iGEM Winter 2018 Info Session

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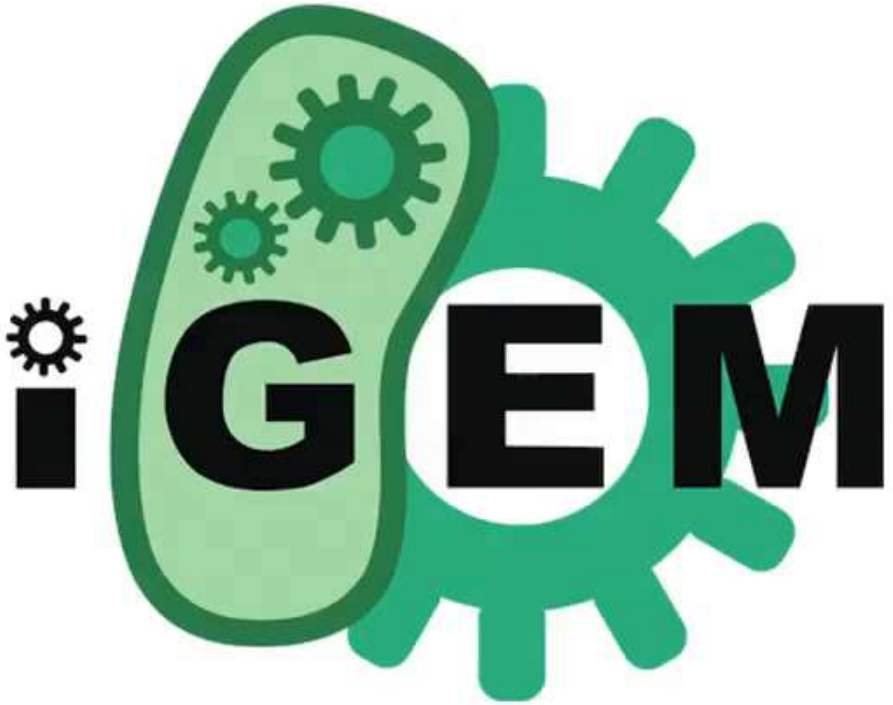


International Genetically Engineered Machine

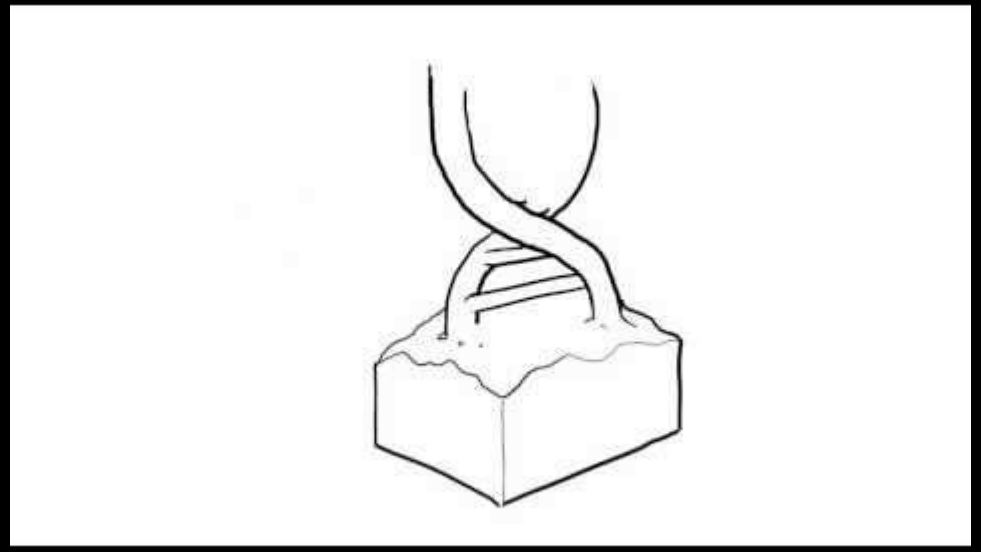
Agenda

1. Introduction to iGEM
    a. Synthetic Biology
    b. What does every team need to do?
    c. Previous Projects
2. Subteams of iGEM
3. iGEM as a class
4. Preparing for the Competition
5. Funding
6. Q&A

Welcome to iGem!

International student team competition in Synthetic Biology

Videos Explaining SynBio



What do we do?

Spring

- Project Development + Training
- Getting to know each other + being certified

Summer

- Bulk of research and lab

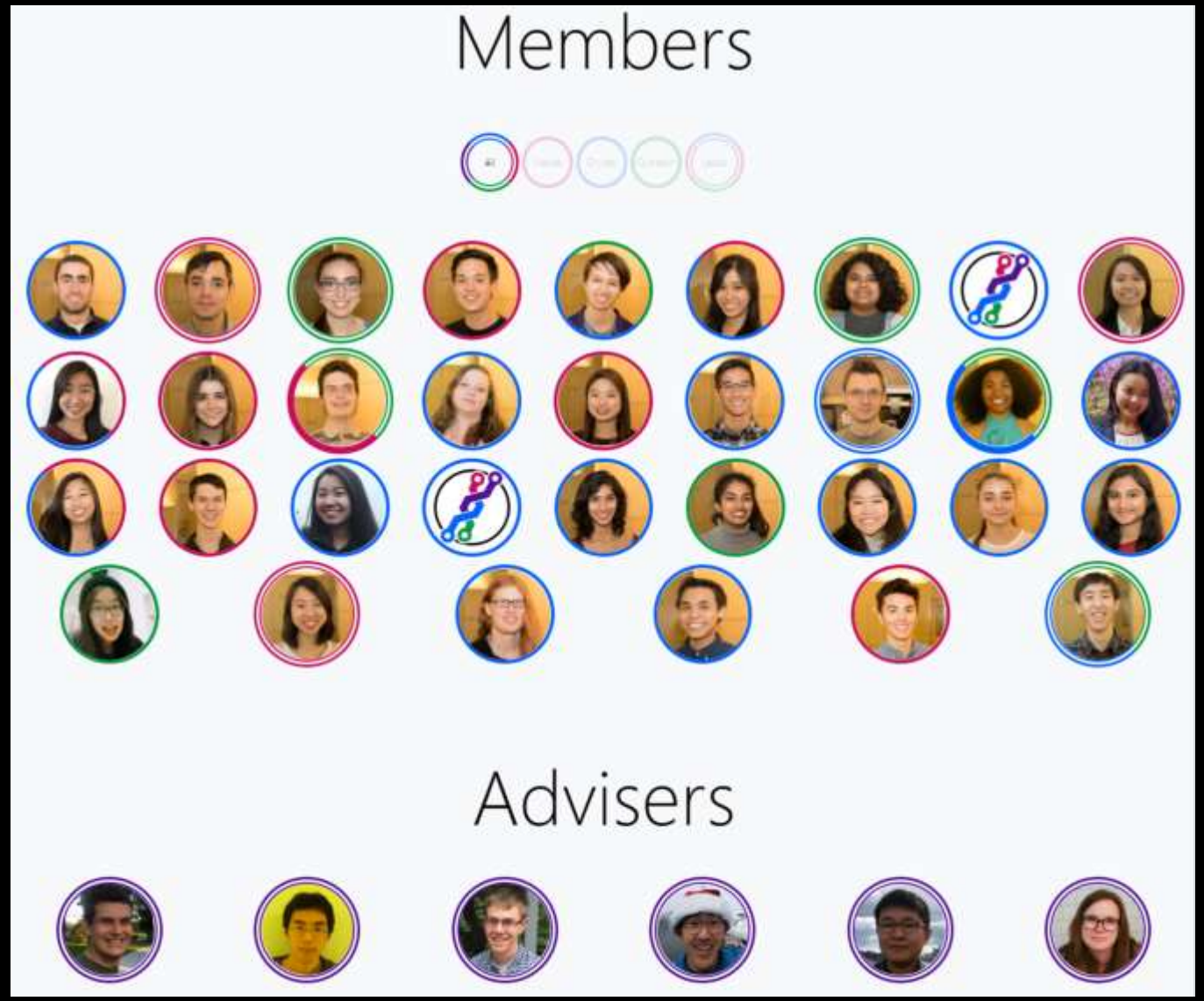
Autumn

- Finishing touches (this is not a calm process)
- Fly to Boston to present findings!

iGEM Projects need...:

- Team
- Track
- Website
- Poster
- Presentation
- Biobrick

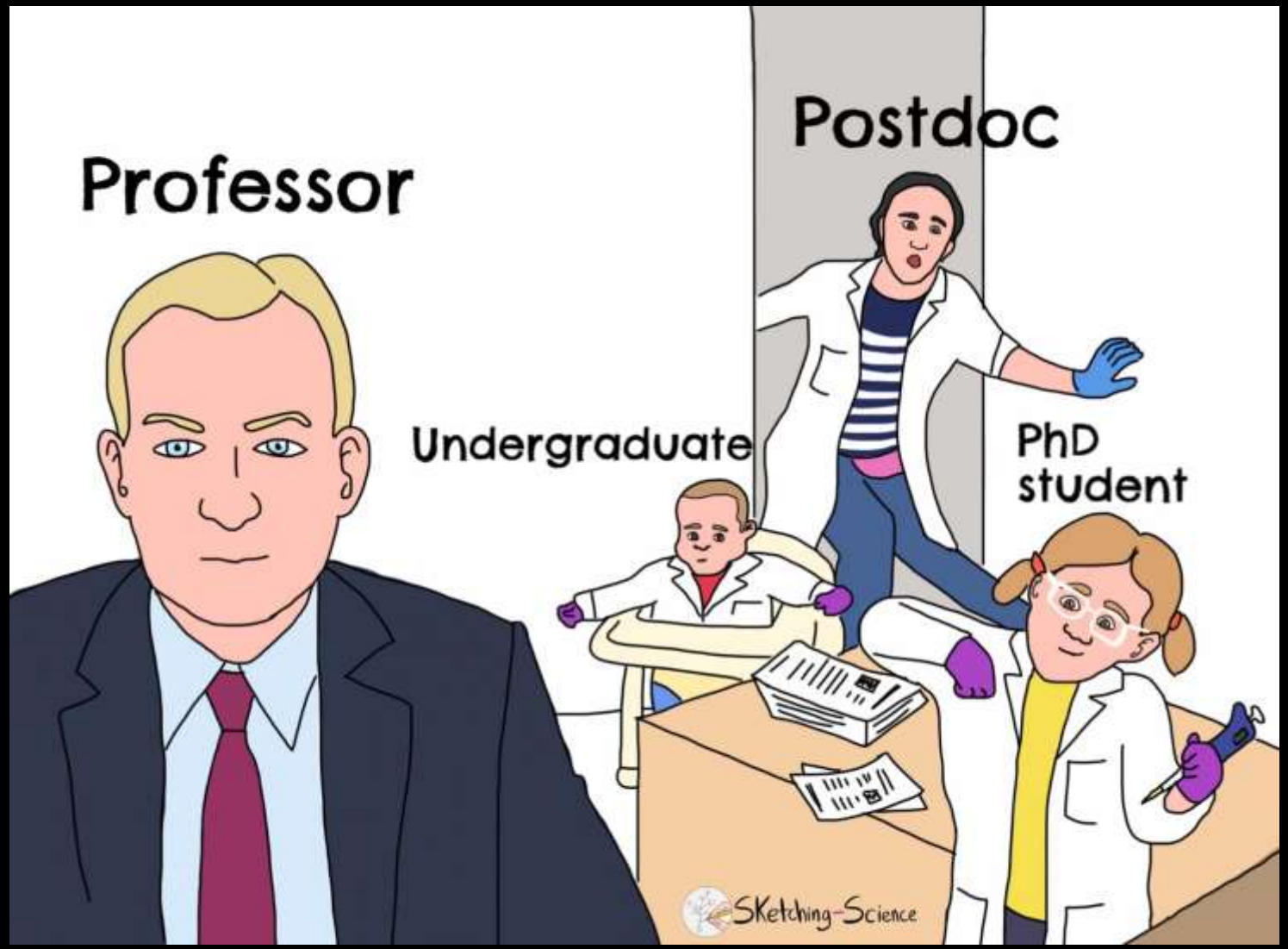
Team!



iGEM is Interdisciplinary!

Biochemistry
Electrical Engineering
Mechanical Engineering
Bioengineering
ACMS
Biology
Informatics
HCDE
Education
Math
Physics
Computer Science

Intended and Declared!


Professor
Postdoc
Undergraduate
PhD student
SKetching-Science

Team! (Professors)

Prof. Herbert Sauro
(BioE,EE)

Systems Biology Software +
Biological Control Systems

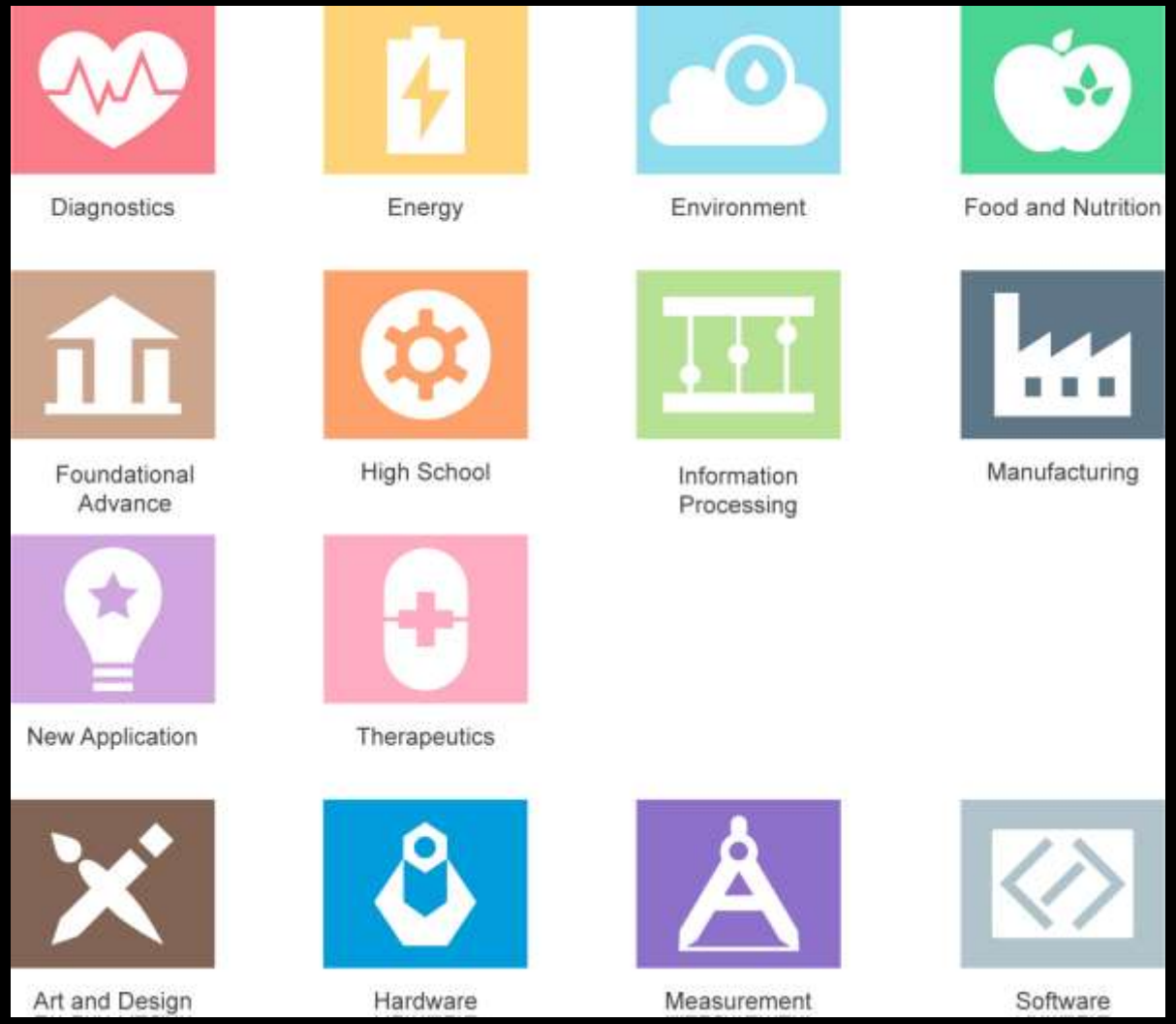
Dr. Karen Thickman
(BioE)

Genomics + Molecular Genetics

Prof. Liangcai Gu
(Biochem,IPD,Genome)

Protein barcoding for interactome studies

Track!


Diagnostics
Energy
Environment
Food and Nutrition
Foundational Advance
High School
Information Processing
Manufacturing
New Application
Therapeutics
Art and Design
Hardware
Measurement
Software

Website!

http://2017.igem.org/Team:Washington

Poster + Presentation!

BioBricks!

- **Part Submission:**
  - Entry in the Biobrick wiki repository

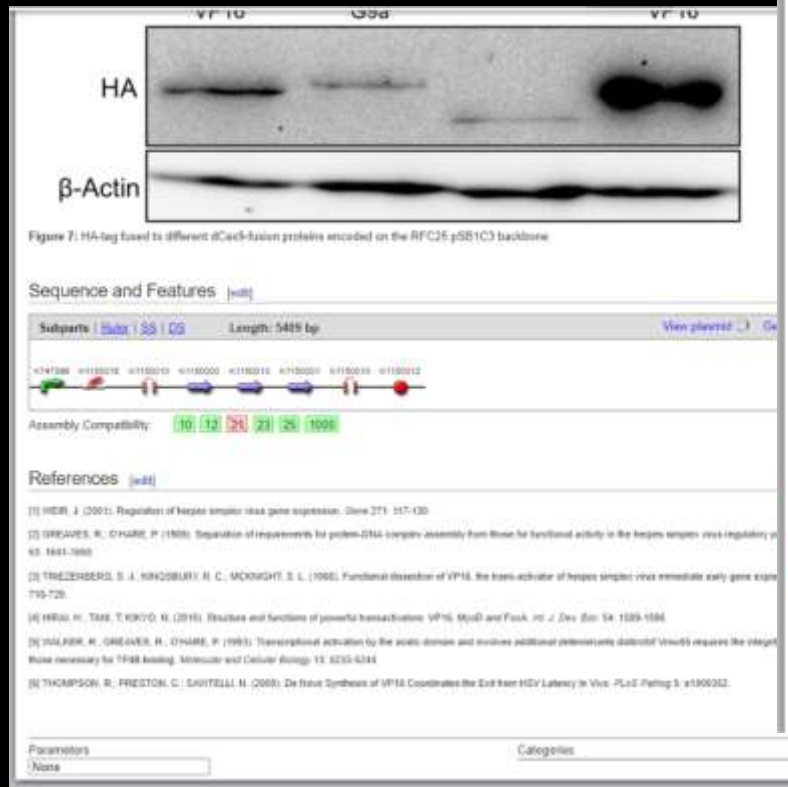
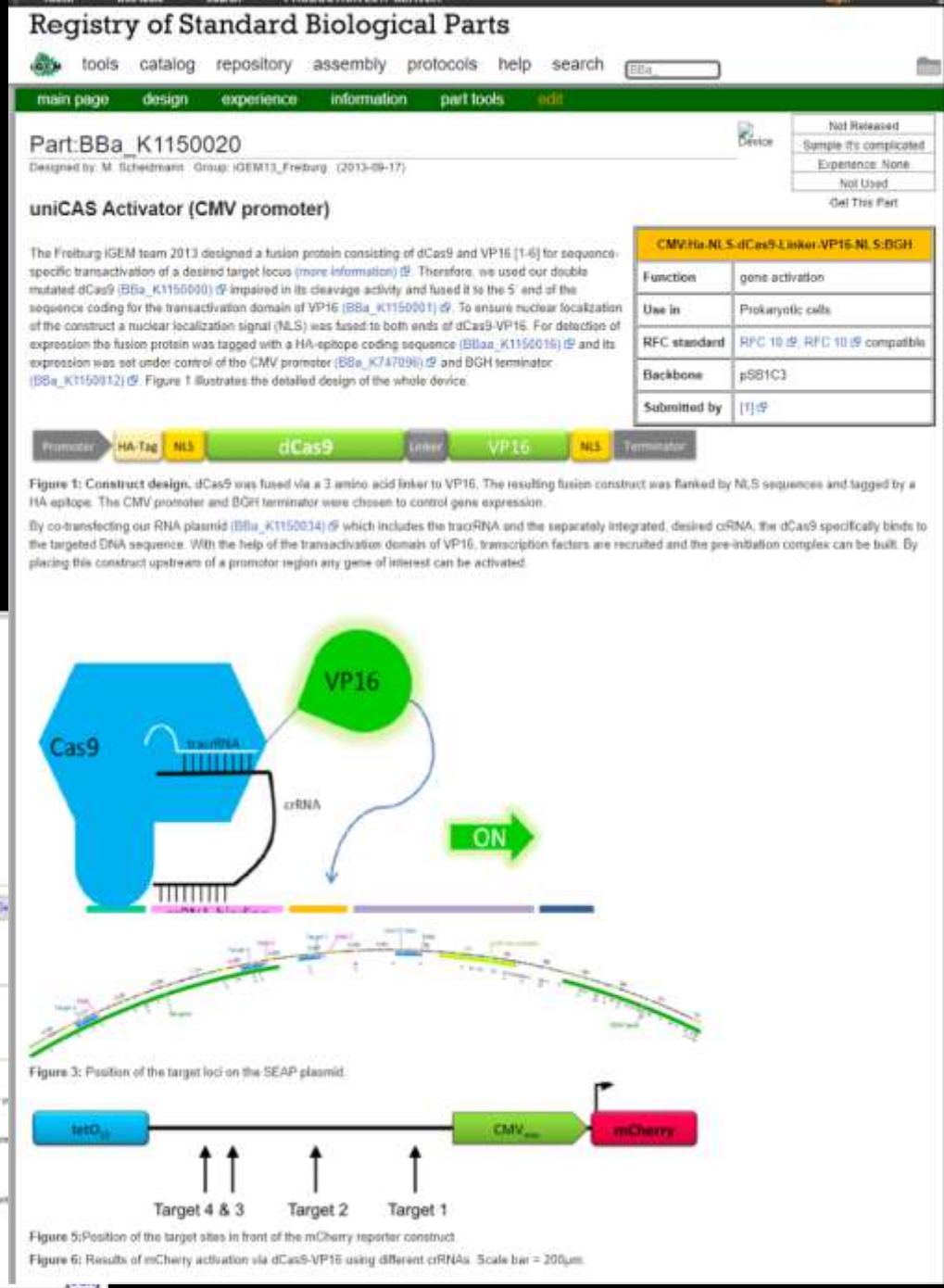


Figure 7: HA-tag fused to different dCas9-fusion proteins encoded on the RFC26 pSB1C3 backbone



Have Fun!

Student responsibilities + expectations

- Have an attitude to **learn** and **willingness** to participate!
- Ability to **work in a team** in a fast-paced environment
- Be available during **Summer** (if you have to juggle an internship and lab...talk to us)
- Dedicate **5-10 hr/wk** in winter/spring, **10 - 20 hr/wk** in summer/fall.
- Stay **up to date** on communications & contribute your own thoughts!

Previous Projects

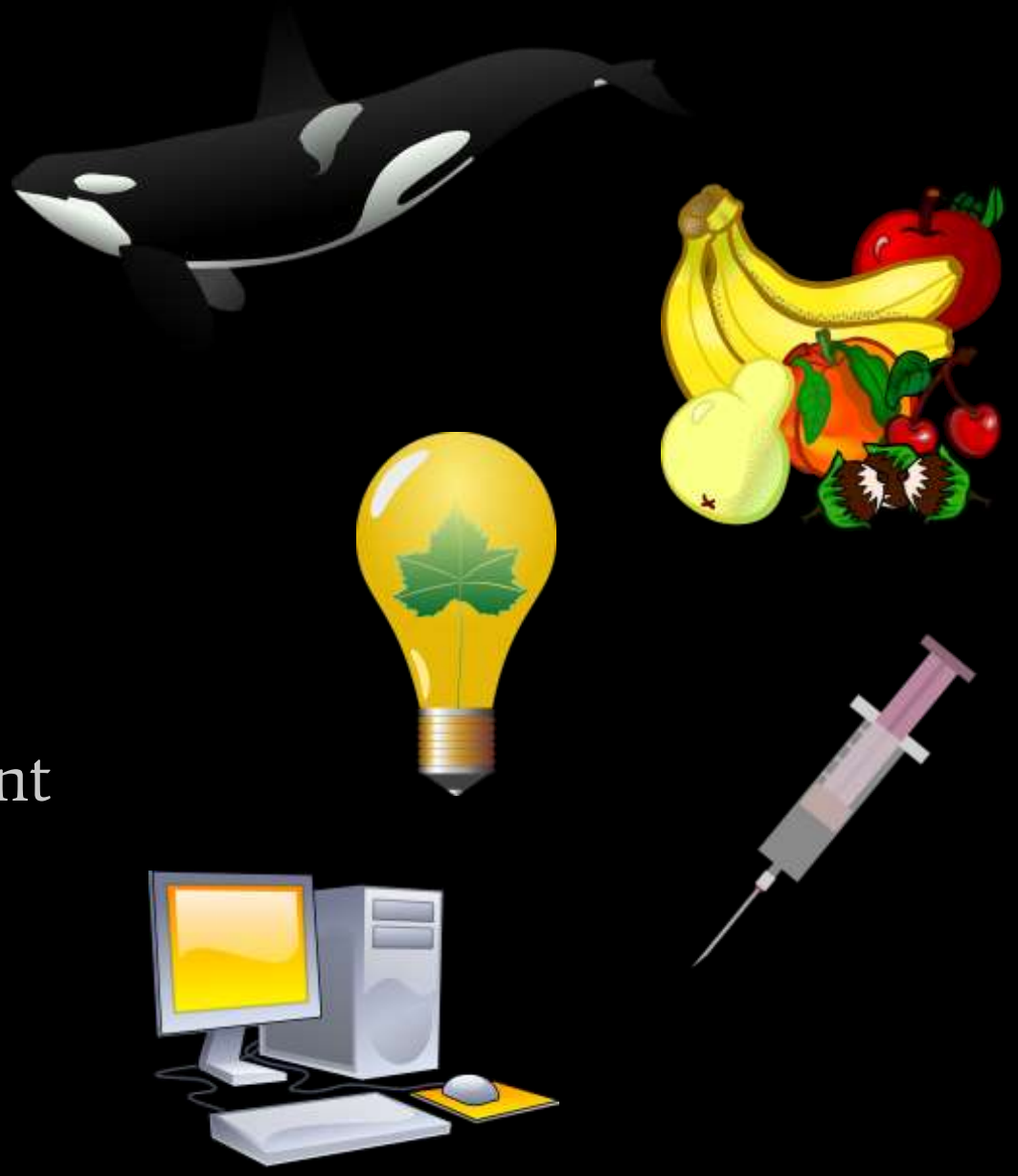
...

Infinite Possibilities!

iGEM Tracks

Projects can be applied to...

- Medicine & Diagnostics
- Environment
- Energy
- Food & Agriculture
- Fundamental science advancement
- Hardware
- Software



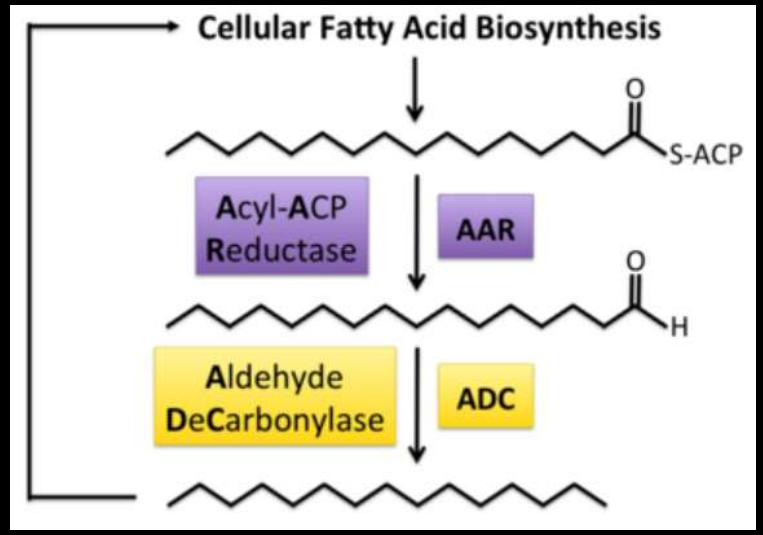
Washington 2011 - Make It or Break It

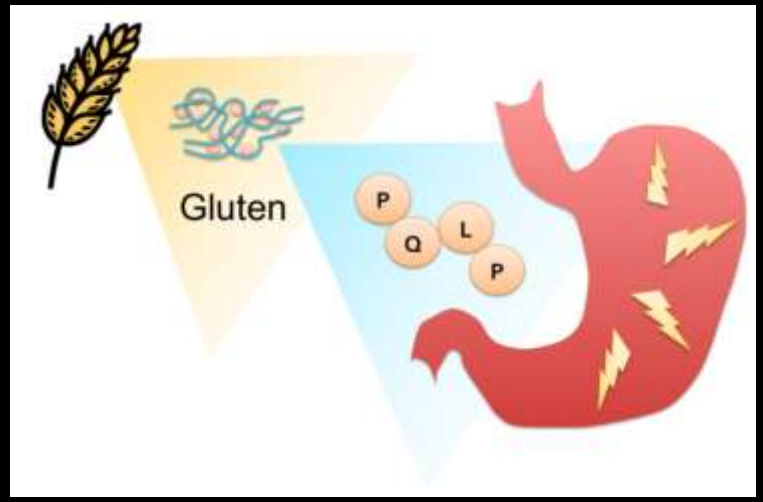
Diesel Production

- E. coli produce alkanes by introducing a pair of genes that convert fatty acid synthesis intermediates into alkanes.

Gluten Destruction

- Reengineered a gluten-degrading protease enzyme to have increased gluten-degrading activity, allowing for the breakdown of gluten in the digestive track for patients with gluten intolerance.





TAS Taipei High School 2017 - NANOTRAP

Removal of harmful nanoparticles from wastewater treatment centers

- Bind citrate-capped nanoparticles with a membrane protein and trap nanoparticles using *E. coli* biofilm
- Built a prototype filter with biofilm
- Worked with both urban and rural wastewater treatment plants to develop ideas

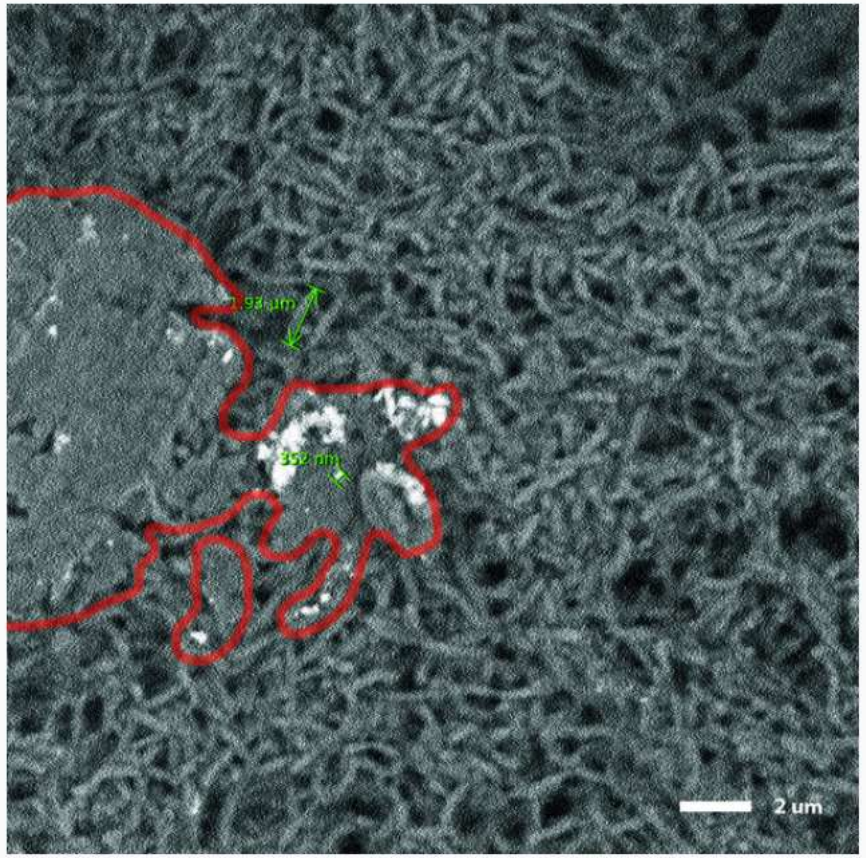
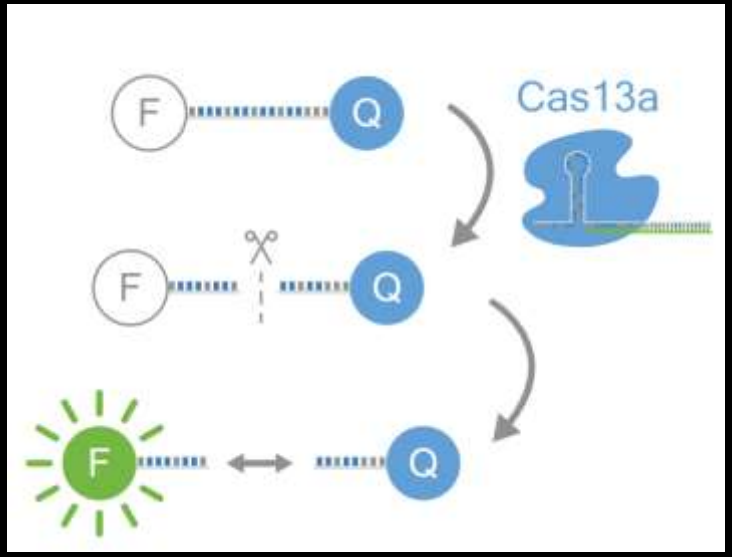


Figure 3-6 SEM Image showing AuNPs trapped by biofilm. A biofilm+AuNP sample was fixed with GA. Some EPS is preserved (red) and AuNPs (white) seemed to aggregate and adhere onto the EPS. SEM Imaging: Justin Y.

Munich 2017 - CascAID

Cas13a controlled assay for rapid detection of infectious diseases in the clinic

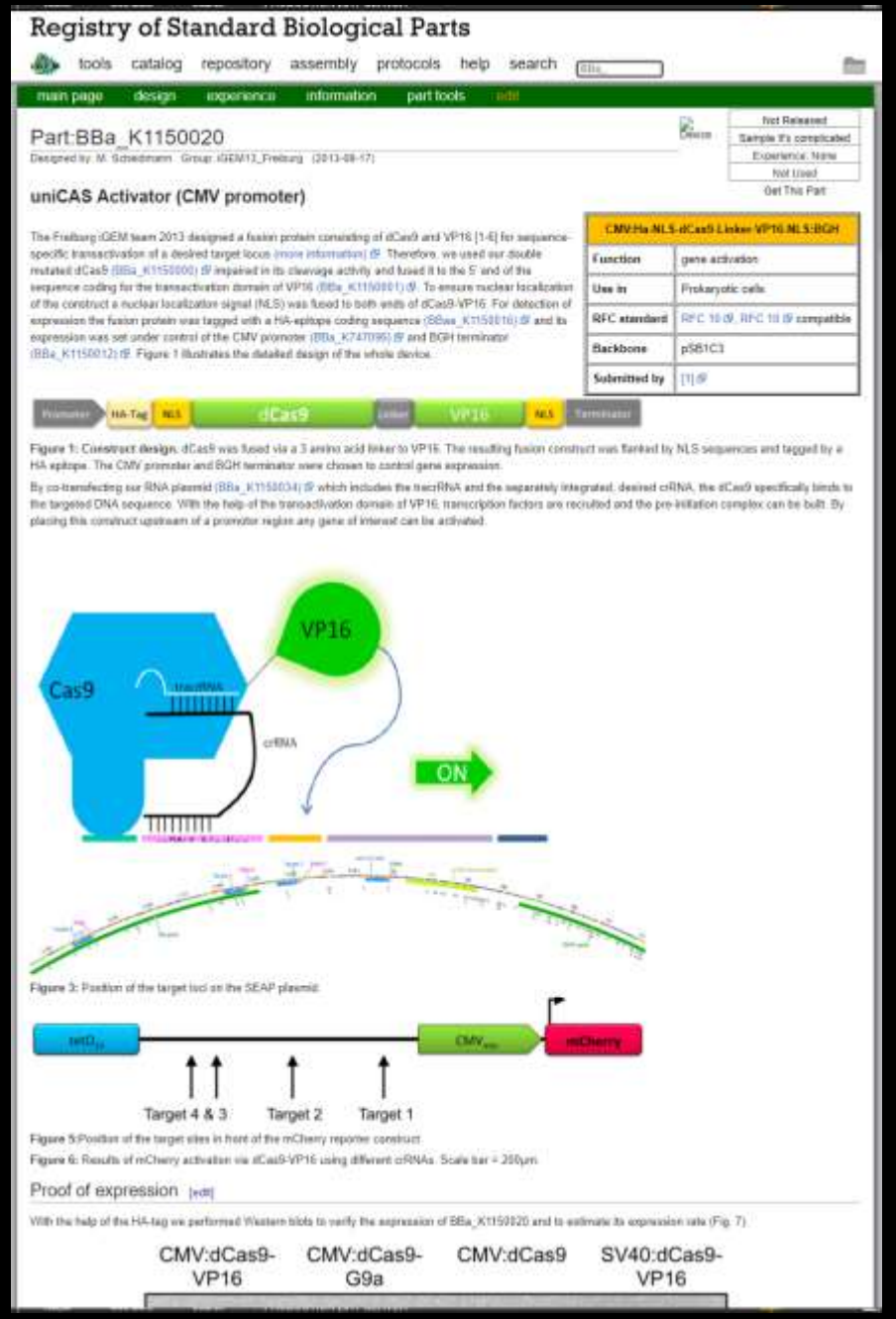
- Engineered genetic pathway for detection of RNA viruses and other pathogens
- Paper and silicone microfluidics
- Sample processing and detection hardware
- Mathematical modeling and analysis software
- Human-centered design




Wetlab

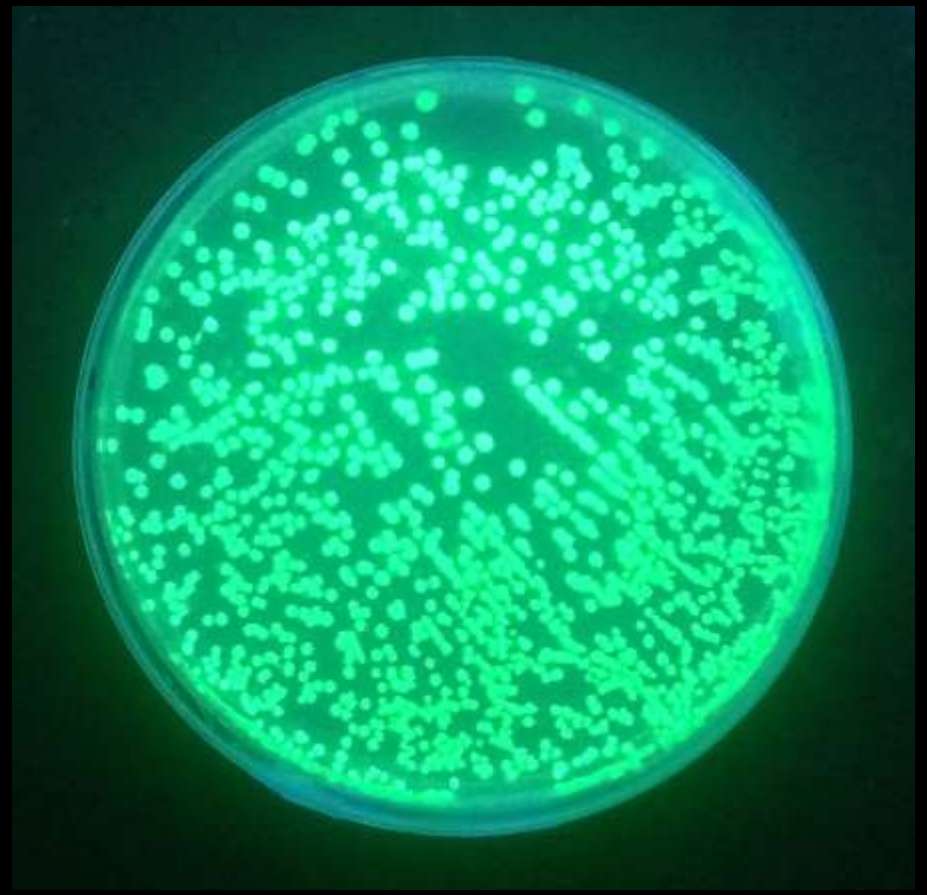
Main Project

- Simple explanation: make it happen!
- BioBricks!



Interlab

- Measurement replicability
- Largest interlaboratory study
- A chance to get published! And…
- A chance to lead a project!



What do we want from you?

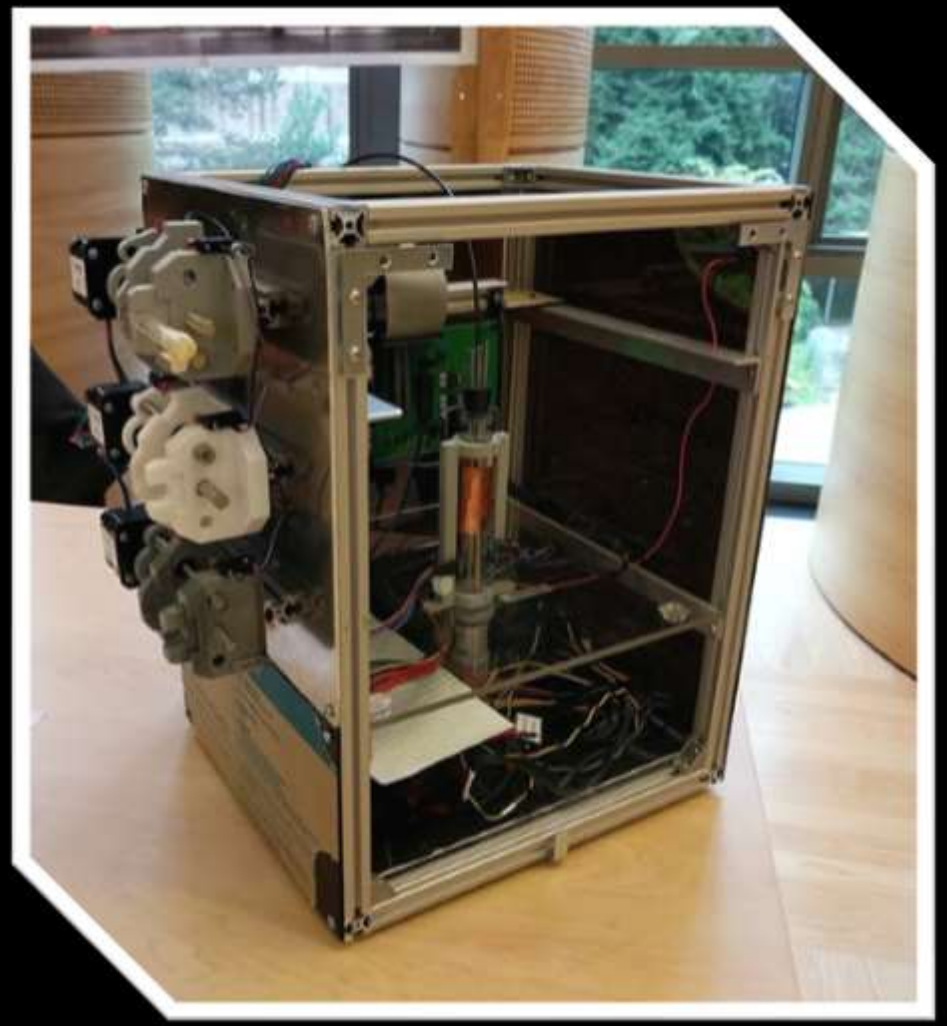
- Your address, credit card number, SSN, soul, and all your waking hours from now until eternity
- Initiative, Good nature, Endurance, Motivation
- ~10 hours a week to start, then more

What do you get out of all this?

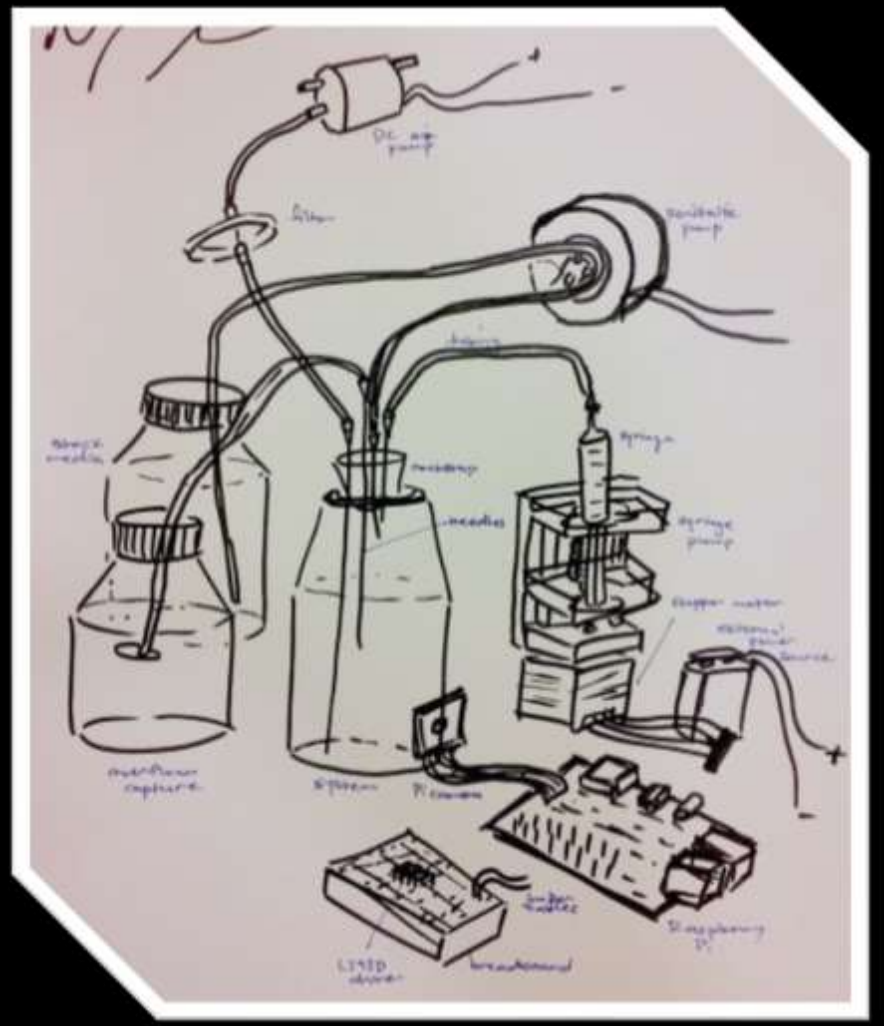
- Molecular Biology Lab Techniques
  - PCR, Gel Electrophoresis, Miniprep, Transformation, etc.
- Research Skills
- Communication and Leadership

Drylab

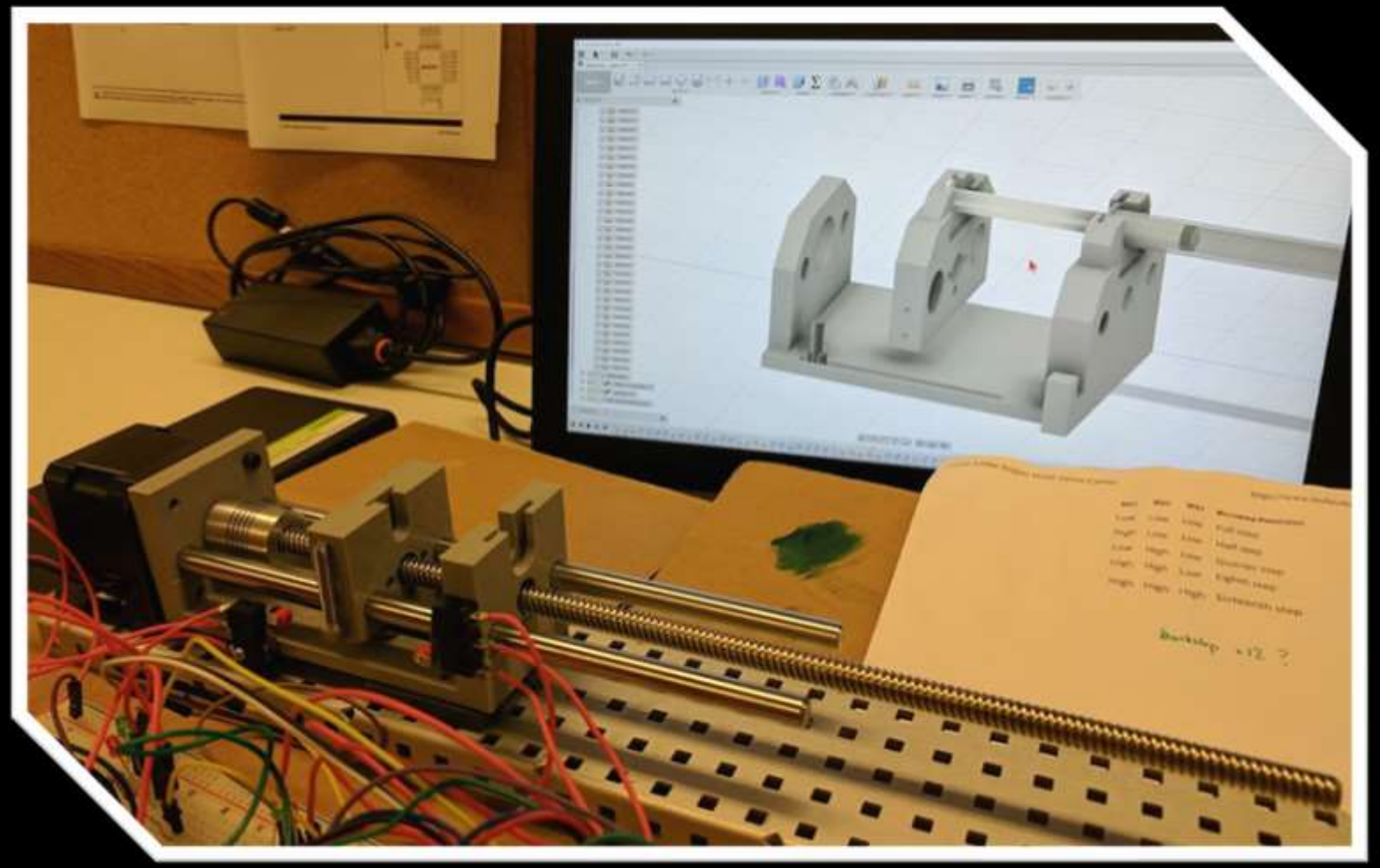
What we did last year



What we did last year



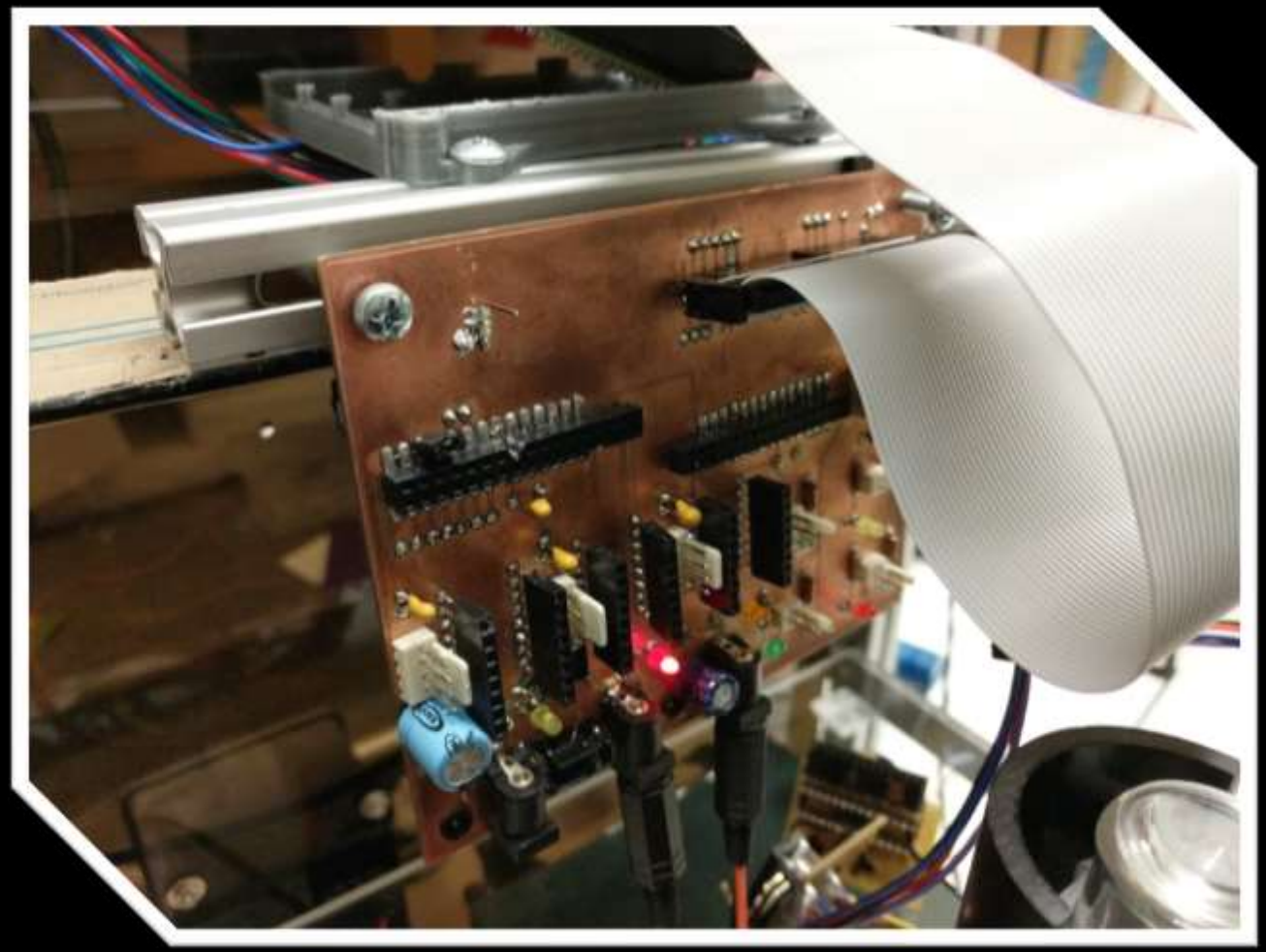
What we did last year



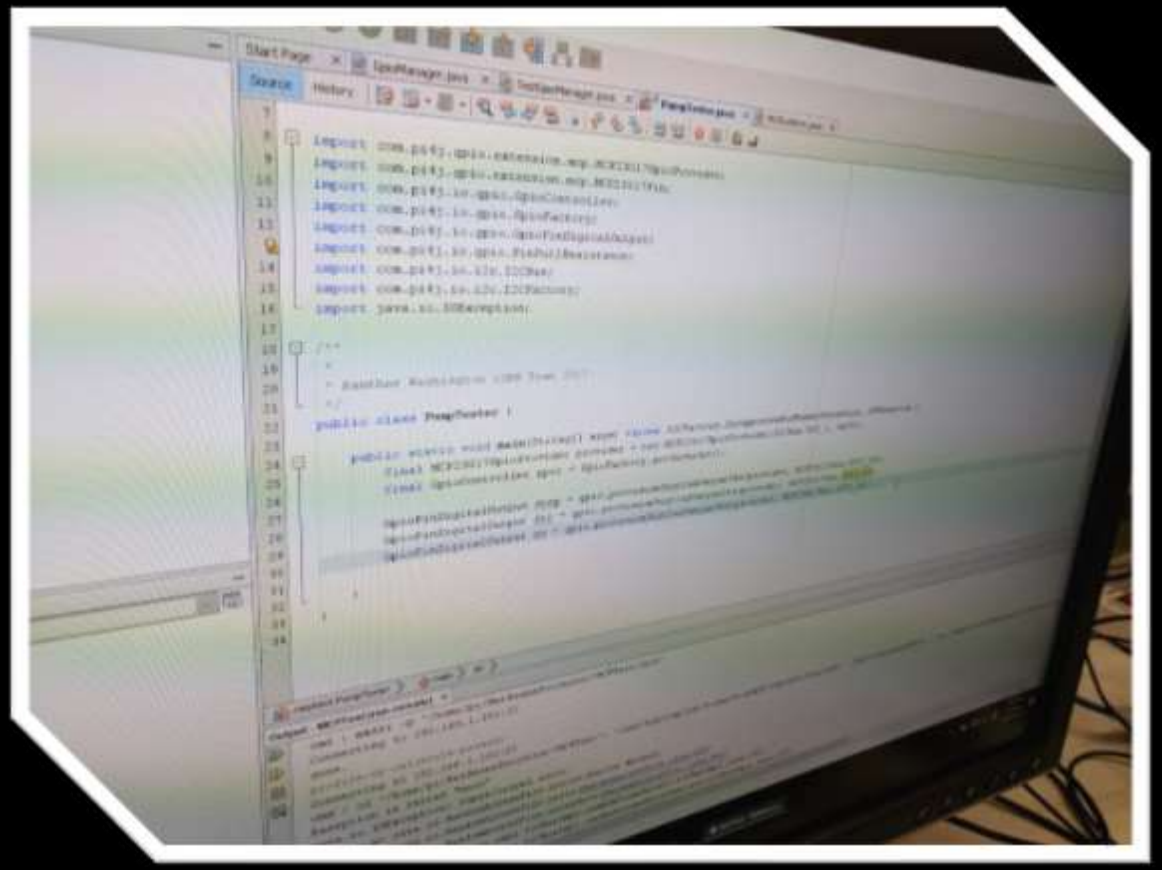
- CAD
- 3D Printing
- Assembly
- Power tools

What we did last year

- Eagle EDA
- Printing PCBs
- Soldering
- Wiring

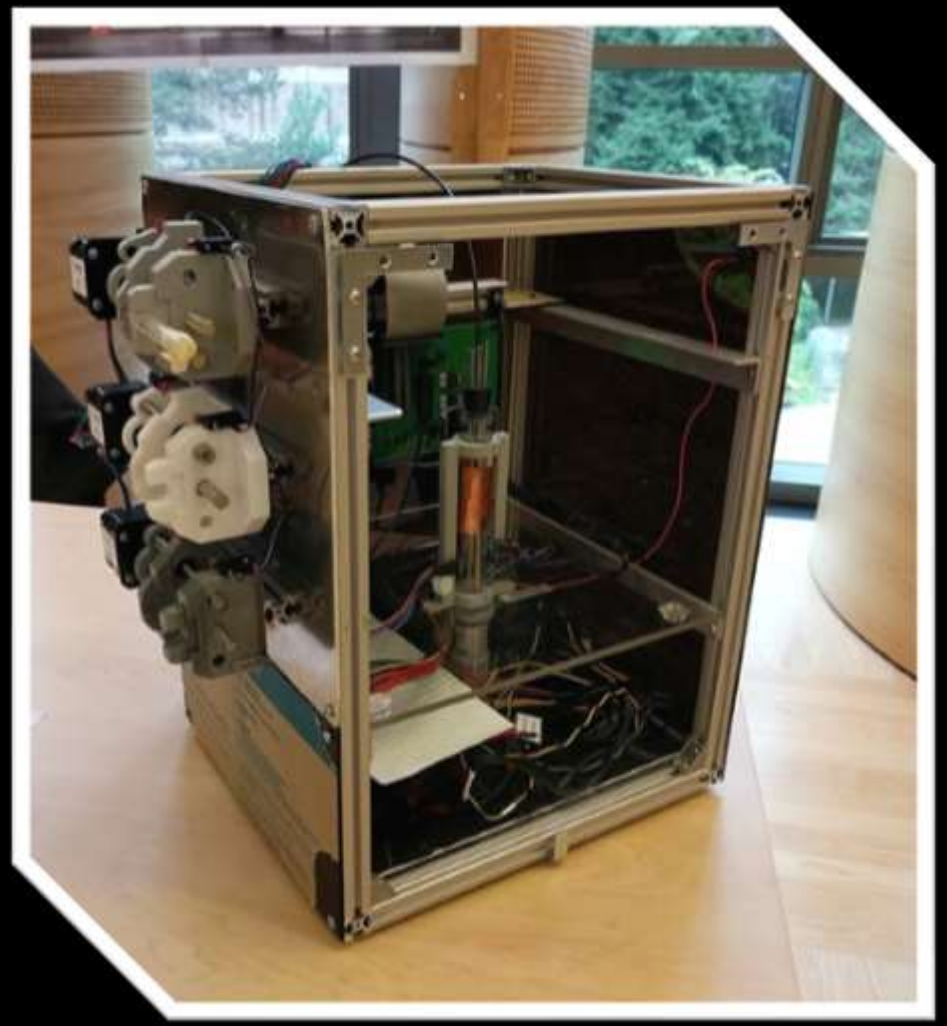


What we did last year



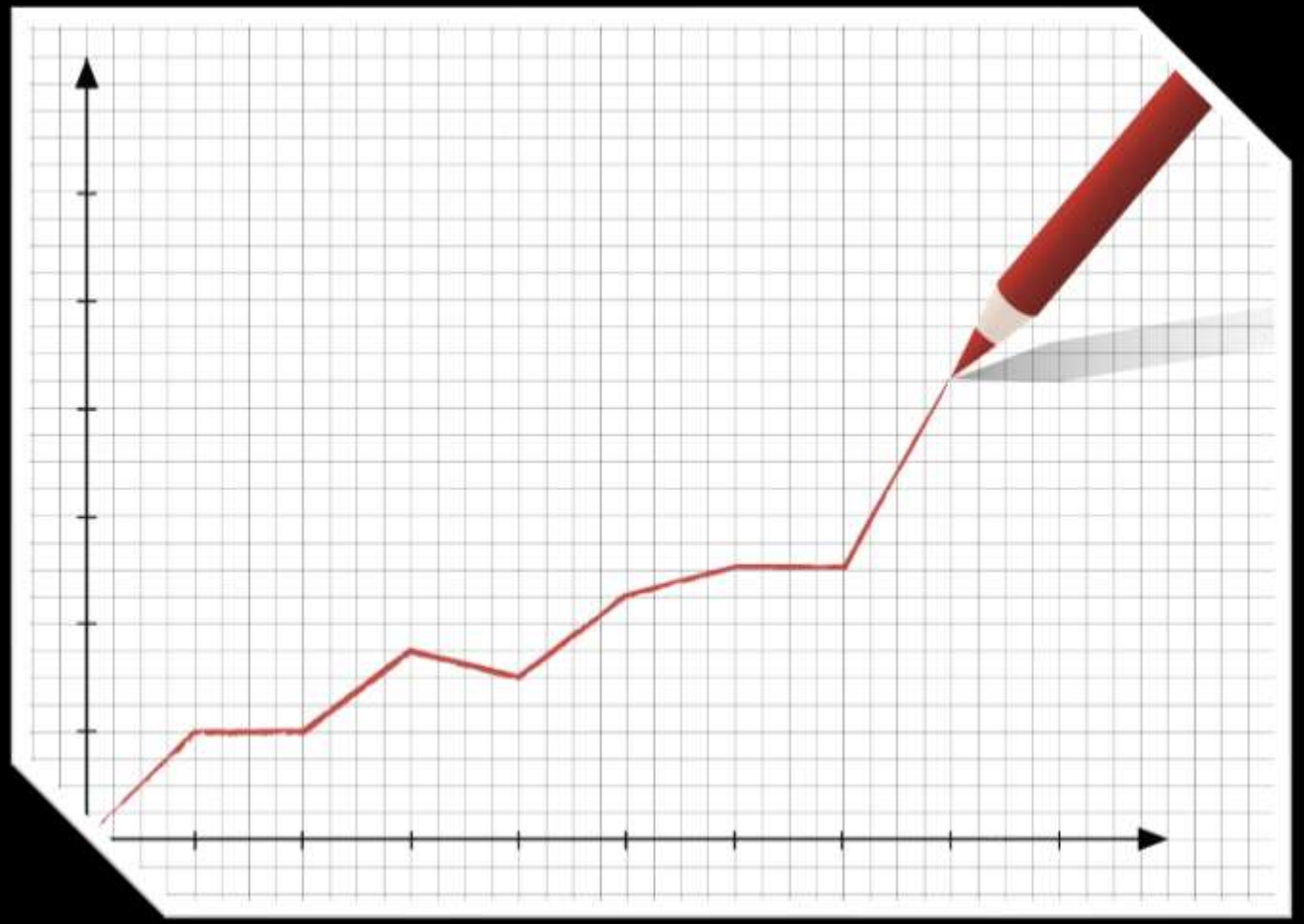
- Java
- Remote programming
- Designing UIs
- Reading APIs

What we did last year



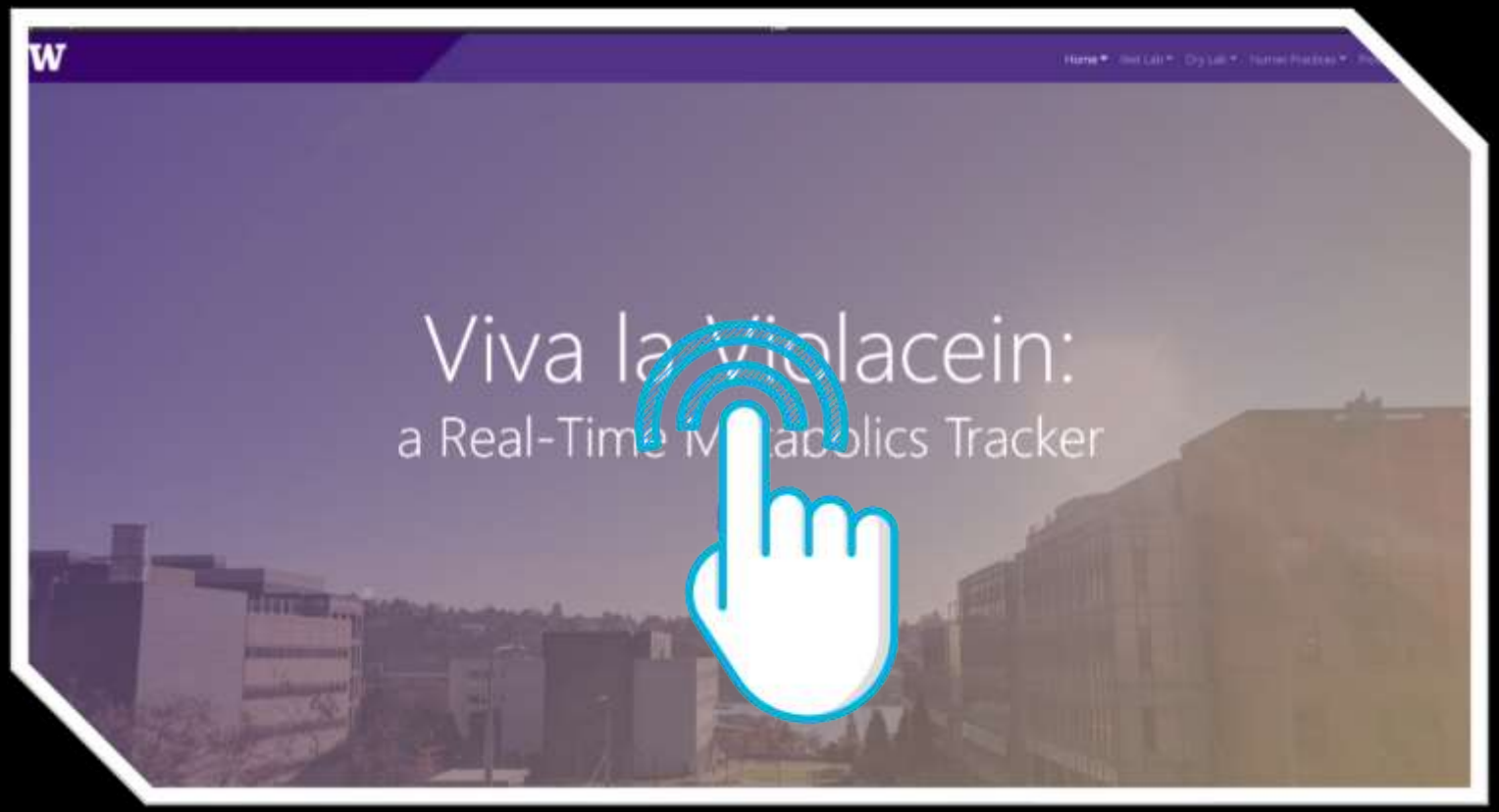
The future

What we want to do



- Math modeling
- MATLAB
- R
- Data analysis

What we want to do



- HTML, CSS, heavy JavaScript
- Photoshop

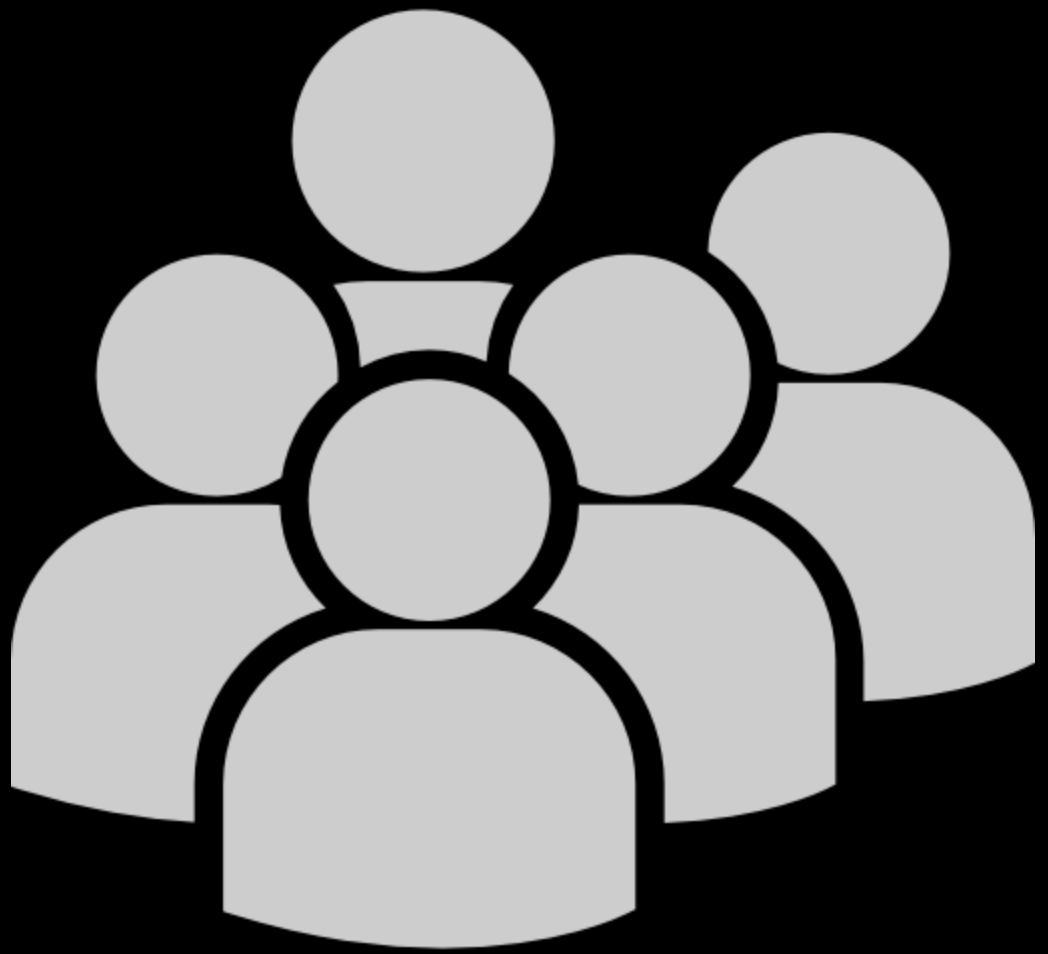
What we want to do

11 + 4 :thinking:

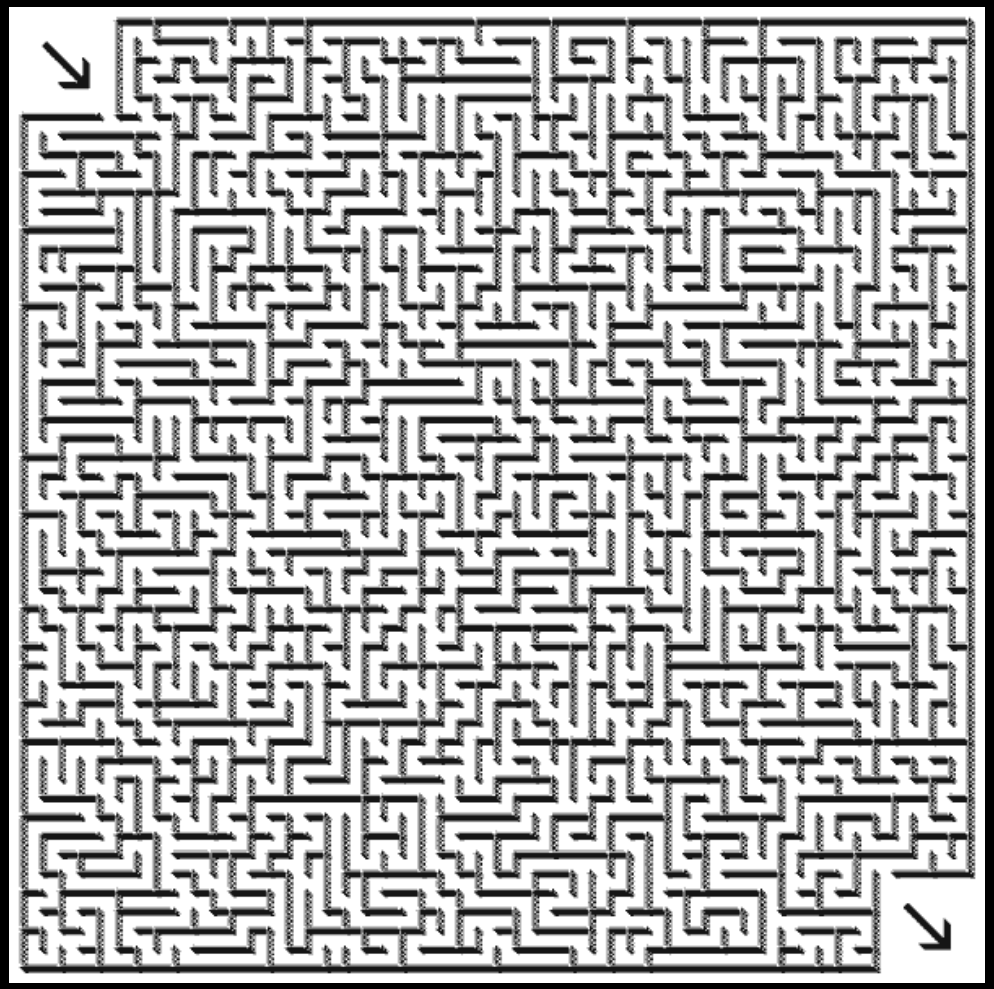
- Independence and problem solving skills

What we want to do

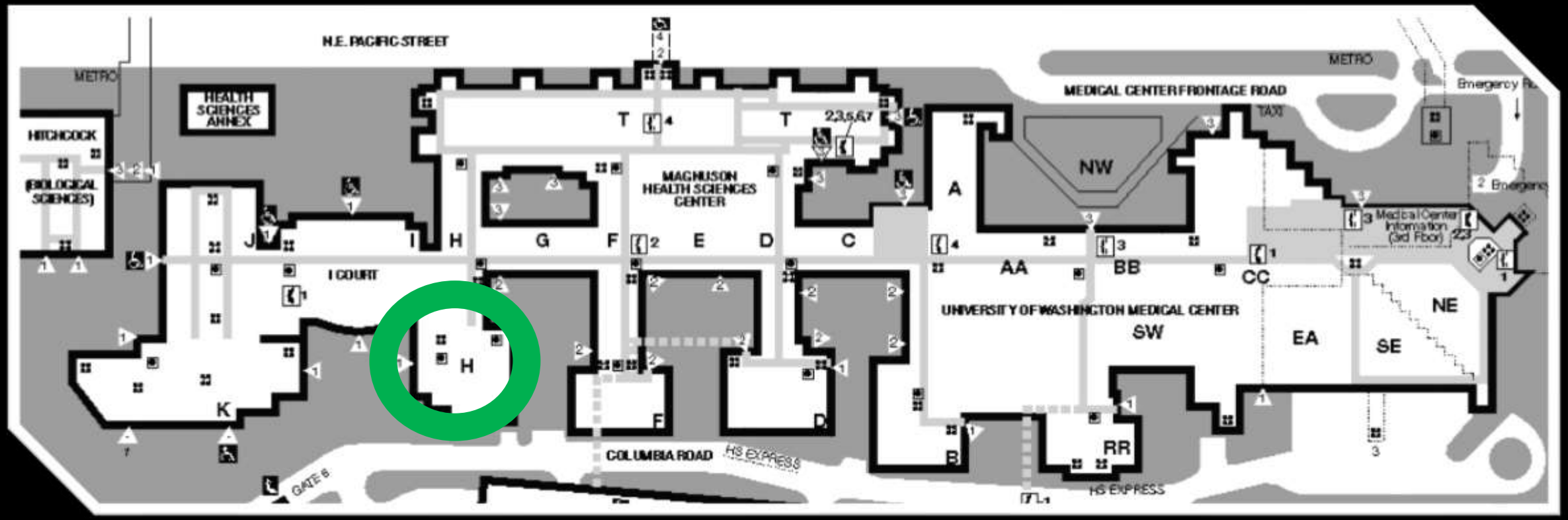
- Community for sharing knowledge
- Collaborate with Outreach team



Where we work



Where we work



Time commitment

- Around 5-10 hours/week

What you need

- Laptop
- GitHub account
- A Brain

What you will learn

- Things listed earlier
- How to not get scared to ask questions
- How to ask for clarification
- How to use a magical tool:

What you will learn

Outreach/Human Practices

•••

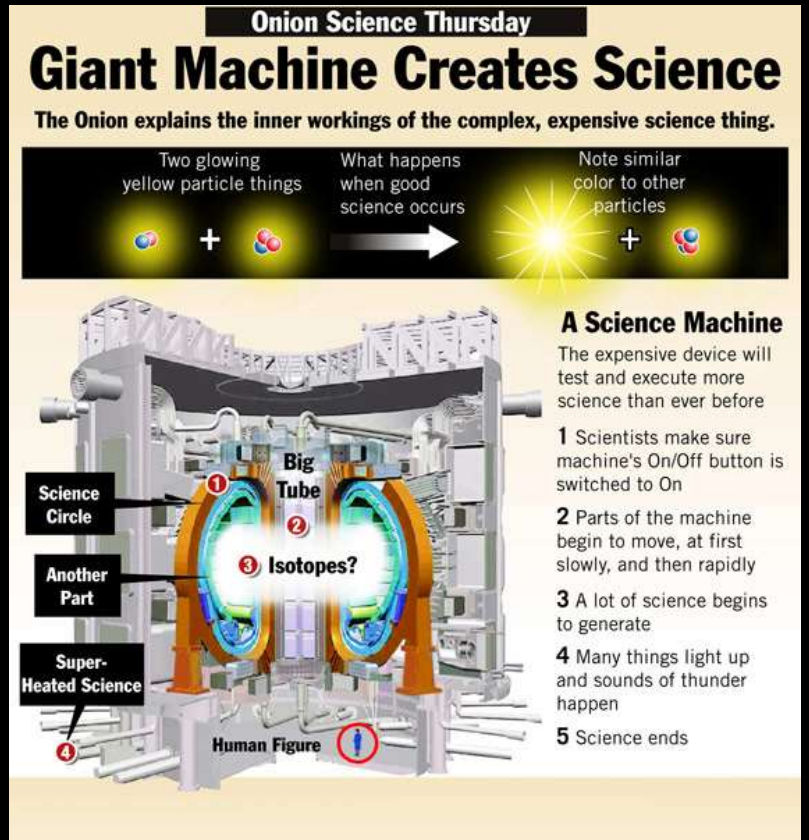
Talking to non-scientists/children

Science? So who cares?

- Future scientists!

- Big Milk

- You! and Me!



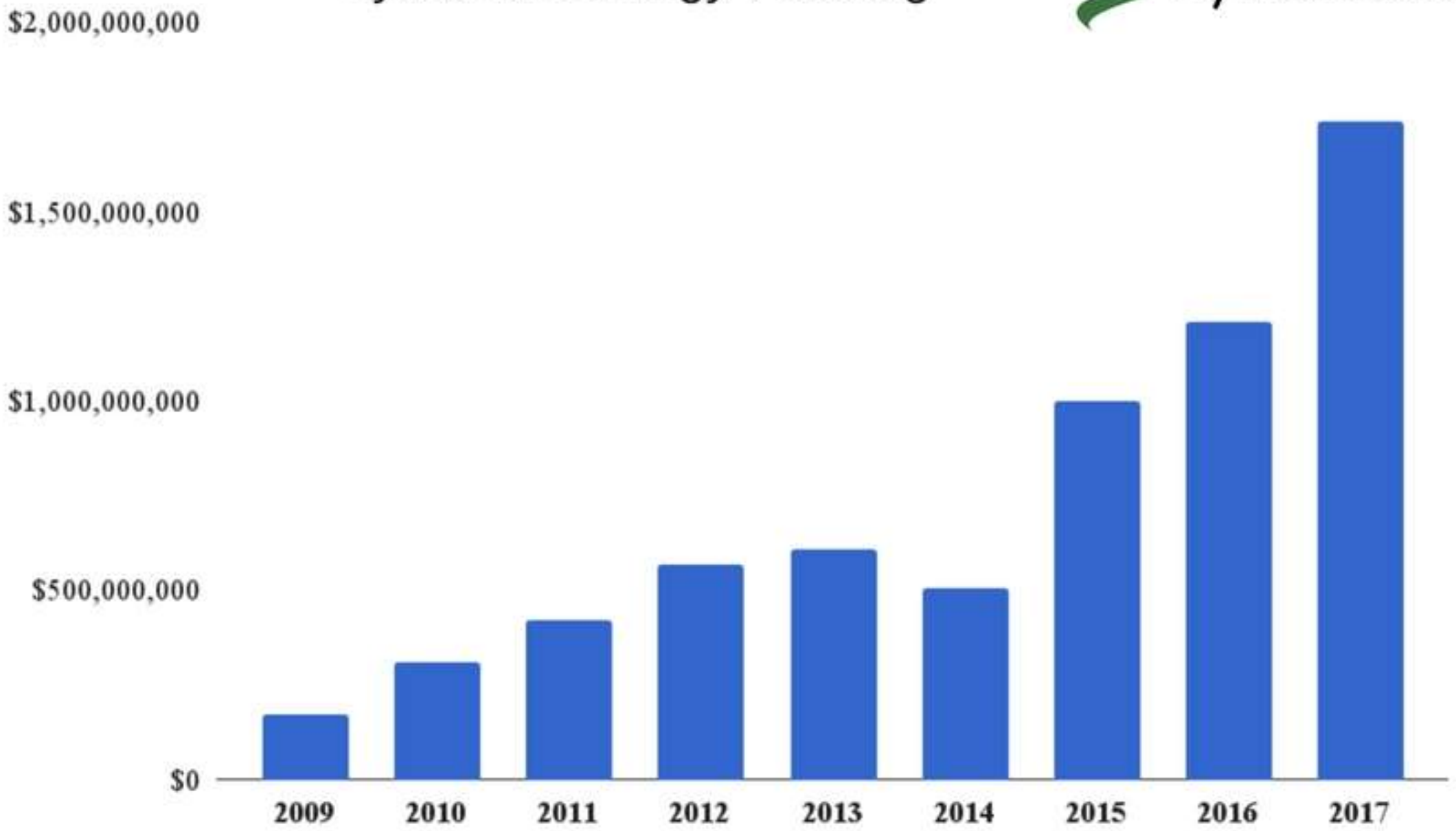
Business, Policy, & Social Media

•••

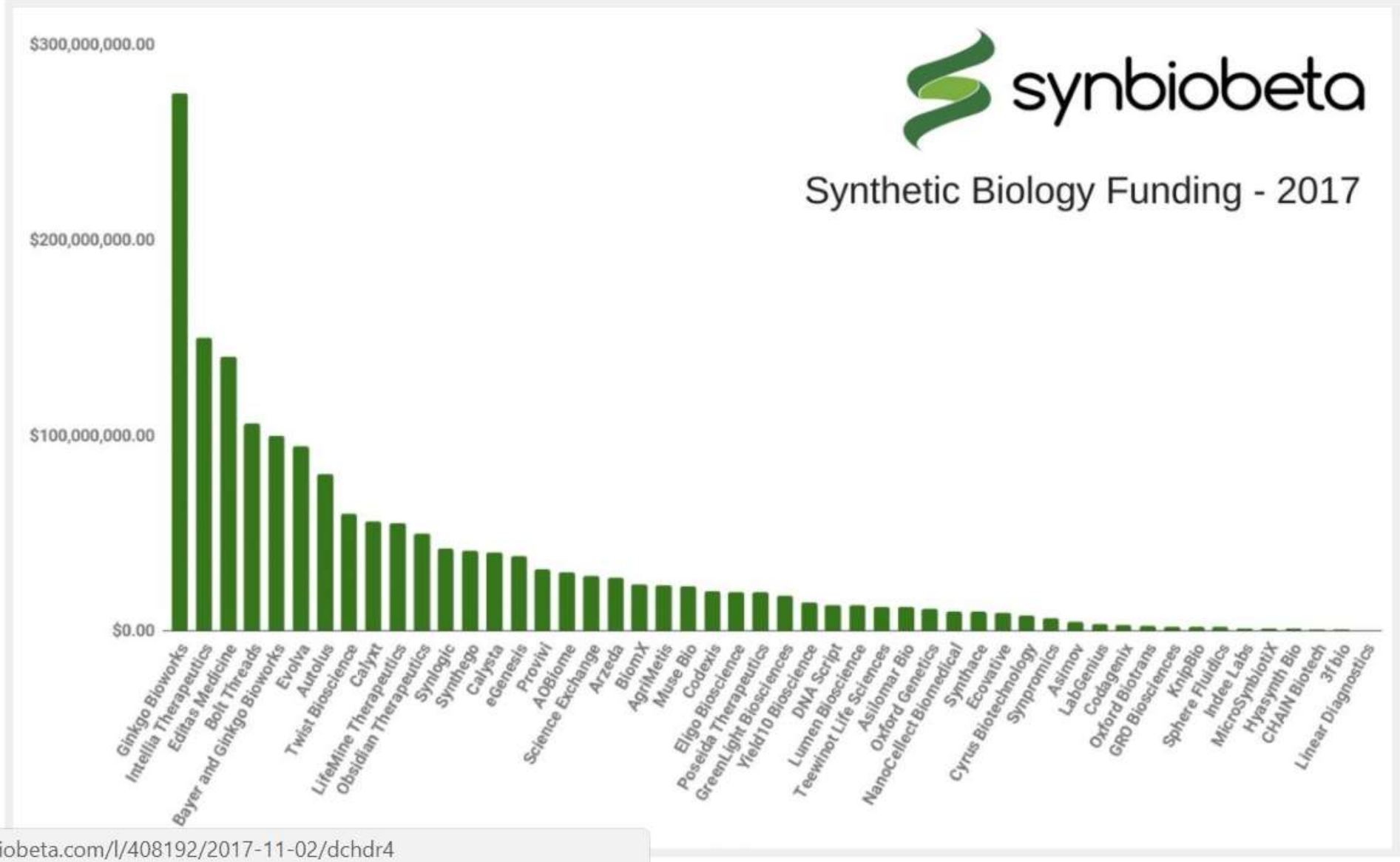
Help us sell our ideas!

Synthetic Biology Funding

synbiobeta



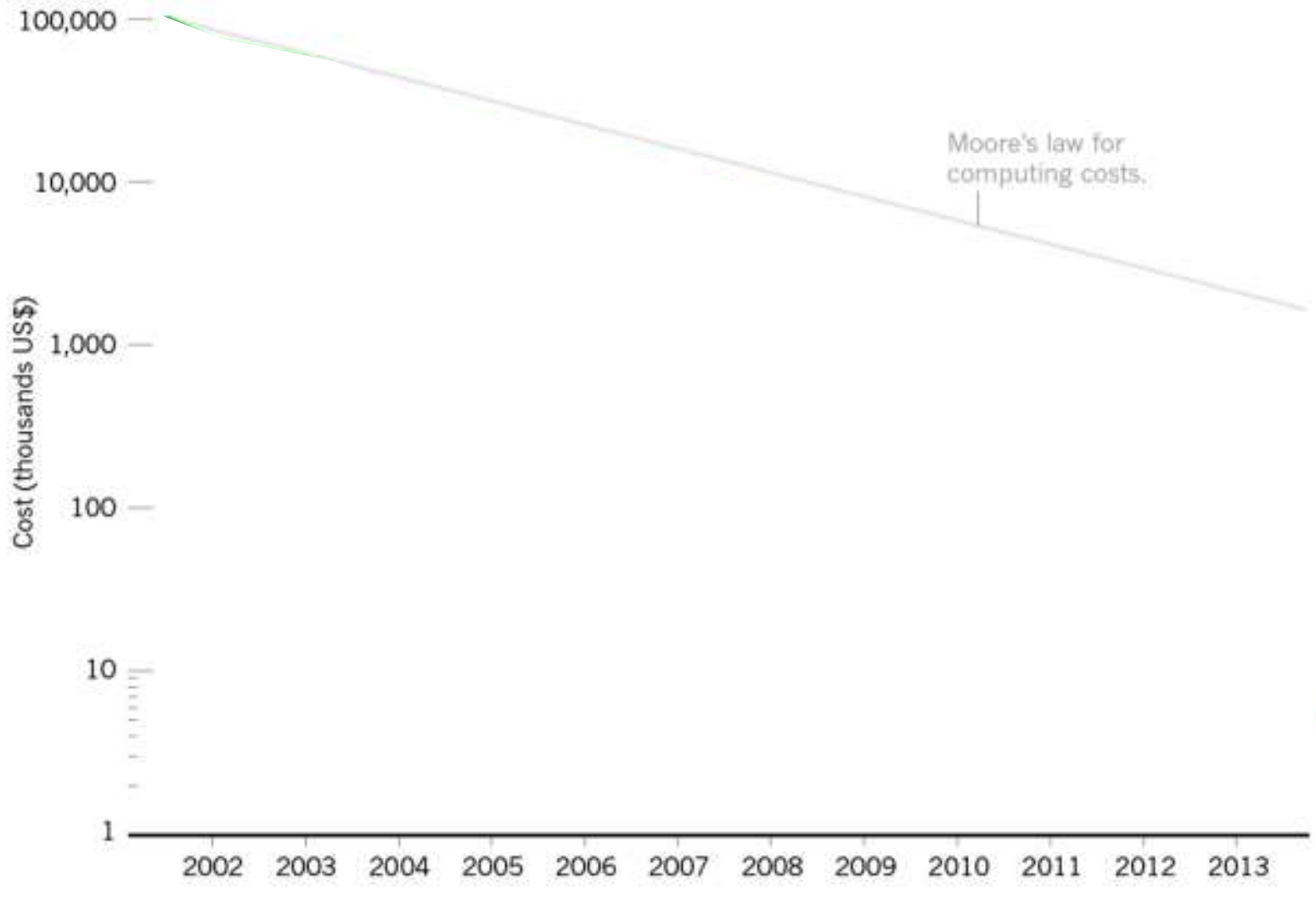
These Fifty Synthetic Biology Companies Raised $1.7B in 2017



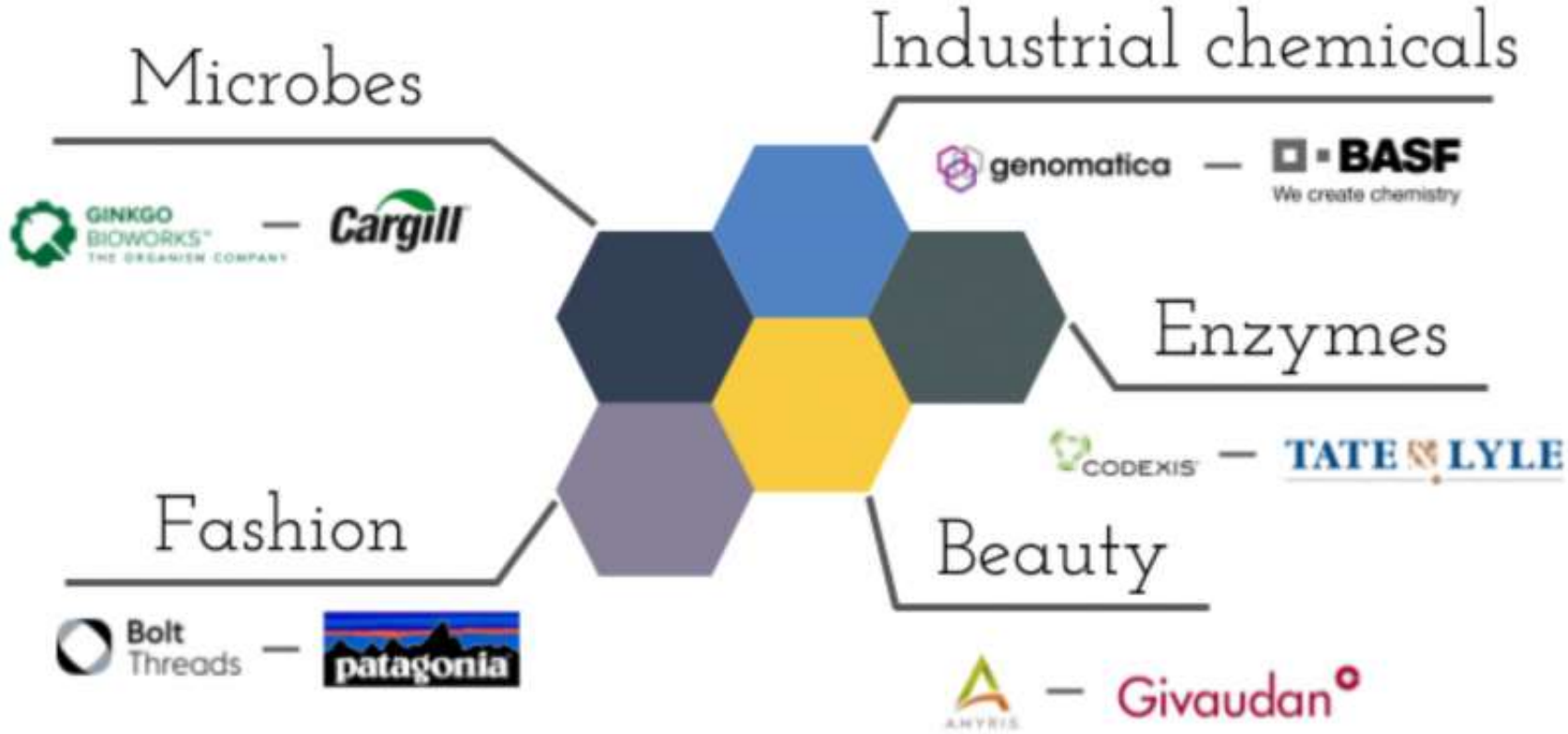

Bolt
Threads

Falling fast

In the first few years after the end of the Human Genome Project, the cost of genome sequencing roughly followed Moore's law, which predicts exponential declines in computing costs. After 2007, sequencing costs dropped precipitously.



Companies now focus on high-value products



And are getting traction with larger companies

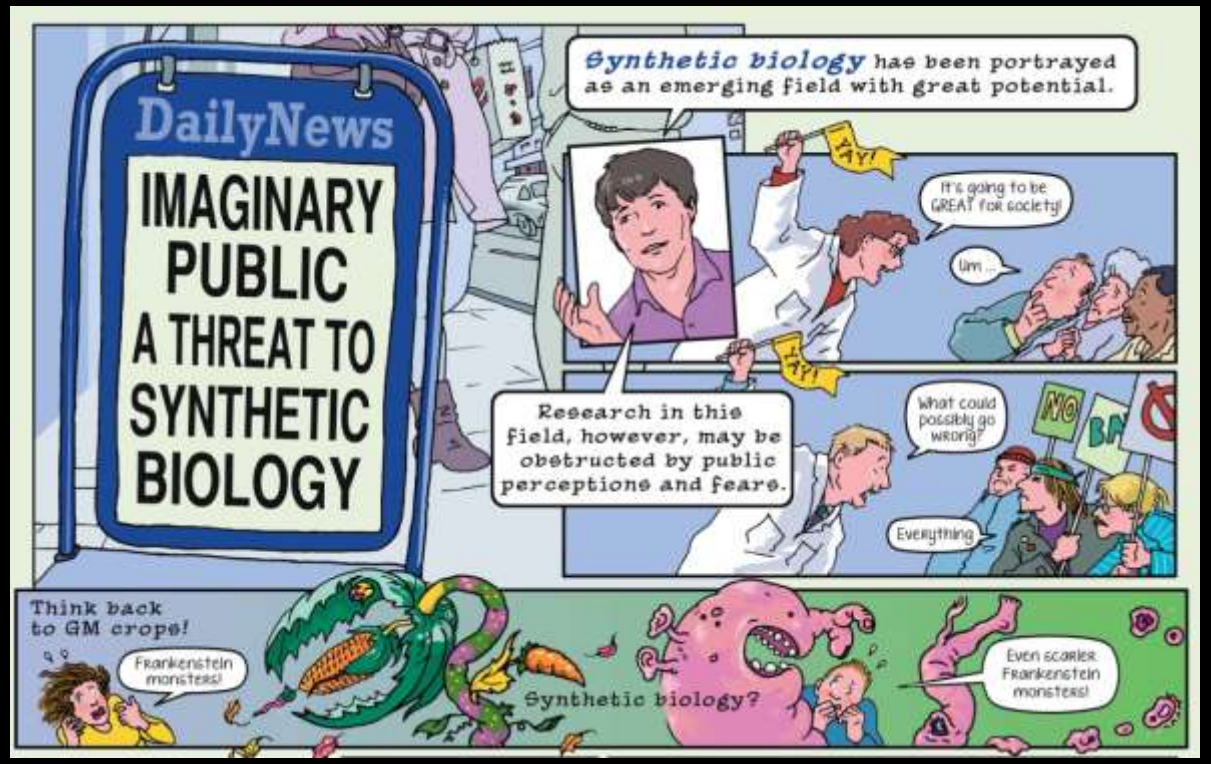
Business & Entrepreneurship

Filling a need (market demand) should inform design decisions in our project

- Write to companies to pitch our ideas and get funding
- Perform market research and SWOT analysis
- Fulfill requirements for iGEM entrepreneurship awards
- Practice technical writing and business skills

Public Policy & Ethics

Regulation and government policy plays a significant role in our research.



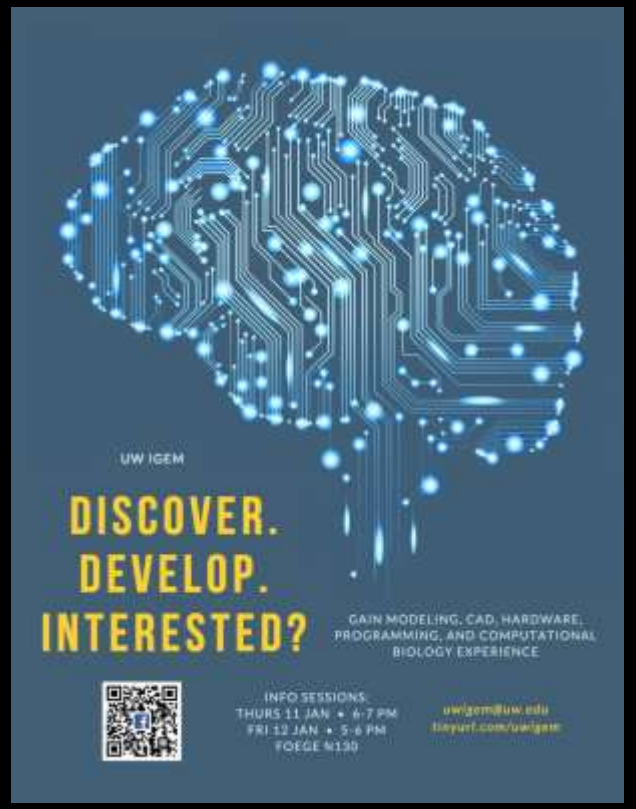
- Learn about policies related to synthetic biology, GMOs, and biotech research
- Research project-related ethical issues
- Interact with local experts and government officials regarding our project
- Write policy briefs related to our project
- Help us make a positive impact in our community!

Social Media

- Help us increase our reach through Facebook, Twitter, and Instagram
- Write content highlighting our team members & project for social media
- MAKE MEMES
- Work with design team to market our team and ideas!
  - Videos
  - Animations
  - Art

DESIGN & ANIMATIONS

WHAT WE'VE ACCOMPLISHED SO FAR



PROJECTS TO UNDERTAKE

Design posters, flyers, and a website

- Team and Project logos
- Outreach informational flyers
- Competition material
  - Project Poster
  - Presentation Slides
  - Wiki figures and animation

Develop a project storyline and introductory animation video

Think up of and tackle fun projects

- Creative introductory pictures

Interested in any of these projects? Talk to Hannah & join the design team! :D

Companion Class

(0-2) Credit Class

- Learn skills you will need in lab
- Different classes for wetlab & drylab
- Necessary to attend, not necessary to officially register
- Works around *your* schedule

Grading

- *Not* a weed-out course
- Mostly participation credit
  - Do you come to lab?
  - Do you come to class?
- Personal Feedback

Instruction

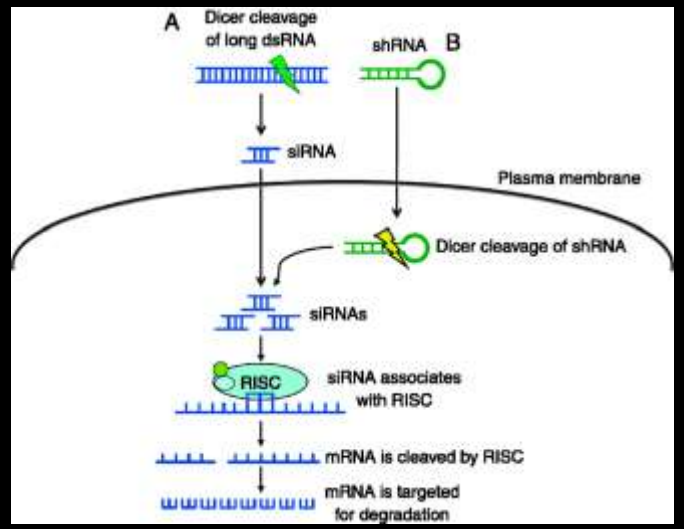
- Taught by your peers
- Really friendly
- Open to helping you both in class and in lab

Scheduling

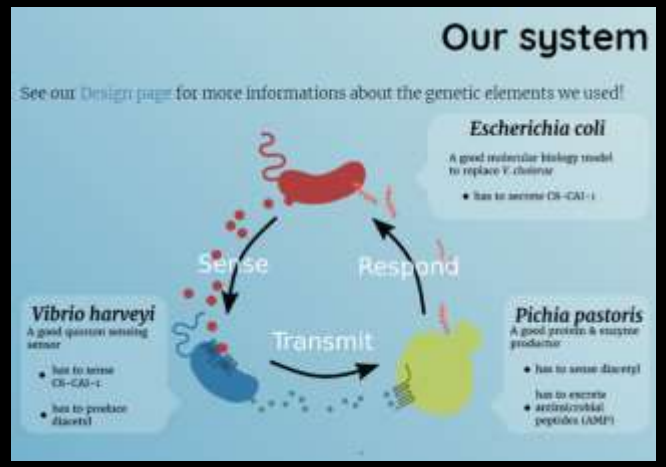
- When we will meet depends on when everybody is available
- We'll collect everybody's schedules and find the best fit

Current Project Ideas

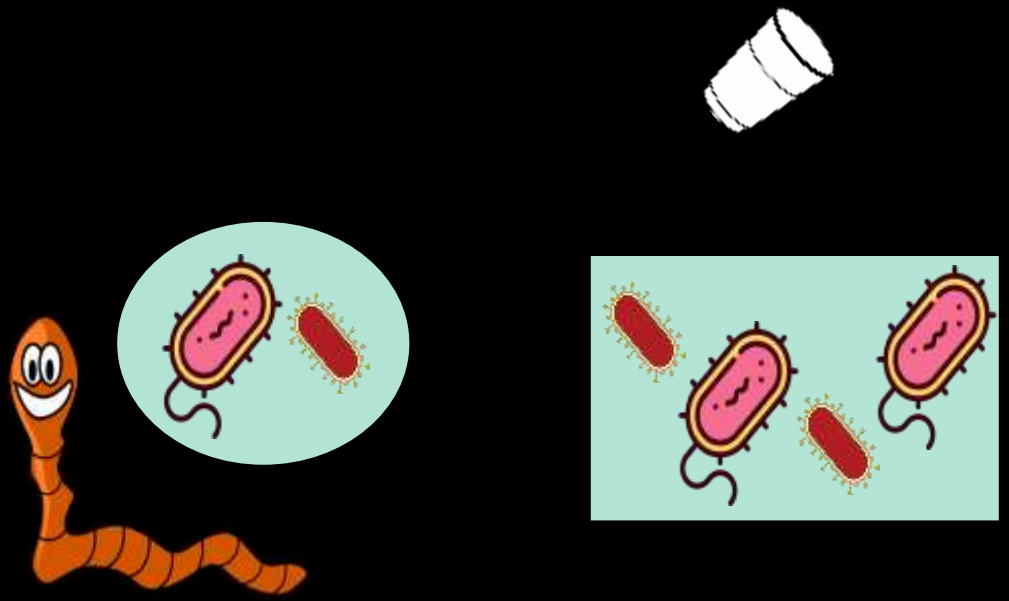
Eradicating cheatgrass

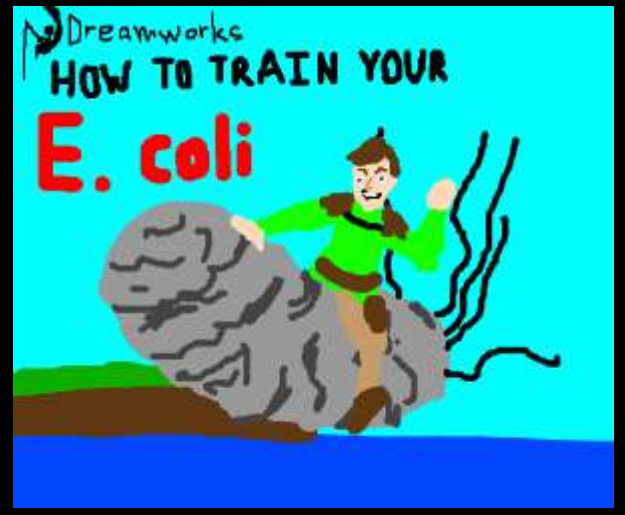


Robust water purification



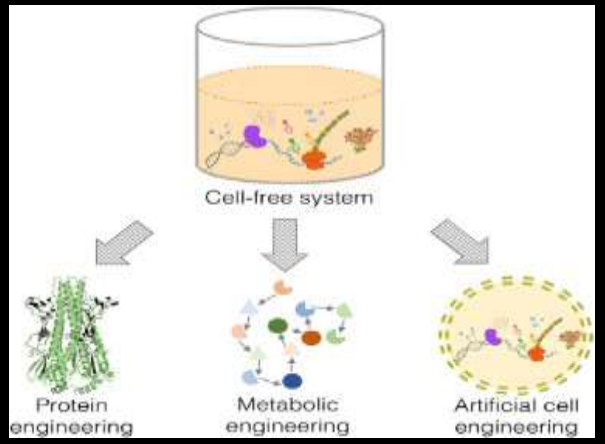
Styrofoam-Digesting Bacteria



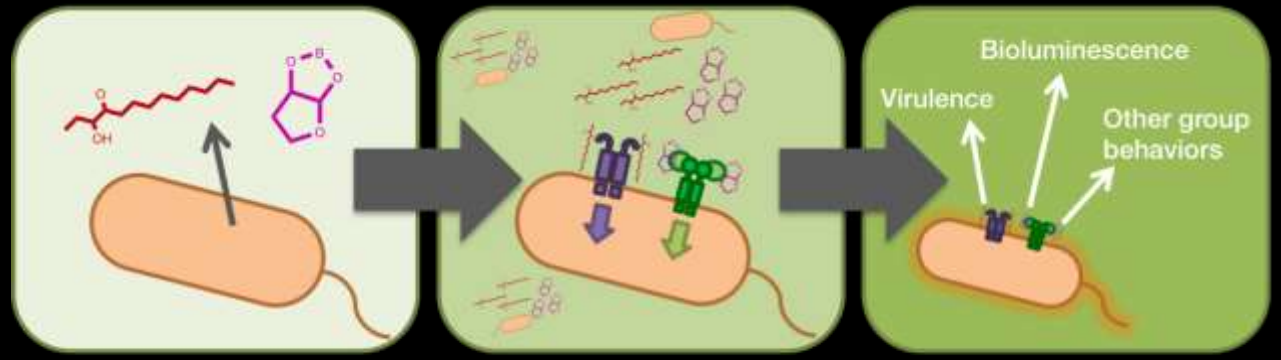


Permanent hair removal cream

Optimizing metabolic pathways and protein expression with a cell free system



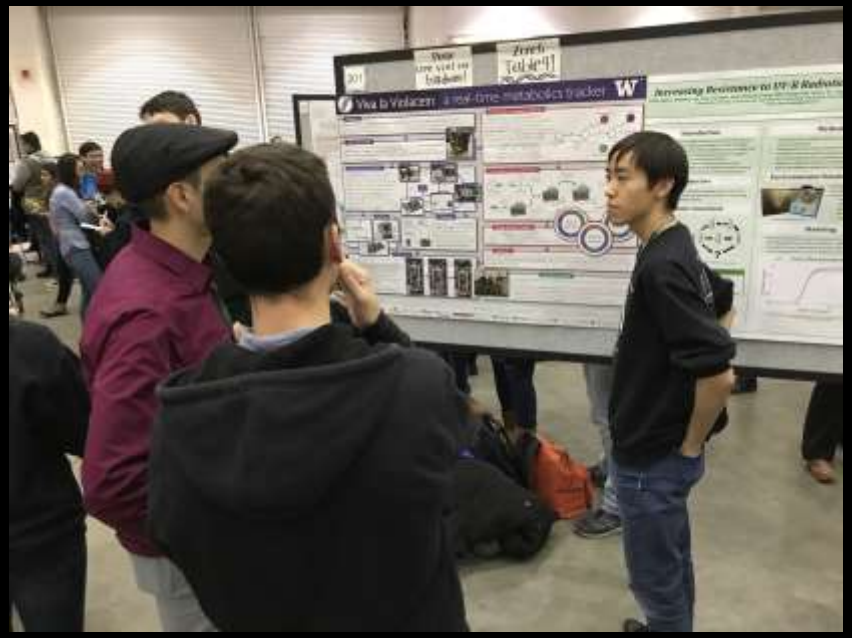
Quorum sensing bacteria




2018 iGEM Jamboree
Competition Date: October 24-28, 2018
Where: Hynes Convention Center in Boston, MA

What is the Giant Jamboree?

- Annual international conference held in Boston
- Project presentations
- Panels of acclaimed judges
- Awards ceremony



What can we do at the Giant Jamboree?

- Watch other teams' presentations
- Poster sessions
- Social events
- Workshops
- Career fair
- Explore Boston!

Individual Cost Break Down

3 Main Categories make up the itinerary:

- Airplane Tickets
- Hotel or Airbnb Stay
- Individual Registration Fee

Total Cost

$300 Airfare

$75 Airbnb

\+ $700 Registration Fee

$1,075

URP Grant

"We encourage all students who have a paper, **poster**, or scholarly creative work that has been accepted for presentation at a professional conference to apply for an award." – URP

Every member is eligible to apply! SO APPLY

Last year, every person who applied received the award.

SO ONCE AGAIN, APPLY!!!!!

~ $300-400

HUB Grant

- $1500 that the iGEM RSO applies for
- Last year each member received $125

With both grants taken into account: $550

Team! (Leadership+Advisors)

Admin

Wetlab

Drylab

Human Practices + Design

Question Time!

- General questions now
- Specific/personal questions to relevant people after we break up