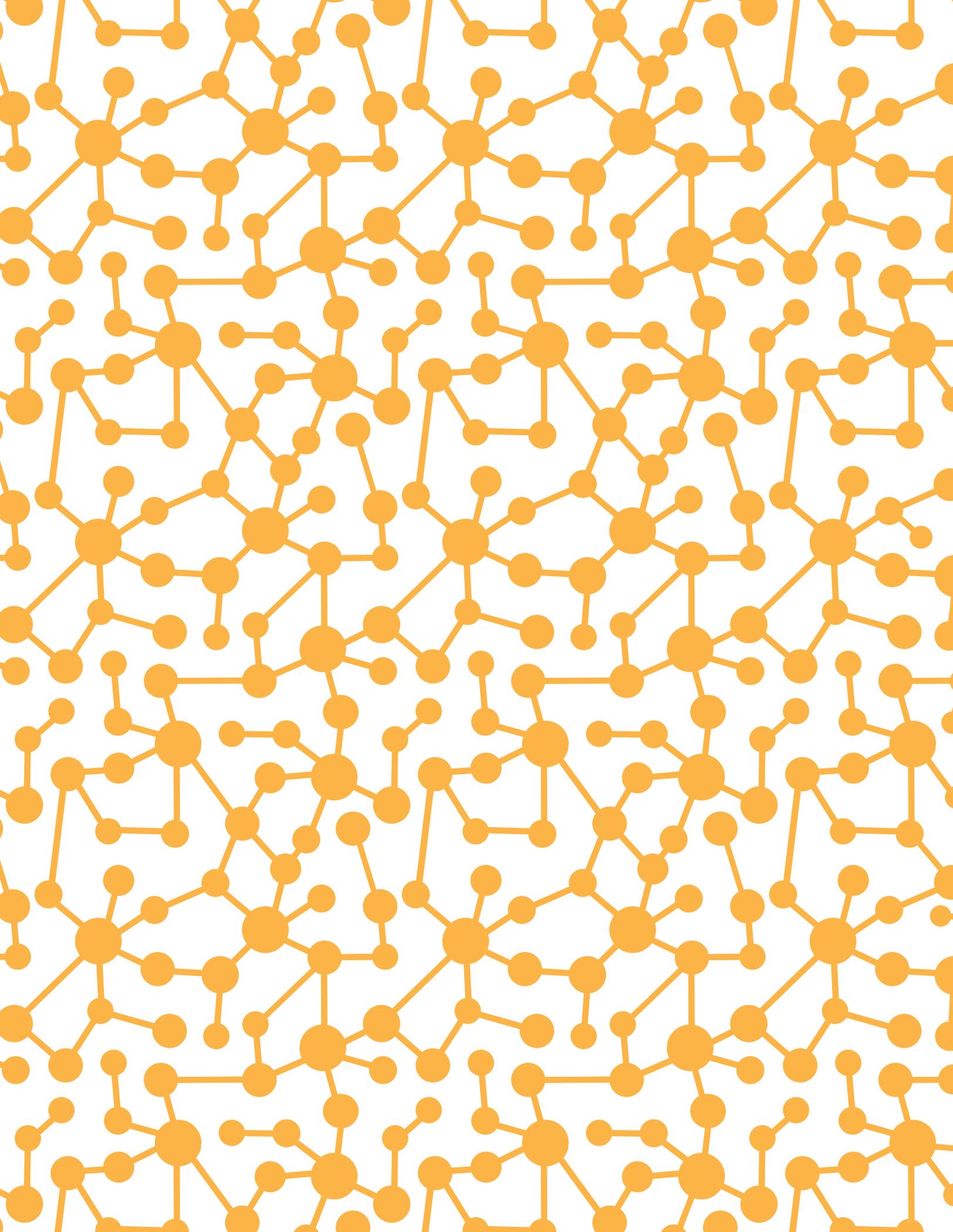


The iGEM Digest



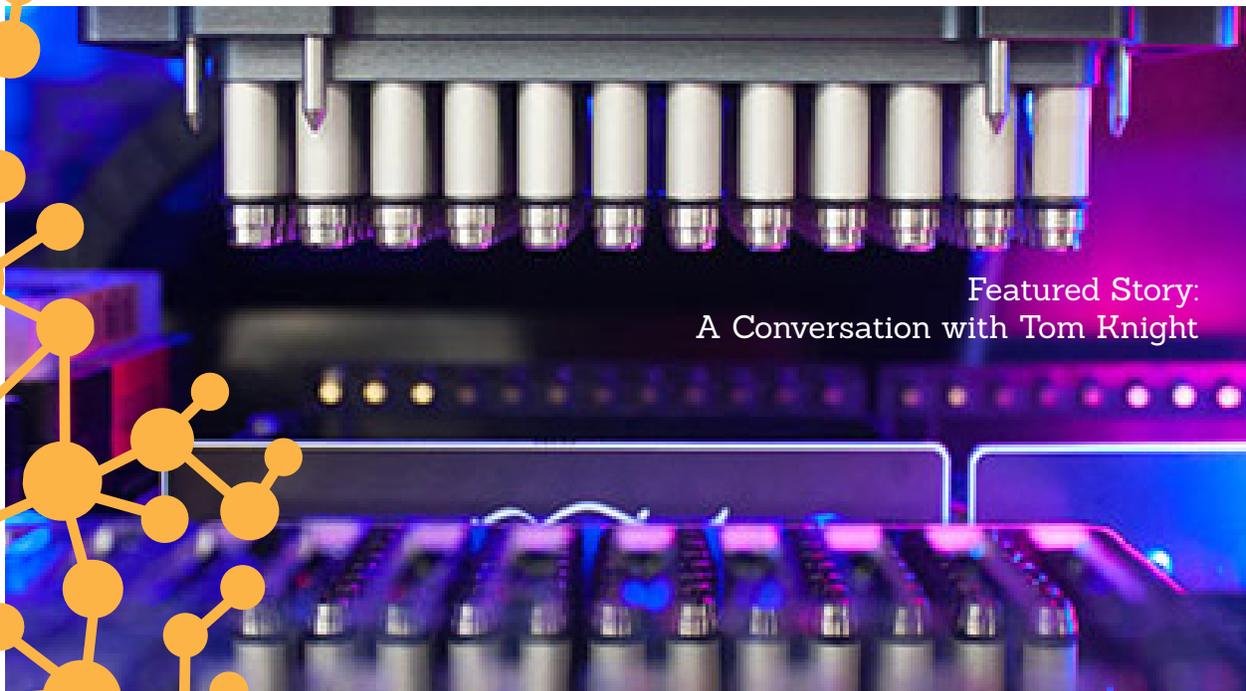
Issue 01 - October 2018





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Featured Story:
A Conversation with Tom Knight

Letter From The Director of After iGEM

Dear Readers,

It is my pleasure to announce the launch of The iGEM Digest.

The motivation for creating The iGEM Digest came from the countless inspiring stories that we have heard from participants, alumni, and others in synthetic biology over the past decade. Each one of these stories is an example of the spirit of iGEM. By launching The iGEM Digest, we have created a venue to celebrate our accomplishments as a community. We also have a greater vision for the Digest—to inspire, connect, and promote the advancement of iGEM and synthetic biology.

Every year of the competition, I am impressed by what iGEM teams accomplish, the stories that are told, and the genuine human connections established. The Giant Jamboree is the gateway to the future of synthetic biology. As you explore the landscape the teams have created and speak with the iGEMers, you witness the promise of the future of synthetic biology as exemplified in the iGEM community. iGEM and the positive change that teams are making in their communities demonstrate the power of local people solving local problems everywhere around the world.

Going beyond the Jamboree, we continually hear the stories of what happens after the competition -- the companies you create with the co-founder you met at iGEM, the continuation of your project that is now garnering acclaim for its impact on your local community, the initiative that was seeded at an event and cultivated with help from your community, and much more. We created After iGEM to excite, inspire, and support the 35,000 iGEMers around the world. We now have the iGEM Digest to share those stories with you.

As synthetic biology and iGEM continue to grow, we look forward to fueling new ideas and celebrating your many accomplishments through The iGEM Digest.



Sincerely,

Meagan Lizarazo

Executive Vice President, iGEM

Director, After iGEM

From The Editors

Dear Readers,

Welcome to the first issue of The iGEM Digest. Synthetic biology has come a long way since its inception, but this would not have been possible without individuals who first gave life to the idea of iGEM and synthetic biology. In creating the The iGEM digest, we wanted to celebrate successes within iGEM and the synthetic biology community through the impact iGEM creates in different corners of the world.

In this inaugural editon, kindled with the spirit of iGEM, each story in The Digest that has emerged out of the competition, shares a distinct narrative and a similar passion. From Boston to Amazonas to Lithuania, iGEM has empowered many of us to begin transformative journeys in our regions and cultivate an impact that goes beyond the iGEM Competition.

In this issue, we join Tom Knight, a founder of synthetic biology and Ginkgo Bioworks, as he reflects on the start of his entrepreneurial journey and where Ginkgo stands today. We also hear stories of regional pioneers of synthetic biology such as the Manaus Amazonas Brazil team. The Amazon Warriors is an ode to the journey of synthetic biology in their region and how it has inspired a generation of students to learn, develop, and apply disruptive technologies for their people. The Vilnius-Lithuania team — champions of the 2017 iGEM Competition — who kickstarted synthetic biology in their country .

We also celebrate our partners who continue to make the iGEM Competition possible and equip iGEM teams with the resources and knowledge to bring their ideas to reality. Lastly, the After iGEM Ambassadors share how participating in the iGEM Competition enabled them on new and exciting journeys

As The iGEM Digest continues to develop, we want to hear your stories and share them with the rest of the world, to inspire everyone, everywhere. Whether you are a student who has participated in the program, a mentor for new iGEM teams, a synthetic biology entrepreneur and enthusiast, an academic, or a science communicator, you have pushed the boundaries of synthetic biology by tackling everyday issues facing the world. You are trailblazing the future for synthetic biology and we want to broadcast your story far and wide. Join us as we celebrate all these stories through The iGEM Digest.

Thank you from the bottom of our hearts for connecting with us through The iGEM Digest. Every single contributor and reader is an integral part of our community and we are excited to welcome you on our journey of inspiration, connection, creation, and celebration.



Sincerely,
Amy Chen
and
Hassnain Qasim Bokhari
Co-Editors-in-Chief

A Conversation with Tom Knight



Tom Knight is one of the original founders of iGEM and the synthetic biology field. Since his involvement with iGEM, he went on to co-found Ginkgo Bioworks, a successful biotech firm in Boston.

Founded in 2009, Ginkgo Bioworks started as a team of just fifteen employees with the aim of designing organisms for commercial use. Ginkgo's early success began with the development of yeast strains to produce fragrances, flavors, and food for commercial use. Since its humble beginnings, Ginkgo Bioworks has expanded to take on other exciting projects beyond the flavor and fragrance industry. These projects include working with DARPA in creating probiotics to fend off stomach bugs, designing bacteria that could decrease the reliance on chemical fertilizers in the farming industry, and creating 'living medicines'.



Tom Knight,
Cofounder of Ginkgo Bioworks

Ginkgo Bioworks has extensive connections with iGEM. All five of the Ginkgo founders (including Tom Knight) acted as advisors to the 2006 MIT team, whose infamous Eau d'e coli project resulted in E.coli strains which were engineered to smell like banana and wintergreen. This iGEM project established the basis for Ginkgo's later work on fragrances. Since their early days, Ginkgo has continued to maintain its ties with iGEM with roughly 10% of Ginkgo's workforce having participated in the iGEM competition in one capacity or another.

Upon Ginkgo's ten-year anniversary came the announcement that it would be a lead contributor in this year's iGEM competition.

Written by **Ellie Powell**

All images provided by
Ginkgo Bioworks

To celebrate this partnership, we speak to Tom Knight from Ginkgo.

Ellie Powell

As one of the pioneers of synthetic biology, could you describe the timeline of events which led to the founding of the synthetic biology field?



Tom Knight

So that's a long story. I have a background in computer science and as an electrical engineer. I guess around 1990, a lot of things happened to get me into biology and got me interested in the field.

I could tell this area was going to be important, so I thought how do we get to the next level? In order to do that, you need money. So, the question became, how do I motivate people who have money to give it to me to do stuff? Computational funding was funded almost entirely by DARPA and as a result, I was very familiar with the community and the people who ran in 1995. I proposed a summer study in 1995 in this area in Cape Cod on 'cellular computing' which focused on merging computer and information technology with some of these ideas to make something that will work.

Next year, as part of that program, we received funding for an MIT microbiology lab, kick-starting the field. The lab ran until 2010, in which a number of developments in the field were made. Ron Weiss worked in the lab where Bio bricks were developed and the first distribution of parts [happened] at a DARPA meeting.

At MIT there is an independent activities period in which students can pursue interesting projects and we started a mini-course in this area in 2004 with Randy Rettberg, which began iGEM.



Ginkgo has a long history with iGEM, with all five co-founders of Ginkgo being connected to the competition.

What sparked your interest in the concept of iGEM?

We were approached by the National Science program. Funding in the US is given out from October to October of the fiscal year and there is an incentive to spend it all. The program manager at the National Science Foundation at the time said that she wanted to make a competition on this stuff. Initially, Drew Endy and myself weren't keen and we asked 'must it be a competition?'. She said that it must be a competition, and it was a brilliant idea. In the first year, five schools competed, and it took off from there.



What led you and the rest of your team to decide to found Ginkgo Bioworks as a start-up?

In the mid-2000's I was still at MIT and was having trouble getting grants. I'd get grants turned down by the funding bodies saying that the grant proposals were good but they couldn't fund them. I got tired of it. Around the same time, the other co-founders (Jason Kelly, Reshma Shetty, Barry Canton, and Austin Che) were all getting on to graduate in 2008 with PhDs in engineering. I had been working with Jason for around 5-6 years and the other students were working with Drew Endy.

We were all working closely together, and we began to talk about what happens next. Jason said to me 'What do you think if we started a company?' to which I replied, 'What would you think if I joined you?'.



This happened in the spring of 2008. At the time there was an economic downturn, which brought both good things and bad things. I discovered that the organization, the American Society for Educating Engineers had a program for newly graduated Ph.D. students for students working in industry, which offered them a \$70,000 salary and health insurance. I asked them if the company had to exist yet, to which the program director said 'go for it, start it!'. We scraped enough money to start the business. Other companies at the time had shut down meaning we could cheaply buy used lab equipment. We didn't have a laboratory for the first year. We had a store for lab equipment, most of which was purchased from eBay.

We assembled the lab for ten cents on the dollar. We didn't have a clear picture of what we were doing but we were confident that we'd figure something out. Our focus hasn't really changed, which is our interest in making biology easier to engineer.

When Ginkgo first started, synthetic biology was in its infancy.

What challenges did you face in the early stages of the start-up?

How have these challenges changed as Ginkgo has expanded?

“We have recently announced our two major projects on biosecurity. Patrick Boyle – an engineer at Ginkgo and previous iGEMer - is an author of a major paper on biosecurity in the National Academy of Science.”

With the continuous expansion, how has Ginkgo evolved its responsibilities and policies with respect to the research conducted at Ginkgo.

For any start-up, you have to ask: How do you make up a business? What do you do or sell? What service do you provide to ensure that you have more money going in than out? We didn't have a clear idea when we started out. We thought DNA assembly would be our business then decided against it. We then considered environmental clean up as a challenge to tackle and spoke with companies working on the oil sands in Alberta and with copper mining organizations in Chile. Unfortunately, we found that these groups didn't care and that there was no market there.

In 2006, the MIT iGEM team did a project on fragrances ['eau d'E. coli'], synthesizing wintergreen fragrance in bacteria. All co-founders of Ginkgo were involved in this project. We realized from this that we could make fragrances and flavors to get people to pay for. It took a long time – around a year- to make contact with the major players in the community. This became our first plausible business model.

The challenges have changed.

One of the main challenges has been trying to maintain the corporate culture of a company as you recruit people. Namely, how do you ensure when a company doubles, triples or quadruples that the vision is not lost? We have therefore focused a lot of effort into that.

From the start, we have been motivated to be responsible in this area. We have close relationships with governmental agencies. We have recently announced our two major projects on biosecurity. Patrick Boyle – an engineer at Ginkgo and previous iGEMer - is an author of a major paper on biosecurity in the National Academy of Science. Also, around two years ago, we purchased Gen9, a leading DNA synthesis company. This integrated us into the international gene synthesis consortium along with other DNA synthesis companies such as IDT and Twist Biosciences, which focus on safety. This ensures there is a vetting process for ordering sequences, namely what the order is and who is ordering it.





How do these policies and responsibilities in synthetic biology compare coming from an iGEM experience to a company in the private sector?

There is a huge difference between the two experiences in that iGEM teams are in the public. We can't talk about clients, projects or who we are. We can be open about some projects, for example, we are working with the Harvard Herbarium to bring back extinct flowers. This involves taking samples of dried flowers of extinct plant species, deep sequencing them, then pulling out the fragrance genes so we can attempt to recreate the fragrances of extinct plants.

It acts as a credible effort to resynthesize scent from flowers and we are required to talk about it. All the DNA goes into public databases. We are also proactive in talking about controversial things such as attitudes towards GMO's. On this topic, Jason Kelly wrote a piece for the New York Times on how we should be proud of GMO's and how GMO's should be labeled in supermarkets. We are therefore trying to reach out to the public.

With the continuous expansion, how has Ginkgo evolved its responsibilities and policies with respect to the research conducted at Ginkgo.

From the start, we have been motivated to be responsible in this area. We have close relationships with governmental agencies. We have recently announced our two major projects on biosecurity. Patrick Boyle – an engineer at Ginkgo and previous iGEMer - is an author of a major paper on biosecurity in the National Academy of Science. Also, around two years ago, we purchased Gen9, a leading DNA synthesis company. This integrated us into the international gene synthesis consortium along with other DNA synthesis companies such as IDT and Twist Biosciences, which focus on safety. This ensures there is a vetting process for ordering sequences, namely what the order is and who is ordering it.



Where do you see the field progressing in the next years and what vision do you have for Ginkgo Bioworks?

For the future, the vision doesn't change. The methods, however, will change. At the moment, we are reliant on high throughput screening and synthesis. Going forward, this will move on to a predictive approach. We are moving away from measuring processes to good simulation tools. This will require fewer experiments to be designed with smaller expenses. This will not happen immediately though and is a five to ten-year project.

Important things are going to happen. synthetic biology could be increasingly important in environmental clean-up strategies. It could also have a place in planet colonisation. If it happens, then planet colonization will be reliant on synthetic biology. The words 'insurmountable opportunities' come to mind. Asking that question is like asking Bardeen in 1948 after developing the transistor to 'please predict iPhones'. You can't predict it. You can make guesses what's important today but we don't have a clue for the future.

Do you have any words of advice for iGEM alumni that want to take their projects further after the competition?

That's hard. At the risk of sounding self-assertive, I would say that the best way would be to come work with us!

To be serious, we are trying to make things faster and better than anywhere else in the world. There would be a high chance of success.

MathWorks, Synthetic Biology and iGEM

From being a course during the Independent Activities Period to becoming the global pioneer in synthetic biology, iGEM has grown tremendously since 2003. 340 teams from more than 40 different countries are participating in the iGEM Competition this year.

From its inception to where it is today, iGEM has found some amazing friends in the shape of partners who have supported the iGEM Competition and one of them is Mathworks.

MathWorks is the leading developer of mathematical computing software. Engineers and scientists worldwide rely on their products such as MATLAB, SimBiology, and Simulink for the discovery, innovation, and development in a wide range of industries, an important one of which is synthetic biology. Moreover, these products are also fundamental teaching and research tools in the world's universities and learning institutions.



The shared focus on research and education of both the iGEM Foundation and MathWorks, and over 10 years of partnership has proven pivotal for the research conducted by iGEM Teams and promotion of the multidisciplinary nature of synthetic biology.

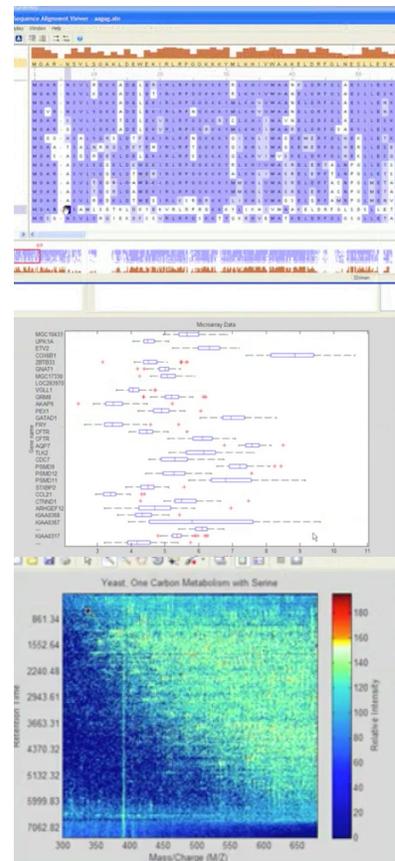
For the past 10 years, MathWorks has been providing free MATLAB Software License and technical support to all iGEM teams.

If you go through iGEM projects, you'll hardly come across one which does not include modeling. It was only appropriate to start our conversation on the role of mathematical modeling in the global scheme of synthetic biology, since Mathworks is the global leader in the field.

Modeling guides the rational design of genetic modifications and enables synthetic biologists to better analyze and predict system behavior prior to fabrication.

Contributed by:
Fulden Buyukozturk

Photo credits:
MathWorks
iGEM Foundation and Justin Knight



Above: Data analysis made by MathWorks' Bioinformatics Toolbox™

“We are constantly amazed by the nature and the impact of projects created by teams in such a relatively short amount of time.”

Fulden Buyukozturk,
MathWorks

For example, models can let you simulate how the system will behave when you put different sub-systems or components, which you know the behavior of, together in a particular manner. The results are often counterintuitive. Models can also help identify which parameter regions will result with the desired system outcome.

Techniques such as parameter estimation, sensitivity analysis, and bifurcation analyses are crucial for the development and use of models that are representative of the biological system. Mathematical modeling and experimentation go hand in hand in synthetic biology as it does in engineering disciplines.

As advances in molecular biology and experimental techniques enable scientists to create complex synthetic biology systems, the need and importance of mathematical modeling will be even more prominent. One obvious challenge with that is the demand for strong modeling and simulation skills in graduating students.

iGEM is key in responding to that challenge by providing an important opportunity for students to be trained in mathematical modeling, among other skills, while working to solve real-world problems.

iGEM teams benefit greatly from the resources provided by MathWorks not only during the competition but after it as well. Winning teams who have used MathWorks products in their projects have the opportunity to be featured on The Winner’s Circle and have been interviewed in videos on mathworks.com. MathWorks is also looking to work with more current iGEM teams on their projects, from initial stages to up until the Giant Jamboree, and build long-standing relationships.

The online resources provided by MathWorks are nothing short of a treasure for iGEM participants and alumni working on new projects after the competition such as videos, documentation, MATLAB Central File Exchange and technical articles.

Below: *MathWorks at the iGEM 2016 Giant Jamboree*



The work done by teams and researchers have been using MathWorks' tools have been a constant source of inspiration to shapes up the resources they develop. Anyone interested in learning more can check out the biological sciences and SimBiology product pages and should feel free to reach out to them with any questions. Staying true to their goal of providing the best resources to the users, MathWorks also conducts workshops as per user requests.

Thank you to MathWorks for being a supporter of iGEM for over 10 years!

Competitions like iGEM give real-world experience to students allowing them to build skills that can be applied to future careers. MathWorks tools are being used across multiple engineering and science disciplines, including computational biology, both in industry and academia. **Having access to industry standard tools like MATLAB, Simulink, and SimBiology can help students have a smooth transition from the classroom to various careers.**

Being engaged with scientists and engineers on a project level provides MathWorks an opportunity to understand workflows and requirements better, and shape their tools to meet scientists' needs. The After iGEM program provides a great opportunity to connect former iGEM participants with MathWorks and hear what they have been doing beyond the competition.



Vilnius-Lithuania

It was an exciting day for the Vilnius-Lithuania team last November when they took home the Grand Prize at the 2017 iGEM Jamboree. The team's iGEM project, SynORI, won three special awards: Best New Basic Part, Best New Composite Part, and Best Part Collection in addition to being nominated for an additional five awards. In order to learn more about the team's story, and to catch up with what the team is up to now, the iGEM Digest contacted the Vilnius-Lithuania team leader Gabrielius Jakutis.

The Digest was very curious how the team started and how the members were introduced to synthetic biology. Jakutis informed The Digest that the team was started by Dainius Tautvaisas, a student who participated in the 2013 iGEM competition as part of the University of Edinburgh team. Tautvaisas believed that Lithuania had plenty of talent and was a great environment for the cultivation of synthetic biology. Therefore, he set up the first team in 2015 and introduced the students, local academia, and the team's first financial partners to iGEM. Since then, the members have been recruiting newcomers on annual basis to participate in the competition.

Although it seemed like the team was established immediately and that everything went smoothly since its inception, I knew there was more to the story and indeed there was.

Written by:

**Amy Chen and
Hassnain Qasim Bokhari**

Photo credits:

iGEM team Vilnius-Lithuania
2017
iGEM Foundation and Justin
Knight



In 2015, no one in Lithuania had known anything about iGEM. Barely anyone was even aware of synthetic biology. This made raising funds, gaining support from lecturers and the university very difficult. However, with their hard work and constant high results (Gold medals and Top 5 track-projects both in 2015 and 2016), the team proved themselves as serious young scientists who were worthy of being supported.

When I asked what advice he has for new iGEM teams who are in the same position that his team was in, Jakutis' words were to "dream big!" Reading through the past iGEM projects when they first started their work, the team felt that winning the BioBrick award looked totally impossible. The inventions and projects of past winners and nominees looked so intricate, corresponding to current trends in science, of the highest quality.

However, they were not afraid to set their eyes high and to set small daily, weekly, and monthly goals to achieve their dream. They knew what they wanted to achieve in the end and did not stop believing in their idea and its execution even for a day and their hard work was rewarded.

Reflecting on their victory, Jakutis felt that the win "was a huge acknowledgment of [their] intellectual capabilities, the moment when all the sleepless nights and hard work paid off. It's simply a good feeling to be appraised and valued for your work." They were extremely proud to bring the victory to their country of 2.7 million inhabitants and a university that is not at the top of the rankings – it was simply remarkable!

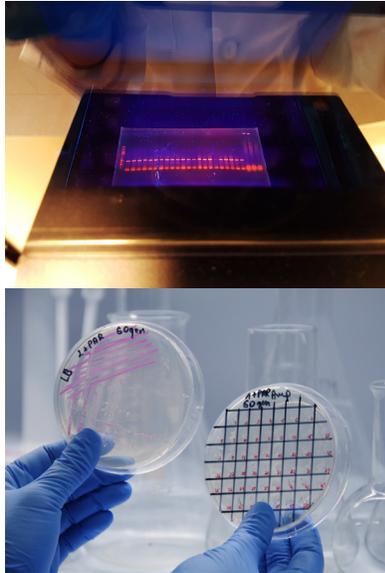
Jakutis felt that the win "was a huge acknowledgment of [their] intellectual capabilities, the moment when all the sleepless nights and hard work paid off. It's simply a good feeling to be appraised and valued for your work."



Above: Lab results for the team's parts

Below: Jakutis presenting the project as part of the team's Human Practices





Above: Design process for the team's project SynORI

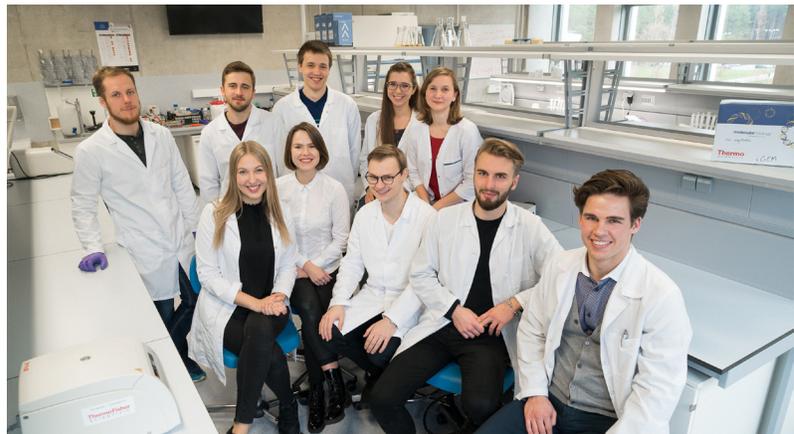
Right: Team photo in the lab

Below: Aukse Gaizauskaite and Laurynas Karpus with the team's awards



The team demonstrated that they too have great talents and strong higher education and Jakutis hopes that their win can motivate smaller neighboring countries and new iGEMers to believe that even when the competition grew to more than 300 teams each year they still have very good chances of becoming the champions. "Hard work maketh winners."

Many people would say that when compared to the U.S. or other major synthetic biology hubs, the Vilnius-Lithuania team were the underdogs in the competition. On the contrary, Jakutis felt that "teams from small countries like Lithuania have a great advantage; one can easily make contacts and get to know and talk to authorities or most important industries. Our team is now involved in some greater projects where we serve as valuable advisors of the life sciences' field." The experience has not only influenced the team members but also has had a positive impact on their community.



Following their victory last year, the landscape for synthetic biology within Lithuania has also changed. Previously, no one in the region had heard of iGEM. Now, almost everyone at Vilnius University knows about the iGEM team. What's even more invigorating is that the young people are now aware of synthetic biology. The Vilnius-Lithuania team's victory has invited more public and private interest into the field of synthetic biology.

The team's victory became a symbol of inspiration for young talent in the field of Life Sciences in Lithuania. It has drawn the attention of the government and authorities to begin considering drawing in Life Sciences' accelerators to Lithuania or establishing incubators for startups. Clearly, Vilnius-Lithuania's victory has led to more discussion about plans and entrepreneurship in biotechnology within their country. The team believes that it's only a matter of time before the country has their first synthetic biology start-up. "It's one of the most rapidly developing fields and we still have some sort of a vacuum in our region." Jakutis expressed. They have a good feeling that that first start-up will be driven by iGEM alumni from the region.



"It's utterly unconventional because iGEM has brought synthetic biology to Lithuania and our teams are probably the only ones who keep on digging that field. It is up to us to make another step further." Since the competition, some of the 2017 Vilnius-Lithuania iGEM members are now carrying on their passion for iGEM and are instructors for a new undergraduate team; a few even started a new overgraduate team. As they say, once an iGEMer, always an iGEMer.

Although some of the members have graduated from the university, some are about to pursue a synthetic-biology related masters or Ph.D. degree locally or abroad. I am excited to see where these young scientists will go and what they will do next!

To read more about the Vilnius-Lithuania team project see their wiki at: 2017.igem.org/Team:Vilnius-Lithuania

To get in touch with the team, connect with them on after.igem.org !



The Amazon Warriors - A Tale of Bravery



In a cold place deep in the Andean Mountains, a snowflake slowly thaws into a small drop of water. It joins a tiny stream, running down between the rocks. An observer cannot fathom the miracles witnessed by the water droplets.

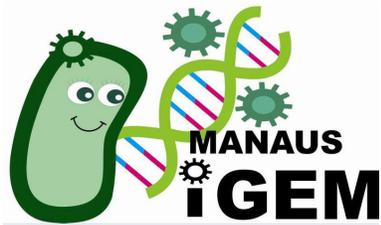
This is where the Rio Amazonas (Amazon River), the largest and longest river in the world, is born. It twists around the mountains, swivels around the heart of the Amazon Rainforest, and boils with life from lost paradises. Just around the corner of a city populated by more than 2 million people rests the Meeting of the Waters, in Manaus.

An unmissable natural wonder in a country marked by natural wonders, it is the place where the dark waters of Rio Negro meet the sandy Rio Solimões, giving final form to the endless Rio Amazonas. Although the tributaries converge, they do not blend. They have different temperatures, speeds, and water densities. The meeting results in a polychrome boundary that can be seen from space.

Manaus, therefore, is constantly watching a harmonic dance between the rivers, in a perfect summary of the entire country: the differences coexist, walk together and, ultimately, mix to build the richness of Brazil.

Written by:
Guilherme Kundlatsch

Photo credits:
iGEM teams
Manaus Amazonas-Brazil 2013
UFAM Brazil 2014
UFAM-UEA Brazil 2016



Above: Designs from the 2013, 2014 and 2016 Manaus teams
Right: 2013 and 2016 teams

“The Latin America teams incorporated and intensified the iGEM Foundation values. We have built a collaborative community, sharing achievements and intensively working in the development of technologies useful to our communities”

Maria Clara Astolfi,
team member since 2013

In a city nurtured by the river, it was natural that the pioneer Manauara iGEMers turned their eyes to the idyllic waters. The group was gathered by Professor Carlos Gustavo, who attended the Latin America Regional Jamboree in Colombia during the previous year (in a time when Regional Jamborees still existed) and decided that Manaus should join the party.

“The Latin America teams incorporated and intensified the iGEM Foundation values. We have built a collaborative community, sharing achievements and intensively working in the development of technologies useful to our communities” explains Maria Clara Astolfi, a member of that pioneer team and of every other since then. Following this spirit, they proposed a solution to a big threat to the Rio Amazonas health: waste frying oils. By engineering *Shewanella putrefaciens*, they developed a new use to this refuse – instead of toxifying the river, now it could be used to generate electricity.

However, this was not the only danger hidden in the waters.

A sneaky enemy was gathering forces and becoming a matter of public health. Mercury is widely used in the Amazon Forest for gold amalgamation. The gold is captured, but the mercury flows down through the rivers. It accumulates in the food chain and is eventually served for dinner – fish is the main protein source for the local population.



It is estimated that a terrifying 3,000 tons of mercury are contaminating Amazon’s biodiversity and native populations. In 2014, the group presented a treatment station to address the problem. They proposed a system using three different engineered *Escherichia coli* strains aiming detection, bioaccumulation, and volatilization of the heavy metal. In 2016, the team returned with an improved version of their system, achieving 70% of mercury bioremediation.

The technologies developed and the solutions proposed have a huge potential to benefit the local community. However, the key work developed outside the laboratories may have an even deeper impact in the region. During the past years, they have spread knowledge about synthetic biology and environmentalism from kindergarten to graduate level. They traveled endless hours by boat, using the rivers as highways, to spread their knowledge. Although education is the key to solving the problems in the future, authorities can propose measures to mitigate the issue in the present.

With this in mind, the group brought heavy metal contamination to the governmental spotlight. By raising the debate with the lawmakers, they are mobilizing the community and demonstrating how science can truly improve everyday life. "Our projects are rooted in the society. They discuss challenges that people from our region face on a daily basis, propose solutions to local problems and return to the community the effort of making iGEM feasible in Latin America" summarizes Maria.



The majestic Rio Amazonas, despite being an incomparable natural force, does not follow a straight pathway to the ocean. It slowly meanders through the forest, turning around obstacles instead of overthrowing them. Every snowflake will blend with the sea, moved by the non-interruptible flow. The Manauara iGEMers faced many barriers like the river faces the rocks: evolving, adapting and, ultimately, transforming the environment around them.

After a bronze, a silver, and a gold medal, as well as the prize for best presentation in Latin America in 2013, the greenest team in the competition returned last season with a successful debut in the Foundational Advance track, providing a useful CRISPR/Cas9 toolbox to the community and returning home with a new silver medal. The tiny stream started in 2012 grows stronger constantly, bringing new wonders to the shore every year, flowing endlessly. In this city blessed by the Amazonas, brave warriors armed with synthetic biology weapons are ready to defend the river.

Top right: 2016 team visiting the Public Federal Ministry
Above: Design from the 2014 team wiki

"Our projects are rooted in the society. They discuss challenges that people from our region face on a daily basis, propose solutions to local problems and return to the community the effort of making iGEM feasible in Latin America"

Ambassador Highlights



Chen Hong

iGEM Ambassador to Asia

iGEM provided me with an opportunity to try something new, go outside of my comfort zone, and build my confidence. For me participating in iGEM was a turning point and over the years that experience has translated to creating opportunities for transformative learning within the polytechnic education system.

Globally, iGEM has become a cornerstone for Synbio industry, with many startups coming out of the competition that inspires students and educators to realize their dreams as researchers, and entrepreneurs, and demonstrate how science can change the world. Beyond the competition, from participant to an ambassador, my passion for iGEM has grown exponentially.

iGEM is not only a competition but also a community to share ideas and exchange information. After iGEM provides new opportunities to share recourse and core value which were created by iGEMers. By linking past and current iGEMers, I believe each little change could eventually lead to a much larger impact.



Will Wright

iGEM Ambassador to Europe

iGEM's impact goes well beyond just the projects, especially as it affects participants. To me, the experience has a very real outcome - when you see many of the participants becoming synthetic biology leaders in academia, industry, and innovation after iGEM.

Personally, it gave me the confidence to take initiatives with my first science-based ventures. Right after iGEM we founded TychoBio - A synthetic biology company that produces sustainable high-value natural ingredients in moss for the flavors and fragrances and biopharma industry.

Now in the Ambassador role, it has been my great privilege to meet the next generation of iGEMers and future SynBio leaders from across the regions. Each project has a core ambition and an infectious hope and that is, to help solve real issues that we are facing both locally and globally; from treating AMR in hospitals in France to generating sustainable plastics in Scotland or helping prevent horse parasite infections in Sweden - all have the common goal, to help solve the great challenges of our times.



Japheth Kelly

iGEM Ambassador to Africa

Even though I was a computer science major, I was the first to apply for the iGEM Competition in my university, purely out of my curiosity and love of biology and consequently, I happened to be the first member of the pioneering team from West Africa.

Not only were we able to overcome many challenges during the iGEM Competition but also we went on to win the Chairman's Award, which was the highlight of my graduating year.

Fast forward a year and I have become the iGEM Ambassador to Africa. As a former participant, I am acutely aware of the challenges that African teams face and my aim is to mitigate these issues and pave the way for more students and teams to begin their journeys in the iGEM Competition. As an iGEM ambassador, I am not only an advocate for synthetic biology which presents amazing opportunities for solving many issues that the continent faces, but I also see the role in the African context to advocate for science in the region. Beginning with local initiatives, I hope that we may encourage the next generation to pursue science and develop problem-solving ethos using the revolutionary tools and principles of synthetic biology.

In our next issue...

Alumni reflect on their journey from the iGEM Competition to today.

**From University of Ljubljana to Verily:
A Conversation with Peter Cimermancic**

Pizza, Jelly, and An Experiment

By Cindy Wu

Road to a Career: Life in Synthetic Biology Research

By Tina Lebar

The iGEMer's Winding Path

By Shuan Mushasha

Stay tuned!

Interested in writing for The iGEM Digest?
Get in touch at after@igem.org.

We're looking for stories from the community
as well as volunteers to join us as writers,
reporters, and editors.





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