

International Genetically Engineered Machines Competition



Welcome

Bigger and Better

Welcome to the 2006 iGEM competition! With a total of 40 schools signed up this year, iGEM has grown a little over 300% since 2005, and will be bigger and better than ever. One thing's for sure: it will be a very different competition than it was last year.

Some of the larger changes include: a shift towards undergraduate teams that have more time to work on high-risk projects; defined competition categories (structured and unstructured) to facilitate the growing range of ideas about how teams should operate, and also to allow unconventional teams, for example, a group of high school students, to participate; an ambassador program meant to help support each team's needs (more on this elsewhere in the newsletter); and an expanded roster of events, including a Jamboree in November that should be very exciting!

Behind the scenes, the Registry of Standard Biological Parts has been significantly improved and expanded, making it easier than ever to find, assemble, build, and annotate BioBricks. There will also be significantly improved documentation.

But the most important thing for 2006 is really what hasn't changed: iGEM is all about having some serious fun while pushing the envelope of Synthetic Biology to the max. Although iGEM is structured as a competition, the emphasis is on collaboration and the sharing of information and experience.

For the latest information on anything iGEM-related, be sure to check out the iGEM

wiki. Better yet, don't just read it -- add your own stories, thoughts, protocols, projects, and other ideas to it! By sharing, we'll all learn more about each other, and grow stronger for it. To all the teams, good luck! ⚙️

Philosophy

iGEM Foundations

There are many reasons why schools choose to participate in the iGEM competition, and even more reasons why students choose to join the teams. To get the most out of the iGEM experience, it's important to understand the core philosophy behind the competition: basically, we want to make biological engineering easy, reliable, and fun.

For most researchers, biological research is an iterative process of struggle, success, then struggle some more. iGEM is testing the idea that biological engineering can be performed more reproducibly through the use of modularized and standardized parts, or BioBricks. Standardization is common in other engineering disciplines yet is relatively unknown in biology. iGEM hopes to change this. The big question remains, will it actually work?

That's where iGEM teams come into the picture. By challenging teams to make and use BioBrick parts in their designs, real-world experience can be collected about the use of standard parts. As to whether they work, the answer is yes. Already, some cool devices have been made -- but lots more examples are still needed.

page 1

Can you imagine 70,000 students competing each summer to the coolest biological system? We can.

While the fundamental philosophy of iGEM comes from Very Large-Scale Integration (VLSI) ideas from electronics, the organization of the iGEM competition itself is modeled on student robot competitions. The largest of these now involves over 70,000 students and 25,000 volunteer mentors, filling entire stadiums! Through friendly competition, iGEM hopes to discover creative new approaches to designing and building engineered biological systems, while allowing as many students as possible to directly participate. Over time, this could lead to a very large community of biological engineers well-equipped to work together to build really complex things.

Can you imagine 70,000 students competing each summer to make the coolest biological system? We can. ⚙️



Open Biology

Share and share alike

iGEM is an experiment in what is becoming known as open source biology -- the unfettered sharing of biological reagents and information. The design of BioBricks permits the re-use and recombination of genetic parts and is ideal for sharing parts. By sharing BioBricks, teams effectively stand on the work done by students in previous years, allowing them to climb even higher. But the parts shown to actually work (demarked by the green "W" besides their listing the Registry) and that have the most complete documentation tend to be the most heavily favored parts for downstream use -- a kind of positive feedback loop -- even though all parts marked with a green "A" are also available for use. To maximize the number of parts used in construction, we are encouraging all participants in the iGEM program to continually update and improve the documentation on the BioBrick parts they have made and use, and to



Bacterial conjugation following a night out dancing in the small intestine.

provide complete and detailed information on any new parts they are adding to the collection. To introduce iGEMers to some of the great parts that are already available for use, and to set an example for thorough documentation, Randy Rettberg has created a Featured Parts section in the Registry Wiki. Some of the current featured parts include conjugation parts, small molecule sensors, and fluorescent signals. Other parts and devices are still waiting to be documented, so if you have experience with any of these parts, please share your knowledge! See the Featured Parts page (http://parts.mit.edu/registry/index.php/Featured_Parts) for more information. ⚙

I_(gem) Robot

DNA on Demand

Meagan Lizarazo has been with the iGEM team since 2005, working with Tom Knight and Randy Rettberg to transfer and optimize iGEM's standard assembly protocols to the program's new Eppendorf epMotion 5075 robot. (Meagan is also the iGEM ambassador for Latin America and Mexico, and likes to translate the Registry

and OpenWetware pages into Spanish in her spare time.)

Working with the robot has been very challenging. The standard assembly protocols can be finicky even when done by hand; doing them on the robot adds a whole new layer of complexity. Meagan has worked to create automation methods and investigate sources of contamination, error, and loss.

Automating the procedures should be worth the effort, though. At maximum capacity, the epMotion robot can perform about 100 rolling assemblies per week. Although there are a few bugs still to hammer out, the problems are being resolved one by one. And, if everything begins to work properly, the robot should help make the assembly of new devices and systems as simple as using the Registry's assembly tools, which also continue to get easier to use each year. However, because automated assemblies are still in "beta" and may be unreliable, and also to allow teams to have direct experience with the standard assembly protocols, Meagan will also be sending out 384-well replica plates containing BioBricks DNA to all the schools in May. Details on DNA deliveries will be sent to the iGEM teams and published on the iGEM wiki. ⚙

iGEM Goals

1. Enable the systematic engineering of biology
2. Promote the open and transparent development of tools for engineering biology
3. Help construct a society that can productively apply biological technology
4. Kick some bacterial butt (optional)



Meagan Lizarazo gets deep into the guts of the iGEM robot.

Photo: M. Lizarazo

Engineered biology: easy as 3.14159265...

TTT Workshop

Teaching the teachers first



The first "Teach the Teachers" (TTT) workshop took place on May 6th at MIT, bringing together about 50 leaders representing 23 of the 40 schools competing this year. Drew Endy gave a polished talk on the Foundations of Synthetic Biology. (See the iGEM wiki for slides.) Randy Rettberg outlined the structure of the competition and reviewed the mechanics of the Registry, while Tom Knight reviewed how BioBrick assemblies worked. Team leaders had the opportunity to introduce themselves and their teams. Pam Silver closed out the day with an overview of yeast biology. The next TTT is scheduled for June 12, 2006 at Imperial College in London. ⚙️



Photos: A. Hessel

Teach the Teachers Workshop, Stata Center, MIT, May 6, 2006

Ambassadors

Coping mechanisms 24-7

The ambassador program is a new addition to the iGEM competition in 2006. The competition can be challenging for some schools the first year as they go about assembling a team, absorbing the ideas related to synthetic and open biology, and get the hang of working with standardized parts. To help shepherd new teams and get them up to speed, Randy Rettberg created the ambassador role. The iGEM ambassadors – James Brown (Northeastern United States, Cambridge), Andrew Hessel (Canada, US Midwest and South), Melissa Li (Western and Southeastern US), Jonas Nart / Robin Künzler / Tamara Ulrich (Europe), Reshma Shetty (Asia), and Meagan Lizarazo (Latin America) – each have experience in previous iGEM competitions and share the goal of helping the 2006 teams have a fun and successful year. They are front line "go-to" people for all things iGEM, able to take the time to answer questions thoroughly and, importantly, increase the amount of information sharing between the participating teams. Each school has been assigned a dedicated ambassador, although teams are welcome to contact other ambassadors as well. They'll be visiting each school as schedules permit after the Teach the Teachers workshops. They hope to meet all the iGEM team members, get a sense of the projects that are being worked on, and answer any questions that people may have. They may even be able to dispense a few tips or hints about how to take home the big prizes at the Jamboree. ⚙️

iGEM Awards

Show me the money

Teams that are participating in the structured competition are competing in the following categories:

- Best Overall Team
- Best Part – 1st and 2nd Place
- Best Device – 1st and 2nd Place
- Best System – 1st and 2nd Place
- Best System (working) – 1st and 2nd Place

Send DNA to the Registry and Win!

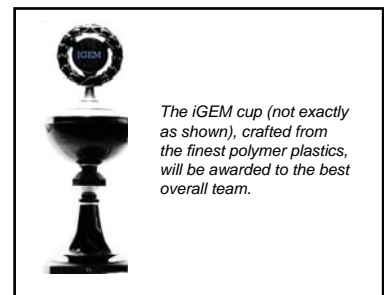
So you've made a new BioBrick (or you have one in the freezer from last year that you've been meaning to send) and you want to send it to the RSBP. Here's how to do it. Note: Every part received will earn you a ballot in a raffle for a \$100 Amazon gift certificate, as well as a big green "A" in the registry!

1. First, be sure to include all part information on the tube, including:
 - o part number,
 - o plasmid the part is in,
 - o cell strain,
 - o any other useful information
2. (Use a labelmaker if you have one, or write very, very neatly.) Overnight ship the DNA or stab to:
Meagan Lizarazo
MIT Room 32-314
32 Vassar Street
Cambridge, MA 02139
Phone: 617.258.5244
3. Send an email to Meagan (meaganl@mit.edu) to let her know a part is on the way. Don't forget to include the overnight delivery tracking number!
4. Any problems or questions? Give Meagan a shout. She'll fix you up in no time!

Note: To qualify for prizes, the project must be documented on the iGEM wiki and the parts used must a) be documented in the registry and b) the DNA received by the registry prior to the Jamboree in November. In addition to the main prizes, limited-edition collectables sure to make others immensely jealous will be up for grabs in a variety of subcategories, including:

- Best Poster
- Best Presentation
- Best Team Spirit
- And more!

The team judged Best Overall, in addition to the great prizes they will receive, will earn the right get to keep the coveted iGEM cup at their institution until the following year, plus participate in exclusive photo opportunities with synbio luminaries! ⚙️



The iGEM cup (not exactly as shown), crafted from the finest polymer plastics, will be awarded to the best overall team.

Call for iGEM info!

We want to hear about your project, team, or other iGEM-related info. If you have an article or idea you think should be in the newsletter, send it to igem@mit.edu

iGEM Puzzle No.1

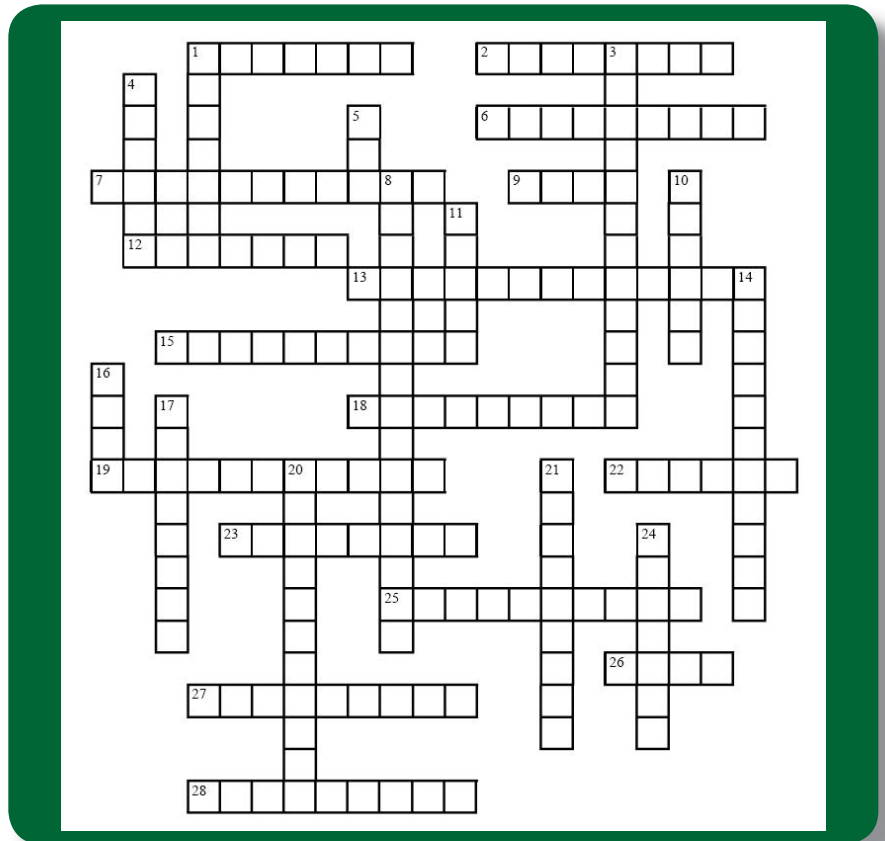
People, places, papers, projects and other trivia related to iGEM.

Across

- 1 Curvy fellow
- 2 2004 overview author
- 6 Essential for easy biology
- 7 Keasling's Drug
- 9 Synbio's Poster Boy
- 12 RFP derivative
- 13 Elowitz's baby
- 15 A cultured friend
- 18 iGEM's genemaker
- 19 Home of iGEM biofab
- 22 Slashdot for bioengineers
- 23 All in all in the wall
- 25 California Gov's fave part
- 26 Hawaii connection
- 27 Not nature's selection
- 28 iGEM co-sponsor

Down

- 1 First western iGEM school
- 3 Went bang! in Nature comic
- 4 Tom's Mesoplasma
- 5 Randy's last microsystem
- 8 Before international
- 10 Energy maverick
- 11 Advanced early sponsor
- 14 Improves genetic readability
- 16 Mom's partners
- 17 Abstraction benefit
- 20 A 2004 IAP project
- 21 iGEM Dr. in shining armor
- 24 Texas winning project



See the iGEM wiki for the crossword solution.

The iGEM program is made possible in part by the generous support of the MIT iCampus program, a \$25 million research alliance between MIT and Microsoft Research to enhance university education through information technology.



Newsletter design and text by Andrew Hessel. Please send comments and suggestions to ahessel@gmail.com

The iGEM Team

Founder and Director: Randy Rettberg
Co-Founders: Tom Knight, Drew Endy
CSBi Coordinator: Nika Stoop
Technical Specialist: Meagan Lizarazo
Ambassadors: James Brown, Andrew Hessel, Robin Künzler, Melissa Li, Meagan Lizarazo, Jonas Nart, Reshma Shetty, Tamara Ulrich

Hot Links

iGEM wiki: <http://parts.mit.edu/igem>
Registry: <http://parts.mit.edu>
OpenWetWare: <http://openwetware.org>
Synbio news: <http://syntheticbiology.org>



The 2006 iGEM logo was designed by James Brown, who participated with the 2005 Cambridge team and this year will be the ambassador for the Northeast US schools.

