Aalto-Helsinki Work Log: July

Tuesday 1.7
We started building a new pitch for our project for Summer of Startups (and Entrepreneurship track) based on the superhero bacteria idea.

We sent a message to iGEM HQ about “confirmed” BioBricks and other issues. Made some minipreps, got the new Top10- Coli strain. ColonyPCR and gel electrophoresis showed that for some reason our ligations hadn’t taken off, but instead produced mystical bands of 3000 bp. We abandoned the training project and moved on to the real deal.

Niklas and Otto trained Simulink and SimBiology extensions for MATLAB for modeling purposes.

Phrase search for Team Seeker turned out to be wayyy more complicated than just plugging in Oskari’s code.

A new way to make our controller circuit was once again constructed. It’s better than ever before.

Wednesday 2.7
Miniprep, ligation, transformation of a bunch of new bricks. Interlabs measurement bricks should be ready to go tomorrow.

We found a ton of BioBricks we could use, learned a lot about CI lambda repressor protein.

Stack Exhange Biology might be useful tool for us and other iGEMers, so we could try to get a iGEM-community going there.

Pietu made a super cool pitch deck of Brian, the bacterium factory worker that turns into a superhero. He pitched it at SoS and it seemed to go well.

Laura completed our first team member mascot chimera. It’s Otto’s Salmon-Snake-Eagle. They’ll be coming out with our team member profiles in the blog every week.

Blog post coming soon. So is our SynBio application.

Thursday 3.7.
We signed up for ThinkHelsinki festival’s PitchNight. Pietu also searched for companies that would be interested in our finished protoype.

In the lab, we made electrocompetent cells from the new Top10 E.Coli-strain. Did colony PCR from ligation colonies and ran a gel. It seemed like that only 1 ligation out of 7 succeeded, but

apparently colony PCR is an untrustworthy method that gives silly results. The mysterious 3000 bp band from a few days ago might have been a part of the genome.

We wrote, commented on, dissected and rebuilt our ERASynBio application many times over. It should reach perfection tomorrow.

Background research on BioBricks, photoreceptors and gene circuits.

New blog post and team member profile (Otto).

We had a meeting about the teaching videos we'll be making for Opinkirjo. We'll most likely have 5 videos with an overarching story about transforming GFP into a bacteria, focusing on specific parts of the process in each video. (Like how we can extract a gene from a glowing medusa, how can we add a gene into a bacteria, what is PCR and how does it work etc.) Though ideas were thrown around for making videos about Superhero genetics and explaining Genetics through memes (because they behave quite similarly in many ways, as described by Richard Dawkins in the 1976 book "The Selfish Gene").

Friday 4.7
Friday funday began with some freshly squeezed juice tailored to everyones custom needs. Thanks Otto! We also listened to team-presentations from most of the team members.
It seems that the BioX Shanghai 2013 team has done something very similar to our idea.

In the lab Minttu and Martina did Miniprep, restriction and the checked results in the gel. Things look bad.

Oskari contacted Ragna about the support from the university of Helsinki. Later Oskari participated in a really useful session at SoS organized by the company Reaktor. The result was new ideas and renewed workflow principle. Many people doing one thing is good if it's done faster than normally.

On the IT-side our computer wizards Laura and Lassi put the Biobrick seeker link on our webpage and researched other teams. Lassi, Niklas and Otto worked on the EraSynbio "plz-give-us-money"-application. We also contacted Paris-Saclay and checked what had been done during the week.
A slight stress can be sensed in our team because of the problems in the lab and the slow progress with the gene circuit. Live long, study hard, enjoy life and prosper.

Monday 7.7.
A quick morning meeting about reorganized work flow. The general idea is more people on less tasks, to get more things done.

Then we were off to Startup Sauna to a team dynamics lecture, which most of us skipped and instead split our machine into clear parts that we can make individually and designed the light receptor part of our gene circuit. Otto, Pietu and Niklas attended the lecture and got some good points out of it.

ERASynBio application is now done and awaiting signatures. Contacted Aalto Arts and Biofilia for the Paris-Saclay team.

Ligations in the lab and a meeting with our instructor Bartek and decided that the transformation problems were because of Ykä-coli strain. Translating lab protocols for the wiki. The search for working promoters and RBS's continues.

In the afternoon Martina and Lassi(!) did electroporation transformation with a bunch of backbones for the Interlab study and other tests to see what went wrong earlier.

The Aalto University news article in English received final comments by Mikko. He also wrote a blog post for kemianteollisuus.fi.

The old task board is now another place to doodle biology and gene circuits. The new one is completely digital.

Our outdated website is now fixed, it doesn't say so much about scents anymore.

Tuesday 8.7
Niklas made nice coffee!
Many people did the igem gene-circuit task and learnt new stuff.
Martina taught us about gene stuff and Niklas was like :)))))

Oskari also held a teaching session about gene structure. Oskari, Pietu, Laura, Niklas and Otto did multiple sequence analysis on different genes when looking for the OR-thing for lambda repressors. And yeah, we now know lots about lamda repressors. Laura, Otto, Pietu, Lassi and Oskari did heavy research on the ORI, ORII and ORIII repressor genes and what kinds of biobricks are available. seems there is no ORIII brick and no brick with all of them. We also discussed how the double-direction promoter works and how the stuff in the lagging strand should be coded (in which direction).

This session was really educating for all of us, but we need to conduct more studies in the lambda phage stuff. It seems no team has used the full potential of the cI induced ORs and promoters. Laura did very good job researching the lambda phage genome and also she drew a nice chimera.

Lassi added the crucial "check sequencing status" button to the biobrick seeker. Mikko also shown with awesomeness and wrote a text for the "kemianteollisuus.fi"-website.

Otto learnt new stuff about ODE:s poisson-scatter and brownian motion.

Wednesday 9.7
Niklas made coffee and Pietu trained pitching.
The lab faced some issues and decided to make new competent bacterias, because Bartek is on holiday next week.

Martina, Minttu went to VTT and ran gels and cut out the DNA from them, meanwhile Oskari, Laura, Niklas and Mikko went to Summer of Startups. Lassi and Otto made competent cells in the lab.

We pitched our idea with a 3min pitch with slides and finally people seemed to understand what we are doing. We got good feedback. After that. We met Miia Bowellan, a co-founder at Proxyventures. Miia is a bio-background investor and they are just setting up their own angel investment company.

We asked Miia about other similar startups, she knew none. We asked her about her contacts in this field and she told she will look up some. Then we asked about branding,which is their primary knowledge. How to brand ourselves, both in igem and after. She told us to be more serious. That's pretty much it. Then we asked about how to get investments and she told us that she'll check her contacts. We asked her to meet us and she told that we should contact her because she is much around in Finland too. We left pretty empty handed, but she had read our case and I think she is interested at least a little. She has kind of changed her interest from bio to business. But she gave us her card and skype.

Niklas and Oskar finalized the ERASynBio application.

Then we did the Harry Potter sorting hat challenge.

Thursday 10.7. - Friday 11.7.
We pitched our project at Garage48 in Tallinn and got a bunch of feedback and praise. As a startup, we were criticized about sounding like a school project, which is sort of understandable, but if we are to do well in the entrepreneurship track, we can't sound like a school project either.

Then we had a bunch of fun in Tallinn with and without Estonian and Finnish startup people.

Monday 14.7.
After finding a scanner and signing the ERASynBio application, we finally sent it. Hopefully they like us. Minttu and Otto also started writing up an application for Jane and Aatos Erkko foundation.

Oskari and Martina put 12 bricks growing in the lab. The CI-promoter (+ GFP) is growing green, which is great, because it's repressed by CI. Cut plasmid backbones from the gel that was ran at VTT.

We planned phase 2 of our gene circuit, it's again a bit clearer. Laura has combined most of the parts into a DNA sequence already. Only promoters left to figure out. Though Oskari did find a bunch of scientific articles on lambda repressors.

Flappy Coli is reaching baffling amounts of production value with music and sound effects. It's also running on aaltohelsinki.com now.

We have our cool new pictures on the website now. They are also organized based on the characteristics matrix.

Pietu contacted Geneious and they are now our official sponsor with nine 6-month student licences for the program. Wooo!

Tuesday 15.7.
Miniprepping BioBricks and ligating them (hopefully they work this time).

We planned some more of the phase 2 of the gene circuit and explained it to everyone who wanted to listen.

In Summer of Startups, our team had 1on1's with Mikael Gumerus and Moaffak. Moaffak promised to introduce us to his contacts.

We also started planning how to demo our idea without bacteria, through a web simulation or a Raspberry Pi + LED combination. To plan for this, Otto and Oskari made some differential equations and Lassi drew some boxes and put words in them.

Next team member profile and blog post are pretty much ready to go.

Wednesday 16.7.
Pietu designed electric circuits with LEDs, looked up where to buy them and made business cards.

Lab team designed a DNA extraction demo for some lab visitors, which we abandoned as one of the ingredients turned out to be sort of dangerous. The visitors had really fun and were very interested. At the same time, we tried transforming some ligations to YKÄ to see if the problems were in the strain or the backbone.

Gene circuit had some problems, but they are being worked out. We need a repressor for C and possibly an inverter for CI. We decided to use TetR for the repression and to skip the inverter for now.

TOP10-strain is so slow that it needs to grow 2 days before you can do colony PCR on it.

Blog and team profile post coming along and so is the terrifying (yet misunderstood) tarantula-hammerhead shark-anaconda chimera.

Next year's freshmen were being toured around the campus, so they showed the learning hub that we are using as our HQ. We probably looked like super smart synthetic biologists to them.

Thursday 17.7.
Minttu and Martina made heat-shock competent cells from Ykä, colony PCR from ligations (at least 2 succeeded) and liquid cultures from the successful ligations and a few others too.

We thought a lot about the YF1 light receptor as according to some sources, it might not work that well, but after some research it seems like it'll be just fine.

Lassi and Laura designed the sequences for our first two BioBricks and they are ready for synthesizing! Well okay, Laura pretty much assembled them already last week, but now we made them all officially in Geneious. After this it was possible to assemble the whole circuit in Geneious, so that happened too.

Mikko got the new blog post and team member profile just about done.

Pietu designed a LED rig for an Arduino/Raspberry Pi-system for demoing purposes.

Otto had a nice vacation day.

Friday 18.7.
So much math by Otto and Niklas. They are completely immersed in the mathematical modeling part. Thinking about Runge-Kutta and differential equations and implementing them in Python.

Lassi gave a 10-minute (okay, 45-minute) lecture about GitHub and editing the wiki in HTML with our tools. Now most of us have written something to our wiki. Afterwards (unrelated to that) Lassi spent a good while fixing bugs in the wiki.

Ligations seem to be working in the lab, gel and colony PCR seem to have the right things in the right places. So there's a bunch of new liquid cultures growing. One of them is a mystery as two colonies from the same plate gave bands of different length. So, we'll send them off for sequencing.

Pietu found a perfect link between electrical circuit analysis and bacterial gene circuit design which is really cool. "Characterizing bacterial gene circuit dynamics with optically programmed gene expression signals" by Tabor Labs.

New blog went out with Flappy Coli! Mikko's team profile interview by Mikko is very much done.

Oskari got on his coding gloves and started implementing the gene circus in Python. There's now a sweet visualization function for the simulation data that Niklas and Otto will be outputting soon.

Laura started making an infographic about our gene circuit, but turned out to be pretty complicated, so there's a text version happening first. That should be pretty useful as well.

Monday 21.7.
Miniprepping, restricting, ligating and transforming in the lab. This time with heat shock.

Pietu attended a lecture by Flowdock founder Otto Hilska. He said that starting slow is alright. Then Sami "hoodydude" talked about his company that finds startups for big companies. Pietu also wrote a SoS blog.

JAES application is very much done, thanks to Oskari, Minttu and Martina. It should go to the post tomorrow.

We got the first version of our simulation working. There's still typos and bugs, but it should working right really soon.

Laura and Lassi figured out Gibson and Golden Gate assemblies to see if they would be useful for us. It requires making a lot of primers, but that shouldn't be a problem as Geneious supports simulating Gibson assemblies and it might plan primers for us.

Mikko set up the meeting with Tania, the ex-iGEMer from the Netherlands. He also fixed the blog text and contacted iGEM HQ about the Safety form. Pietu and Mikko also started planning our video series in more detail.

Tuesday 22.7.
In the morning Oskari, Laura, Martina, Minttu and Lassi met Bartek to discuss what to do next and the genes to be synthesized.

Niklas searched for protein degradation data for our simulation.

Pietu worked on a new pitch that's less comical and more professional, even though we love Brian the Bacterium. Most of us were around to give feedback too.

All of us met Tania, an ex-iGEMer from the Netherlands (from the 2012 Amsterdam team), she was really cool. She told us a lot of useful things and made us see that we actually have things pretty good from the funding and lab support side. She also thought that our gene circuit could work, which is a huge relief as there isn't that many people in Finland that know anything about them.

She also suggested that we use Gibson assembly, so we probably need to start planning primers for that.

Otto spent most of the day coding the simulation and integrating it into Oskari's visualization function. It's not quite there yet, but it's looking promising. Oskari and Lassi gave also some coding tips to Otto, so the code is now easier to read.

In the lab there were two PCR teams going head to head: Martina/Minttu doing colony PCR and Lassi/Laura doing PCR for backbone amplification. Interlab measurement parts finally seem to have stuck and should be ready for use.

In the evening, Martina lead us geocaching and we went to see the Travel Bug Graveyard close-by in Innopoli. It's amazing what you can hide completely in plain sight.

Wednesday 23.7.
Yesterday most of us worked on a new, better pitch for the pitching contest before the night's BBQ event. Oskari, Mikko, Niklas and Pietu did that for most of the day. Otto helped as well, but he also spent time to get the simulation working properly. Parameters are bad and there's still ways to go, but it's starting to look pretty impressive.

Laura made Martina's chimera (koala, turtle, moose). She/He/It(?) looks quite charming in a slightly threatening kinda way.

Martina and Lassi formed today's lab team. They remade the PCR's from yesterday because they seemed to be lacking DNA. We made new ones with DNA dilutions. The normal agarose had run out so used some super-expensive low melting point stuff that made the gel take forever to solidify and screwed up the wells. Then it turned out there was a new bottle of the old stuff in the cabinet. We still used the crappy gel and it turned out alright.

In the evening we took part in the pitching contest, it went mostly fine. The pitch itself didn't go perfectly, but the answers to the audience questions made up for it. Then again, the price was a trip to London for a startup thing that wouldn't be much use for us.

Thursday 24.7.
Analyzed the gel in the morning, then made cultures of 14 different colonies: Backbones, ligations and stuff. Met with Bartek for a few hours to discuss sequencing and synthesizing. Sequencing is 2,5€ per tube, so we won't be going broke. So we are sending 16.

Tried to find cI inhibitors and parameters for the simulation. Thought about iGEM tracks.

Laura started editing the wiki CSS and content and made the CSS more structured. She also found a really weird interaction with flipclock.js and link colors. The wiki also has a bit more color and looks cooler overall.

Mikko has been working on the video script and the newsletter.

Pietu ordered calling cards and called a few CEOs. They were on vacation, one of them even was boating when he answered. He got some contacts and will be contacting them next week.

Oskari made a cool intensity slider for the simulation. He also messaged Juhani Lahdenperä, a cool biotech guy, about our project and the feedback he gave us.

Friday 25.7.
We had a long and intense discussion about iGEM tracks in the morning. We decided to go for entrecote, moneyfacturing and new app. (Entrepreneurship, Manufacturing and New Application).

Oskari started implementing a web UI for the simulation with Raphaél.js.

Minttu visited the Amsterdam Zoo. Mikko was at the doctor.

In the lab we prepared the samples for sequencing. There were 14 tubes to miniprep, it took a while. We got 4 new BioBricks growing on plates and on Sunday growing in a liquid culture.

Pietu pitched and got feedback from Mike Broadshaw. Also planned Demo Day with Oskari.

Laura added a bunch of new pictures to the wiki and got them to look nice.

Monday 28.7.
Detective work, looking for new sponsors and made a tool for keeping track of contacting them. Also a sparkling new e-mail to send to potential sponsors. We'll be drowning in cash soon.

We had a good Skype session with Groningen 2012 team, who actually won the whole freaking iGEM that year. They told us a bunch of useful things that no one wrote up. The whole thing was recorded though.

Laura assembled the new parts to be synthesized, which actually are around 1000 bp, so we don't have pay the same for shorter sequences. That also really speeds up the assembling process.

In the lab, Minttu and Lassi extracted plasmids from BioBrick cultures (miniprep). Also, restriction/ligation/transformation and finished up the sequencing samples. We gave them to the janitor to send. They should be going out tomorrow.

Oskari learned about about RBS's, was the main Skyper for the Groningen meet.

We need to get our lab book in English and in digital form. Lassi documented it on his phone and will start doing it when he feels like it.

Social media is still being updated thanks to Mikko's valiant effort. An e-mail information packet is also going out soon.

Tuesday 29.7.
The lab remade yesterday's ligation with new backbone, but old restriction. We got CAM backbone liquid culture growing for gel purification.

The team went crazy over Duolingo. Maybe it'll help us talk to other teams.

Our simulation seems to be kind of unstable with it's parameters, small changes can destroy the whole balance, which sounds rather worrying considering that the real biological world is definitely even less stable. Otto spend a day breaking it, then started over and got ok results. They still need some tuning.

Another Skype session, this time with Columbia. They wanted to talk to us about mathematical modeling and stuff, this time we wrote down their answers to our questions too. They gave us some of their code to look at. We also discussed a bunch of collaboration stuff, concerning BioBrick Seeker and low-budget iGEM.

Alberts (the book), Oskari, Niklas and Otto figured out promoter simulation a bit better. Also we noticed that C promoter isn't directly affected by the concentration of CI, so we redefined that part with TetR concentration in relation to CI and then the activity of C promoter in relation to TetR.

Pietu send a bunch of e-mails to companies and actually got some replies. He also coded a contact management system thing in PHP and JavaScript.

Wiki work being done (hopefully we'll avoid the sleepless nights before wiki freeze), mostly by Laura. Lassi helped set up a way to host fonts on Github by actually having the backup copy of the wiki be online in a sort of Frankenstein form. All this because the iGEM wiki only supports uploading a handful of file formats.

Wednesday 30.7.
First newsletter sort of thing went out.

Most of us went to Startup Sauna for some promo video stuff. Posing in lab coats, pouring energy drinks into a huge Erlenmeyer flask.

Our simulation is progressing well. Otto and Niklas finalized the mathematical modeling part and the WebUI is starting to look good. Lassi started to look into porting the Python simulation into JavaScript to plug into the WebUI.

The focus for the coming days until next week's Wednesday will be the Summer of Startups Demo Day. So Pietu was working on the final pitch deck.

Pietu has also been developing a CRM system for reaching out to companies.

In the lab, Minttu and Lassi did ColonyPCR and gel, that showed that the ligations from the last two days seem not to have worked out. We will probably need to purify the backbones again to fix that.

Laura had a design heavy day, drawing the new chimera and new Brian for the pitch deck. Also sketching out the rollup.

Thursday 31.7.
We met Bartek in the morning (so a Barteque after yesterday's Barbeque). Thought about what's going wrong in the lab as the ligations are not working. The best bet is the backbones, so we'll do another purification round at VTT for the backbones. The genes go out to synthesizing now too. Minttu and Martina did PCR with a temperature gradient to see how it affects the primers. iGEM prefix and suffix primers don't seem to do well at all, but the new ones that bind to GFP seem to be working better the higher the temperature is. They also restricted backbones for almost 4 hours to make sure all of them are linear for the gel purification.

We also met Markus (and Bartek again) in the afternoon to explain our project in more detail and see what he thinks we should be focusing on next.

Lassi and Otto went through the simulation code, so that it could be ported to JavaScript. Then it happened surprisingly easily. It's outputting the right values, but it's not yet completely hooked into the WebUI. The WebUI is looking even cooler now, with real time charts and sliders.

While the others met Markus and Bartek, Pietu, Laura, Mikko and Lassi went to play a movie production team. They started filming the teaser for the Demo Day, a story of a lab introduction gone wrong and a plate that got sneezed on. Mikko was acting (Lassi too, for some reason), Pietu was filming and Laura was the sound guy.