



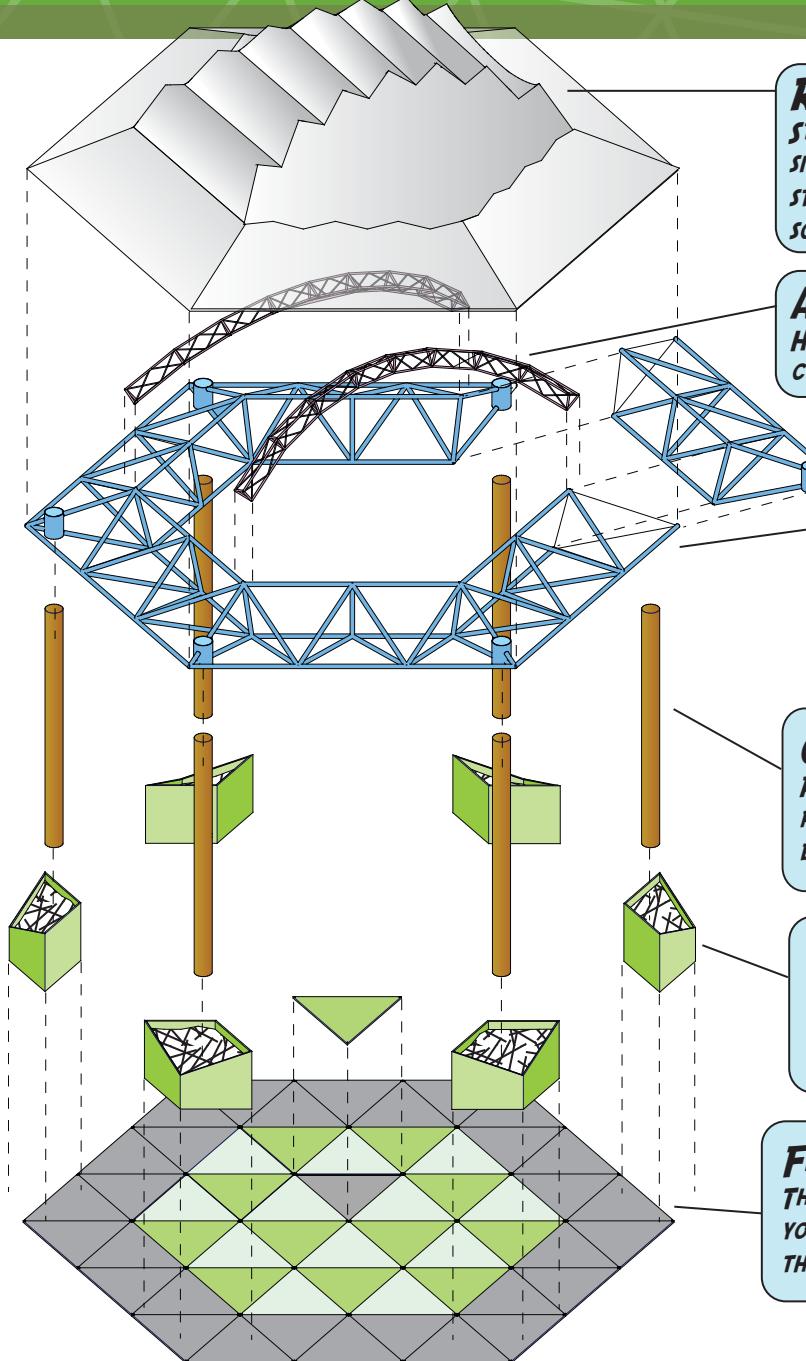
MAS.960: Design for Empowerment
Sam Kronick
8 December 2009



a toolkit for building adventure classrooms



adventure
playgrounds



ROOF:

STRETCH SOME FABRIC, PUT IT IN TENSION, HOLD IT DOWN WITH CABLES FOR STABILITY, KEEP OUT THE RAIN, LET IN SOME SOFT LIGHT, AND CUT THE GLARE.

ARCHES:

HOLD UP THE ROOF WITH SOME NICE CURVES.

RING TRUSS:

A SPACE FRAME TO CONTAIN THE FORCE FROM THE ROOF. A SOLID FRAMEWORK FOR CLAMPING, HANGING, LASHING ON WHATEVER IS NEEDED. BREAKS DOWN INTO PIECES FOR EASY STORAGE.

COLUMNS:

RAISE THE ROOF ON SOME STURDY PIERS. COVER 'EM IN FLIERS AND LET EVERYONE KNOW WHAT'S UP!

ANCHOR BOXES:

FILL THESE UP WITH DIRT FOR A SOUND FOUNDATION. GROW SOMETHING NICE WHILE YOU'RE AT IT!

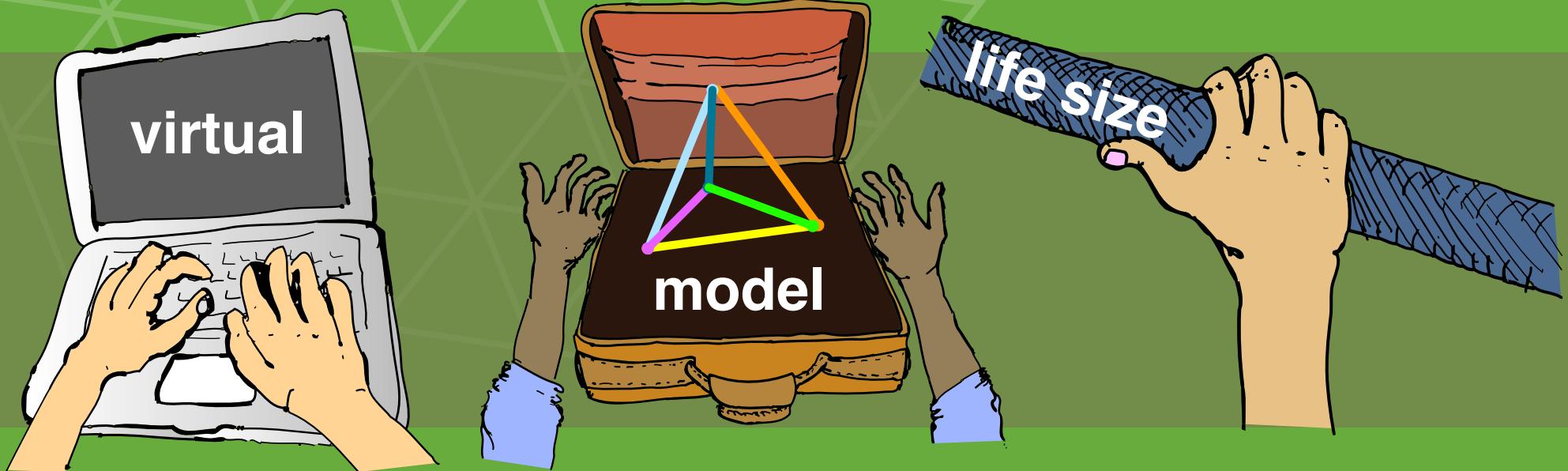
FLOOR TILES:

THREE POINTS TO LEVEL MEANS YOU'LL ALWAYS WIND UP FLAT. USE THIS AS A GRID FOR PLANNING.



summer
building
workshops

three ways to build:

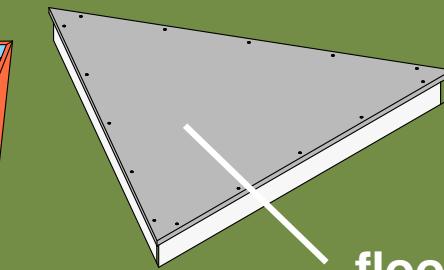
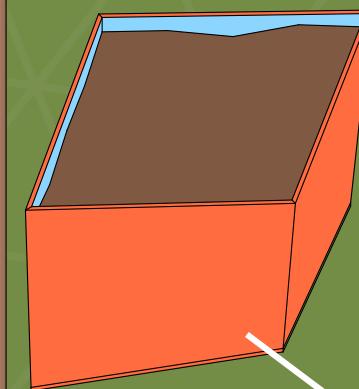
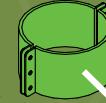




virtual

textile roof

**spaceframe
hardware**



**planter box
foundation**

timber post

post collar

components

floor tile

3D Warehouse

Components

Google 3D warehouse | [Models](#) | [Advanced](#)

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ting-bing components
by [kronick](#)
Modular components for building with the ting-bing system.
<http://classroom.mit.edu>
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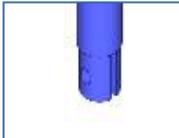
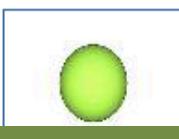
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 Spaceframe Strut [remove from collection] Spaceframe strut dynamic... Edit Remove Share Download Model	 Spaceframe Round Flange [remove from collection] Spaceframe connection flange... Edit Remove Share Download Model
 Spaceframe Hub Sphere [remove from collection] Steel sphere 2-3/8" diameter... Edit Remove Share Download Model	 Spaceframe Flat Flange [remove from collection] Spaceframe connection flange... Edit Remove Share Download Model

Name
Description

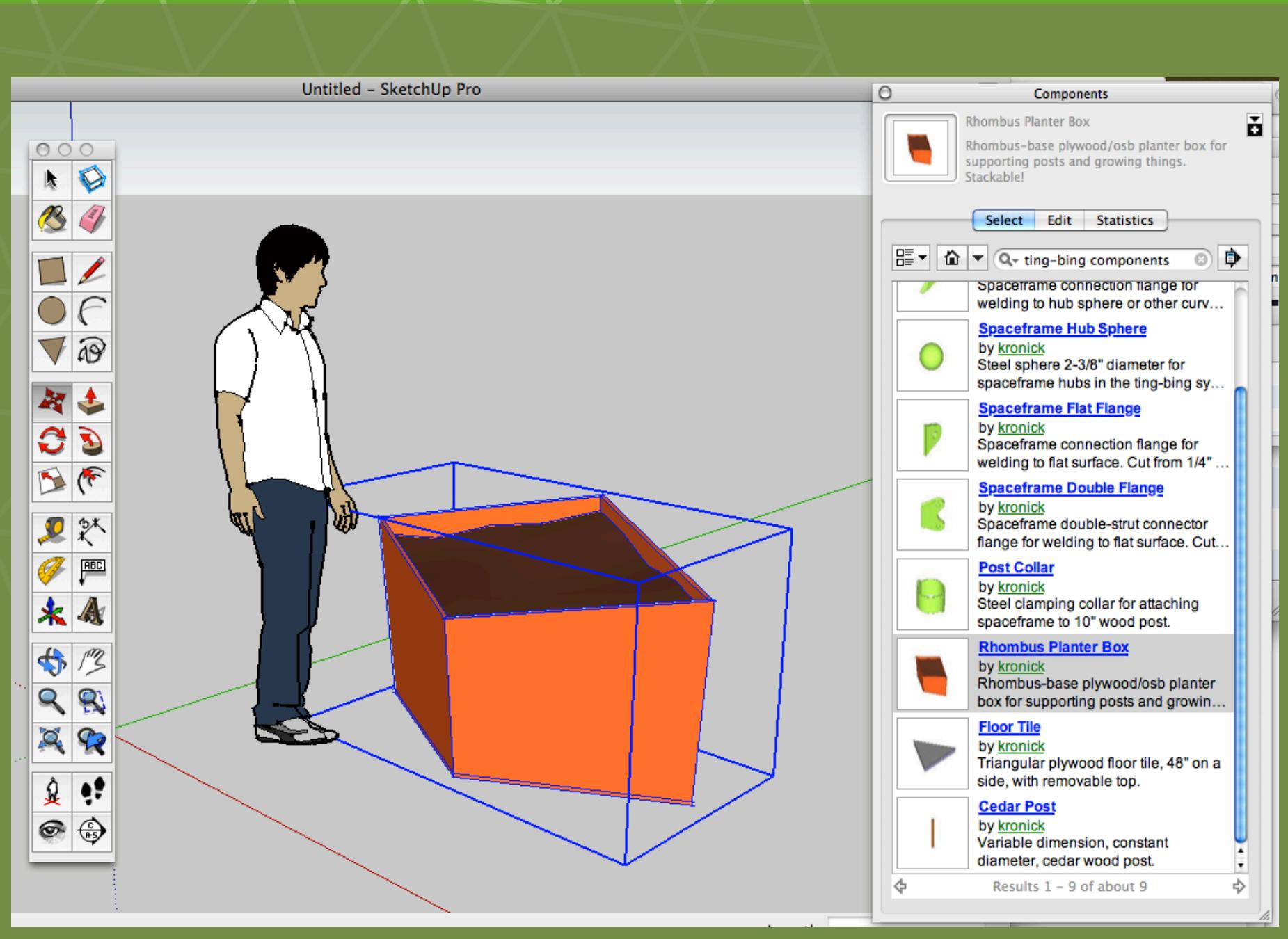
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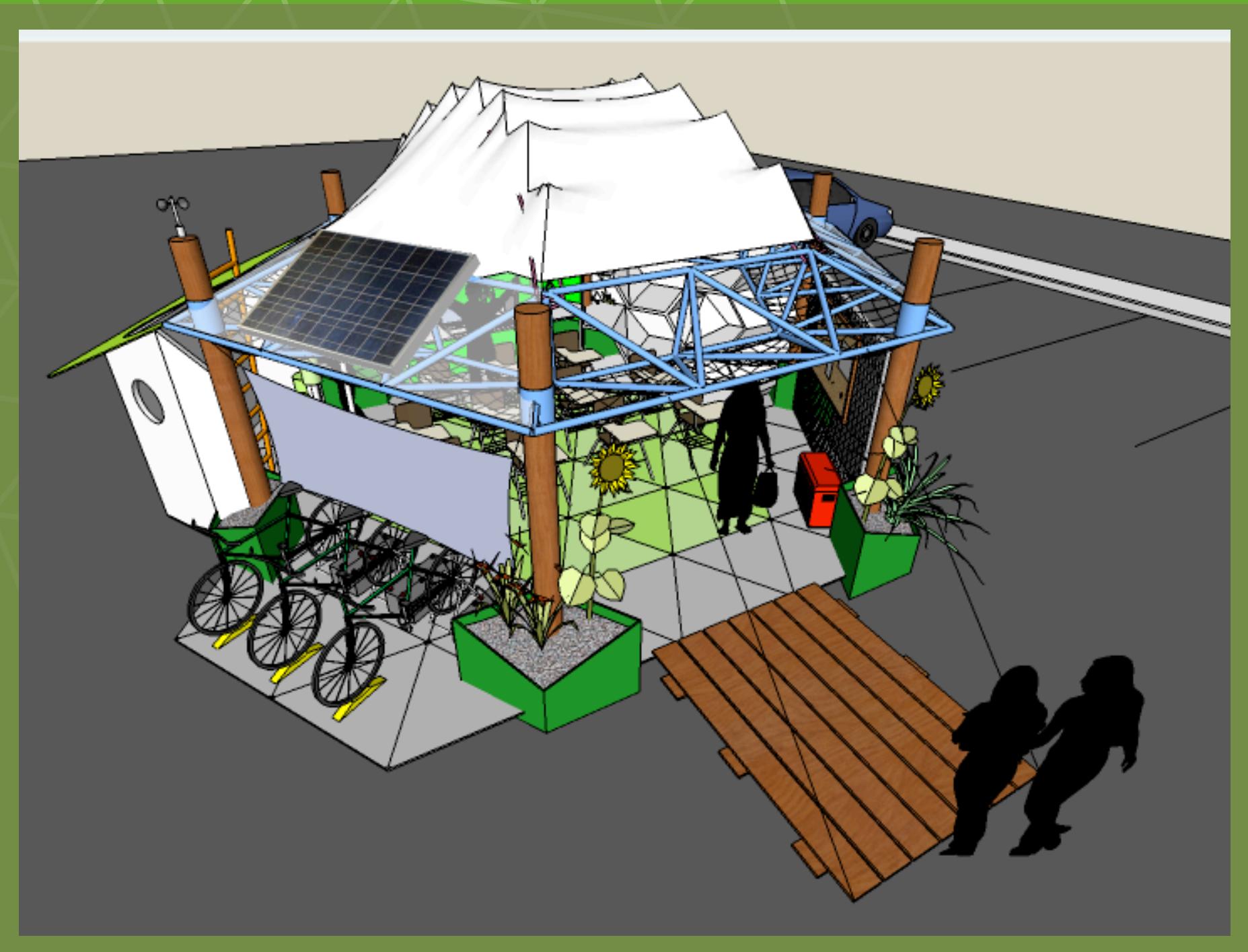
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-  [Spaceframe connection triangle](#) for welding to hub sphere or other curv...
by [kronick](#)
-  [Spaceframe Hub Sphere](#)
by [kronick](#)
Steel sphere 2-3/8" diameter for spaceframe hubs in the ting-bing sy...
-  [Spaceframe Flat Flange](#)
by [kronick](#)
Spaceframe connection flange for welding to flat surface. Cut from 1/4" ...
-  [Spaceframe Double Flange](#)
by [kronick](#)
Spaceframe double-strut connector flange for welding to flat surface. Cut...
-  [Post Collar](#)
by [kronick](#)
Steel clamping collar for attaching spaceframe to 10" wood post.
-  [Rhombus Planter Box](#)
by [kronick](#)
Rhombus-base plywood/osb planter box for supporting posts and growin...
-  [Floor Tile](#)
by [kronick](#)
Triangular plywood floor tile, 48" on a side, with removable top.
-  [Cedar Post](#)
by [kronick](#)
Variable dimension, constant diameter, cedar wood post.

Results 1 - 9 of about 9

sketchup 3d warehouse

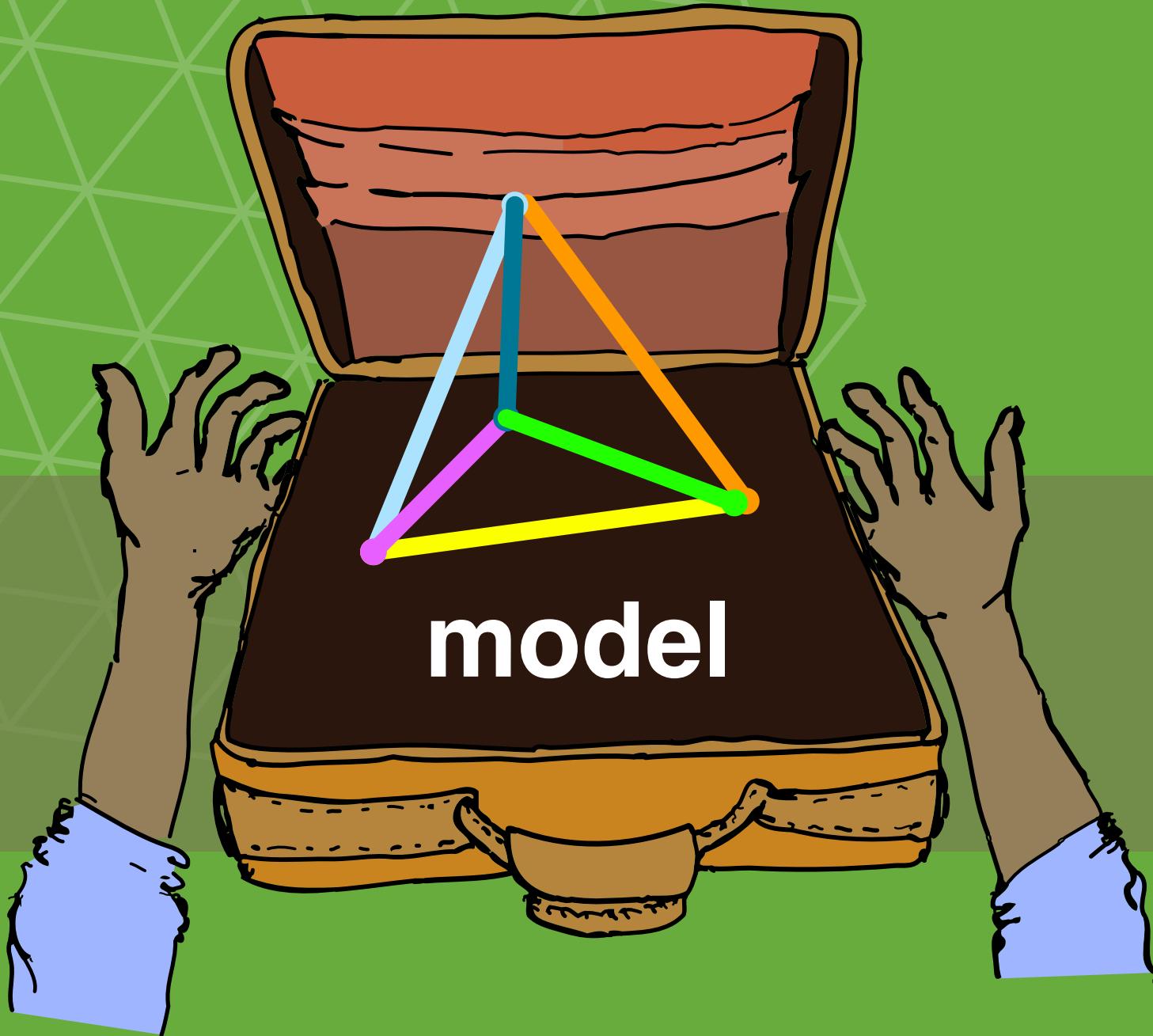




```
require "sketchup.rb"

class SpaceTool
  def activate
    strutRadius = 1
    hubRadius = 2
    puts "Spaceframe Tool Activated!"
    model = Sketchup.active_model
    selection = model.selection
    model.start_operation "Make Spaceframe", true
    edges = []
    faces = []
    vertices = []
    spacegroup = model.active_entities.add_group
    if model.selection.empty?
      entities = model.active_entities
    else
      entities = model.selection
    end
    entities.each do |e|
      faces.push e if e.is_a? Sketchup::Face
      edges.push e if e.is_a? Sketchup::Edge
    end
    # Get rid of faces
    #model.entities.erase_entities faces
    # For each edge, create a tube
    edges.each do |e|
      strut = spacegroup.entities.add_group
      strut.set_attribute "id", "type", "strut"
      strut.set_attribute "id", "parent", e
      e.set_attribute "id", "type", "edge"
```

scripted components



model

post collars
wood posts

extra magnets

paints



planter box
fold 'ems

scale figures

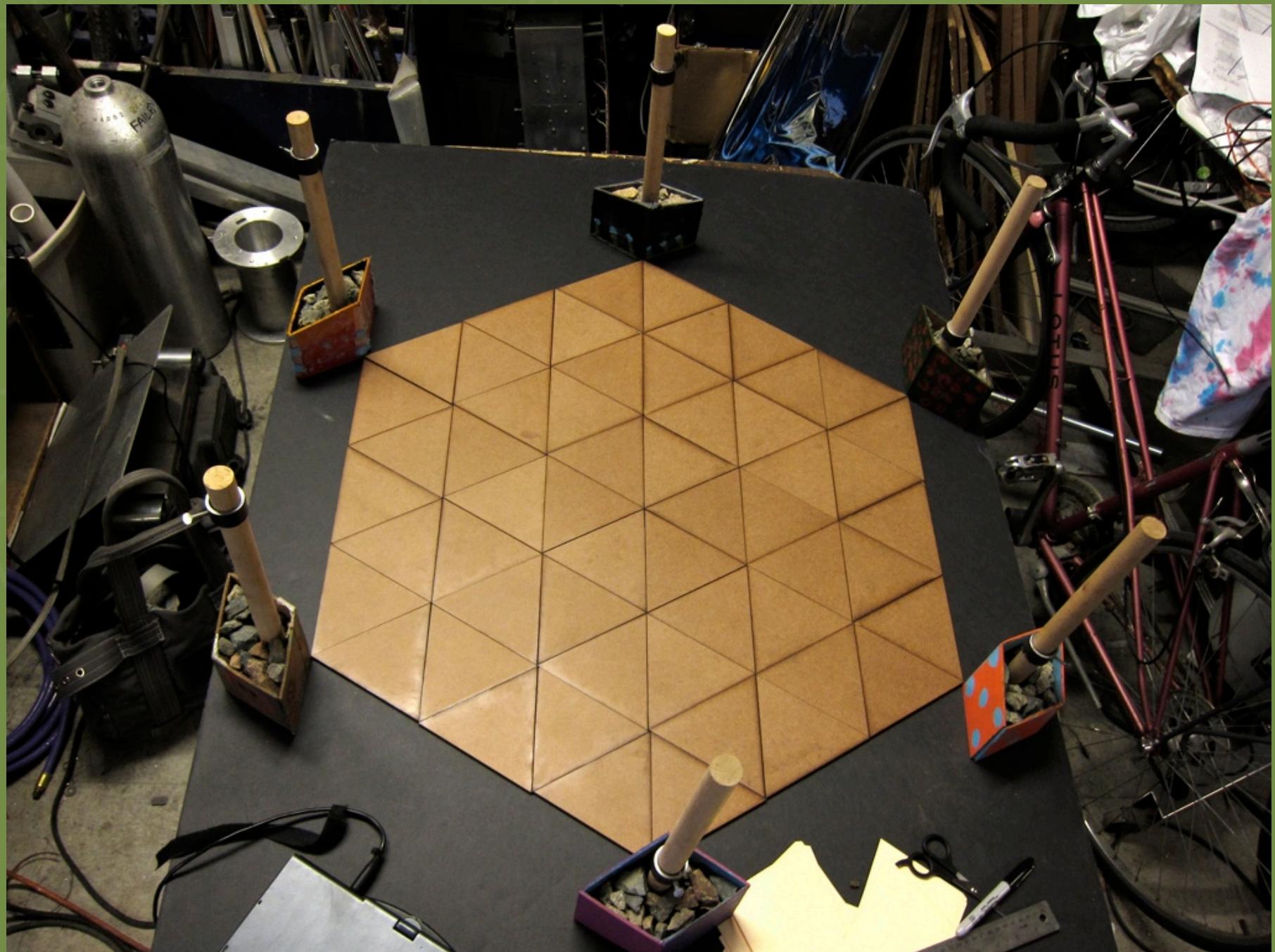
floor tiles

space frame
straws

string

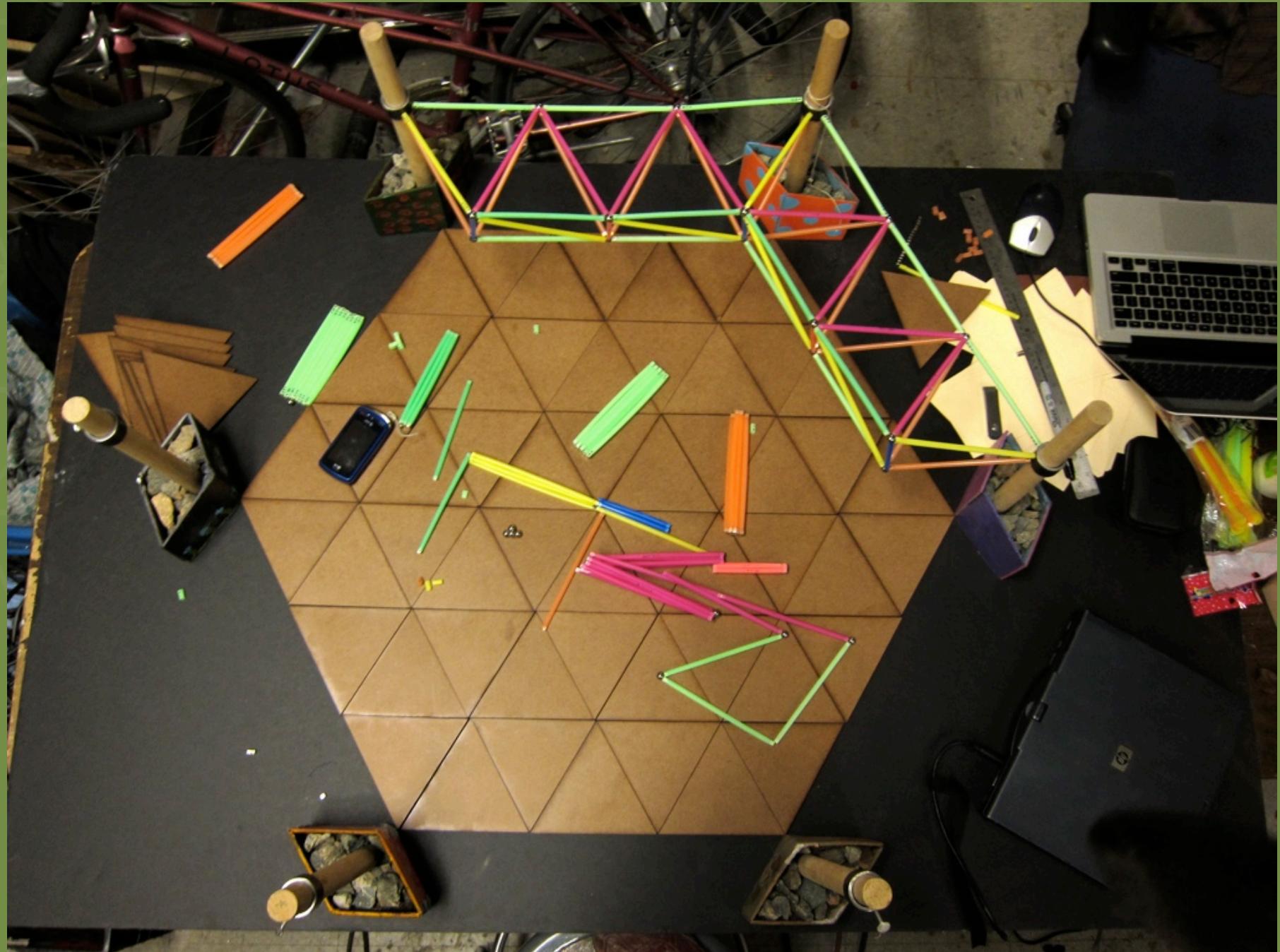
plastic film

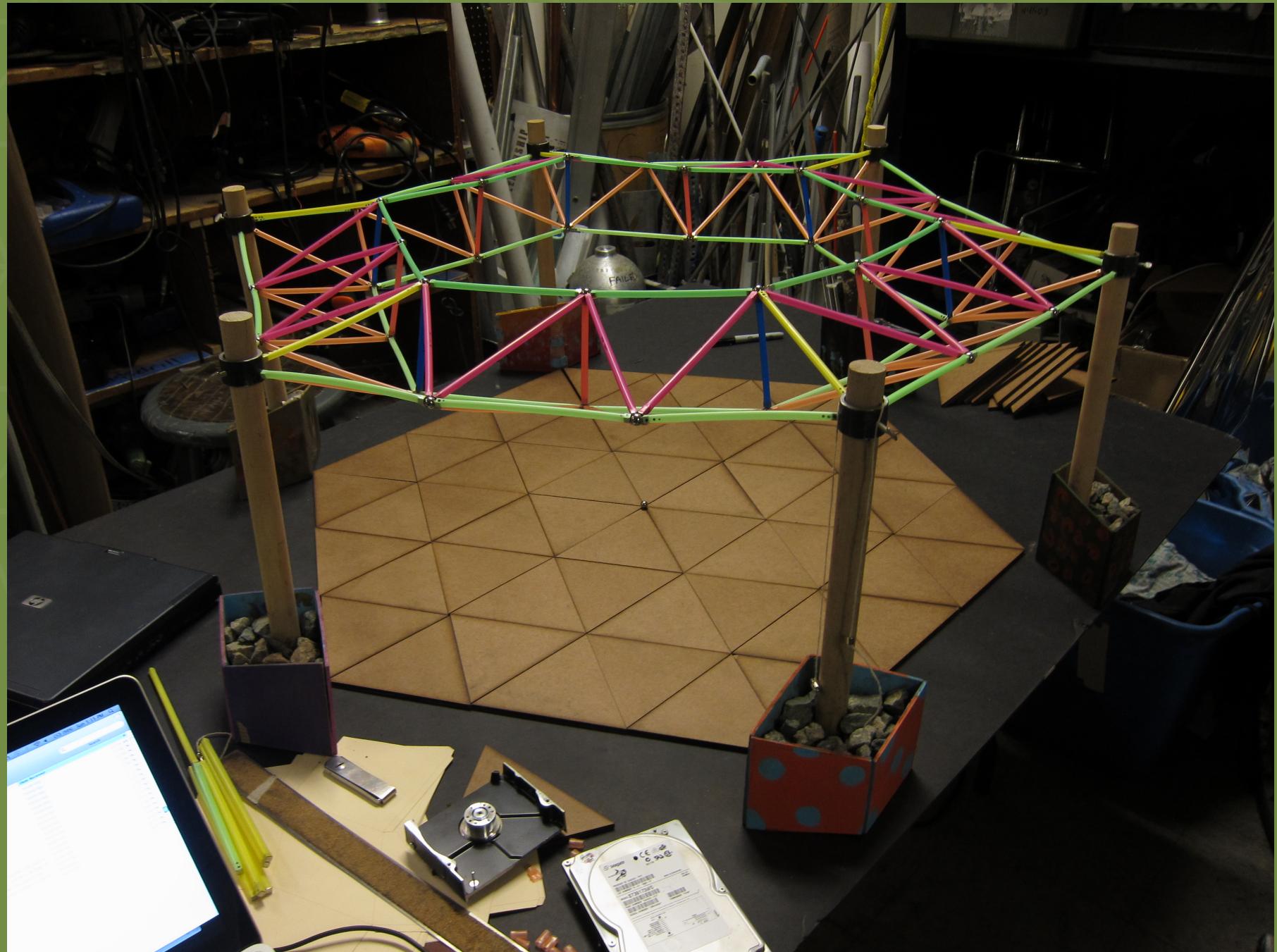
markers

















instructables

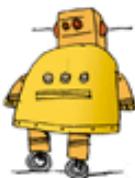
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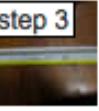
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Custom Low-Cost Magnetic Model Construction Kit from Drinking Straws

[VIEW ALL STEPS ON ONE PAGE](#)

[intro](#) Custom Low-Cost Magnetic Model Construction Kit from Drinking Straws

I love playing with toys like [Geomags](#) and [Magnetix](#). They're those little plastic rods with magnets in the end that click onto steel spheres to form geometric forms. I see them a lot in museum gift shops for some reason.

There are three problems I have with these toys, though: First, they're pretty expensive. Browsing around, it looks like you're paying about 80 cents to a dollar per strut (like [this](#)). Second, they're limited to regular or semi-regular geometry because all the struts are the same size. Third, the structures you build wind up pretty small because the struts are short. This means that the models you build don't translate very well to something economical to build in real life.

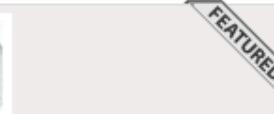
This Instructable will outline my solution with a **low-cost**, **custom-length**, **scalable** magnetic construction kit you can build without special tools and made from parts that are easy to get (including regular ol' drinking straws!).

Why not build your own building kit?

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Space Frame Structure Force Sensors

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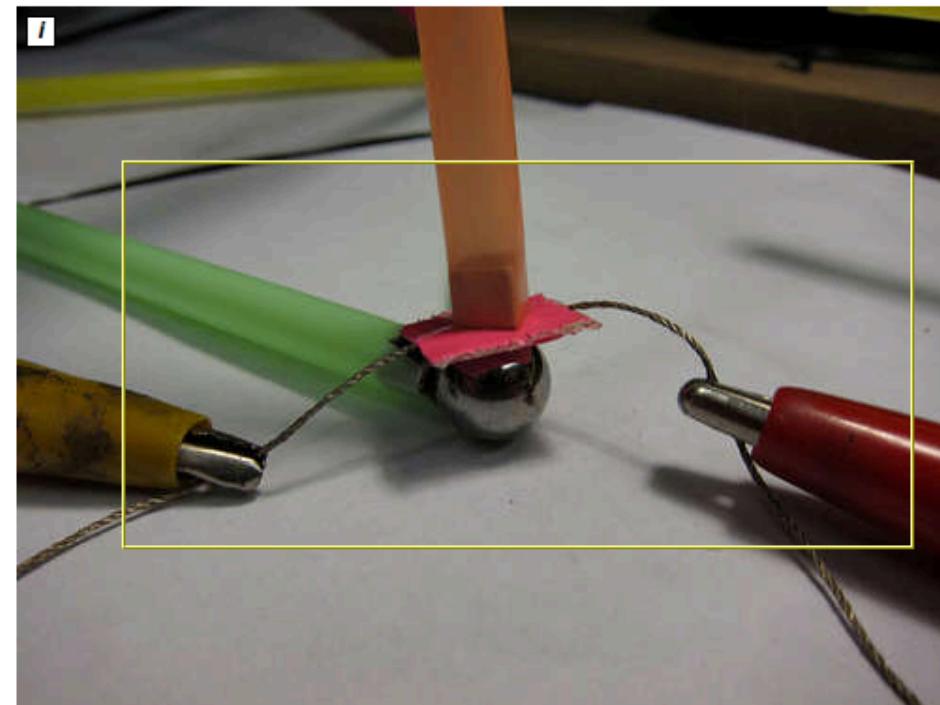


step 3 Put the sensors in the model

The magnets should be strong enough to hold the thin sensor between the end of the strut and the steel hub. Just sandwich it in there like you see in the pictures. Sandwiches all around!

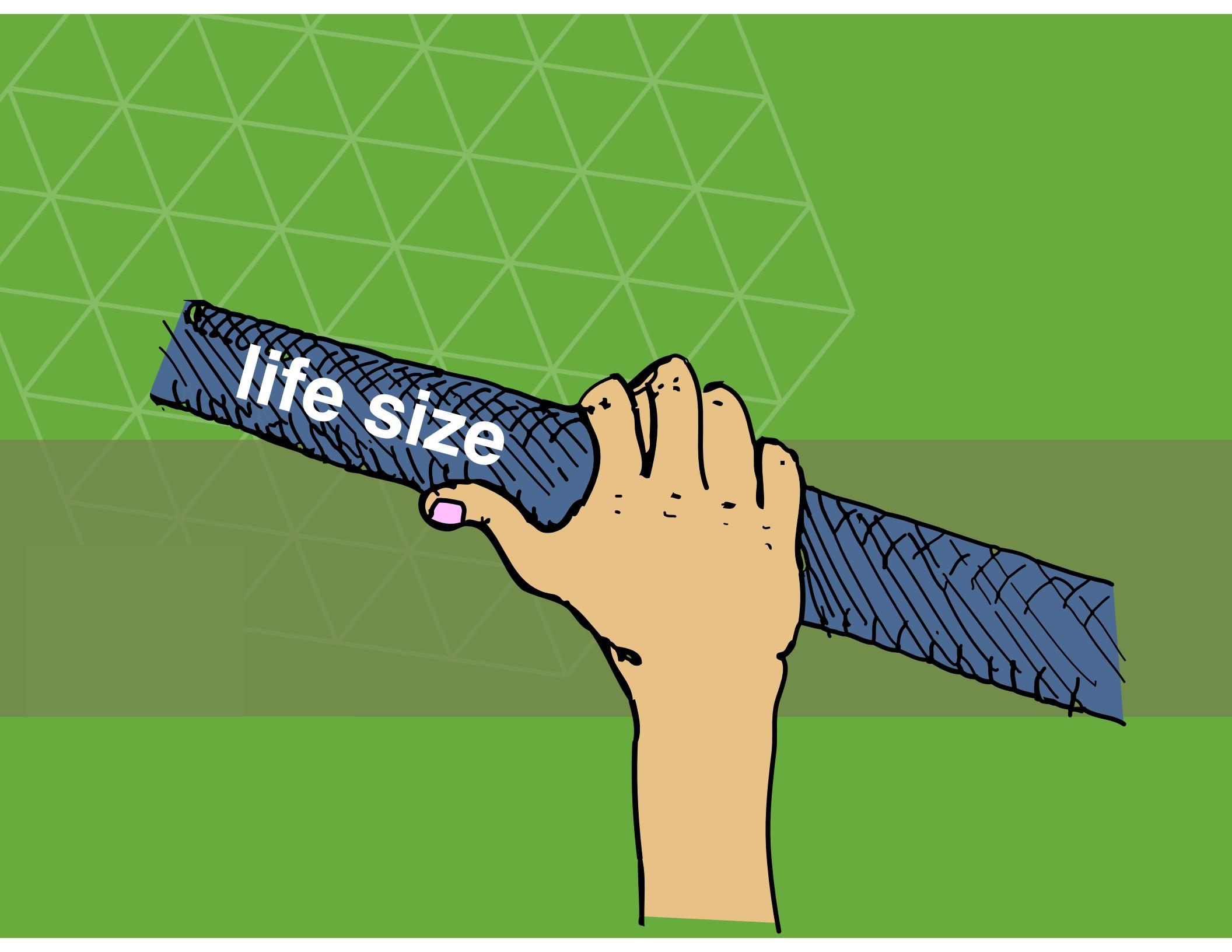
The force of the magnet will create some pressure on the sensor to begin with. Pushing on it (placing it in compression) will add more pressure to this. Pulling the node away from the strut (putting it in tension) will lower the pressure. More pressure will decrease the electrical resistance, less pressure will increase the resistance. You can check this with your multimeter by hooking the leads up to the conductive threads coming out of the sensor.

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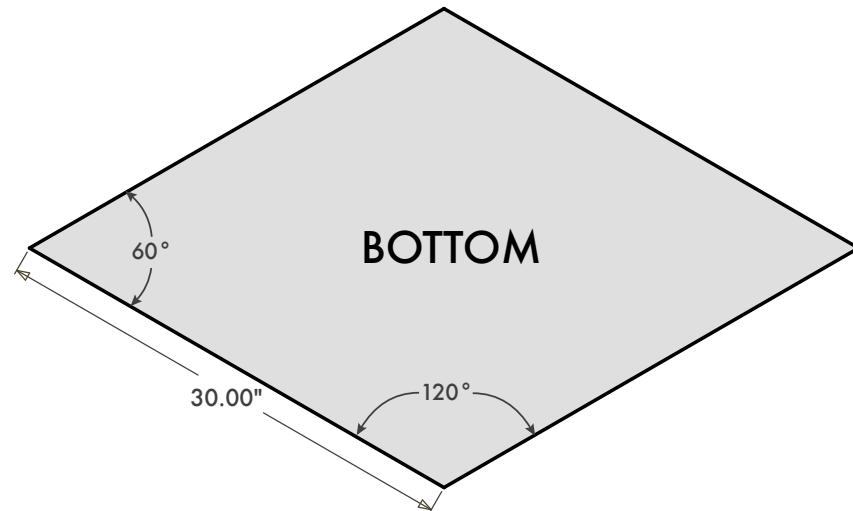
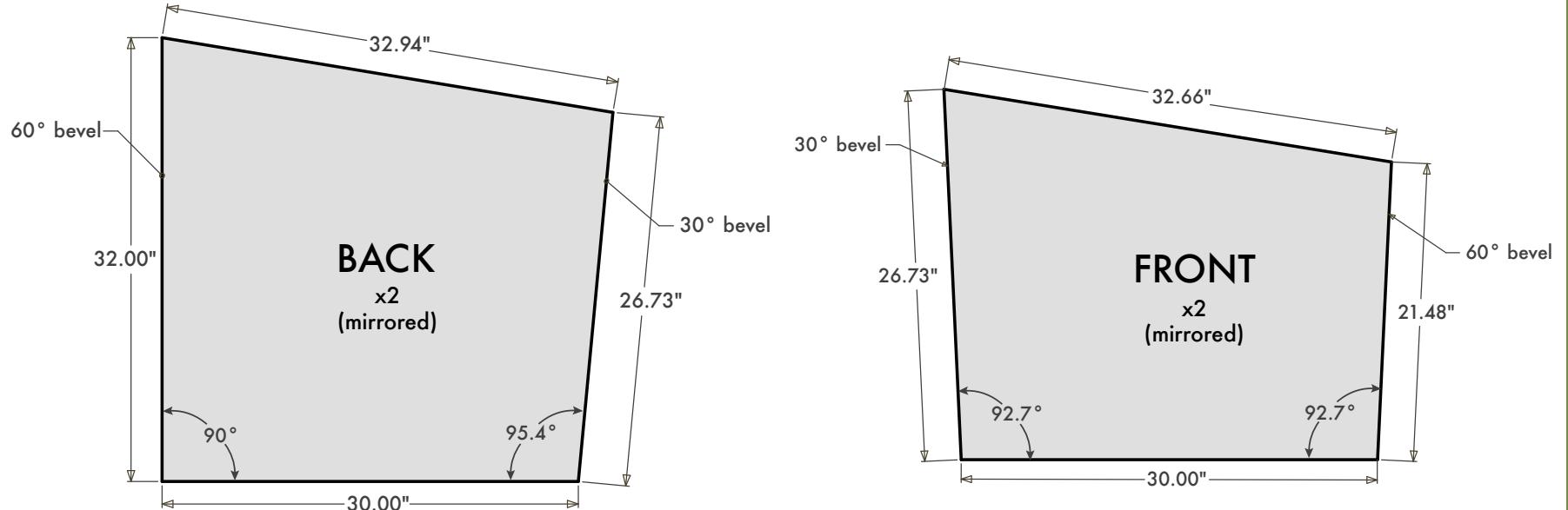
[« previous step](#)

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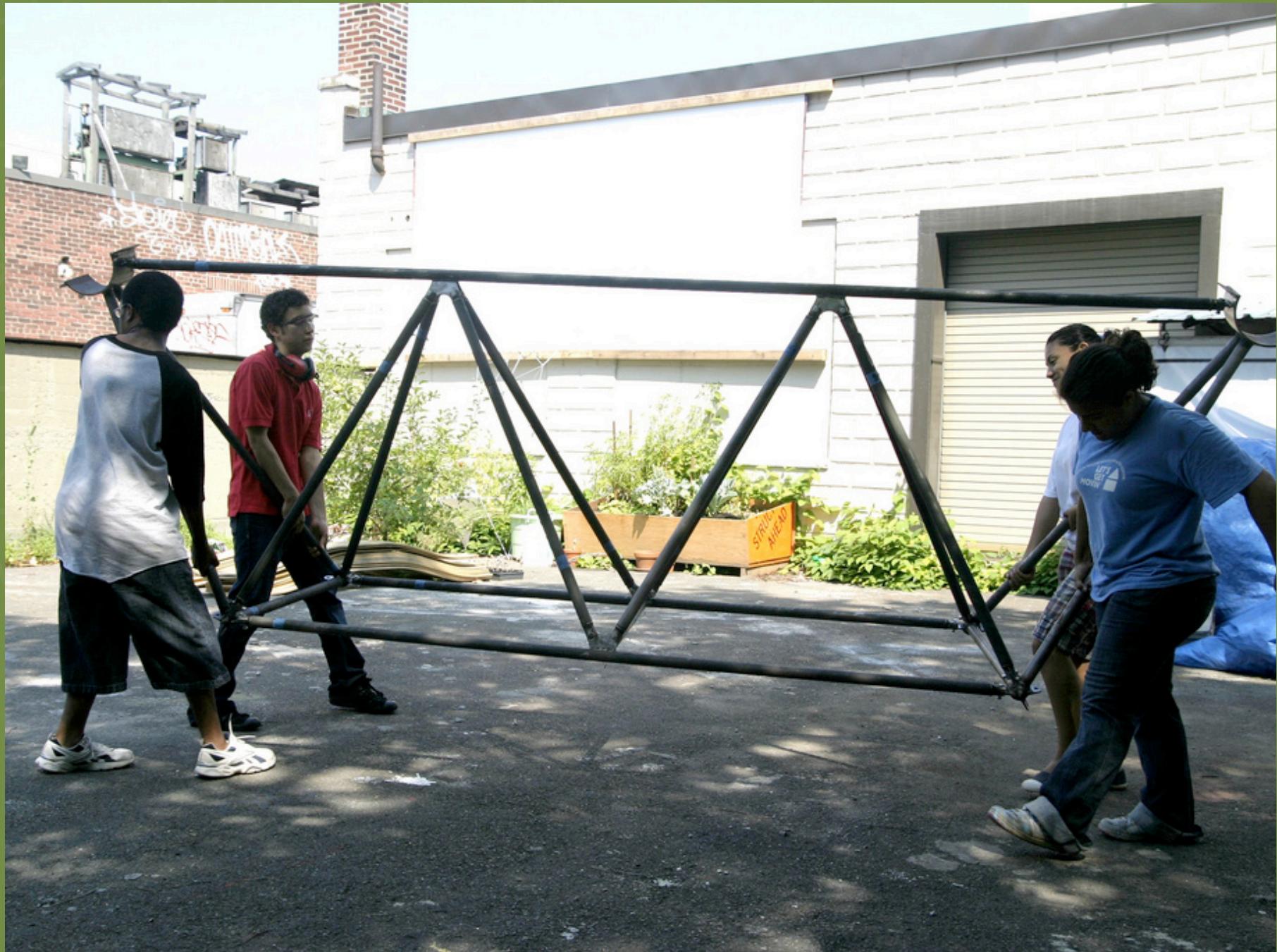


life size

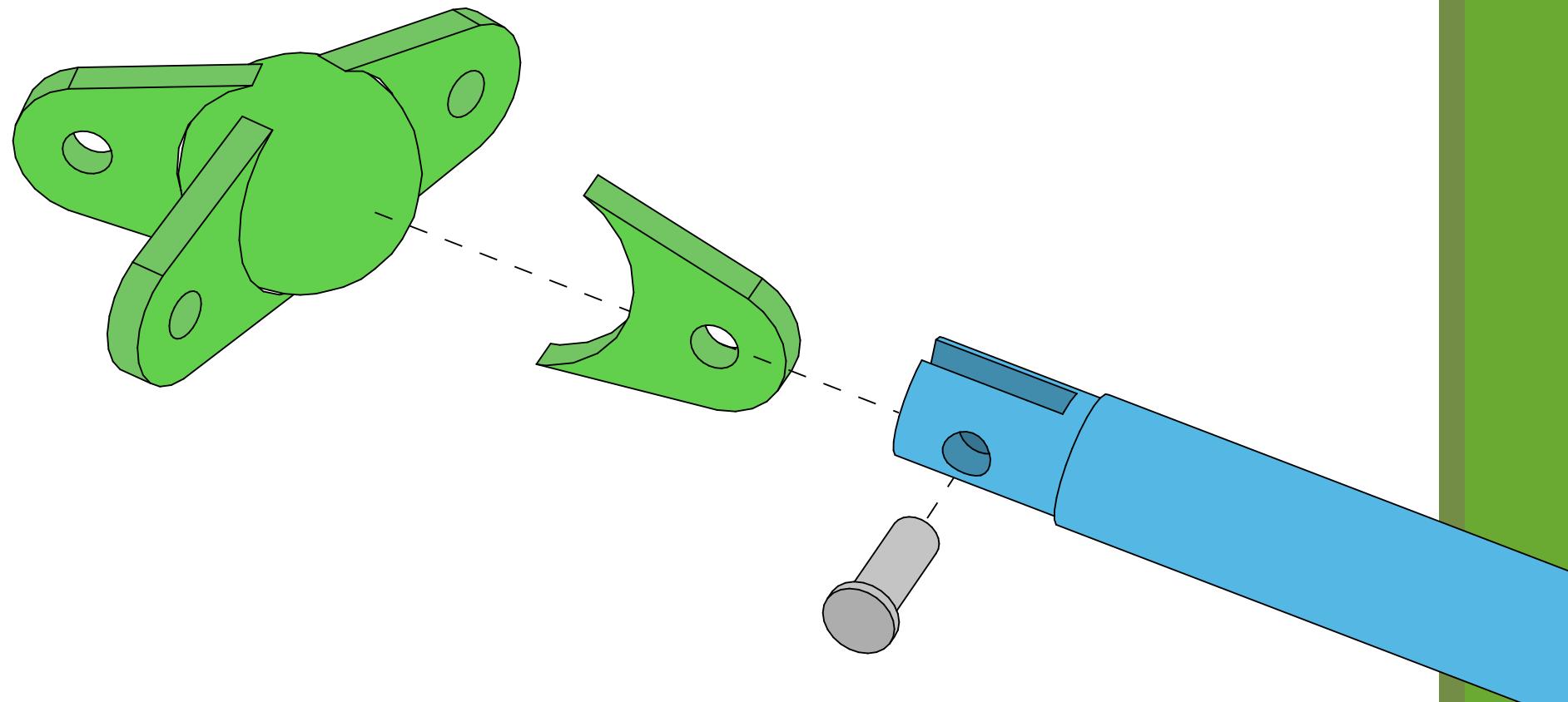




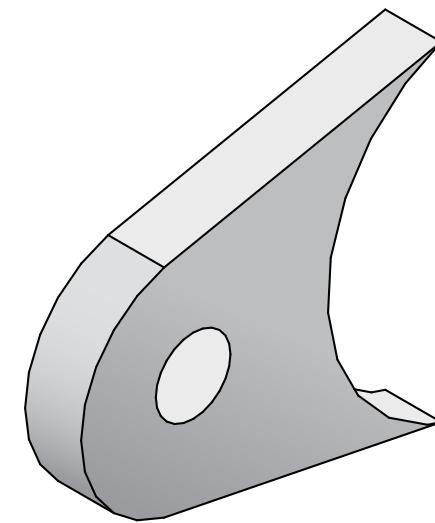
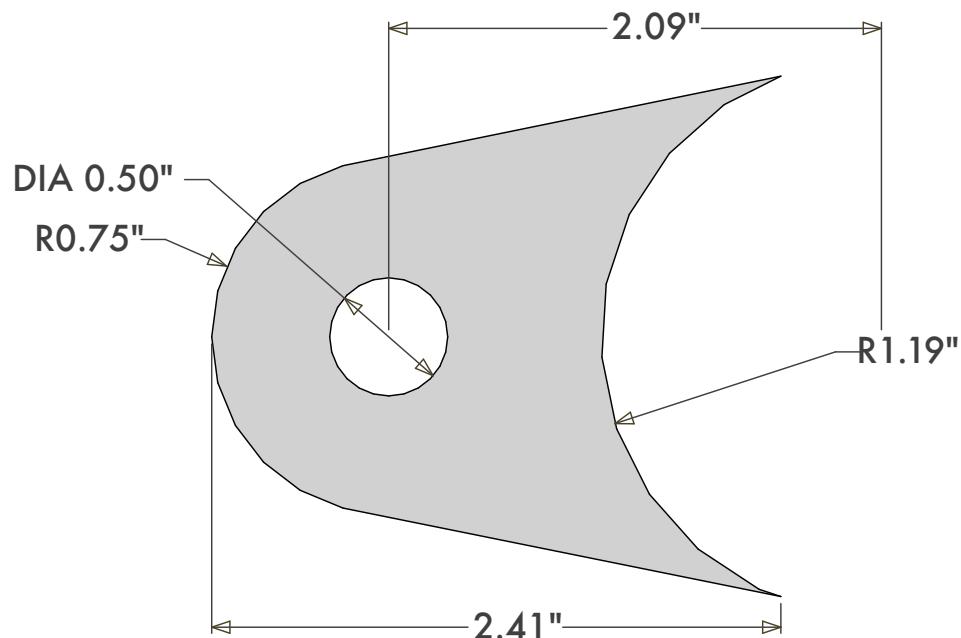
Material:
5/16" exterior grade
plywood or OSB







assembly diagrams



Material: 1/4" Steel

dimensions and .dxf files

Google docs ting-bing Bill of Materials

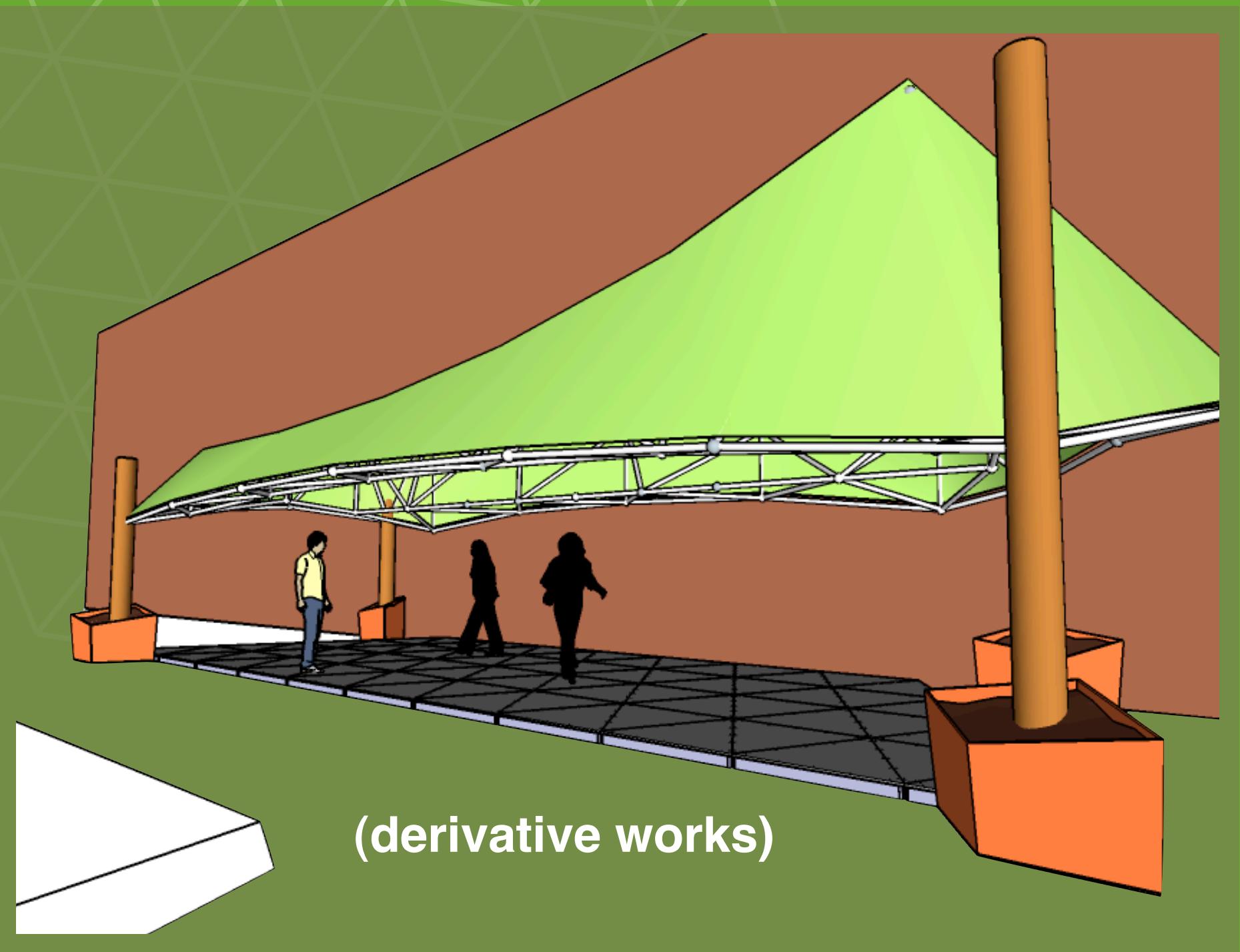
File Edit View Insert Format Form Tools Help

	A	B	C	D	E	
1	Component	Material	Quantity	Source	Notes	URL
2	Planter Box	3/4" OSB 4'x8' sheet	2 sheets	Home Depot	(or exterior grade plywood)	
3	Planter Box	Fiberglass tape 4" width	20 yards	MysticMarineDiscounts.com		
4	Planter Box	Epoxy Resin	.5 gallon	Jamestown Distributors	WEST Systems 105	http://www.jamestov...
5	Planter Box	Epoxy Hardener	.05 gallon	Jamestown Distributors	WEST Systems 206	http://www.jamestov...
6	Planter Box	Epoxy Microfibers filler	1 oz.	Jamestown Distributors	WEST System 403	http://www.jamestov...
7	Planter Box	Latex Paint	.5 gallon	Local Hardware Store		
8	Space Frame	1-1/2" x .065" DOM Steel Tubing	varies	Dillsburg Aeroplane	Sold in whole lengths from 17-24'	(717) 432-4589
9	Space Frame	1-1/2" 1018 steel round	varies	Dillsburg Aeroplane	For end connectors, order by the foot.	(717) 432-4589
10	Space Frame	Connection flanges	varies	Fred Nelson Fabrication	Plasma cut from .dxf file	http://www.frednelso...
11	Space Frame	1/2" x 1-3/4" Clevis Pin	varies	McMaster-Carr	#97245A422	http://www.mcmaste...
12	Space Frame	Cotter Ring 1-1/8" Diameter	varies	McMaster-Carr	#95390A438	http://www.mcmaste...
13	Space Frame	Steel Ball 2-3/8" diameter	varies	King Architectural Metals	#13-116-F6	http://www.kingmeta... itemcode=13-116-F6
14	Floor Tile	3/4" Plywood - 4'x8' sheet	1/2 sheet	Home Depot	A-C-X Grade Fir (exterior grade)	
15	Floor Tile	1/4"-20 x 1" Stainless Steel Screw	15	McMaster-Carr	#92210A542	http://www.mcmaste...
16	Floor Tile	1/4"-20 Stainless steel hex nut	15	McMaster-Carr	#94804A029	http://www.mcmaste...
17						

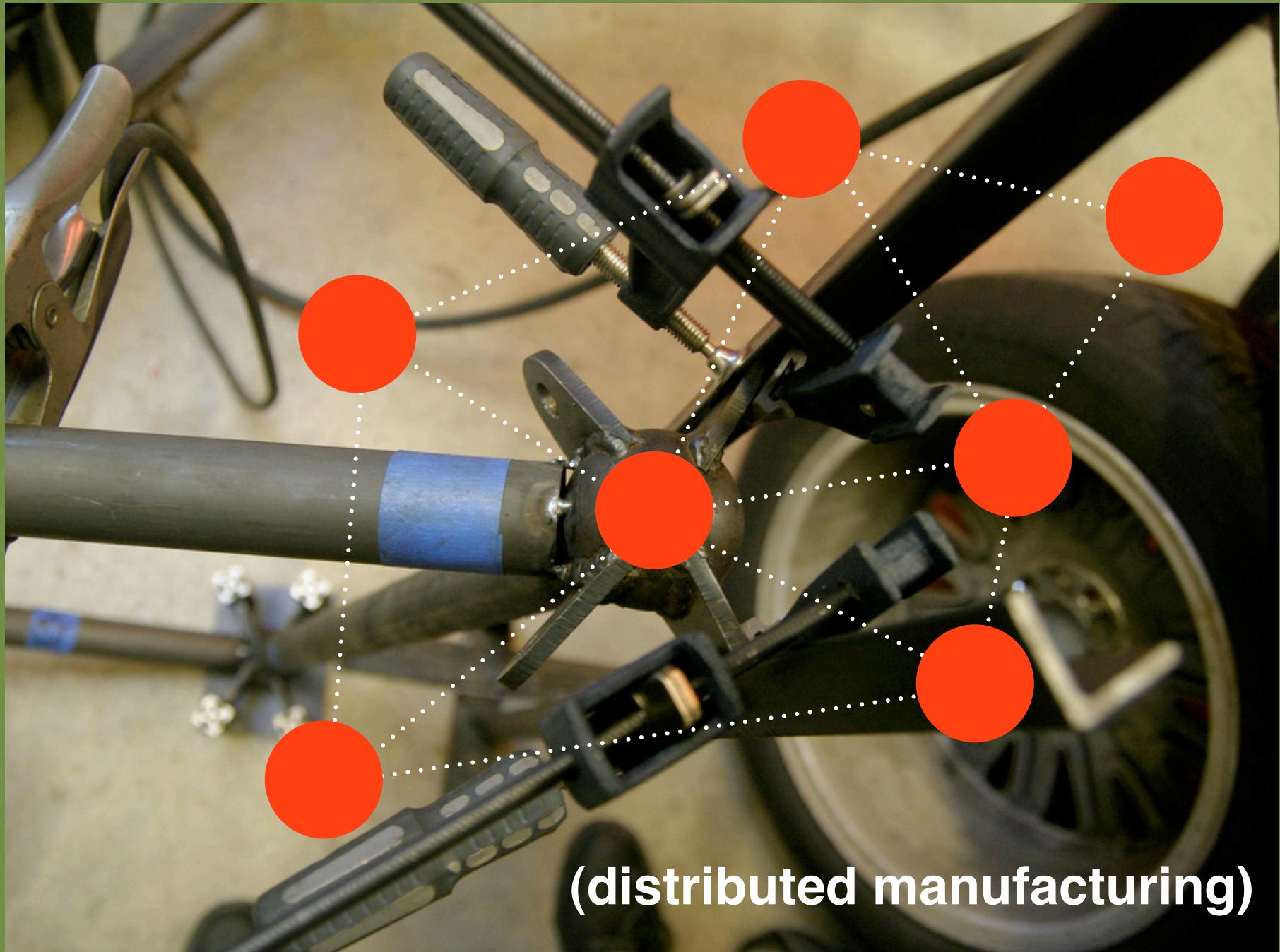
bill of materials



*an open source
building toolkit*



(derivative works)



(distributed manufacturing)