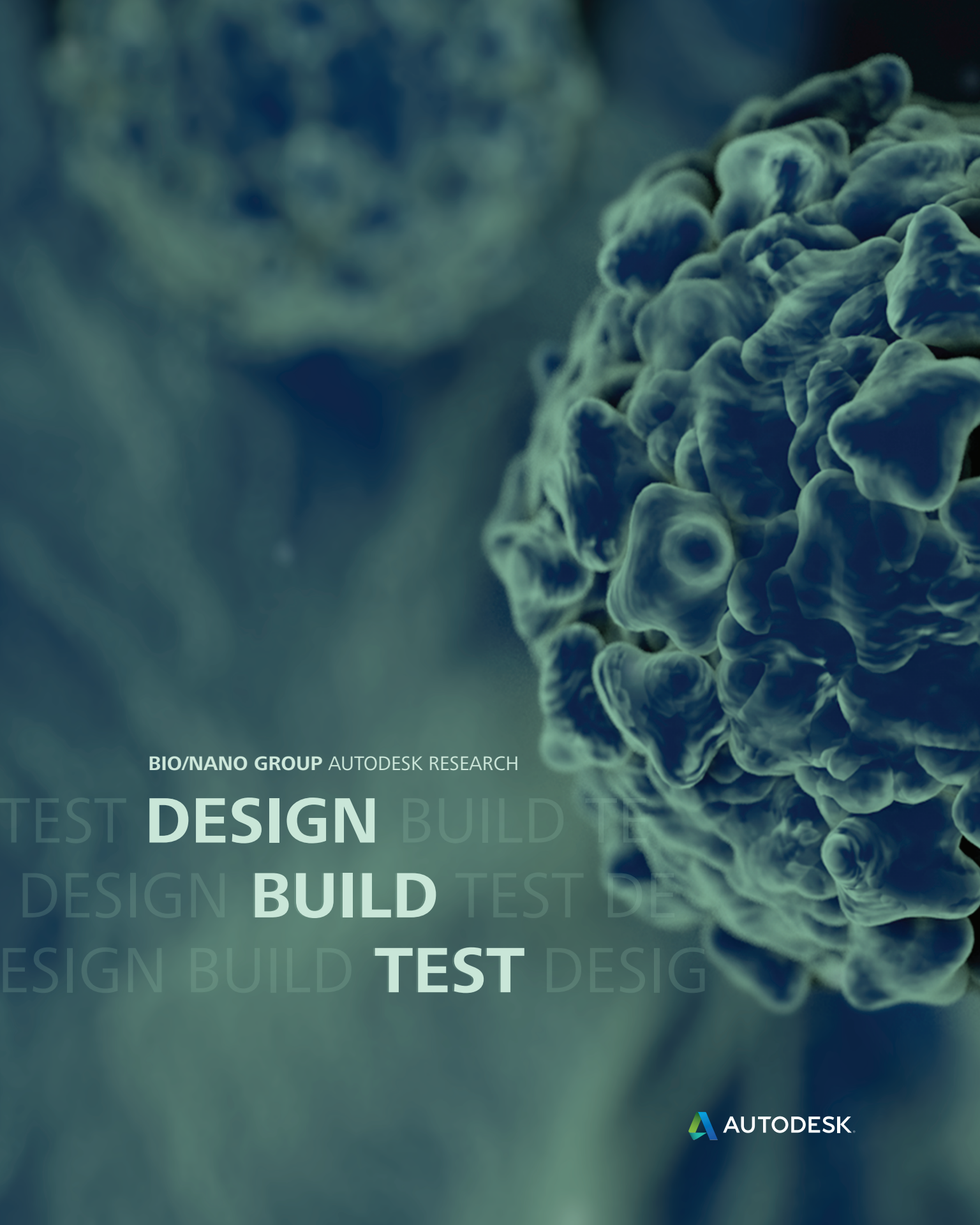
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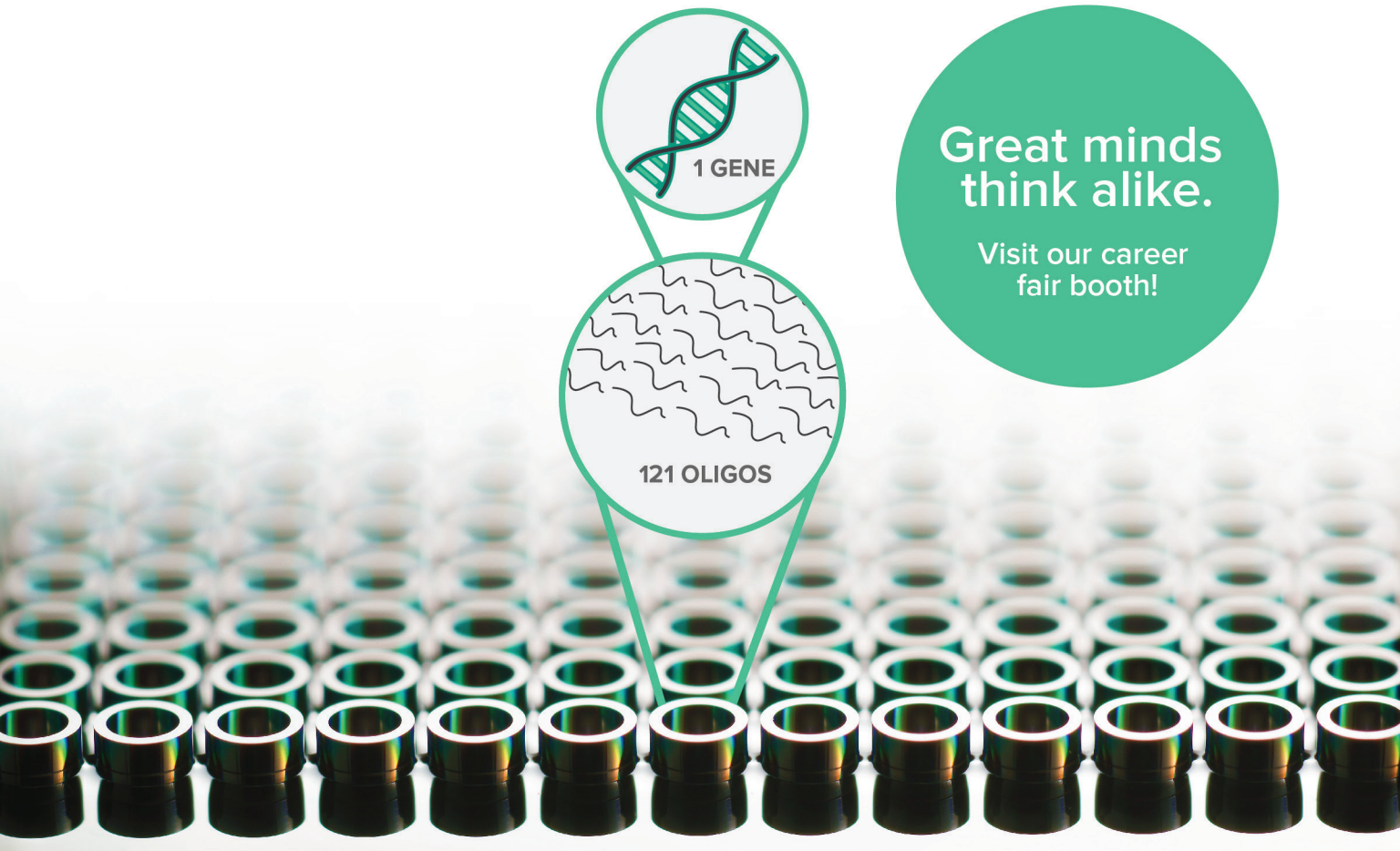

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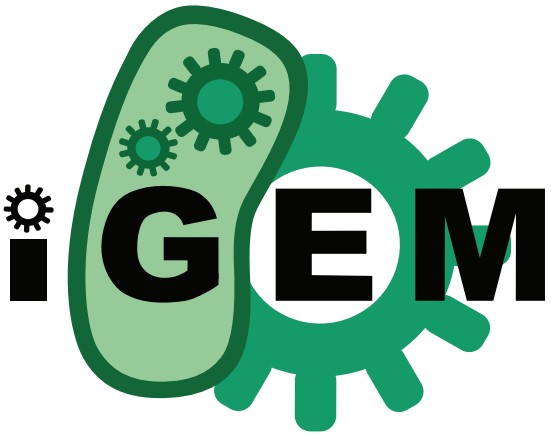

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OCTOBER 27 - 31

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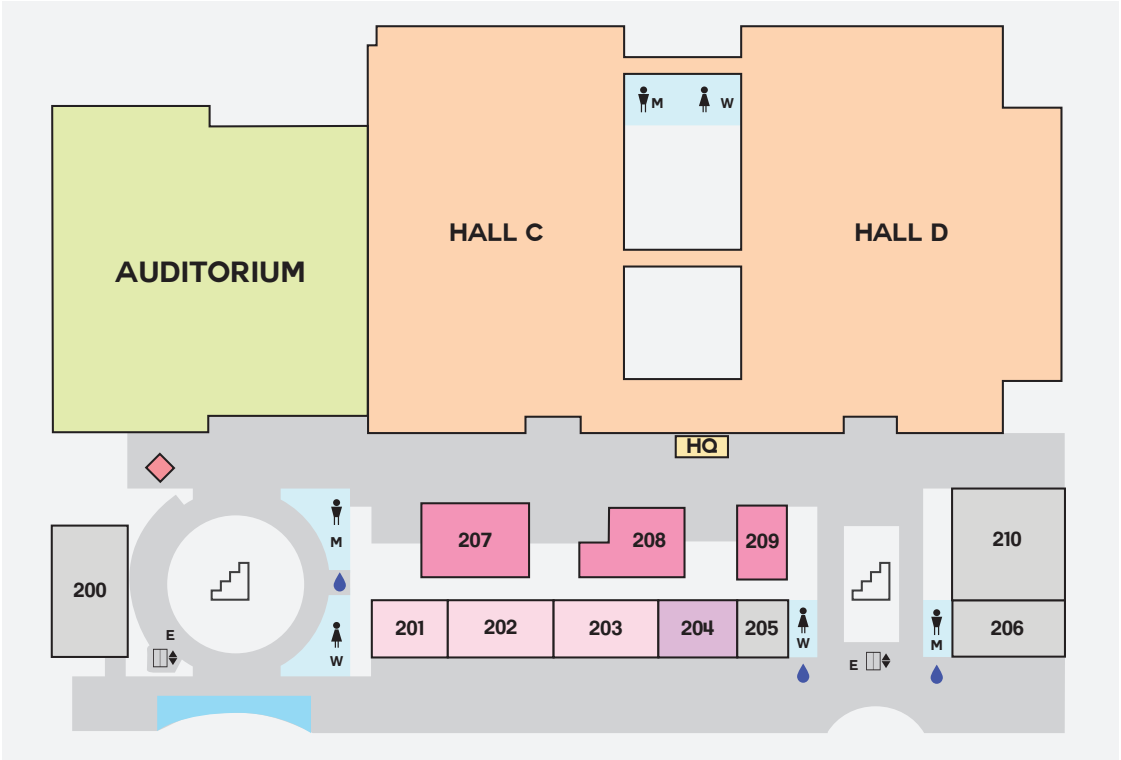

3RD Floor