

cornell

iGEM

2018

SPONSORSHIP

PACKET

cornell iGEM
synthetic biology project team

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TEAM LEAD LETTER

BY RAHUL RAMBHATLA

2018 Team Lead

Thank you for your interest in sponsoring the 2018 Cornell International Genetically Engineered Machines (iGEM) team. We are an award-winning team composed of 41 undergraduates from various disciplines across the university. Each year, we push the boundaries of synthetic biology by combining engineering practices with genetic engineering to address problems we see in the world and compete at the world's premier synthetic biology competition: the iGEM Giant Jamboree.

The iGEM Giant Jamboree brings together high school, undergraduate, graduate, and community teams annually in Boston. Teams implement synthetic biology in unique ways, either to fundamentally advance the field or to solve environmental and medical problems. With the help of our generous sponsors, we've achieved incredible success at competition. In addition to receiving the Gold Medal in five of the last six years, our team has also won awards for Best Applied Design, Best Undergraduate Environmental Project, and Best Human Practices. Recently, our success has led to awards for Best Supporting Entrepreneurship at the largest Giant Jamboree to date. From working with Ithaca High School to set up their own synthetic biology team to being featured in articles in Popular Science, Cornell iGEM seeks to reach for ambitious goals while giving back to our community. Our sponsors help us continue our pursuit of cutting-edge research and engineering, as well as supporting us to be a positive impact on the community around us.

By supporting us, sponsors gain access to a large and quickly growing audience of students, teams, researchers, and industry professionals – over 300 teams attended the iGEM Giant Jamboree last year. Our team's sponsors are featured prominently on team apparel, website, presentation materials, and poster. Our website offers a comprehensive overview of our past projects and can be found at <https://igem.engineering.cornell.edu>. In addition, this packet contains a detailed breakdown of our budget, team, and accomplishments.

Thank you for your generous sponsorship!

Sincerely,

A handwritten signature in black ink that reads "Rahul R".



WHAT IS iGEM?

SYN BIO COMMUNITY

International Genetically Engineered Machines

iGEM began in 2003 at Massachusetts Institute of Technology, and has since grown into the world's largest synthetic biology competition, now hosting over 300 teams from around the world in 2017. At the beginning of the season, each team receives a kit plate of synthetic DNA parts from the iGEM headquarters. Using these and parts of their own design, teams integrate synthetic DNA components to create novel, engineered organisms to solve various engineering problems. Teams participate each year at the international competition and are judged based on the quality of their biological work, the significance and applicability of their project, human practices and safety components, and the presentation of the work via their website, poster, and a formal oral presentation.



The Parts Registry

One of the iGEM competition's greatest goals is the development and cultivation of the Standard Registry of Biological Parts. This parts registry contains thousands of synthetic DNA components designed to be modular: every part in the registry can be interchanged within common DNA backbones, allowing researchers to easily create novel genetic circuits for important engineering purposes. After every competition season, iGEM teams submit their genetic parts (called "BioBricks") to the parts registry for future teams and researchers to use. This collaboration is essential to the iGEM competition and research in synthetic biology in general, and it ensures that any research done by our team can be utilized by the scientific community as a whole.



THE CORNELL TEAM

41 STUDENTS FROM 4 COLLEGES

2018 Team

Cornell iGEM is an undergraduate synthetic biology team and has solidified itself as a perennial contender at iGEM competitions. The team, founded in 2009, is still relatively new, but recent successes have helped the team gain prominence at both the university and the iGEM competition. Our team is composed of 41 undergraduate students from four colleges across the university (Engineering, Arts & Sciences, Agriculture & Life Sciences, and Human Ecology). This diverse group of students uses their different expertise to complete a complex and novel project each year. Cornell iGEM provides dedicated students who have a desire to pursue biological research and engineering an opportunity to gain experience in a professional work environment, hone their practical engineering skills, and pursue their own research goals. As evidenced by our recent human practices accomplishments, our team prides ourselves on sharing our research and promoting safety with regards to the controversial field of synthetic biology. In doing so, we are developing the next generation of responsible scientists with the potential to bring synthetic biology to the forefront of modern engineering solutions.



OUR ACHIEVEMENTS

	Oxyponics	2017	
	<p><i>Detection system for oxidative stress in hydroponic farming</i></p> <ul style="list-style-type: none"> - Gold Medal Classification - International winner of Best Supporting Entrepreneurship 		
	FishPharm	2016	
	<p><i>Drug delivery system and probiotic treatment for Bacterial Cold Water Disease in fish hatcheries.</i></p> <ul style="list-style-type: none"> - Gold Medal Classification - International Best Supporting Entrepreneurship, Best Environmental Project, Best Applied Design awards 		
	Organofoam	2015	
	<p><i>Genetic Fungal Engineering Toolkit</i></p> <ul style="list-style-type: none"> - Gold Medal classification - North America and International Best Human Practices Advance award 		
	Biofactory	2014	
	<p><i>A cell-free method of synthesizing complex biomolecules.</i></p> <ul style="list-style-type: none"> - Gold Medal Classification - International Best Manufacturing Project 		
		2013	
		2012	
		2011	



BIOLOGICAL BAND PASS FILTER

Our 2018 Project

The ability of biological systems to respond to signals underlies everything from metabolism to cell death to bioremediation. This year, our team plans to find ways to expand ways for cells to respond to external stimuli. In the status quo, most cells cannot respond to frequency-based signals – only amplitude-based ones. Our project this year aims to design and implement a biological circuit that allows cells to respond to specific frequency-based signals.

To achieve a frequency-dependent response, our circuit relies on bacterial sensory promoters, which respond to various external stimuli including light and heat. A series of filters and logic gates removes noise from the input signal. Using an already well-characterized low-pass filter combined with a NOT gate to invert it, we can create a band-pass filter that isolates the frequency of the signal we aim to respond to. If a signal makes it through the filter, a fluorescent protein is produced. By integrating other circuits into our system, we can produce both graded and binary responses to the input signal.

Creating the intracellular response to signals requires the ability to precisely control protein degradation rates. Recent research has found relatively easy ways to tune this degradation rate using the mf-Lon system found in *M. florum*. As a result, our product development team will create mathematical models to predict the response of our circuit to external signals.

As the field of synthetic biology grows it continues to integrate a diverse array of disciplines, including mathematics, engineering, and statistics. Our project integrates signal processing and mathematical modeling to expand our understanding of synthetic biology. More than any of our past projects, we combine and find new uses for existing parts designed by teams from around the world in the true spirit of collaborative growth and exploration.

2018 PROJECT BUDGET

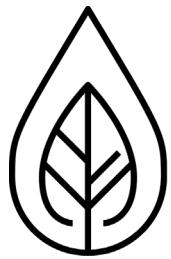
Project Expenses

Expenses	Cost
OligoPrimer and Gene Synthesis.....	\$2000
DNA Sequencing.....	\$500
Molecular Biology Reagents.....	\$4000
Plasticware and Lab Supplies.....	\$3000
Product Development and Hardware.....	\$2500
Software Licensing.....	\$1300
Outreach Supplies.....	\$200
Training Fee, Printing.....	\$400
	Total \$14,200

Competition Expenses

Expenses	Cost
Team Registration.....	\$4500
Individual Passes.....	\$5560
8 passes x \$695/each	
Travel Expenses.....	\$1500
Lodging.....	\$5000
5 rooms x 4 nights	
	Total \$16,560

Grand Total \$30,760

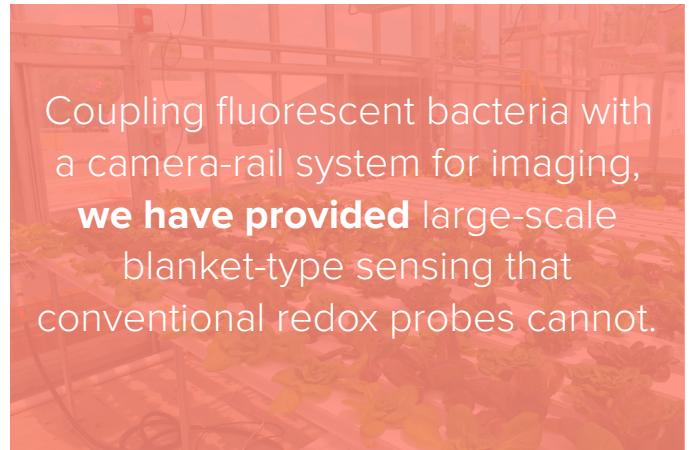


OXYPONICS

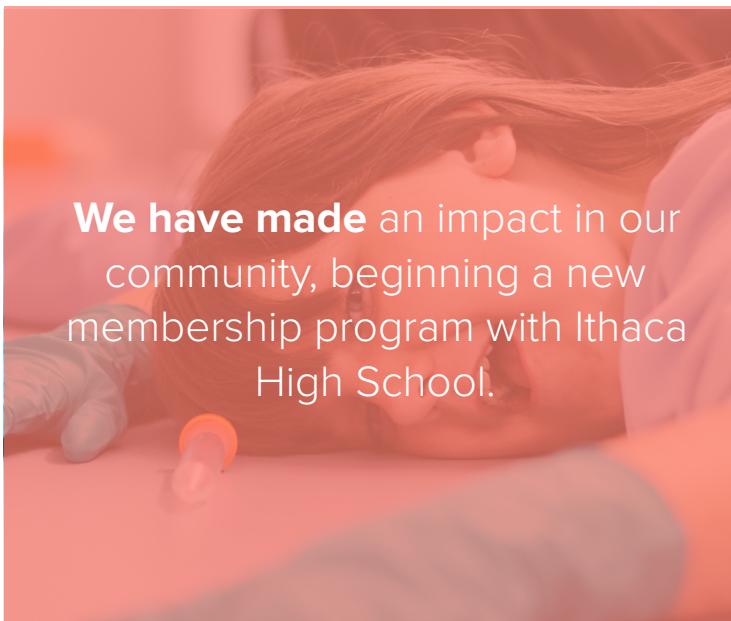
Our 2017 project in review



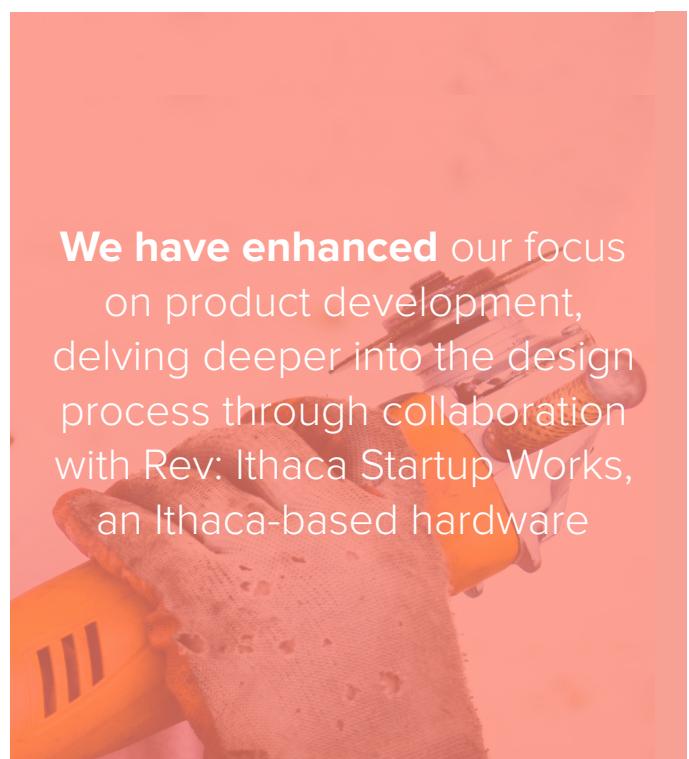
We have created a multifaceted system to detect and regulate oxidative stress in hydroponics systems in agriculture.



Coupling fluorescent bacteria with a camera-rail system for imaging, **we have provided** large-scale blanket-type sensing that conventional redox probes cannot.



We have made an impact in our community, beginning a new membership program with Ithaca High School.



We have enhanced our focus on product development, delving deeper into the design process through collaboration with Rev: Ithaca Startup Works, an Ithaca-based hardware



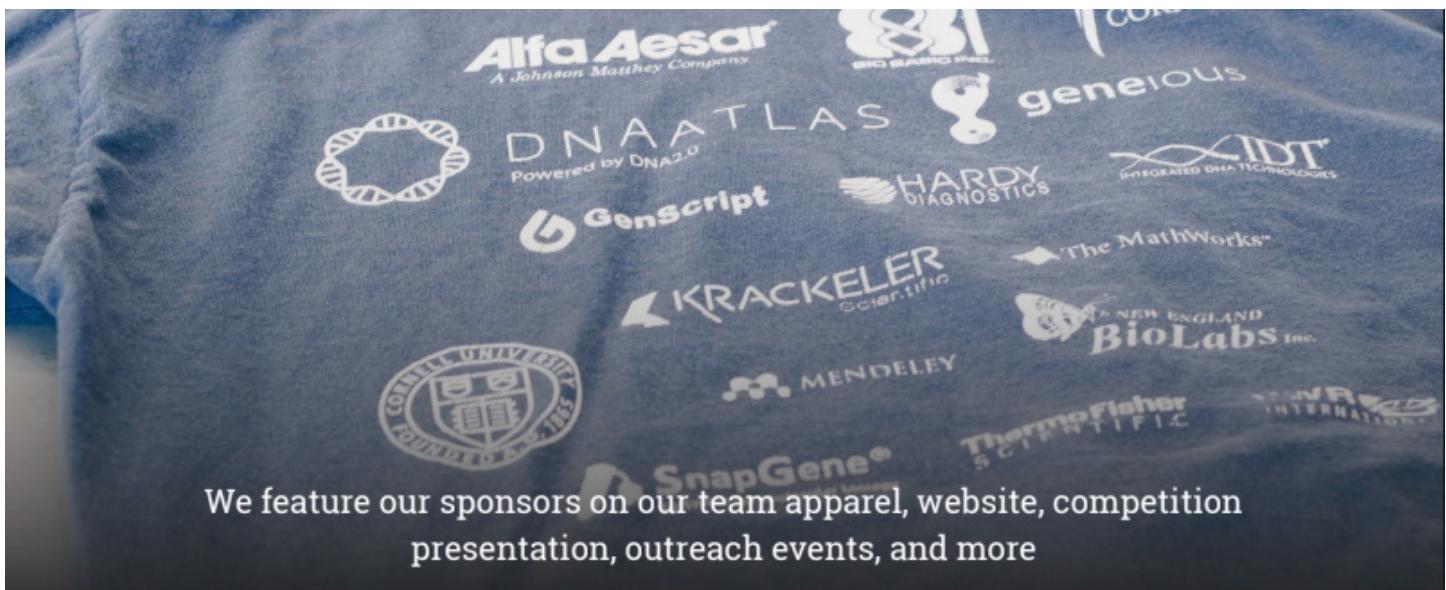
We have received gold medal status at the international competition level and won Best Supporting Entrepreneurship.



SPONSORSHIP BENEFITS

Competition Visibility

Sponsors get high visibility through both the presentation in the iGEM competition and the networking through the university. Each year, Cornell iGEM competes at the largest international synthetic biology competition (over 300 teams in attendance with over 5600 participants). All of our sponsors are featured prominently on our competition poster, competition presentation, and project Wiki. Even after the competition, our team website and Wiki from this past competition season (on which all of our sponsors are featured) both receive around 500 hits per month, and still continue to be visible. Due to our success the past couple seasons, our team has been featured in various publications including Elsevier, the Cornell Chronicle, the Cornell Daily Sun, IDT's Decoded, and Popular Science, as well as newsletters from our past and current sponsors.



University Networking

Cornell University is a highly respected and well-regarded research university. At the university, sponsors can gain publicity through interactions between the team with other students and research labs. As a relatively new team, we have a very young and active alumni network with which we share the names of our sponsors. Each year we have graduating members who are eager to pursue careers in biology and engineering — quite possibly with a sponsor.

YOUR SPONSORSHIP

Gifts in Kind

- Centrifuge tubes (2 mL, 15 mL, 50 mL) and micropipette tips
- PCR reagents (DNA polymerase, dNTPs, etc.)
- Cloning enzymes (EcoRI, Spel, PstI, XbaI, NotI, DNA Ligase)
- Antibiotics (Chloramphenicol, Kanamycin, Ampicillin)
- Gel electrophoresis materials (Agarose, TAE Buffer, DNA Ladder, Ethidium Bromide)
- Molecular biology kits (Plasmid minipreparation, DNA clean and concentration)
- Electroporation cuvettes
- Media components (LB Broth, Yeast Extract, Tryptone, various salts)
- Software licenses
- Electrical & mechanical engineering tools

Monetary Support

Our team also accepts any monetary support. There are many items we need that we cannot receive in kind, so monetary support is vital to the success of our team. In addition to purchasing those items listed above, contributions will be put towards custom primers, DNA sequencing, iGEM registration fees, travel and lodging for competition, and savings funds for future Cornell iGEM teams.

Intellectual Partnership

In addition to receiving donations from sponsors, we have also formed partnerships with businesses in the past. In 2013, Cornell iGEM made great strides in bridging the gap between the iGEM competition and industry. Our collaboration with Ecovative, a leading biomaterials company, proved to be the most meaningful and in-depth partnership between an iGEM team and a corporation to date. Such partnerships depend greatly upon our project each year, and as a team we are open to working with businesses to solve problems with synthetic biology.

DONATION FORM

Supporting Our Efforts

Cornell iGEM provides promising undergraduate scientists and engineers the opportunity to pursue their own research interests in a supportive team environment. While Cornell does provide our team with laboratory space, access to some of its outstanding facilities, and funding for competition fees and travel, funding for individual components of our project must come from generous, outside sponsors. If you are interested in supporting our efforts this year and becoming a part of an exciting and successful synthetic biology team, please fill out the following form and return it to the provided address. Checks can be made payable to "Cornell iGEM" and attached to this form. If you have any questions about our team or specific support we could use, please don't hesitate to contact us. We greatly appreciate support of any kind. Thank you for your time!

Mailing Address

Cornell iGEM
Attn: Greg Albano
B07 Weill Hall
Ithaca, NY 14853

Contact Information

Team Leader: Rahul Rambhatla
Phone: 213 - 880 - 7781
Email: cornelligem@gmail.com
Website: igem.engineering.cornell.edu

General Information

Name of Organization: _____
Mailing Address: _____
City: _____ State: _____ Zip Code: _____

Contact Information

Contact Name: _____ Contact Title: _____
Phone Number: _____ Email Address: _____

Donation Information

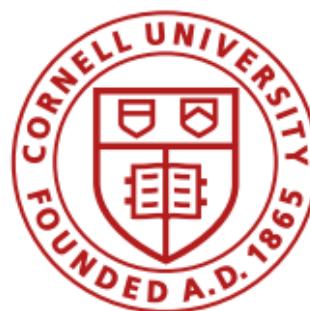
Gift in Kind

What is the gift in kind? _____
What is the market value of the gift in kind? _____

Monetary Donation

What is the donation amount? _____
Donor Signature: _____ Date: _____

THANK YOU 2017 SPONSORS!



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