Welcome to the Public Invention Mathathon 2018!

...a cooperative weekend to solve some open problems.
If something goes wrong, email <read.robert@gmail.com>

Goals of the Mathathon...

- Have fun!
- Do some math socially together.
- Solve some open problems in a particular field.
- Learn how to evolve Hackathons into Mathathons.

Our field of endeavor today is...

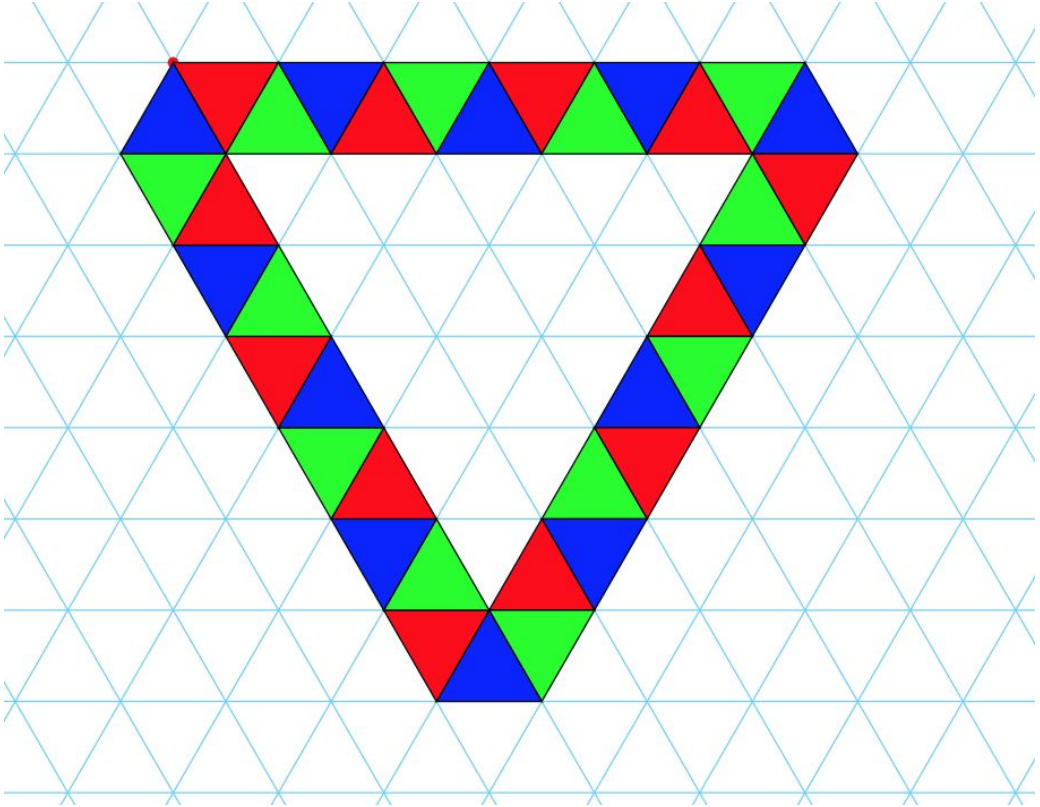
Simplex chains!

Basically, connected chains of triangles and tetrahedra.

Which are very important in structural engineering and robotics, because they are inherently rigid.

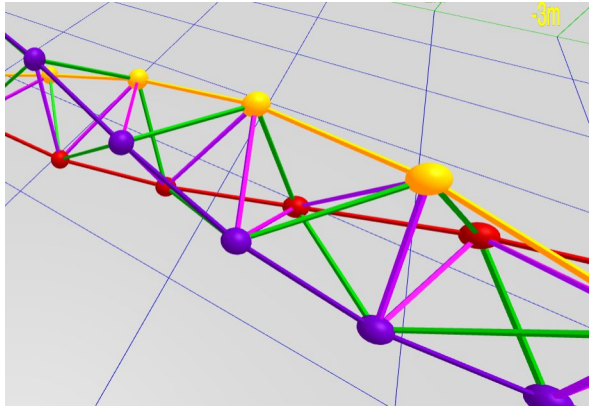
Trusses (in 2D) and spaceframes (in 3D) and Tetrobots (robots made completely out of tetrahedra) are active areas of research.

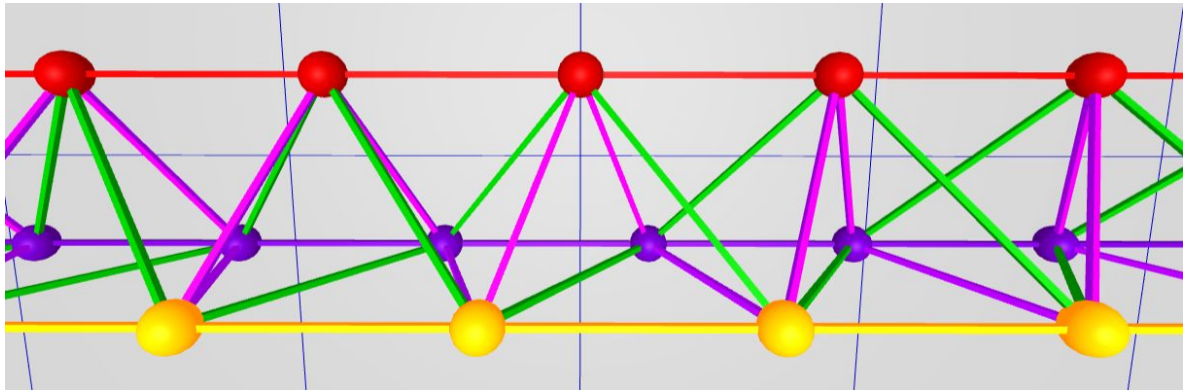
Trusses….



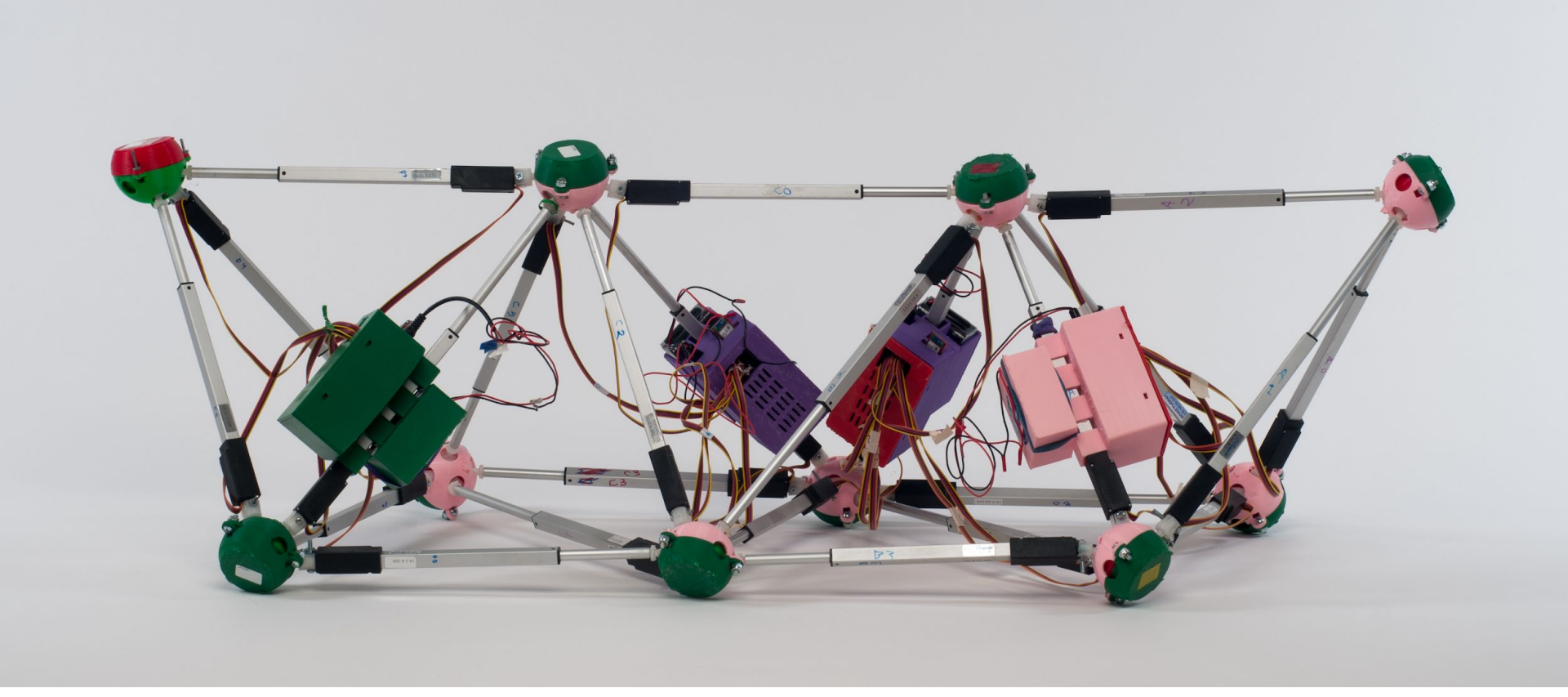
Structures formed of triangles are inherently rigid and generally strong for their weight.

Tetrahelices...





Robots!



Problems of all difficulties...

But don’t worry! We have defined over 30 problems of widely varying difficulties. Some are easy, some are very hard.

Whether you are a High School student or a Professor of Mathematics, we have a problems that may be right for your skill level.

For easy problems, we have created an interactive web page!

Furthermore, these problems are at the intersection of Geometry and Computer Science. Some of them can be explored purely by computer programming, with much knowledge of geometry; others may be better attacked with pencil and paper and classical geometry.

We are here to help...

- We will take as much time as needed to explain how to use the :
- Slack chat channel, this Zoom room, and GitHub.
- We will help you find problems suited to your skill level.
- We will help you form teams if you want to work with someone else on these problems.

Basic Structure: Time!

- The Mathathon begins now and ends at 5:00 Eastern/2:00 Pacific.
- Your facilitators will be available this whole time, except for the middle of the night in North America.
- Judging will occur after that Mathathon, based on whatever has been emailed to use or is in a GitHub repository at 2:00 Pacific time on Sunday.

Basic Structure of the Mathathon…Cooperation!

- No cash prizes, but awards given for best solutions….
- But also best sharing! We want to work in the open…
- So please share you solutions to the whole Mathathon for others to build on.
- Let us help you form teams of you don’t have one already!
- List of awards in back of the paper.

Awards!

- Crowd favorite (to be determined by email vote)
- Best contribution by someone without a post-baccalaureate degree
- Best contribution by someone without a college degree
- Best contribution by someone without a High School degree
- Best contribution by a Senior Citizen (at least the age of 65)
- Most creative technique
- Best contribution by someone not a US Citizen
- Most worthy of publication
- Second most worthy of publication
- Best contribution by a child under 16 (may be accomplished in conjunction with a coach, so long as the child is fully engaged)
- Best contribution of a new problem statements
- Most helpful to other participants (not on same team), to be awarded based on written testimonials
- Second most helpful to other participants (not on same team), to be awarded based on written testimonials
- Most useful open repo during the mathathon
- Best mathematical presentation and writing
- Best code contribution
- Best contribution of graphic art, figure, or diagram

To be eligible for awards….

In your team directory or in email, please a file or a pargraph labeled “bio.txt” and simply assert that you are in an award category, such as Senior Citizen, or non-US citizen, on your honor.

If using GitHub, create a directory with your team name, add bio.txt, and put files in it in any form you choose.

Otherwise, email me your files.

Basic Structure: Presentation of Work

- Presentation of Work is up to you….
- We don’t care if you produce…
  - beautifully typeset work made with LaTeX…
  - A photograph of a scribble on a napkin....
  - An incomplete sentence in plain text file…
  - A computer program….
- But all work must “placed in the public domain” --- more particularly, all code must be released under the GPL v. 3 and all text and math released under the Creative Commons by Attribution Share-alike license.

Basic classifications of problems….

- You will need to read the paper or talk to us for details, but basically four categories:

1. Chains of 2D regular equilateral triangles: easiest
2. Chains of 2D irregular triangles: harder
3. Chains of 3D regular tetrahedra: harder still
4. Chains of 3D irregular tetrahedra: very hard

In our paper, we have given our specific judgements about how hard problems are... but we approach that with humility!

Tools for cooperation…

- This Zoom Room
- Slack team and slack channels
- Email : read.robert@gmail.com
- GitHub (you will need a GitHub account for this)
- You can of course use your own means of communication!

If you have a problem, ask your moderators! (me). We're dedicating this whole weekend to this purpose!

When you put something in GitHub, create directory with your team name, and add a file with your email address if you want us to be able to email you!

Code of Conduct….

We have a code conduct. The gist is simple:

- Don’t harass anyone. Be excellent to each other.
- Welcome everyone, no matter what gender, race, nationality, how well they speak English, and no matter what their math level is.
- If someone harasses you, email me immediately.

Things you ARE allowed to do….

- Help each other!
- Share your work!
- Pose new problems!
- Improve the wording of problems!
- Create new slack channels!
- Use your own video chat for your own discussions!
- Discuss things with us in the main Zoom Room!
- Post your failed solutions!
- Post your solutions as early as possible!