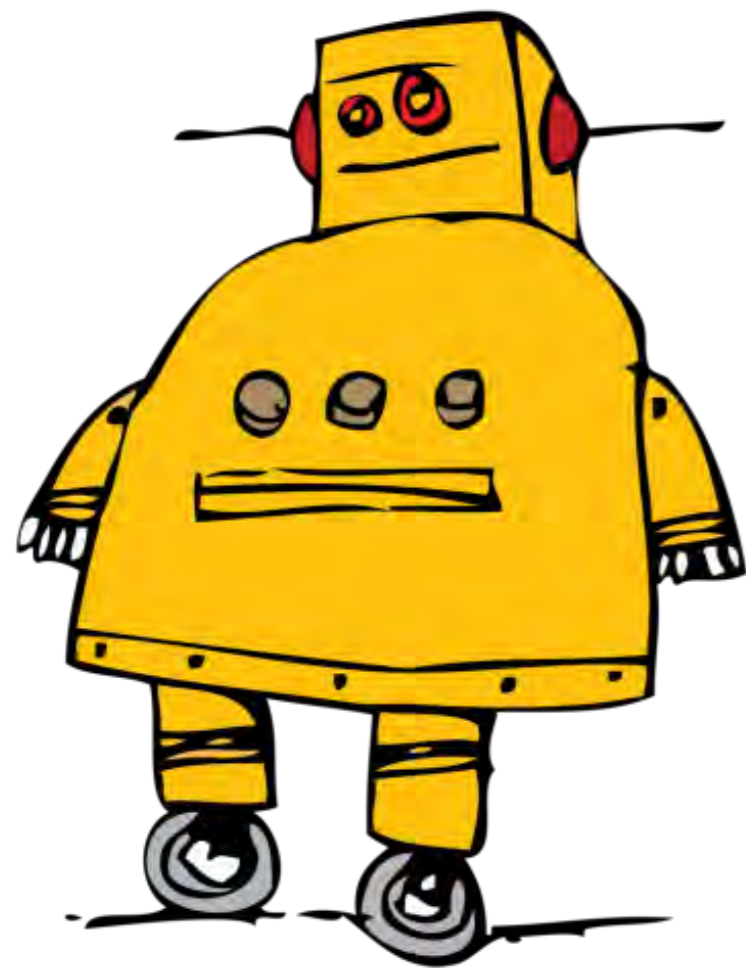


instructables



# instructables.com

## K'Nex Guns: How 13-year-olds and rubberbands power an open- source hardware community



Eric J. Wilhelm  
Instructables.com Founder



# Storyline

---

**The Story of Instructables and Big Ideas about Open-Source Hardware**

**What Actually Happened**

**K'Nex Guns as a Model Open-Source Hardware Community**



# Autodesk

---

**Instructables was acquired by Autodesk in August 2011**

**“K’Nex Gun Site Acquired by Billion-Dollar CAD Maker – What Gives?”**

**Sunday 2011-09-18 2 PM on the Main Stage at Maker Faire**



# The Story of Instructables



<http://www.instructables.com/id/How-to-Start-a-Business-1/>



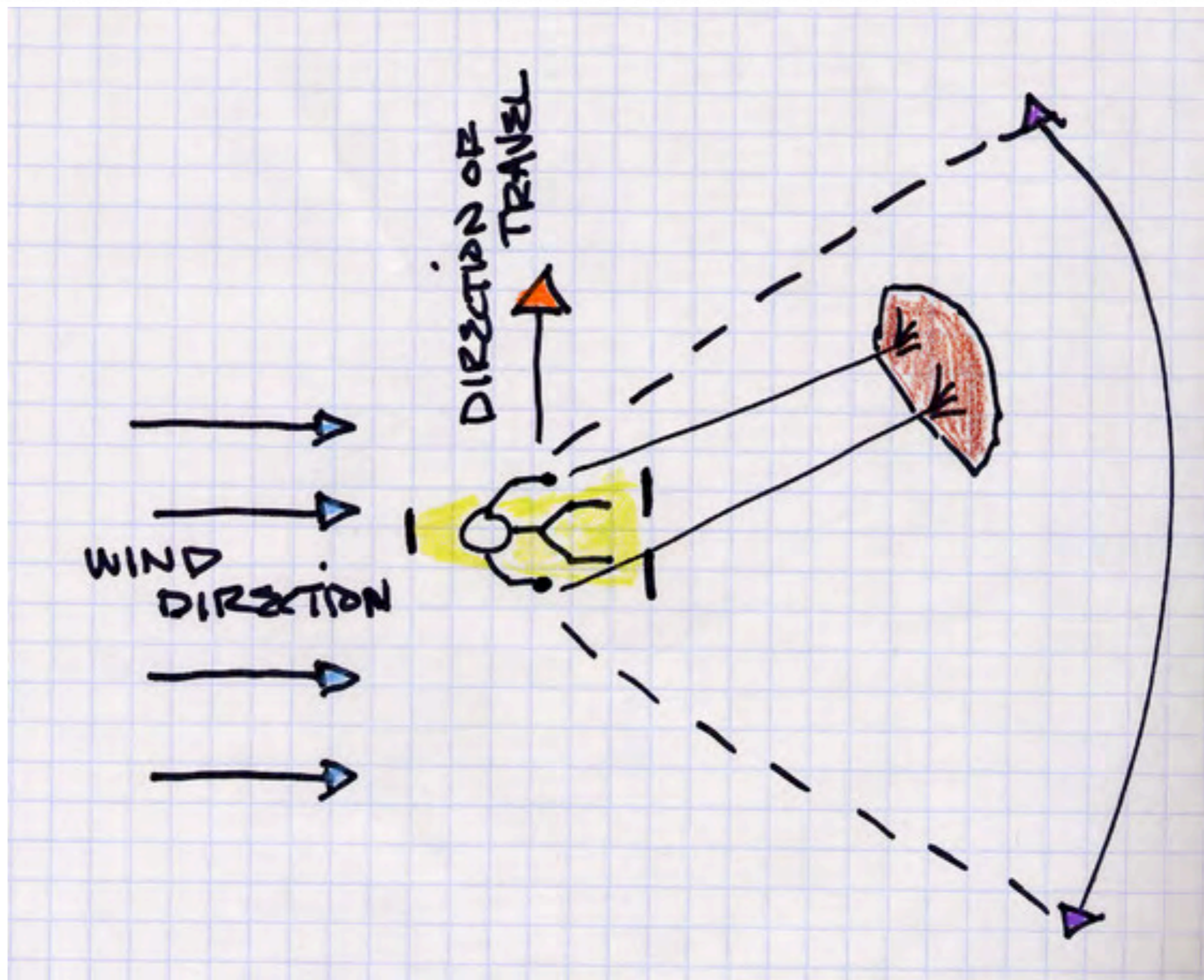
# The Story of Instructables

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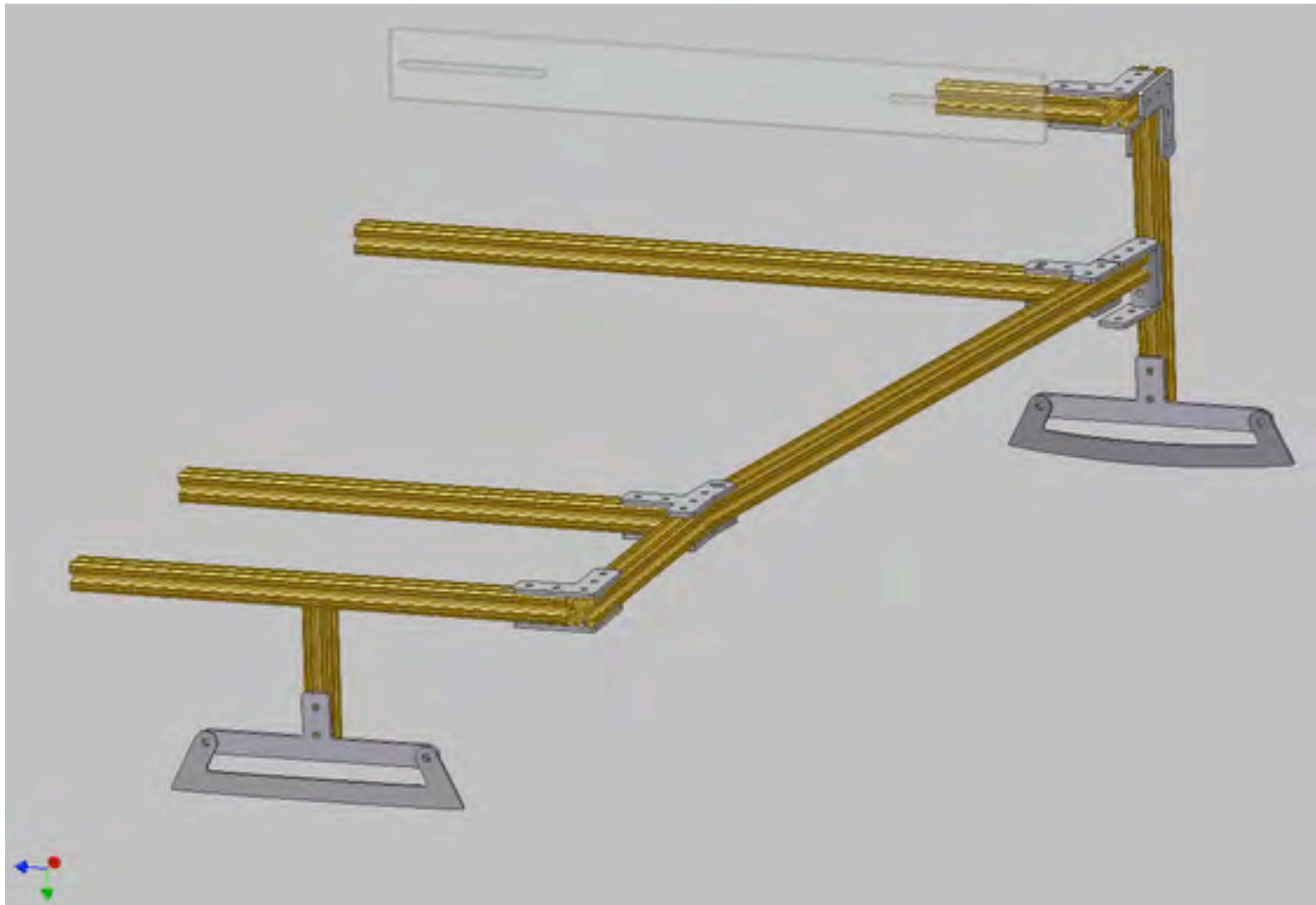


# The Story of Instructables





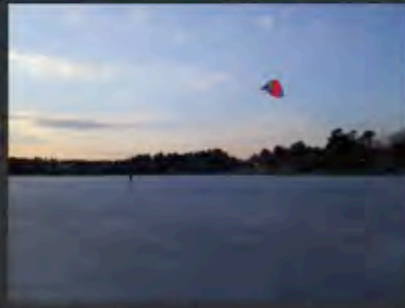
# The Story of Instructables



# The Story of Instructables

## Traditional Polynesia Ice Canoe (Ice Proa)

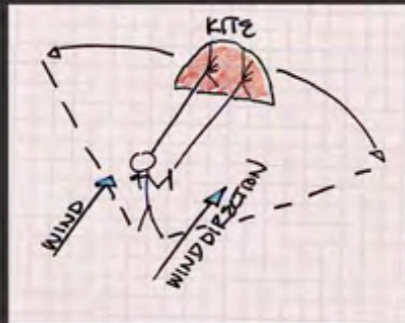
To invent, you need a good imagination and a pile of junk.  
-Thomas Edison



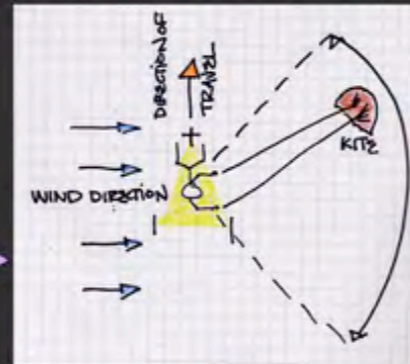
Once it's too cold to kitesurf in the water, it's time to find a frozen lake and kite on top of the water.



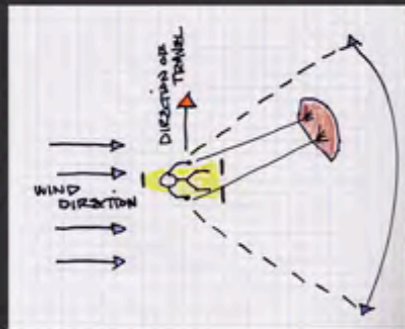
Initially, I cut some ice skates out of steel, sharpened them on a belt sander, and bolted them onto Saul's old sand buggy. This ice buggy moved fast, but I felt like I was always being pulled out of the seat by the kite.



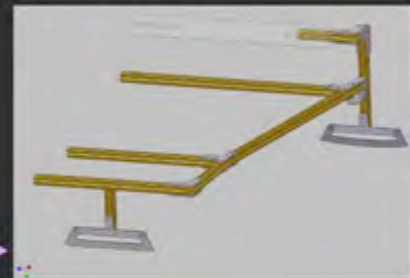
All kites fly and generate force within some quarter sphere defined by the kite itself, the pilot, and the conditions. The homemade 9 m<sup>2</sup> nasawing shown above Cuaboag pond flies in an angle a bit greater than 135 degrees, while some very efficient foils can push that angle much further.



To get going on the ice buggy you edge against the pull of the kite and use only the component of force that points in the direction you want to go. Rarely do you want to be pointed directly at the kite, so the pull of the kite is almost always to the side. Since your feet are used to steer, there isn't much to hold you in the buggy.

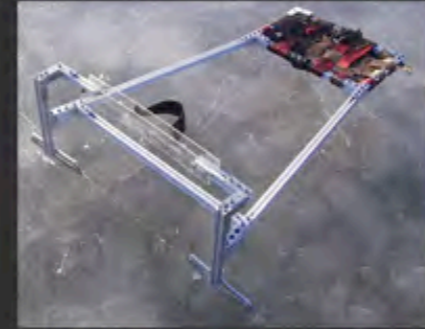


After a full day of ice kiting left me with a sore back and bruised hips (especially after a couple of crashes where I was actually pulled completely out of the ice buggy) it seemed clear I needed a proa type vehicle - something which has a constant windward and leeward side. I wanted to sit with the wind to my back and use my feet to steer and to hold my position in the vehicle.



With a bit of CAD, some leftover 8020 structural aluminum, a few jet machined connectors and blades ...

The front is symmetric so I only put the right side into CAD.



... I made a "traditional" Polynesian ice canoe. Or at least I'm sure if the water ever froze in polynesia this is what their ice kite/sail craft would look like.

The plastic beam on the leeward side is a fixture that turns the two skates. Push out in the center at the footstrap to go upwind, pull in to go downwind.



Here I explain the difference between the ice buggy and ice proa as part of a quick tour through MITERS (where I build most of my kites and toys).

Don't miss this!

- More ice kiting pictures:
- [Ice Kiting - 1st MITERS video](#)
  - [Ice Kiting - 2nd MITERS video](#)
  - [Ice Kiting - 3rd MITERS video](#)
  - [Ice Kiting - 4th MITERS video](#)
  - [Ice Kiting - 5th MITERS video](#)
  - [Ice Kiting - 6th MITERS video](#)
  - [Ice Kiting - 7th MITERS video](#)
  - [Ice Kiting - 8th MITERS video](#)
  - [Ice Kiting - 9th MITERS video](#)
  - [Ice Kiting - 10th MITERS video](#)



3 Mustkilters - Ice Proa video (plays in quicktime)

Here's video of me explaining how the ice proa works as well as zooming over Cuaboag pond - part of the "3 Mustkilters go ice kiting" video.




More pictures.






# The Story of Instructables

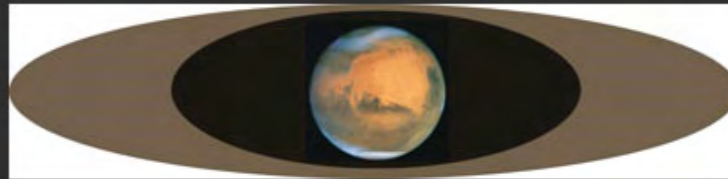


3 Mb .mov movie of me kitesurfing (and crashing) at Pleasure Bay, South Boston. (plays in quicktime)



1.6 Mb .mov movie of me kitesurfing at Nahant.

Unsatisfied with commercial kitesurfing boards, I decided to make my own.



[Red planet CAD file \(corel draw file\)](#)

After drawing the shape and graphic for my board, I cut the rough shape out of half inch plywood. I chose an ellipse because I found that the corners on some of the more rectangular boards caught the waves when I rode in surf and tended to trip me. With my aqua colored wet suit and full surfing helmet, people on the beach always ask me where I left my space ship, so I figured I'd put a picture of Mars on my board so they'd know what kind of creature was asking to be taken to their leader.



I sanded the board, applied a coat of stain, and drilled holes for the foot straps and leash. I then printed out the graphic on non-glossy paper with a plotter, gave the board a coat of epoxy, applied the graphic and gave it another coat of epoxy.





# The Story of Instructables

Zero Prestige

http://www.zeroprestige.org/

ZEROPRESTIGE.ORG - THE BUILD BLOG ZEROPRESTIGE.COM - THE WEBSITE

SEARCH THIS SITE:  Search

JANUARY 22, 2005 10:20 PM

Squid-Labs Howtoons.org  
kite-plans board-building tutorials / Q&A's  
www.monkeykites.com

## Inflatable UAV

I gave a 6m inflatable to a friend (Chris C) to run UAV experiments with. Here is one of the more spectacular results. It's a shame stuff working is never as photogenic as stuff breaking...

Posted by saul at **January 22, 2005 10:20 PM** | **Comments (0)**

### dynamic soaring (fast as shit)

[http://www.charlesriverrc.org/articles/flying/markdrela\\_ds.htm](http://www.charlesriverrc.org/articles/flying/markdrela_ds.htm)  
great article on dynamic soaring.  
the video: 206mph!

<http://www.reeseproductions.com/mpegs/D5webclips/D5record206mph2.html>  
this is way cool. by exploiting the wind speed gradient at the side of a hill, and by oscillating through high and low wind speed areas able to ratchet up the speed of radio controlled gliders to over 200 mph!! holy cow!

interestingly for a high L/D kite this could mean kite-loops in the boundary layer if kept spinning could see the kite accelerate up to it's drag limit. wouldn't want to be on the end of it, but again, interesting to think about. might be a way to go after the speed sailing record if the wind bluff of a 40' wave would produce a sufficient gradient.... but that's just a crazy idea.

some pics.  
<http://www.radiocarbonart.com/Pages/dsfestgallery.html>  
Posted by saul at **January 18, 2005 11:04 PM** | **Comments (0)**

### 17m V 2.0

Hello Everyone!  
I recently finished making the unbuilt 17m V 2.0. I decided I would try something different with my first kite, which may not have been wise, but worth the try. There have been a few commercial kites with sticks as battens instead of inflatable ribs, due to lack of funds I decided I'd try this. Also the whole kite was made of chikara, very very light weight it worked but it would not have lasted.

Go to <http://web.media.mit.edu/~saul/zeroprestige/index.htm>

## WHAT AND WHY IS ZEROPRESTIGE.ORG?

www.zeroprestige.org is a weblog devoted to the design iteration of kitesurfing and kitepowered sports. Principally we are interested in furthering the sport by enabling an 'open source' (shared knowledge and documentation) approach to kite-building and to the building of bars, boards, ice and snow equipment, and things kite-powered in general. You are encouraged to add comments and knowledge to any of the postings. If you would like to be able to add content directly such as kite photos and surfplan files, email me and I will give you an account on this blog. The files on this site are only available for hobby/homebuilt use. Any commercial use is not allowed.

## ARCHIVES

!! SAFETY !!  
bars and lines  
bladder  
boards  
built, flying kites.  
innertube craft projects for maniacs  
kites  
other  
plans  
tutorials

## VIDEOS WORTH SEEING

The Stoopid Thing small large  
Ice-Kite-Buttboarding small big 11.2 flight in Sydney  
Ice-Kite-Buttboarding - The original on the water at W.Dennis

## LINKS

Add to blog  
Blog Use Statistics

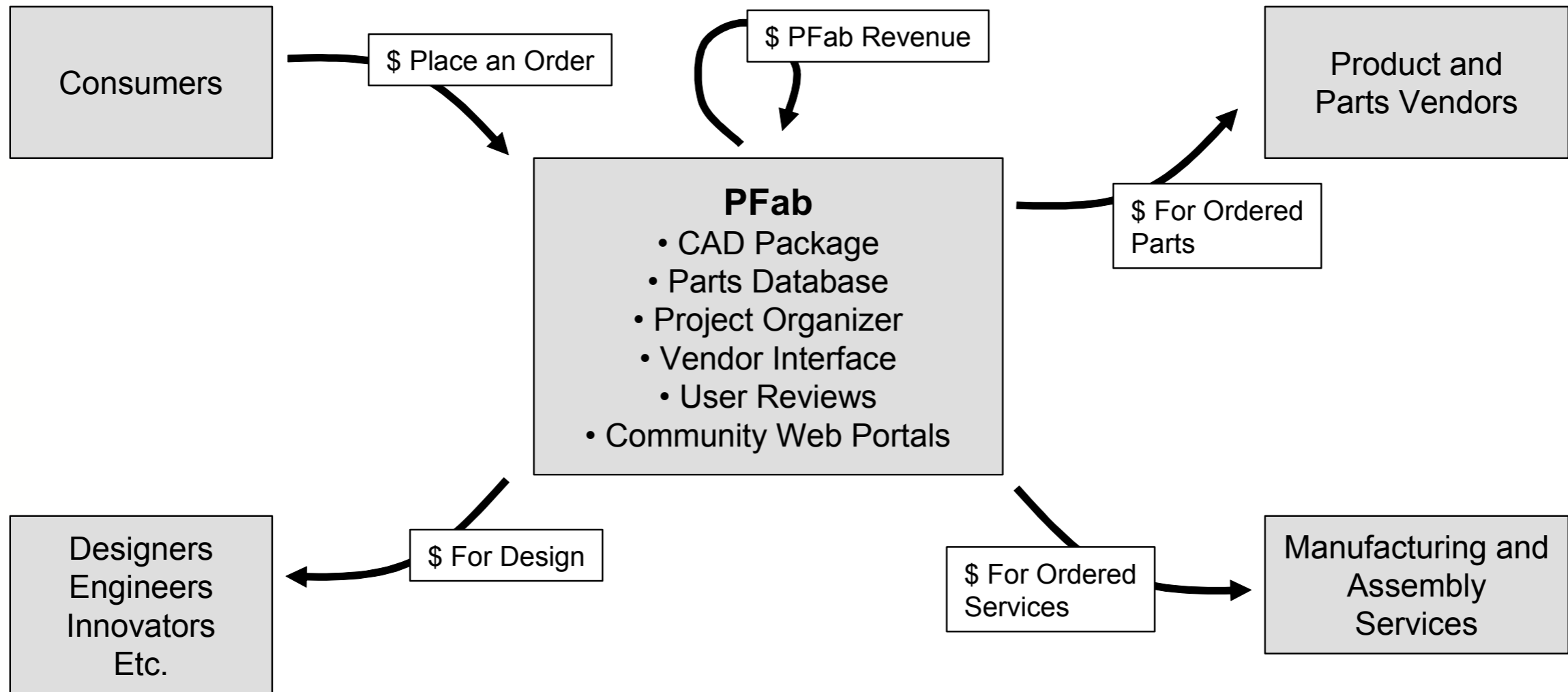


Zero Prestige.org – Open-source approach to kite and kite-powered vehicle design; more than 400 kites built from plans.



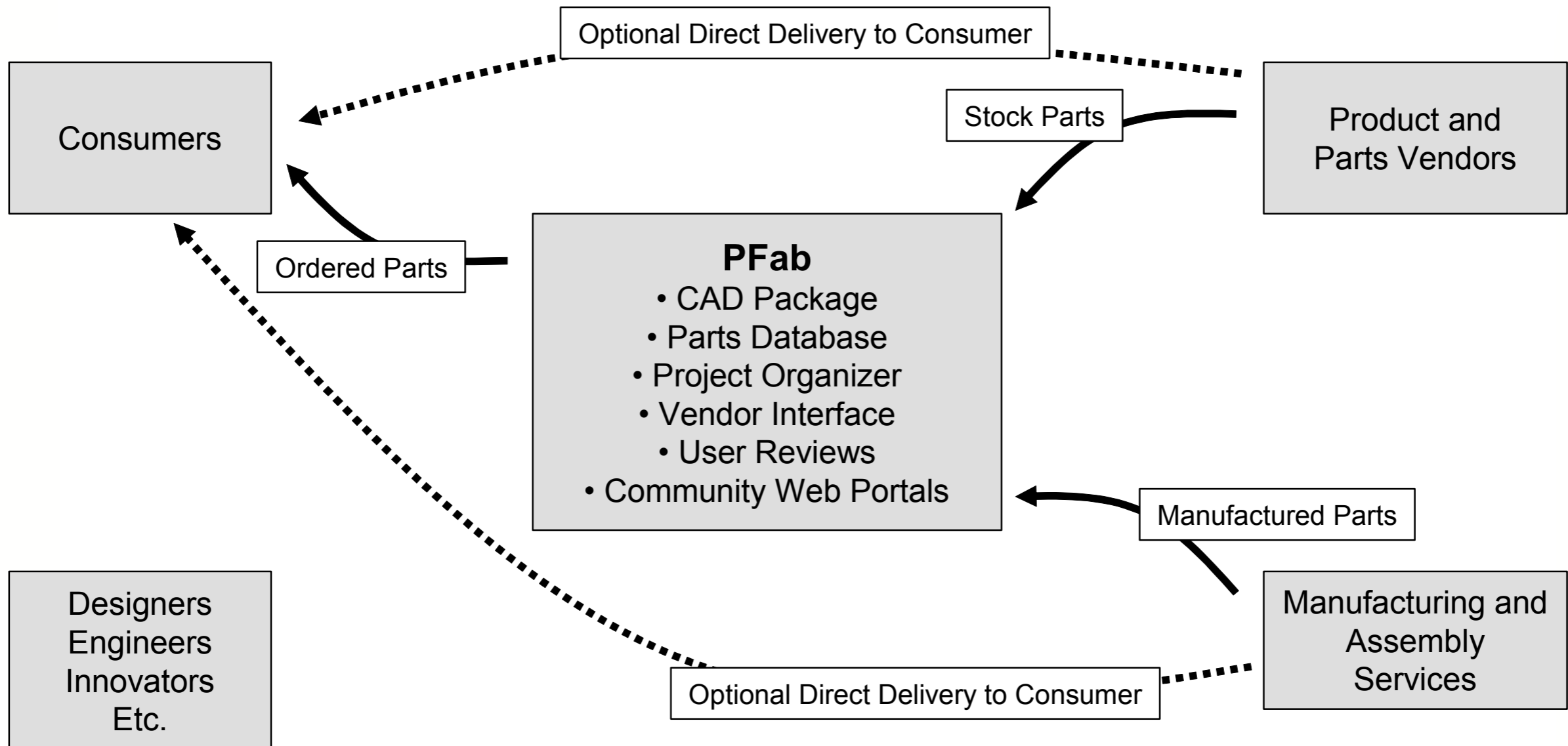
# Big Ideas about Open-Source Hardware

## Movement of Money



# Big Ideas about Open-Source Hardware

## Movement of Physical Goods





# Big Ideas about Open-Source Hardware

## Make your own kiteboard

Eric J. Wilhelm



Cut and sand 3 of 6

**Operations:** ▶  
[Table sawing](#)  
[Tim Anderson's kiteboard edge rounding](#)  
[Pad sanding](#)  
[Belt sanding](#)

**Tools:** ▶  
[Table saw](#)  
[Belt sander](#)  
[Pad sander](#)

**Description:** ▶  
 After marking the shape I wanted, I cut it out on a table saw and cleaned up the edges with a belt sander. Next, I rounded the edges with a belt sander using Tim's method. I wanted a sharp edge on the bottom, wet surface, but a rounded edge on the top to reduce the area where the poly could get banged up and let water through.

I sanded the whole surface smooth: 100 grit with a belt followed by 220 on an random orbit pad sander.

◀ prior step    next step ▶    ◀ prior view    next view ▶

Related to this how to

**Operations:** ▶  
[Band sawing](#)  
[Saul Griffith's router kiteboard edge rounding](#)  
[Hand sanding](#)

**Tools:** ▶  
[Band saw](#)  
[Mitre saw](#)  
[Router](#)

**Comments:** ▶ [showing only friends and experts [more](#)]  
[Same board for 3 years!](#) [Saul]  
[I only like commercial boards](#) [Dang]  
[Make sure to use Baltic birch](#) [TimA]

Kiteboard edge rounding  
 Tim Anderson [friend]

Sand 2 of 4

**Operations:** ▲  
**Tools:** ▲  
**Description:** ▶  
 Once the board is clamped down, round the board with 100 grit paper using a belt sander. Use a rolling motion and move fast. If you don't move

◀ prior step    next step ▶    make full screen (with thumbnails)  
[same window](#) [new window](#)  
[show related information for this project](#)

# Open-Source Hardware Documentation

instructables



instructables : Traditional Polynesian Ice Canoe (Ice Proa)

http://www.instructables.com/id/EPKZ5O80HQEQZJI20F/

Welcome, ewilhelm | help | logout

## Traditional Polynesian Ice Canoe (Ice Proa)

Added Aug 18, 2006 by ewilhelm


edit instructable

VIEW ALL STEPS ON ONE PAGE

Intro 1 2 3 4 5 6 7 8 9 10 11 12

### intro Traditional Polynesian Ice Canoe (Ice Proa)

Once it's too cold to kitesurf in the water, it's time to find a frozen lake and kite on top of the water. Build a "traditional" Polynesian ice canoe using aluminum extrusion or whatever material you have at hand. If the water ever froze in Polynesia, I'm sure this is what their ice kite/sail craft would look like.



ice\_proa.zip 4 MB

+ PRINT + LICENSE [ FLAG ] next »

comments sort by: active | newest | oldest viewing all of 7

**xrobevansx** says:  
When I think "polynesia" I think Hawaii, Fiji, Tahiti, etc...where is there ice in these parts of the world?  
[REPLY] [flag] [delete]

**Myself** says:  
Am I the only one who thought "Dugout canoe made from a solid block of ice!" after reading the title?  
Don't get me wrong, iceboats are awesome (living on the great lakes, I've seen my share), but an actual ice hull would be even awesome. (It's a word, just for today, because I said so.)  
[REPLY] [flag] [delete]

**aerohydro** says:  
Thats the second best thing I've seen all day. One with wheels would be awesome.  
[REPLY] [flag] [delete]

**radiorental** says:  
with wheels: <http://www.instructables.com/id/E30DQ1JZG7EP286R5K/>  
inspired by the butt board  
[REPLY] [flag] [delete]

Done

Adblock

### Halloween Contest!

#### Author Stats

We are currently re-engineering our stats, they'll be back soon.

#### They Like It

- joedog86
- moon161
- canida
- Mercat
- eevonk

#### They Also Like

- Cozy Boat
- Secret Image Shadow...
- Daguerreotype Photo...
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#### Keywords

- kiteboarding
- wind
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**Windsurf Kitesurf Lessons**  
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
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# Open-Source Hardware Documentation

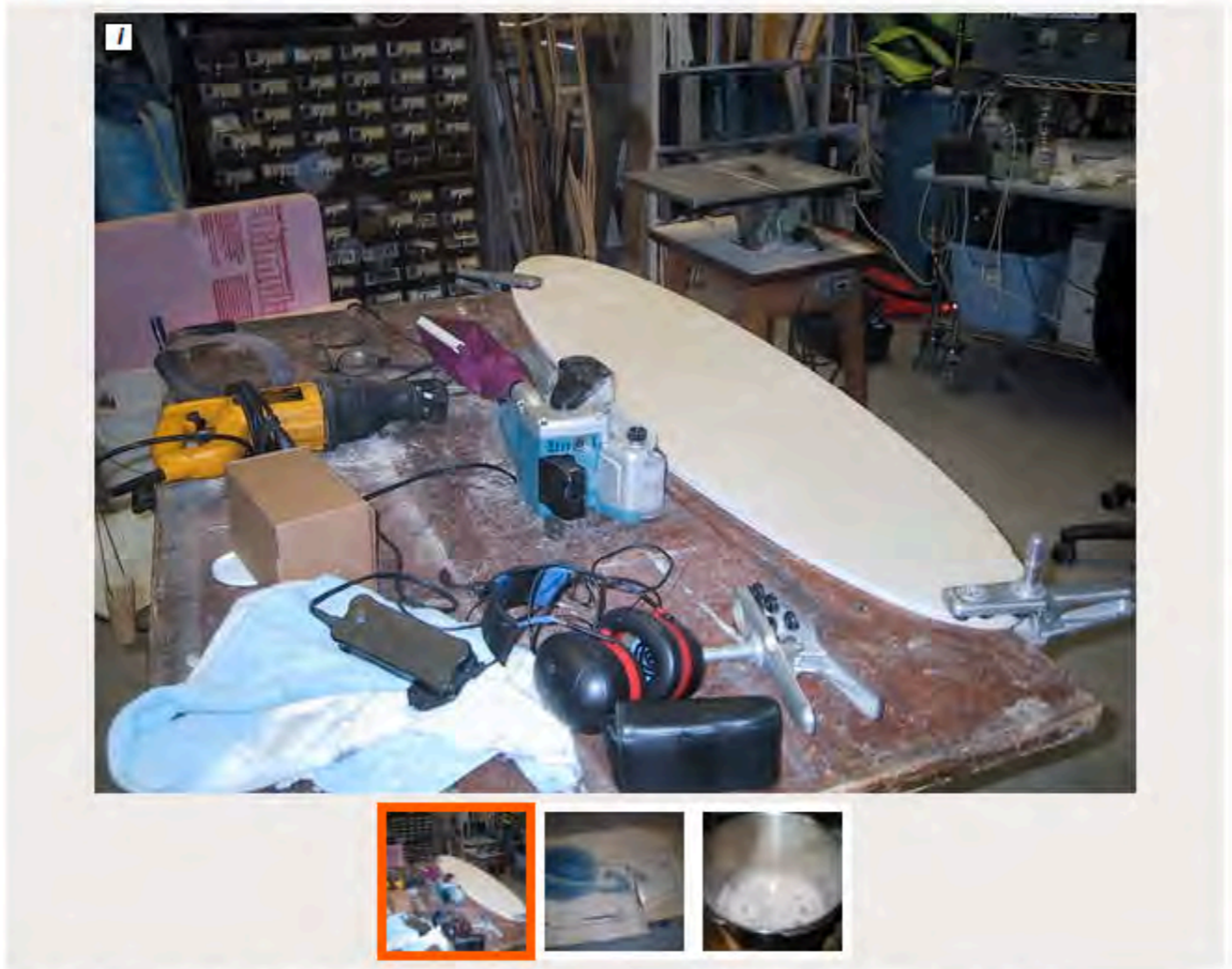
## Plywood kiteboard



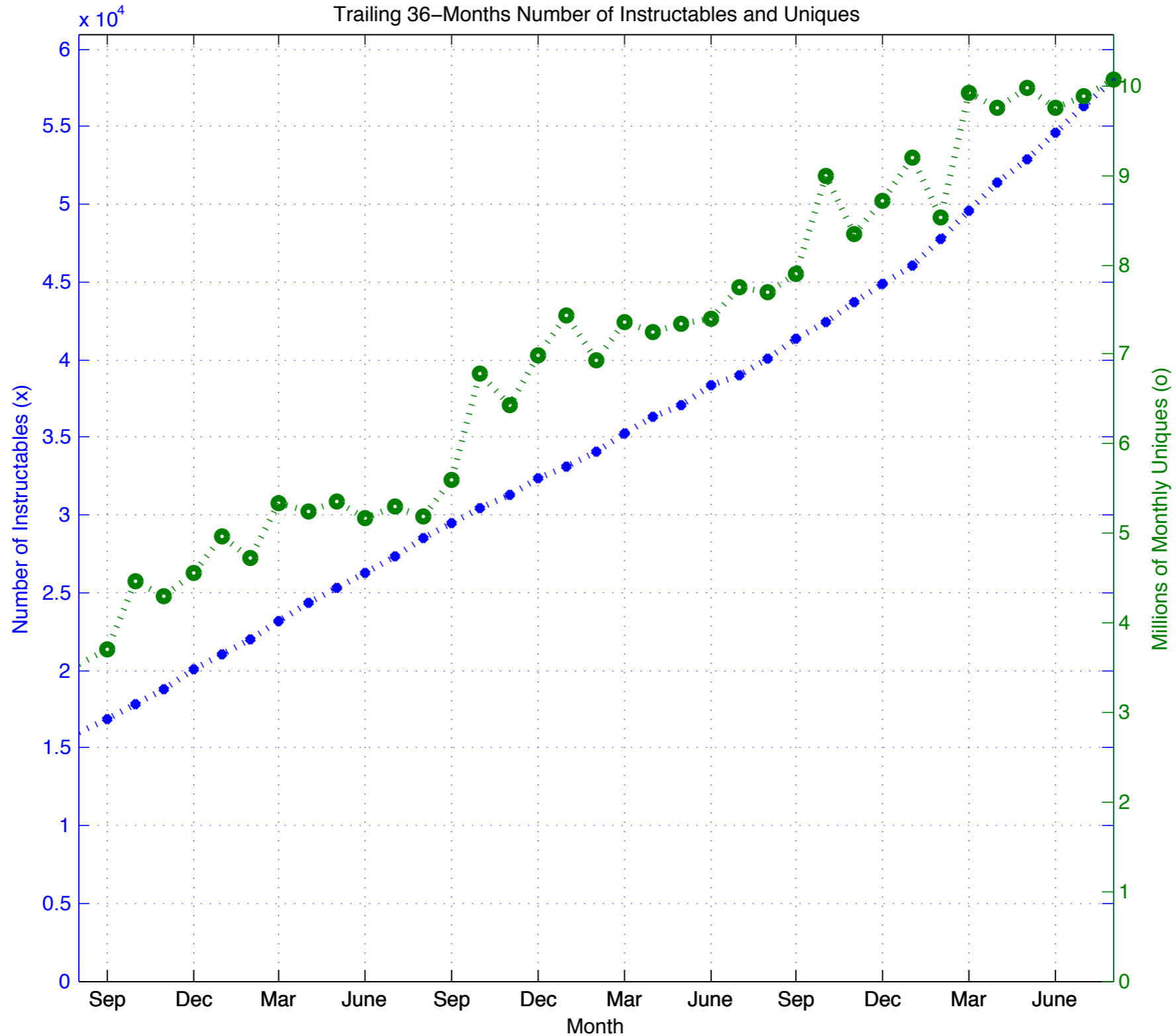
**571** Followers  **132** Likes 

**Author: ewilhelm**  
Eric J. Wilhelm is the founder of Instructables. He has a Ph.D. from MIT in Mechanical Engineering. Eric believes in making technology

### Step 2 Cut board



# Open-Source Hardware Documentation







# Bring on the K'Nex





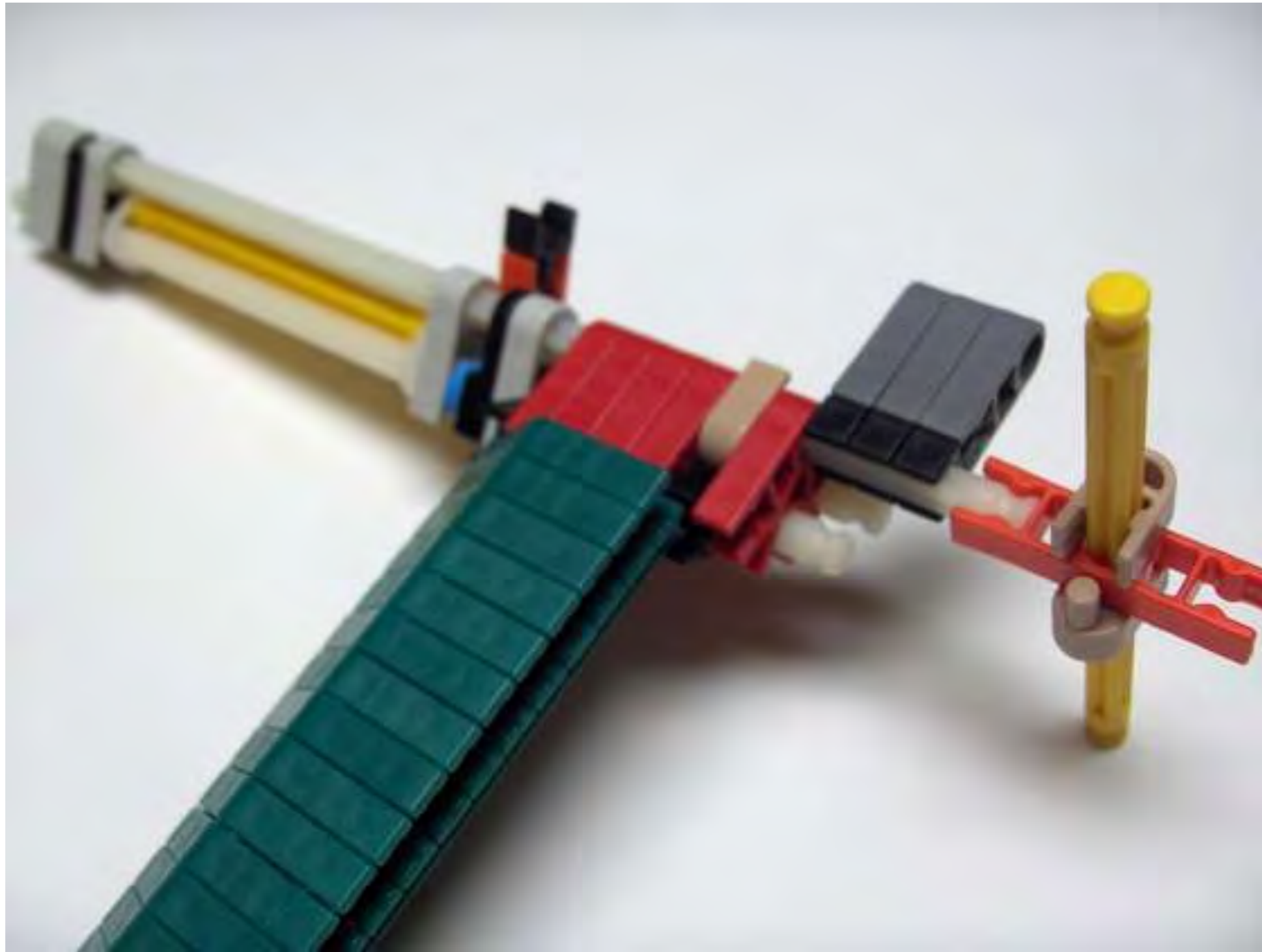
# Bring on the K'Nex



Metropolis - a K'nex Ball Machine

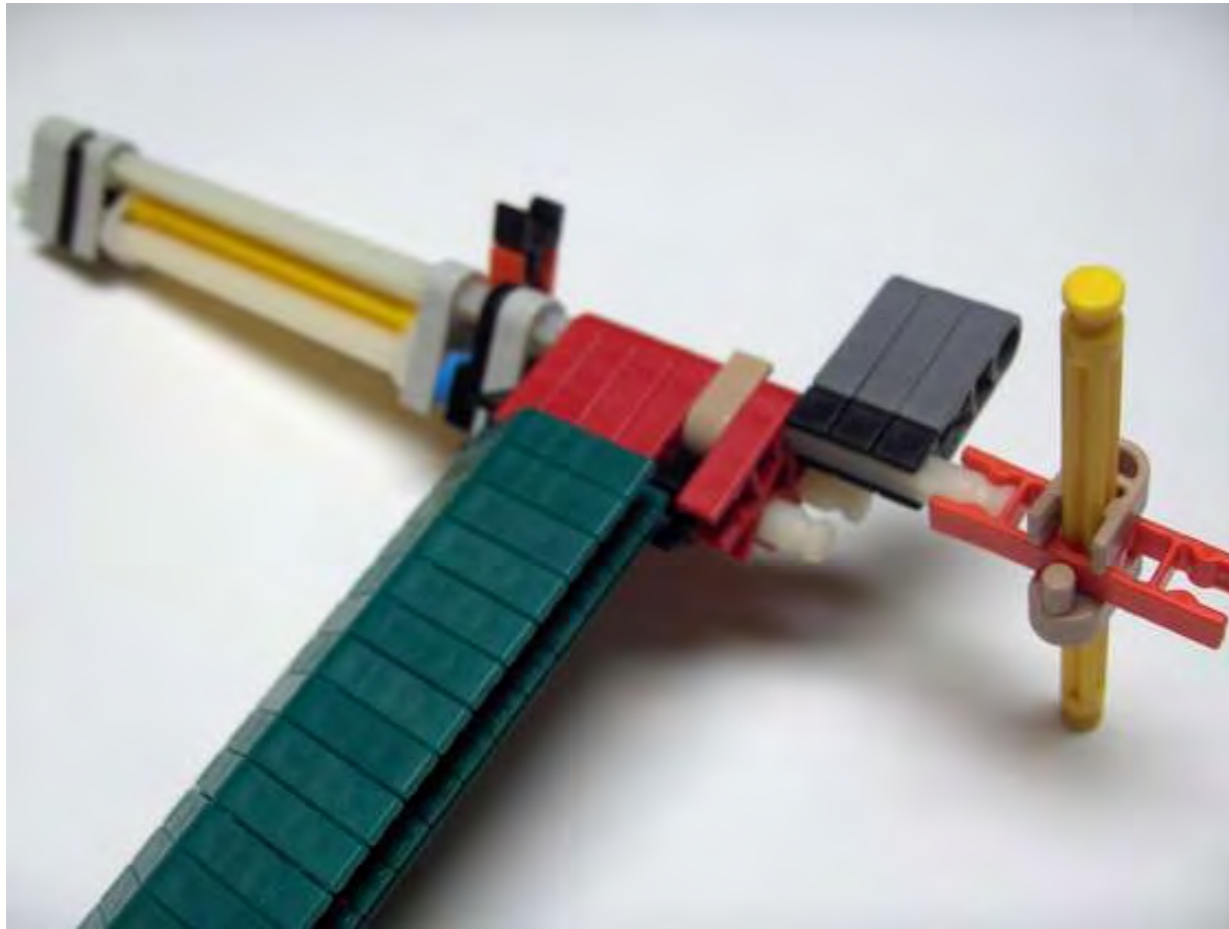


# Bring on the K'Nex Guns





# Why Guns?

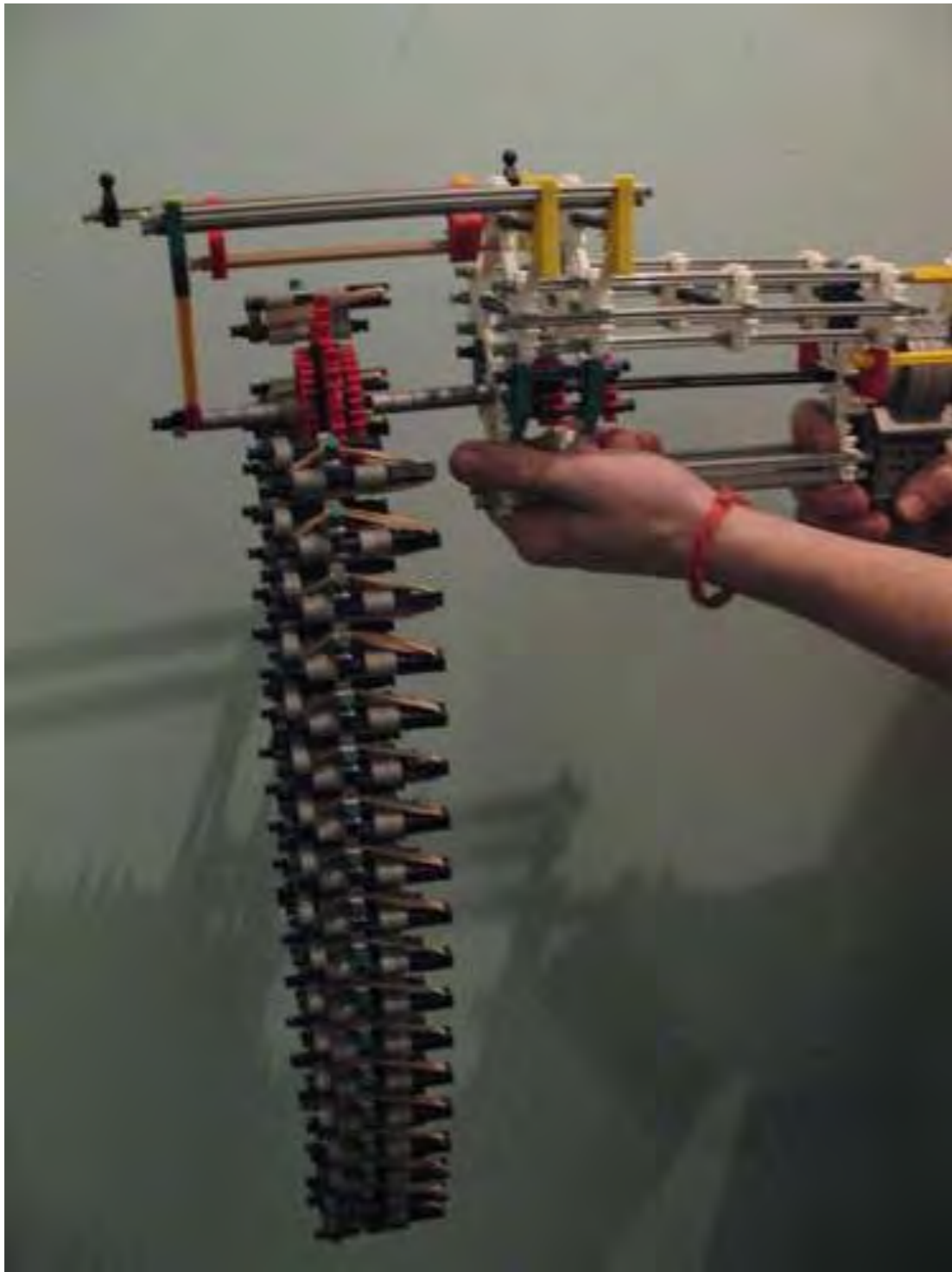


<http://www.instructables.com/id/K-NEX-GUN/>

**The motivation of an air rifle**  
**Changing the RSS feed**



# Bring on the K'Nex Guns



[http://www.instructables.com/id/Knex-Machine-Gun\\_I/](http://www.instructables.com/id/Knex-Machine-Gun_I/)



# Bring on the K'Nex Guns – K'Nex Heavy Cannon

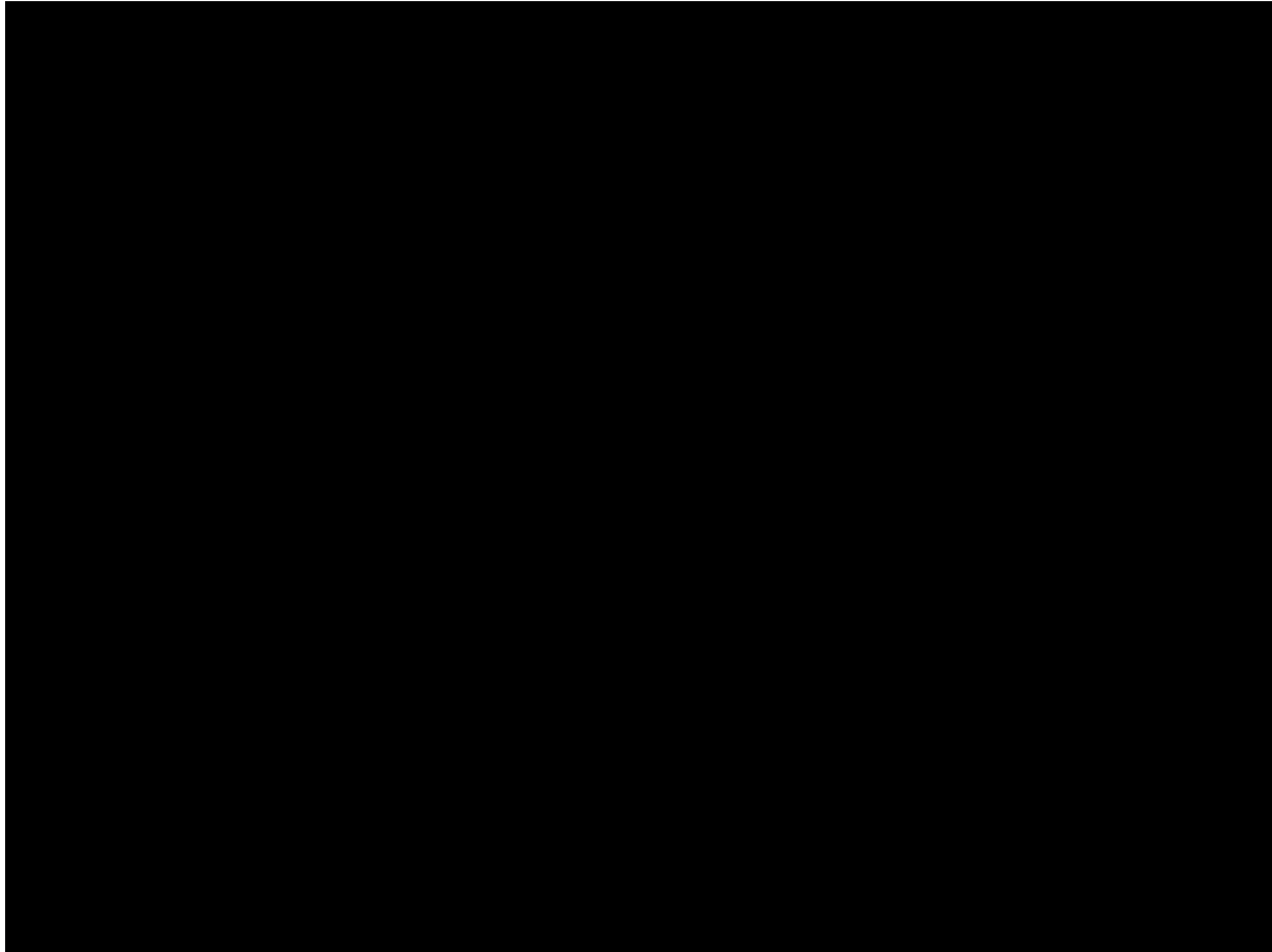


It shoots large missiles, and shoots them hard. It is powered by 48 rubber bands, tied together into 8 strings of 6. It is 2 feet wide (on the bow) and 5 feet long. A true monster.



# X985 Vivisector

---





# K'Nex CAD

## Making 3d knex models using mlcad

[edit](#)

by **toulvus** on Jan 30, 2007

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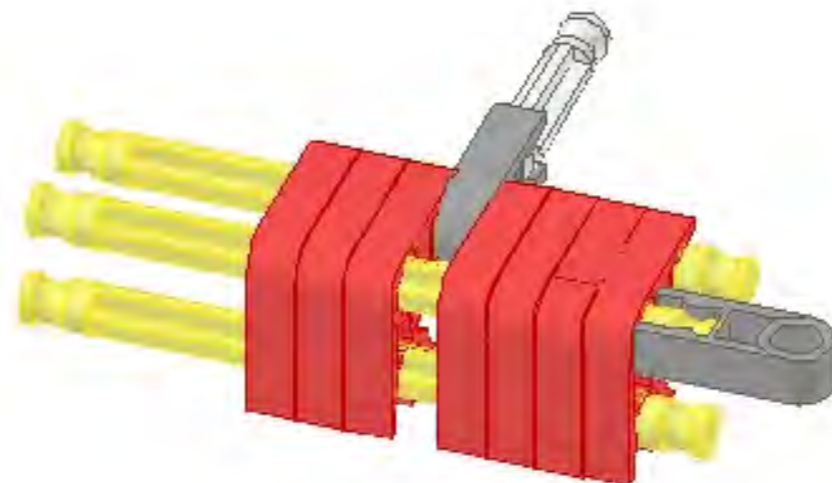
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### intro Making 3d knex models using mlcad

Here I will teach you how to make 3d knex models using mlcad.

**1**

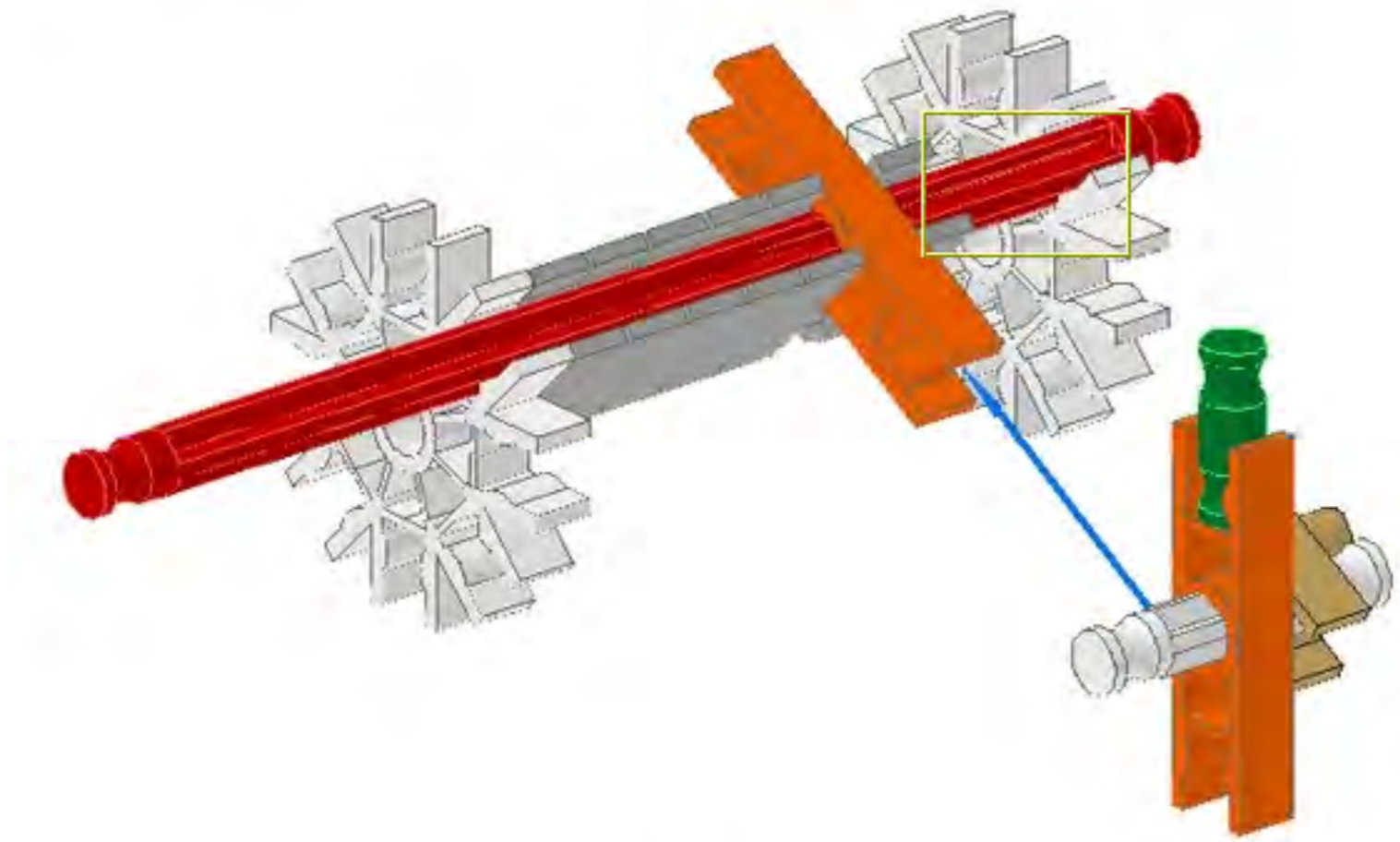






# K'Nex CAD

**step 1 construction**  
make 24 of these!!!! wow!!!



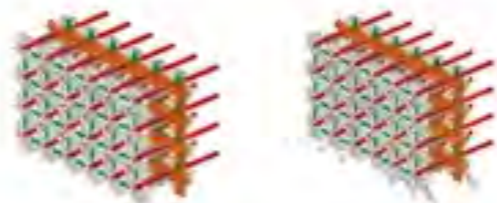
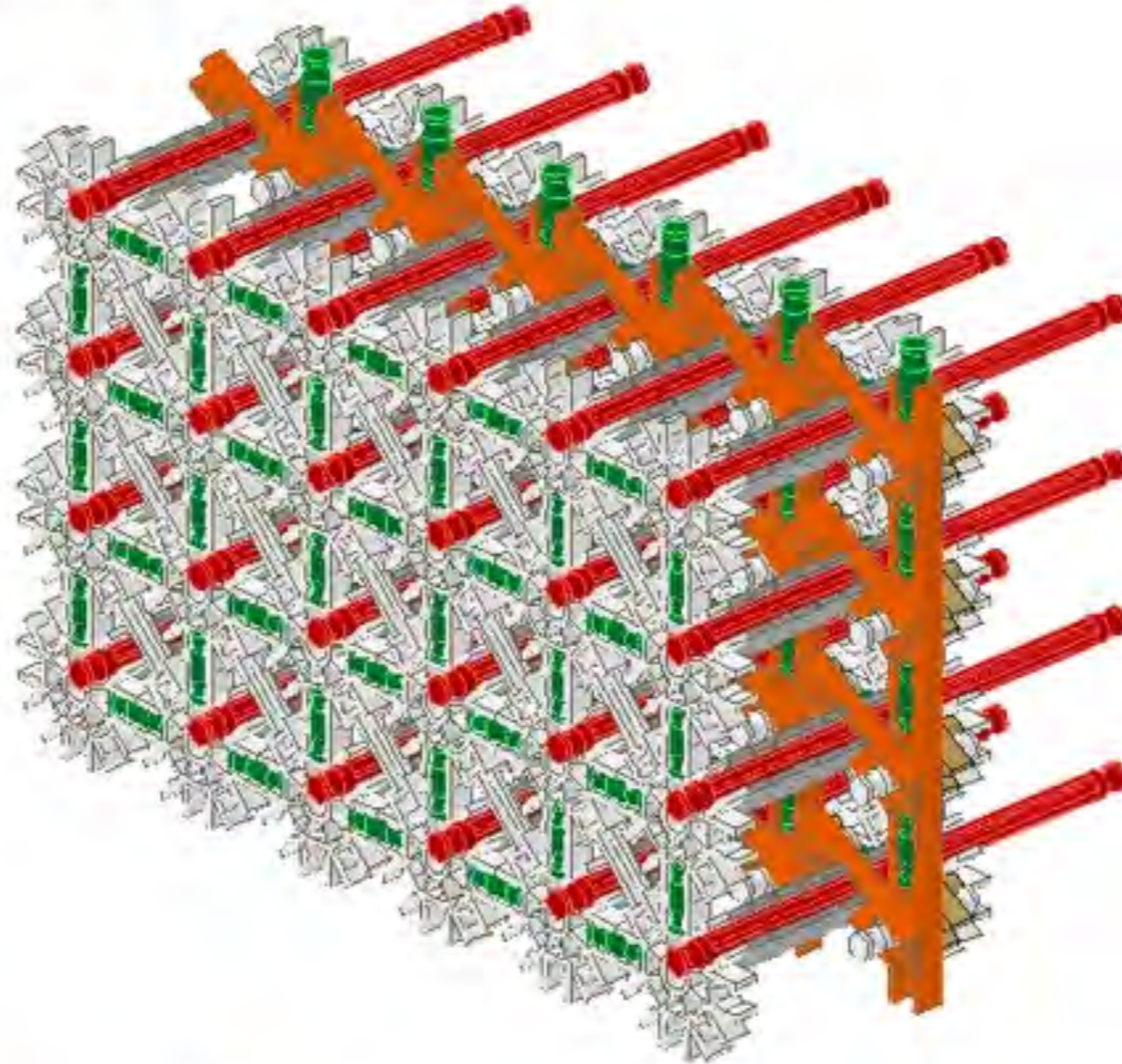
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# K'Nex CAD

instructables



**step 2 construction**  
the 24 barrels go like this



comments (0)

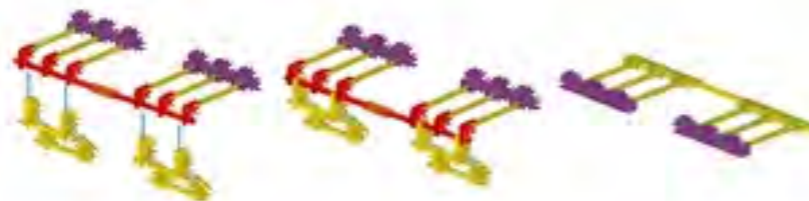
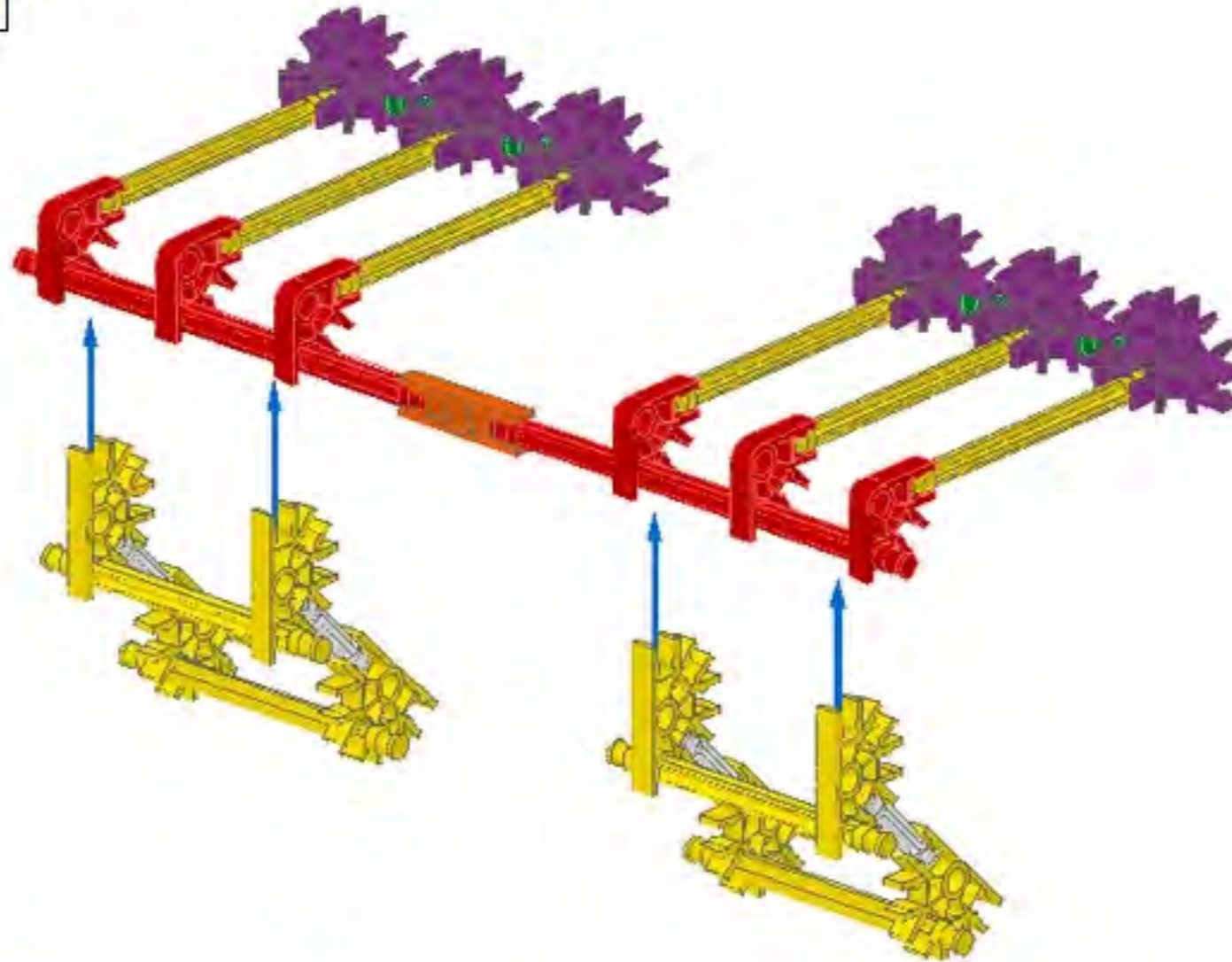
# K'Nex CAD

instructables



**step 3 construction**  
construct the legs

1



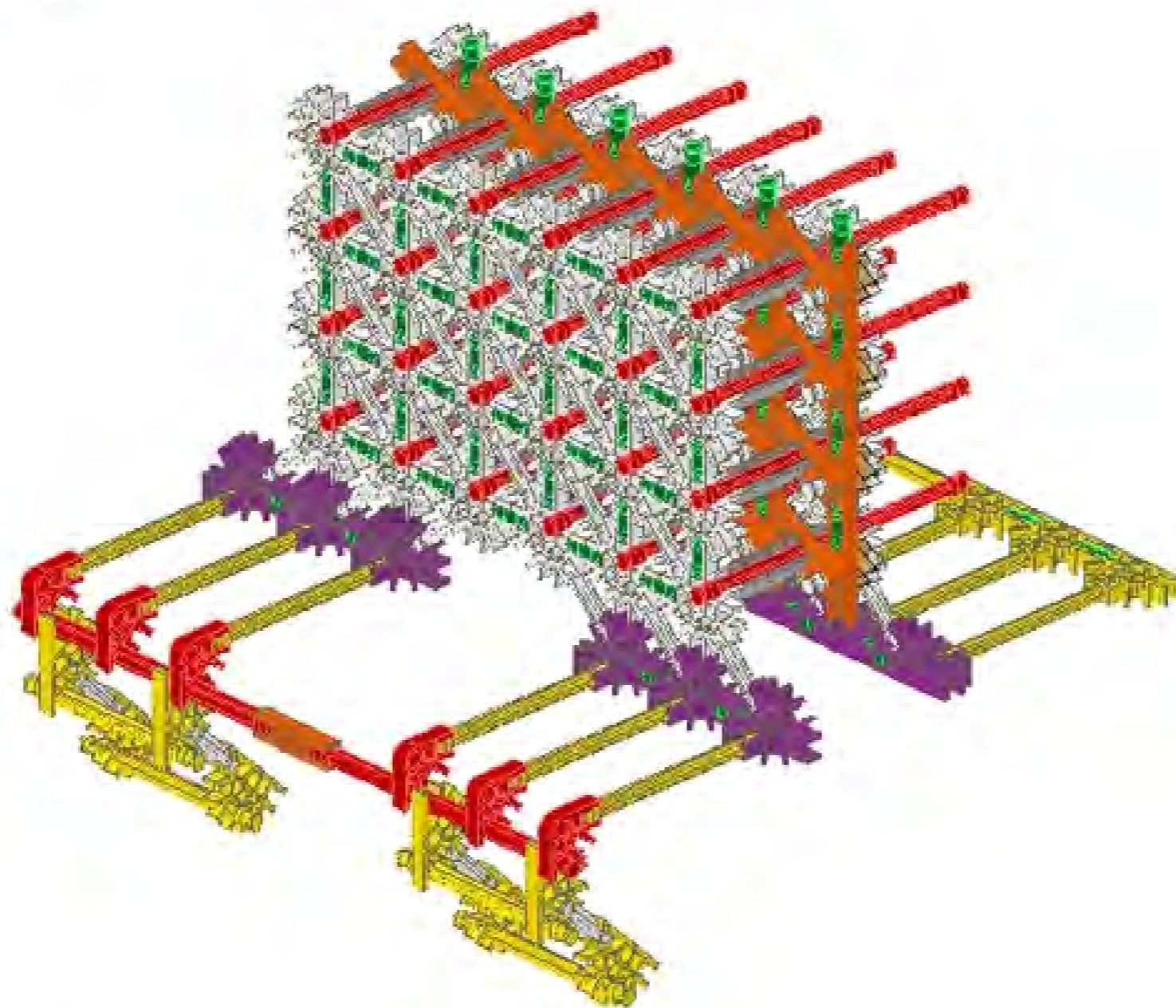
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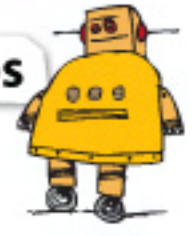
# K'Nex CAD

## step 4 construction

add the legs

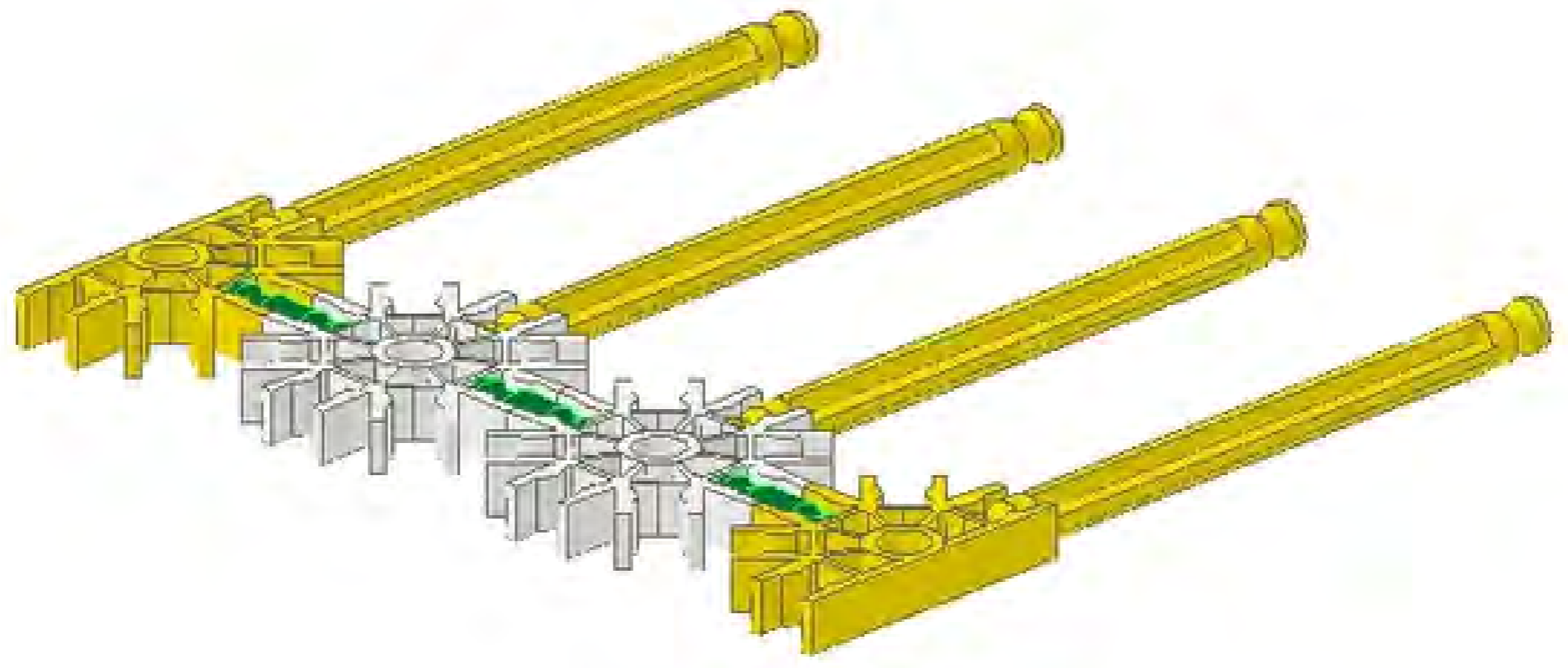


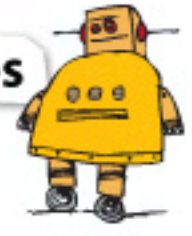
comments (0)



# K'Nex CAD

**step 5 firing pins**  
make 6 of these

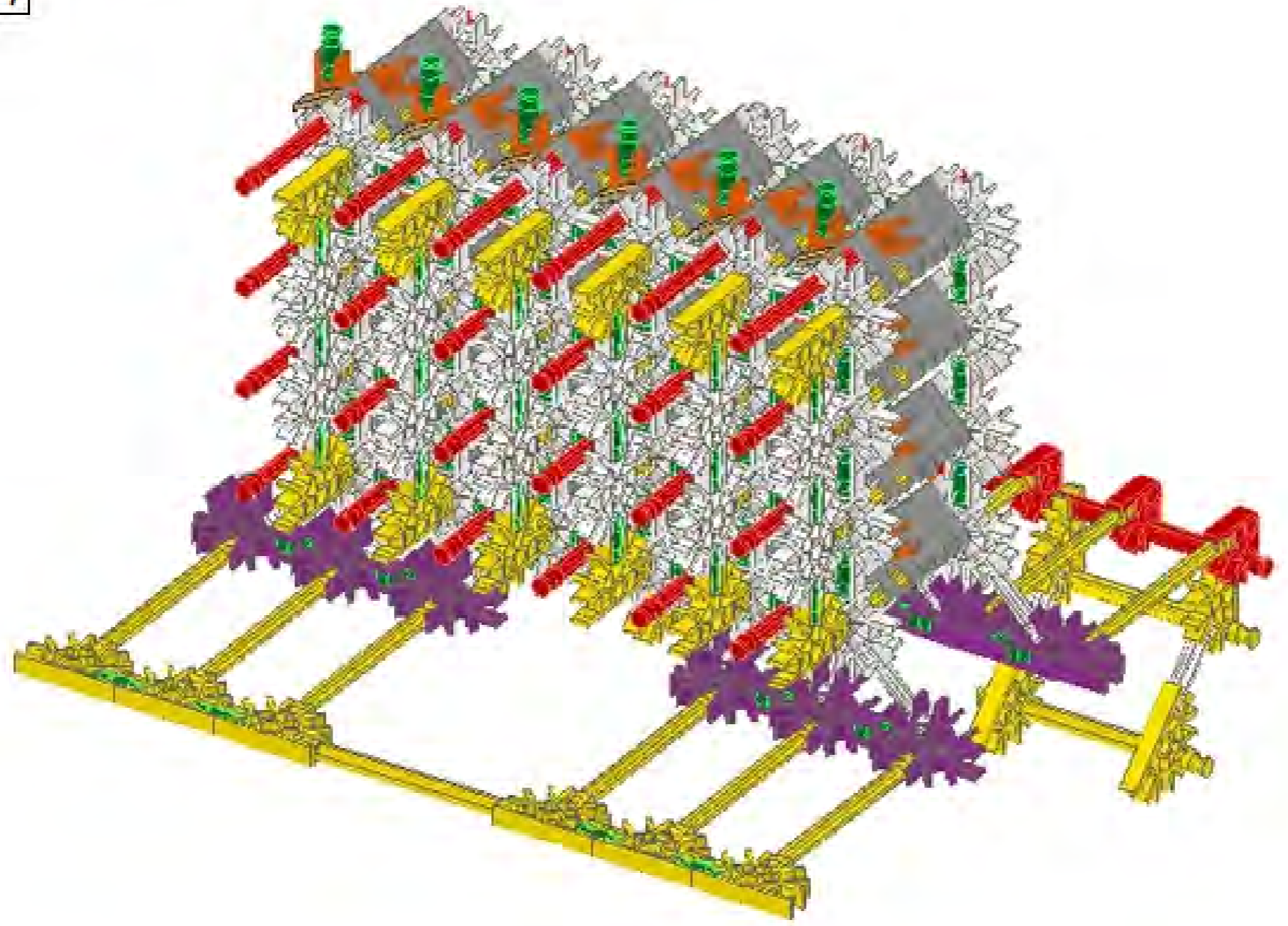




# K'Nex CAD

## step 6 construction

add the firing pins



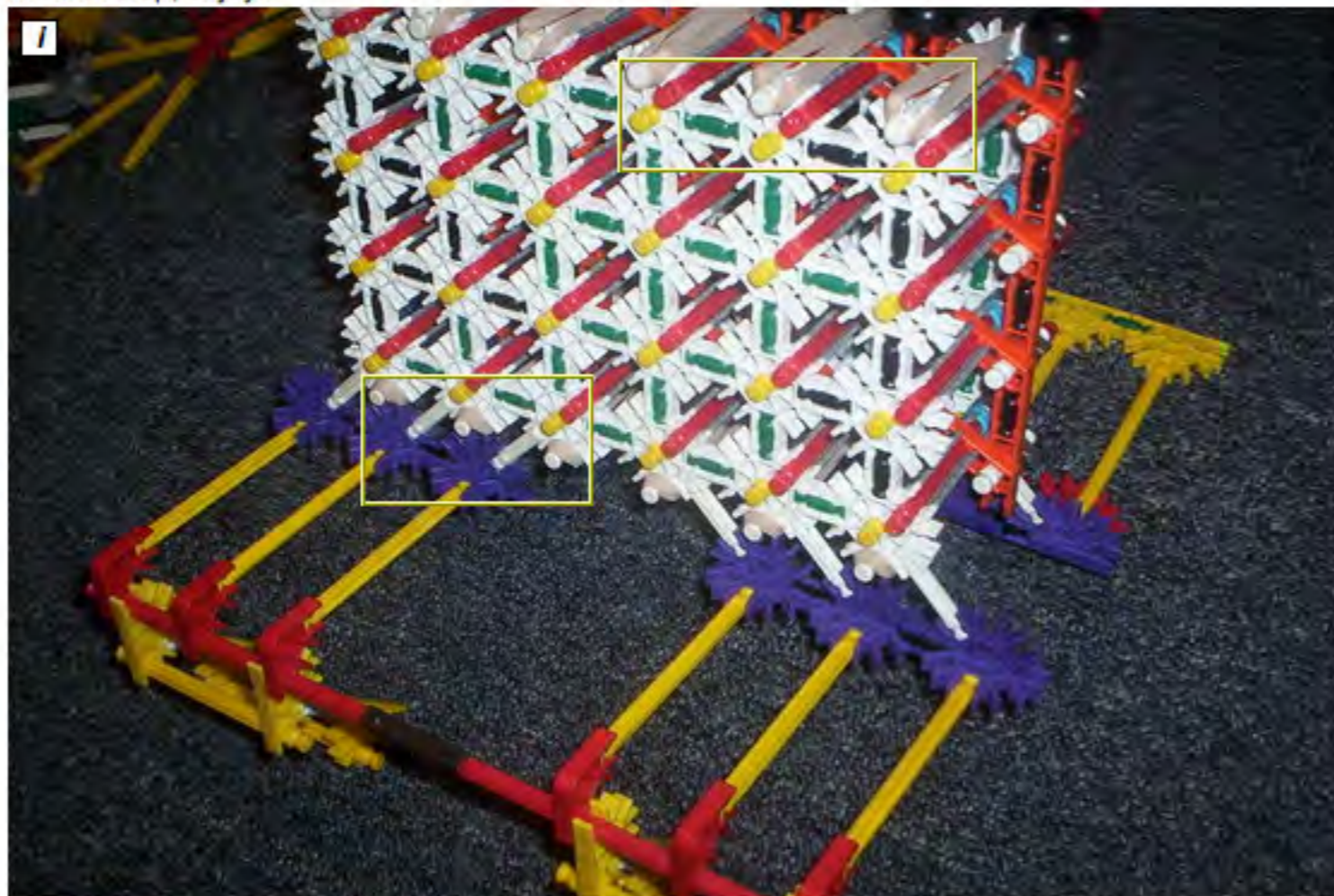
# K'Nex CAD

instructables

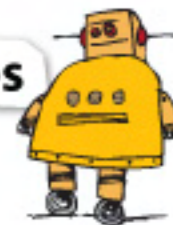


## step 7 rubber bands and extras

the final step, enjoy!!



comments (0)



# K'Nex CAD

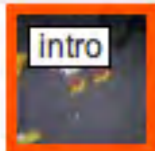
## knex tripwire (cannon?)

by mepain on Feb 1, 2007

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rate it [+](#) [-](#)

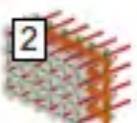
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1



2



3



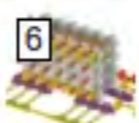
4



5



6

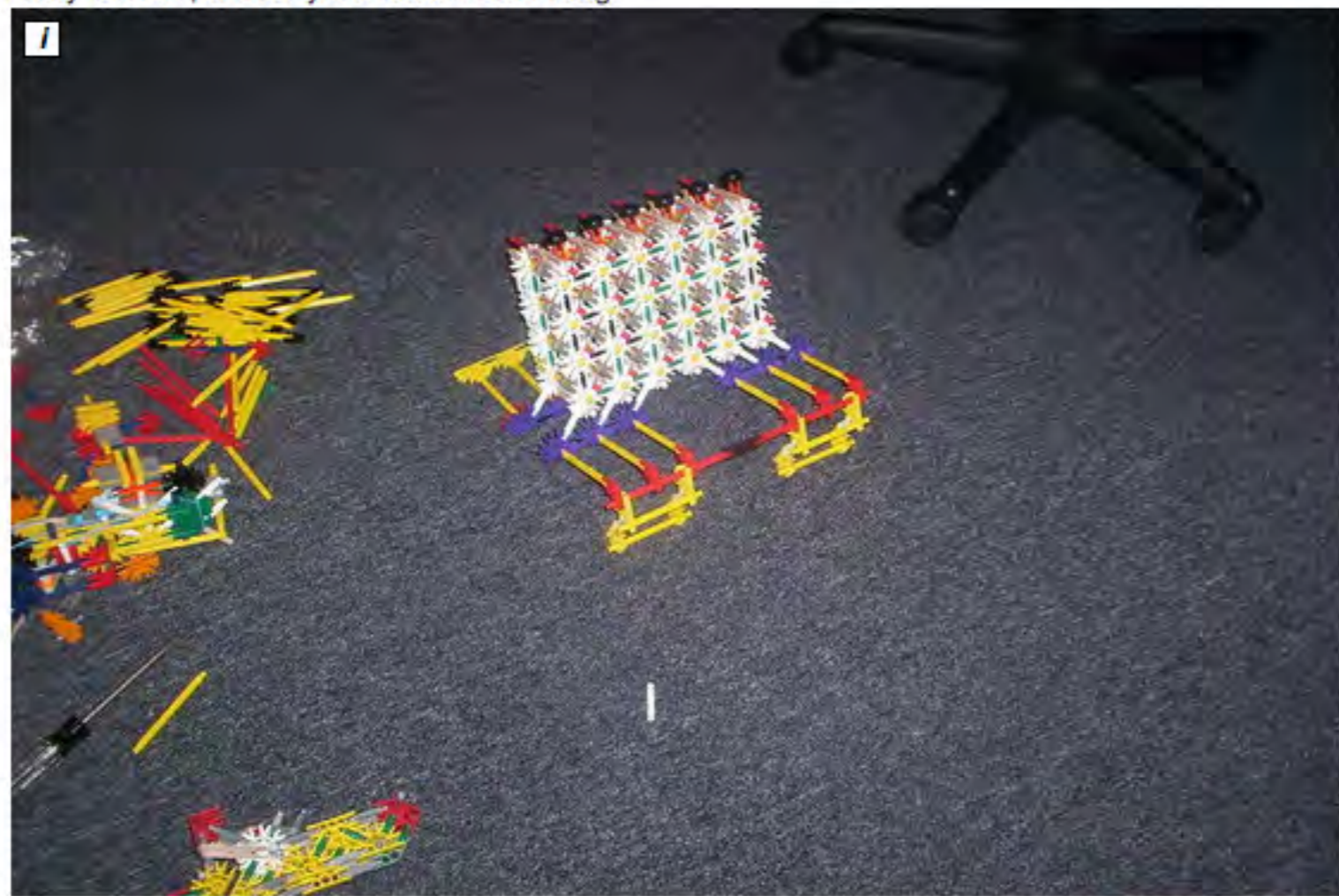


7



### intro knex tripwire (cannon?)

I sereously dont know what to call this, maybe a tripwire claymore? anyway, i dont have any kind of string attached now, but you all are really creative, im sure youll think of something!



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# Community-Sponsored Challenges

The Jamalam, DJ Radio and Lowney Present

The  
**K'NEX**  
Innovations  
Competition  
*Round 1:  
Weapons*

A collection of blue K'NEX structures, including a large gun-like weapon in the center, surrounded by various geometric shapes and patterns made from the same material.

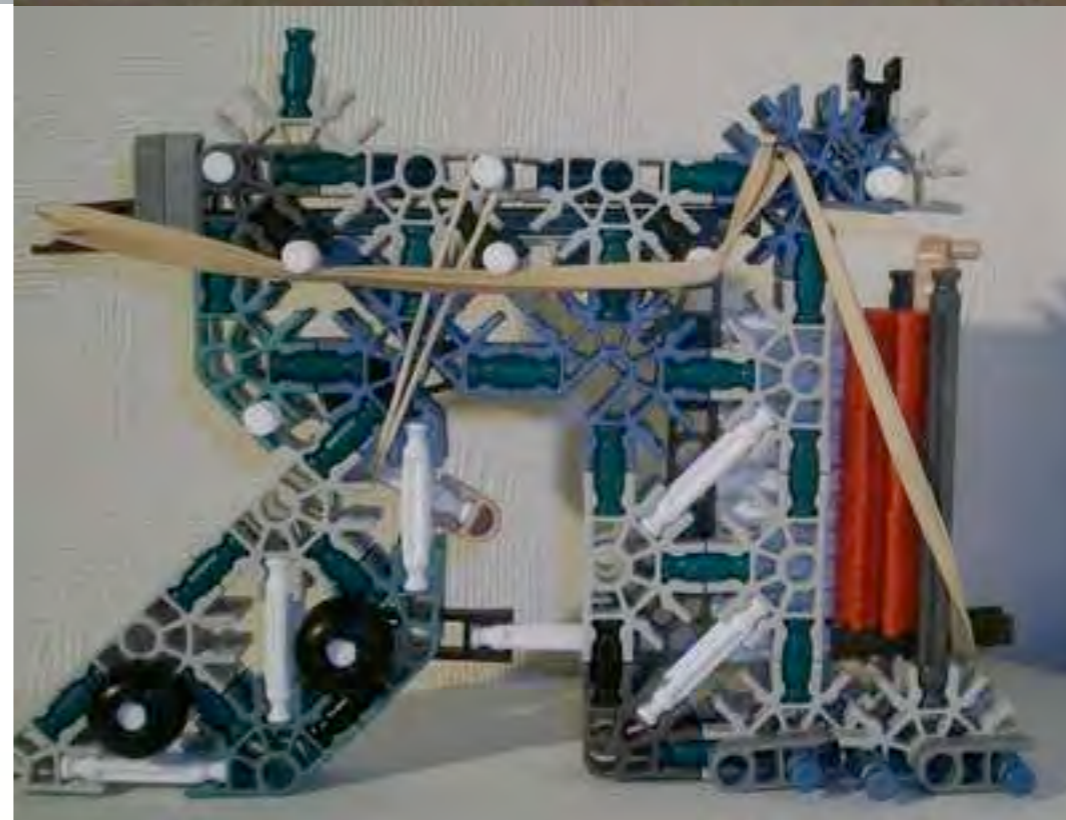
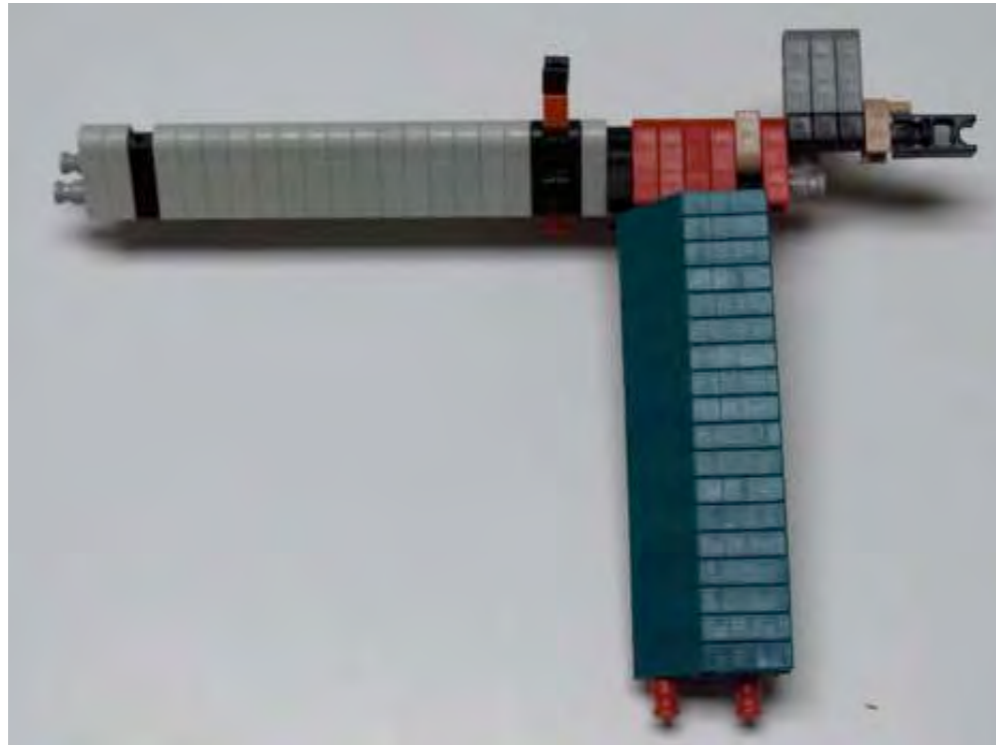
Hosted at [www.instructables.com](http://www.instructables.com)

First round begins  
**THURSDAY, SEPT. 1st**  
AND WILL CLOSE ON SEPTEMBER 30TH

Terms and conditions: entries can either be a slideshow, instructable or a video. Entries must be published between Midnight September 1st and Midnight September 30th. Entries cannot have been published prior to the competition dates, and re-publications are unacceptable. Judges will not take star ratings into account when deciding on winners. No foreign pieces are allowed, apart from rubber bands (or anything similar such as surgical tubing), tape and cut pieces (but try to keep cut parts to a minimum). Judges will adopt a fair and unbiased approach when judging.



# Real Innovation in K'Nex Weaponry



**Block trigger**

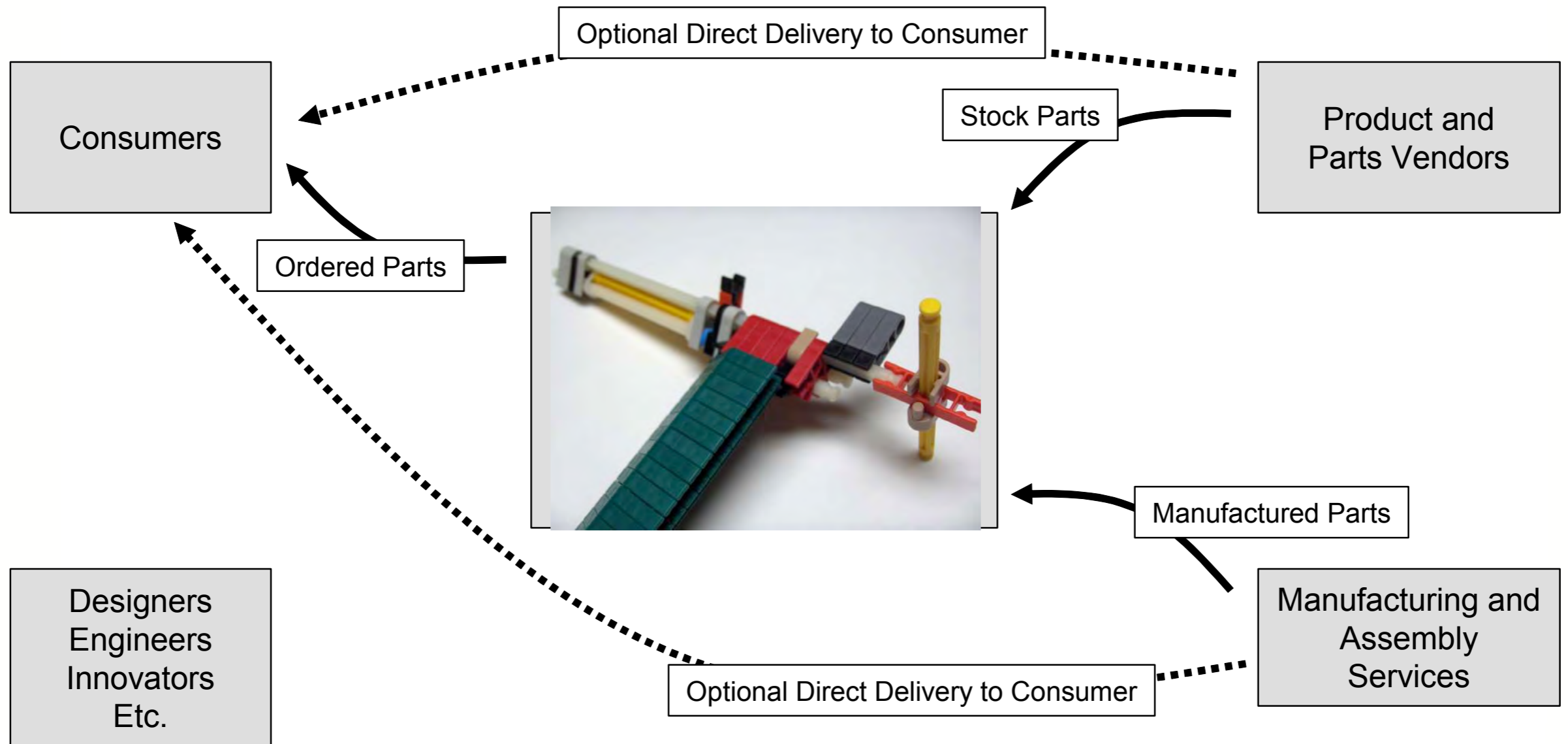
**Sear trigger**

**True trigger with  
magazine**



# This is Open Hardware!

## Movement of Physical Goods





# Self-Sustaining Open Hardware Community

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**Suitable tools**

**Motivation**

**Recognition**



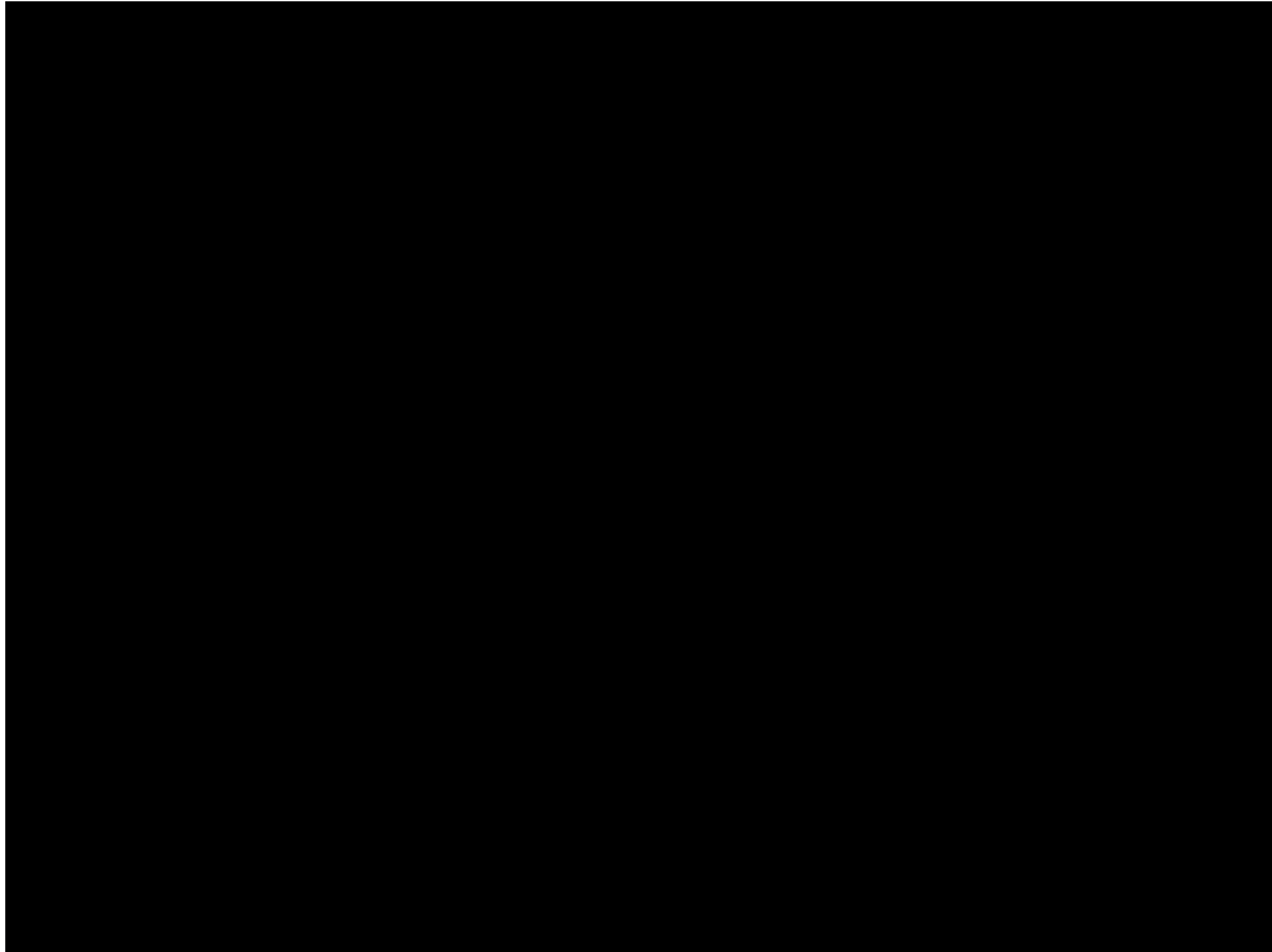
# This is Open Hardware!





# X985 Vivisector

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# The Story of Instructables



Boston Globe appearance in the same week as dissertation