

# Public Invention

Free-Libre Hardware Inventions

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# Water-borne disease killed 3,400,000 people last year. What if...

Someone **invented** a [way to detect E. coli](#) and thereby fecal contamination in drinking water in only 6 hours...

And the methodology for doing so was freely and legally **published**, not patented or private, so that everyone could immediately benefit....

And *what if* on top of that, it was **developed** at a hobby-level of capital expenditure (< \$1000), by a team using free software and hardware?

Then water could be quickly **judged** potable, and source of contamination could be easily tracked. With effort, many lives could be saved.

## **Welcome to Public Invention.**

Time has been cut to 48 hours...

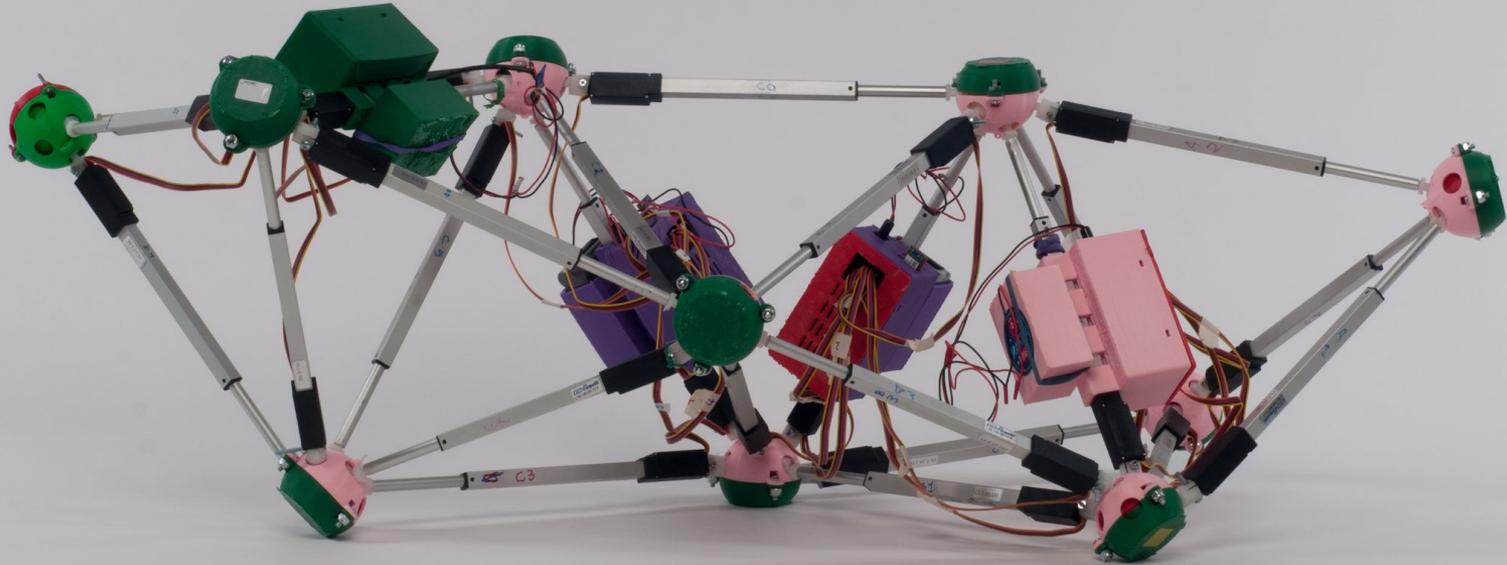


... but can it  
be cut to 6  
hours? Or 6  
minutes?

## 45 projects...but our short list:

- [Rapid E. coli detection](#) - (coached by Chris Ferguson, PhD)
- [TetroCon](#) - (with Avinash Baskaran) (and Tetrobot)
- [MathTablet](#) - (coached by David Jeschke)
- [SegmentedHelices](#)

# Some Work...The Tetrobot



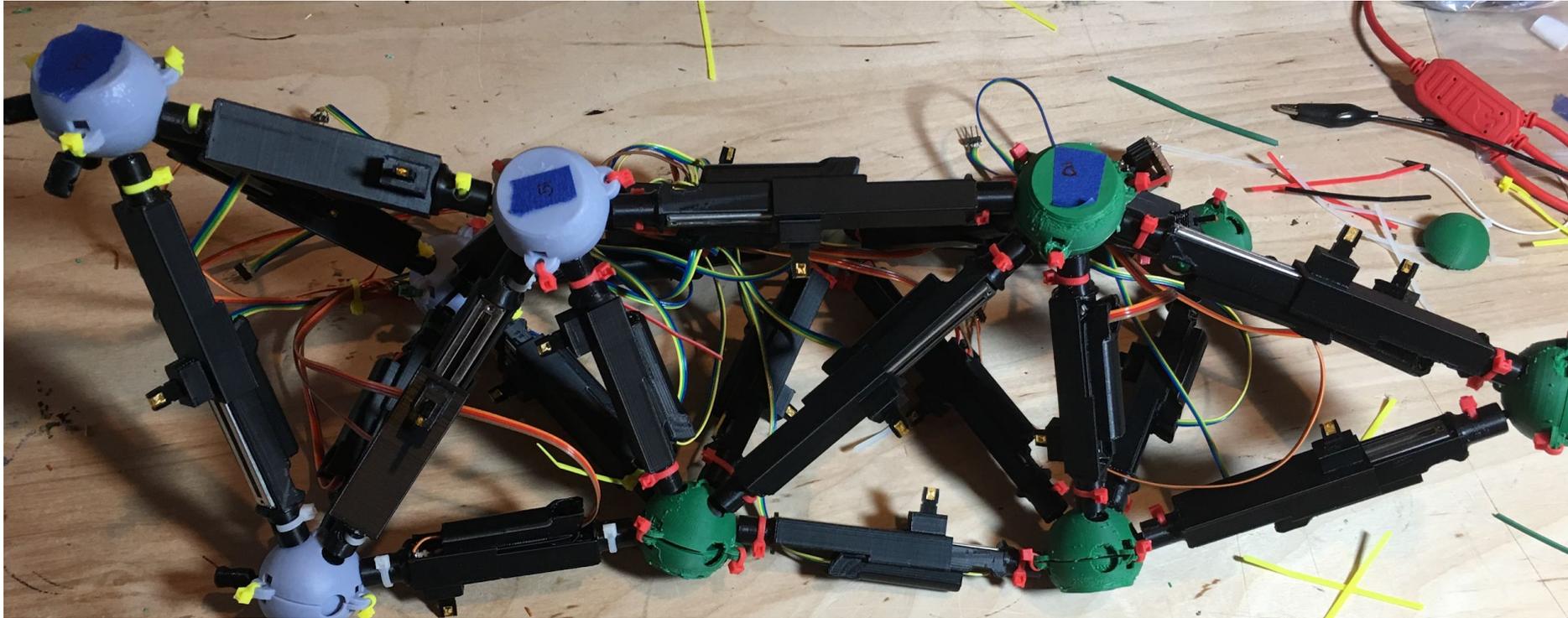
...but it needs a controller...

**We are working on  
both computer  
control...**

**And a Puppet -- the  
GlussCon**



Our hand-held tentacle controller...



The larger robot mirrors  
the puppet...

Becoming, for example,  
a bridge...

Or a bulldozer...

Or a crane...



# How We Will Save The World

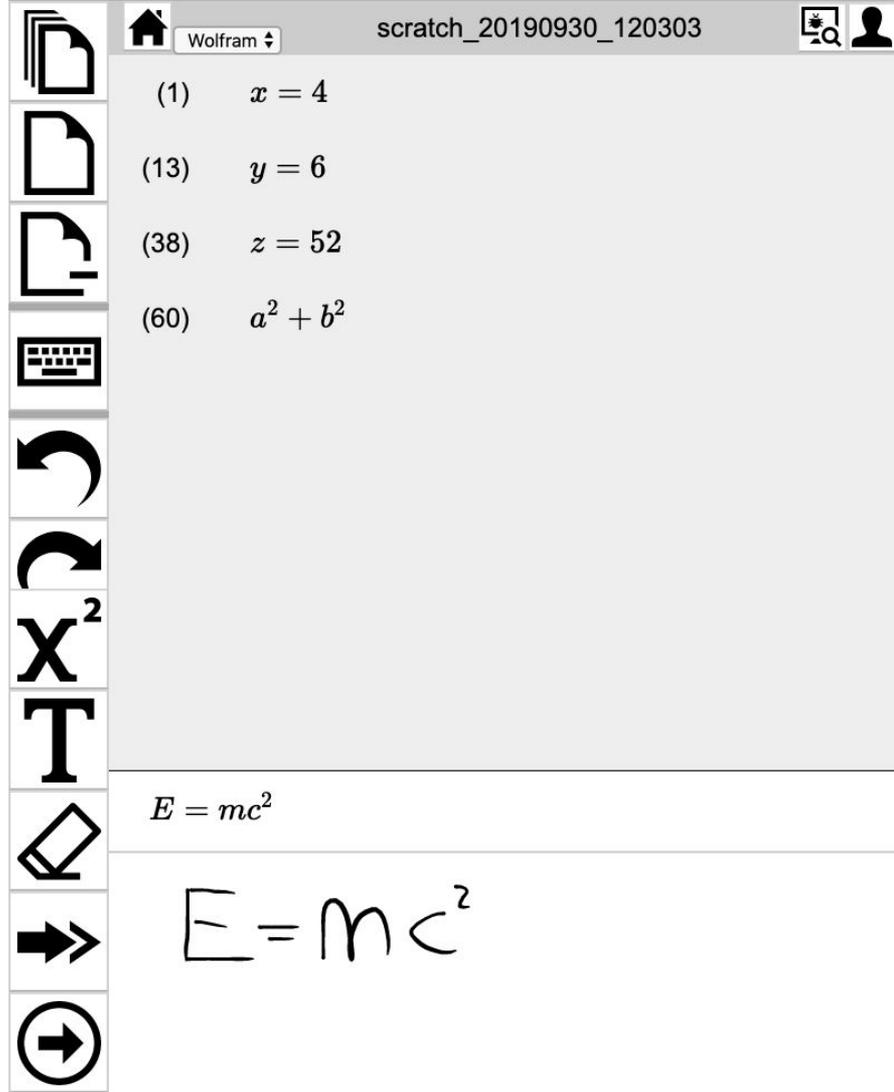
- The TetroCon project let's us become
- ***Dr. Octopus!***
- ---and thereby build search-and-rescue-robots!
- And agricultural robots that are more efficient than tractors!



# Math Tablet...

A hand-writing enabled math genius looking over your shoulder. Mostly software.

(Coached by David Jeschke.)



The screenshot shows the Wolfram Math Tablet interface. At the top, there is a home icon, the text "Wolfram", and the user ID "scratch\_20190930\_120303". Below this, a list of equations is displayed:

- (1)  $x = 4$
- (13)  $y = 6$
- (38)  $z = 52$
- (60)  $a^2 + b^2$

Below the list, there is a section with the typed equation  $E = mc^2$ . Below that, the same equation is shown as handwritten text:  $E = mc^2$ . On the left side of the interface, there is a vertical toolbar with various icons for document management, editing, and navigation.

# Potential Projects - aimed at environmentalism

- [More Efficient Pot](#)
- [Single-chamber biochar producing stove](#)
- [Interactive Model of Human Waste Processing](#)
- [Air Treader: Safer flying machines](#)

- Better cooking pots will relieve poverty and fight deforestation...
- Biochar may directly sequester carbon and improve soil...
- Safer flying machines would let us convert roads to gardens...

**In the end, technology is not neutral:**

**We can choose to be humanitarian makers.**

**We can choose to be Public Inventors.**

# A long American Tradition...

- Benjamin Franklin did not patent the Franklin stove - 1750s
- Jonas Salk did not patent the polio vaccine - 1950s
- Buckminster Fuller patented everything but licensed freely to the needy - 1930s+
- Richard Stallman articulates the principles of Free Software - 1980s+
- Free Libre Open Hardware becomes a thing - 2000+

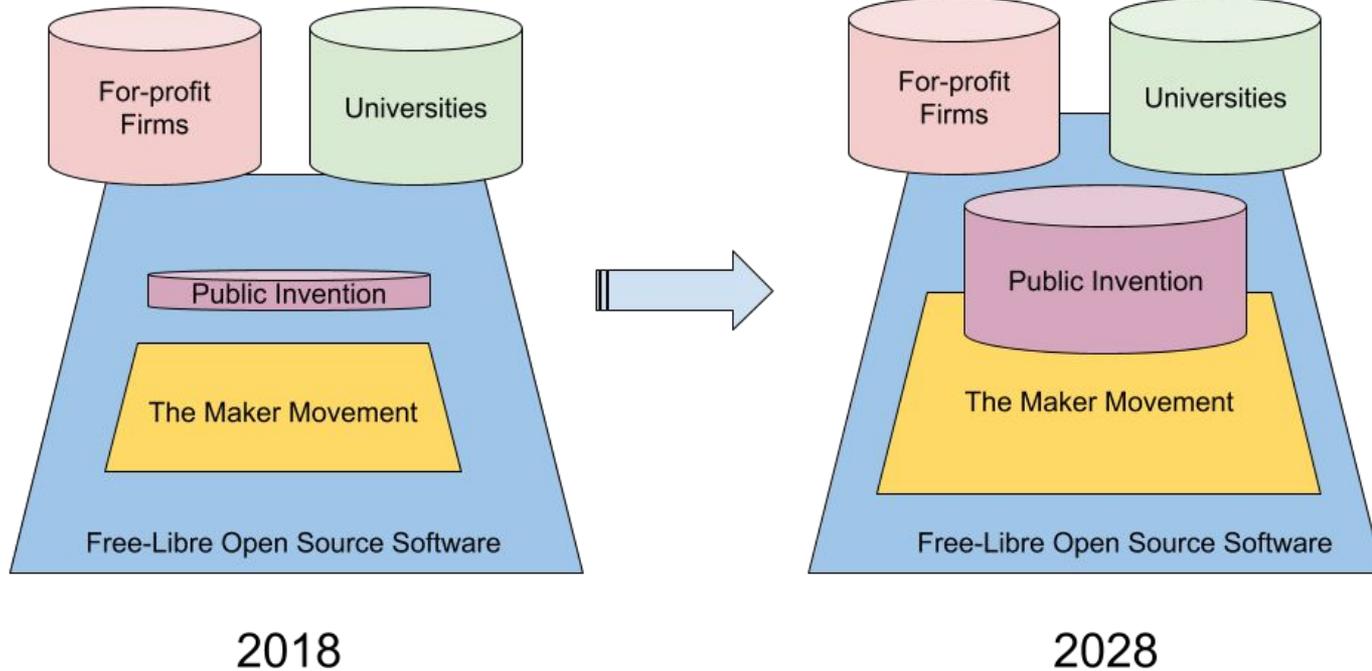
**We now attempt to create a movement towards not just free-libre software and hardware, but invention itself: Public Invention.**

# What is Public Invention to us?

- Stronger than “innovation”
- Useful to humanity
- The pinnacle of the Maker Movement
- Generally involves physical devices or materials in some way
- More risk of failure than mere development or design
- Underexplored useful engineering

But we will research math and software as well.

# The Rise of a Third Pole: Public Invention



Goal is to create a movement, not an organization.

# Invention Without Capital or Monopoly

How do you get the resources to invent without a profit motive enabled by monopoly of a patent?

- People do lots of altruistic things, and more money than ever is available.
- 3D Printers, free software, published scientific papers, biohacking, microcontrollers, cheap printed circuit boards have all enabled serious invention at hobby-level capital investment.
- The free software community has learned how to apply many minds to a single problem.

# Why not seek patents?

- **Who cares?**

- Impossible to track who made what contribution on large teams
- Produces moral dilemmas
- Expensive
- We are unwilling to make a judgement that entity X, however large, should pay, and entity Y should not. Therefore patents are economically worthless to us.

# What about “defensive” patents?

- Simple publication in theory creates “prior art” and is sufficient to prevent anyone patenting the work
- Policy of “working in the light” should produce an incontrovertible, ongoing, contemporaneous public record
- Basic policy: Push everything to GitHub or GitLab all the time. Publish everything. Publish right now.

# A Vision of the Future

- 20 years from now, someone will go to a cocktail party and say “I’m a Public Inventor”, and everyone will understand what they meant.
- Over time, more and more invention will be done without a profit motive.
- In the future, it will be easy to be a “weekend Public Inventor” or a “between jobs Public Inventor.”
- More and more inventions will be made freely available for anyone to use without a fee.

# The Public Inventor...

- Is driven by a desire to help humanity
- But wants to be recognized
- Chooses to spend their free time inventing rather than making more money than they need
- Wants to learn from and teach colleagues
- Loves being part of an invention team

Maybe you are a Public Inventor and just haven't called it that yet.

# Our Organization: Public Invention (charitable non-profit) is here to help...

Why is an organization needed?

Public Invention shouldn't be tied to who you know, it should be tied to what you care about and what you can contribute!

- Teams don't form themselves.
- Useful best practices should be established.
- Match ideas to volunteers.
- Collect and publish donated ideas.
- Funnel resources to resource-starved inventors (material support rather than labor, at first.)

# Mission: Invent things that help humanity

Our goal is to form and support teams that actively invent things for public good.

- Share everything equally and immediately.
- **Work in the light.**
- Keep it real.
- Don't build weapons.
- **Ideas are cheap.**
- Seek egalitarian usefulness.
- Collaborate whenever possible.
- Honor and value every contribution.

# THE FULLER SCALE

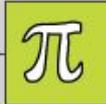
The Fuller Scale is created by Public Invention to represent the amount of humanitarian impact an invention will have. The unit of humanitarian impact is named after R. Buckminster Fuller (1895-1983).

**One fuller** = the impact of all of the inventions made by Bucky in his lifetime.

## Physical Invention

	Faster than Light Propulsion	500 fullers
	Fusion Power	200 fullers
	Printing Press	100 fullers
	Controlled Flight	75 fullers

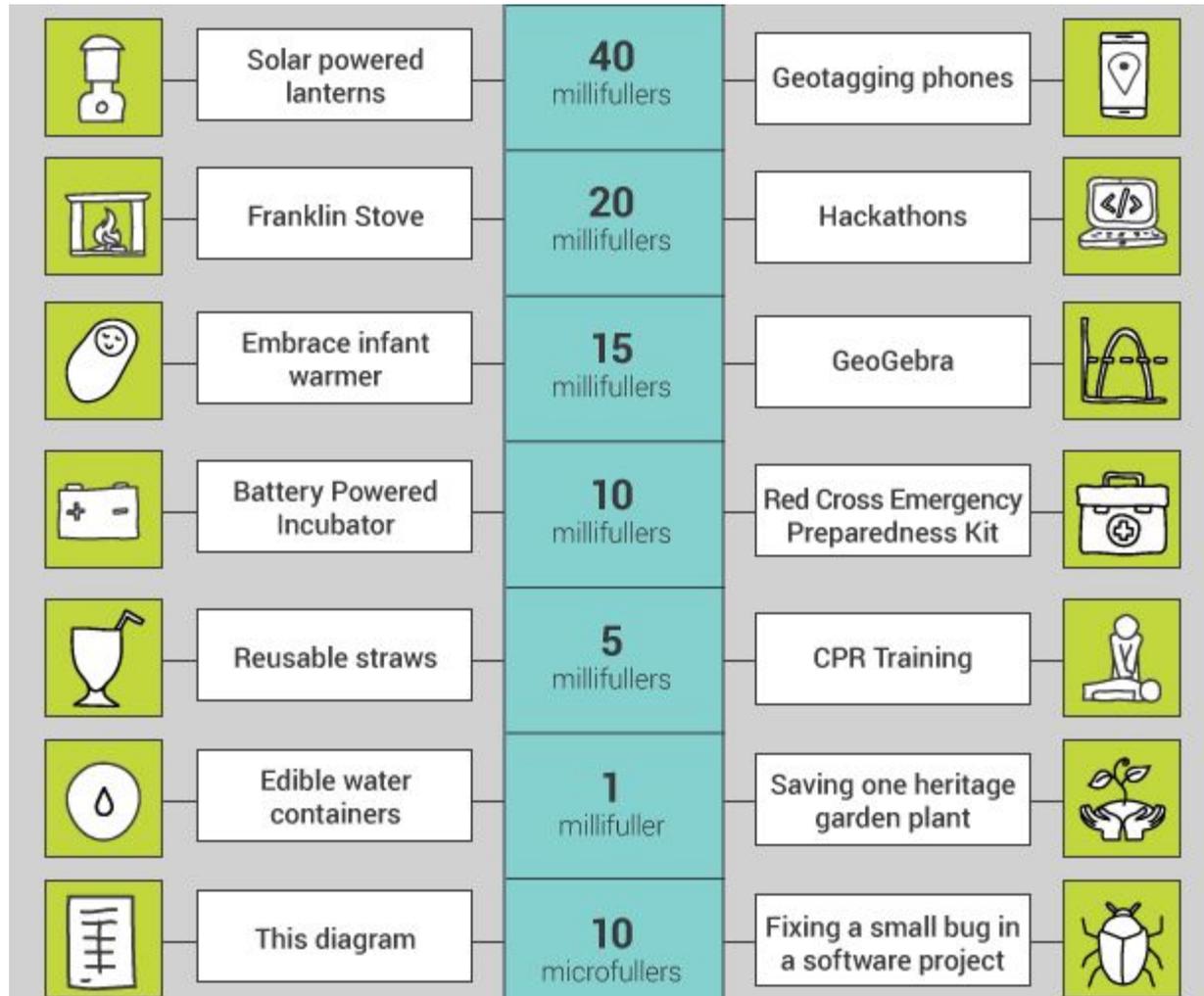
## Social Invention

Universal Human Rights	
Mathematics	
Freedom of Speech	
Democracy	

	Vaccination	50 fullers	Universal Suffrage	
	Universal Computers	20 fullers	Double-entry bookkeeping	
	Photovoltaics	10 fullers	Public Libraries	
	LED lighting	5 fullers	Wikipedia	
	3D Printing	2 fullers	Free software	
		1 fuller	All of Bucky's Invention	
	Geodesic Dome	500 millifullers	Blockchain	
	Iodine supplements	400 millifullers	Source control	
	Water filters	100 millifullers	Emacs	
	Legos	60 millifullers	Crowdfunding Websites	

But Public Invention projects and most free software projects should probably be measure in **millifullers**...

These are the spaces where Public Invention can legitimately play!!



# Could this idea be applied to free software?

Or is it better that it remain informal?

We believe inventors should work where their inclinations lead them, and not slavishly follow a consensual value judgement.

# Recommended Geek Practices (I)

- Every project begins with a public git repository
- GPL 3 or Aferro for code
- Make it easy for academics to contribute with credit
- Start the technical paper on the first day, even if empty
- For text: CC-BY

## Recommended Geek Practices (II)

- Plan to make videos from the beginning
- Publish code, text, photos, drawings, etc. to the repo at the end of every day (or more often)
- Coming up with the wrong idea first and sharing it is a great service
- Sturgeon's Law: 90% of everything is crud, and this will apply to our projects as well, so: **don't worry, be crappy!**

Videos  
sometimes  
help cross  
language and  
cultural  
barriers, so we  
have a  
[YouTube  
channel](#)

The screenshot shows the YouTube channel page for 'Public Invention', which has 90 subscribers. The navigation menu includes HOME, VIDEOS, PLAYLISTS, CHANNELS, DISCUSSION, and ABOUT. The main content area features a video titled 'Demonstration of math for Segmented Helices' with 33 views, 10 months old. Below this is a section for 'Functioning GlussBot' with a 'PLAY ALL' button and an explanatory video description. A grid of video thumbnails follows, including 'Glussbot/Glusscon at SxSW Create 2017', 'TetroCon Waldo', 'Gluss Bot Motivation Part 1', '5TetGlussBot Turning', and 'BroadWalk'. At the bottom, there are five created playlists: 'Math and Theory', 'Invention Projects', 'Functioning GlussBot', 'ATX Preemie Warmer', and 'Introductory Videos'.

**PUB INV** Public Invention  
90 subscribers

HOME VIDEOS PLAYLISTS CHANNELS DISCUSSION ABOUT

Recent work, seeking collaborators

**Demonstration of math for Segmented Helices**  
Public Invention • 33 views • 10 months ago  
Demonstration of free functionality (runs in browser) here: <https://pubinv.github.io/segmented-helices/index.html>. I demonstrate interactive 3D code that exploits mathematics to develop segmented

**Functioning GlussBot** ▶ PLAY ALL  
Explanatory video showing the GlussBot at SxSW 2017, including our relatively new controller, the Glusscon, with crowd interaction and some explanation of the overall project.

**Glussbot/Glusscon at SxSW Create 2017**  
Public Invention  
300 views • 2 years ago

**TetroCon Waldo**  
Public Invention  
82 views • 3 years ago

**Gluss Bot Motivation Part 1**  
Public Invention  
510 views • 3 years ago

**5TetGlussBot Turning**  
Public Invention  
34 views • 3 years ago

**BroadWalk**  
Public Invention  
29 views • 3 years ago

Created playlists

**Math and Theory**  
VIEW FULL PLAYLIST

**Invention Projects**  
VIEW FULL PLAYLIST

**Functioning GlussBot**  
VIEW FULL PLAYLIST

**ATX Preemie Warmer**  
VIEW FULL PLAYLIST

**Introductory Videos**  
VIEW FULL PLAYLIST

# Recommended General Practices (I)

- Most projects begin with a repo and a technical paper and aim for a video
- In-browser, zero-deployment whenever possible
- Look for spinoffs (Examples: [Triad-Balance](#), [SegmentedHelices](#))
- Modern Agile, modern tech, modern publishing

## Recommended General Practices (II)

- The [inventors](#) matter more than our directions---inventions come from the grass-roots
- But global warming requires a response; we balance the goal-driven with the invention-called

We work at:

- The thin boundary between science and engineering, and
- The thin boundary between the impossible and the trivial.

# Calls to Action

- **Contact us** so we can help you find a project that resonates with you.
- **Donate** a one-page invention idea to Public Invention!
- **Become** an Invention Coach.
- **Find** an invention project that resonates with you and offer your help.
- **Every** skill is needed somewhere, not just high falutin' math and science skills.