

An aerial photograph of a baseball field in Davis Sq, Somerville MA. A group of people is gathered on the grass in the outfield, some holding colorful balloons. The infield is a light-colored dirt base. The field is surrounded by a fence, and there are trees and buildings visible in the background.

Balloon mapping, Davis Sq, Somerville MA

Building communities  
one kit at a time

Jeff Warren • [PublicLab.org](http://PublicLab.org)



# Public Lab

an open community which  
collaboratively develops

accessible, open source, Do-It-Yourself

technologies for investigating local  
environmental health and justice issues

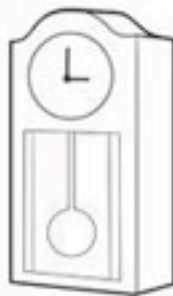
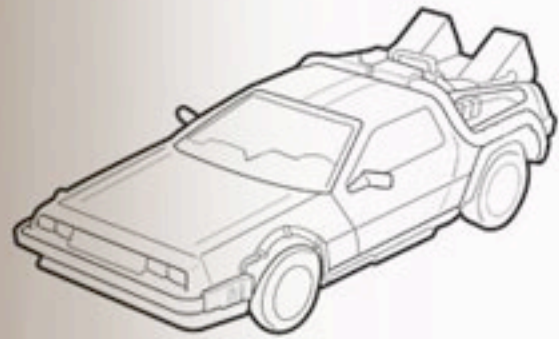
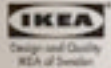


Antikythera  
mechanism

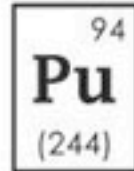




# DJILORIANN



365x



90,000,000x



1.21gw



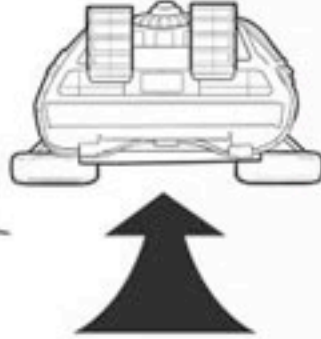
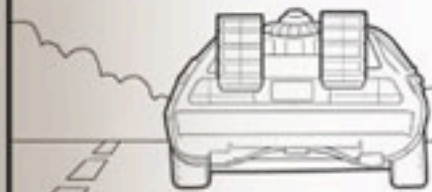
45,000x



1x



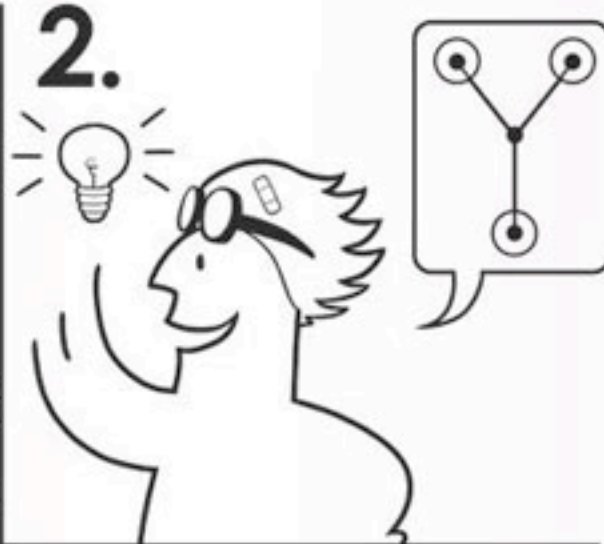
20,000x



1.



2.



3.

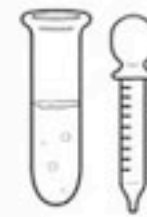


4.



CollegeHumor

# DINDASÜR



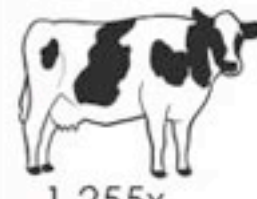
200x



1x



15,000,000x



1,255x



1x



2x

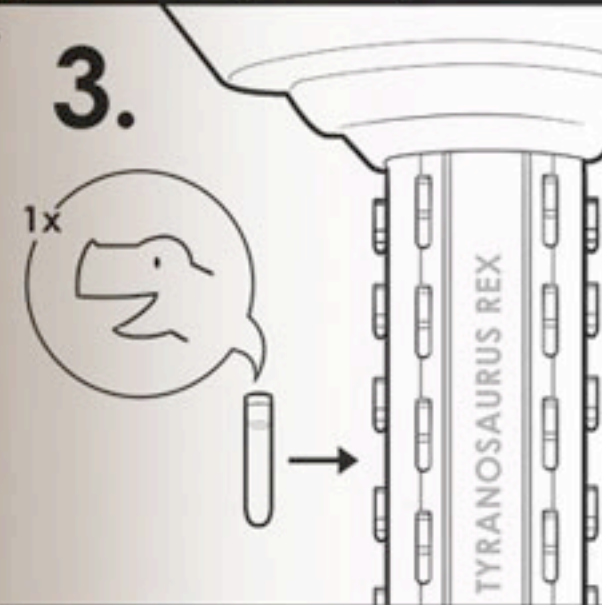
1.



2.



3.



4.



5.





This kit includes:



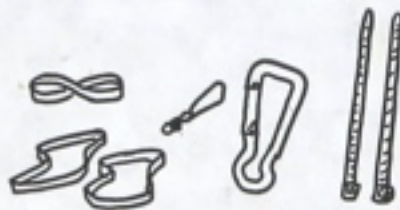
1000 ft string



5.5-ft weather balloon



protective gloves



rubber bands, zipties, & carabiner

You add:



camera with  
continuous mode



2-liter bottle



80+ cu ft  
helium



First contact



# How do people encounter Public Lab?

- \* Events/workshops (in person)
- \* Media coverage
- \* Website
- \* “Starter Kits”





**Michael A. Cooper**

@MACooperr



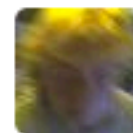
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My @PublicLab infragram filter kit arrived today. Let's make some NDVIs!

#remotesensing #NDVI

[pic.twitter.com/Ervp7i8HGw](http://pic.twitter.com/Ervp7i8HGw)

← Reply ↺ Retweet ★ Favorite 📌 Pocket ... More



**Jenny Levine** @shifted

31 Aug

One of my Kickstarters arrived today - @infragram [flic.kr/p/fG1YRG](http://flic.kr/p/fG1YRG)

📷 Hide photo

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**Vandecasteele Arnaud**

@geotribu

Follow



Cool ! I received my #BalloonMappingKit  
Thanks @PublicLab

[pic.twitter.com/1664rTsdX6](http://pic.twitter.com/1664rTsdX6)

← Reply ↺ Retweet ★ Favorite 📌 Pocket



**Brian Boyer** @brianboyer

13 Mar 12

Balloon mapping kit from @publiclab arrived just in time for sunny weather! [pic.twitter.com/OdDsNjHS](http://pic.twitter.com/OdDsNjHS)

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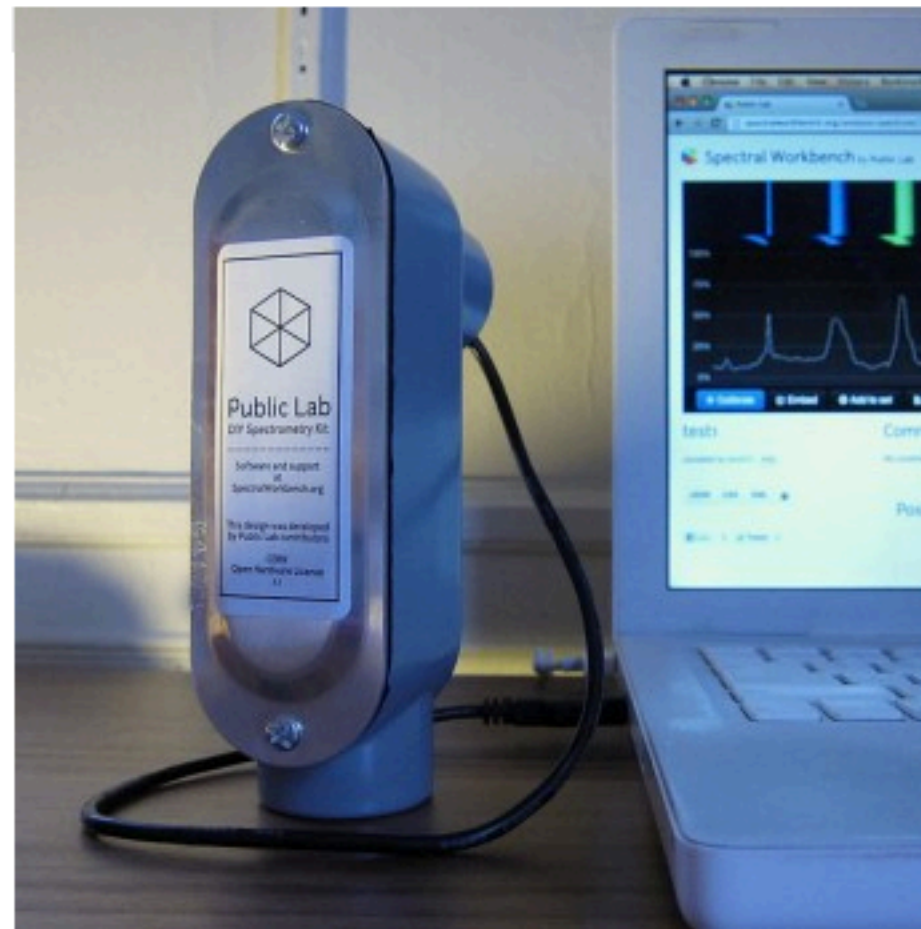
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Choose a Price Range

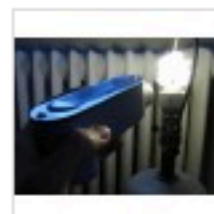
Enter search keyword **GO**

Home » [Desktop Spectrometry Kit](#)

## Desktop Spectrometry Kit



Click on image to zoom



Availability: In stock  
Item number: 3153423

**\$49.95**

Quantity:

- + Add to Wishlist
- ♥ Add to Compare
- ✍ Add Your Review

**Buy Now**

The kit includes:

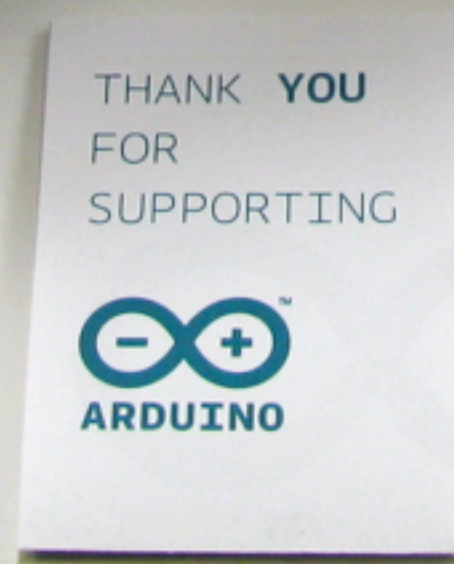
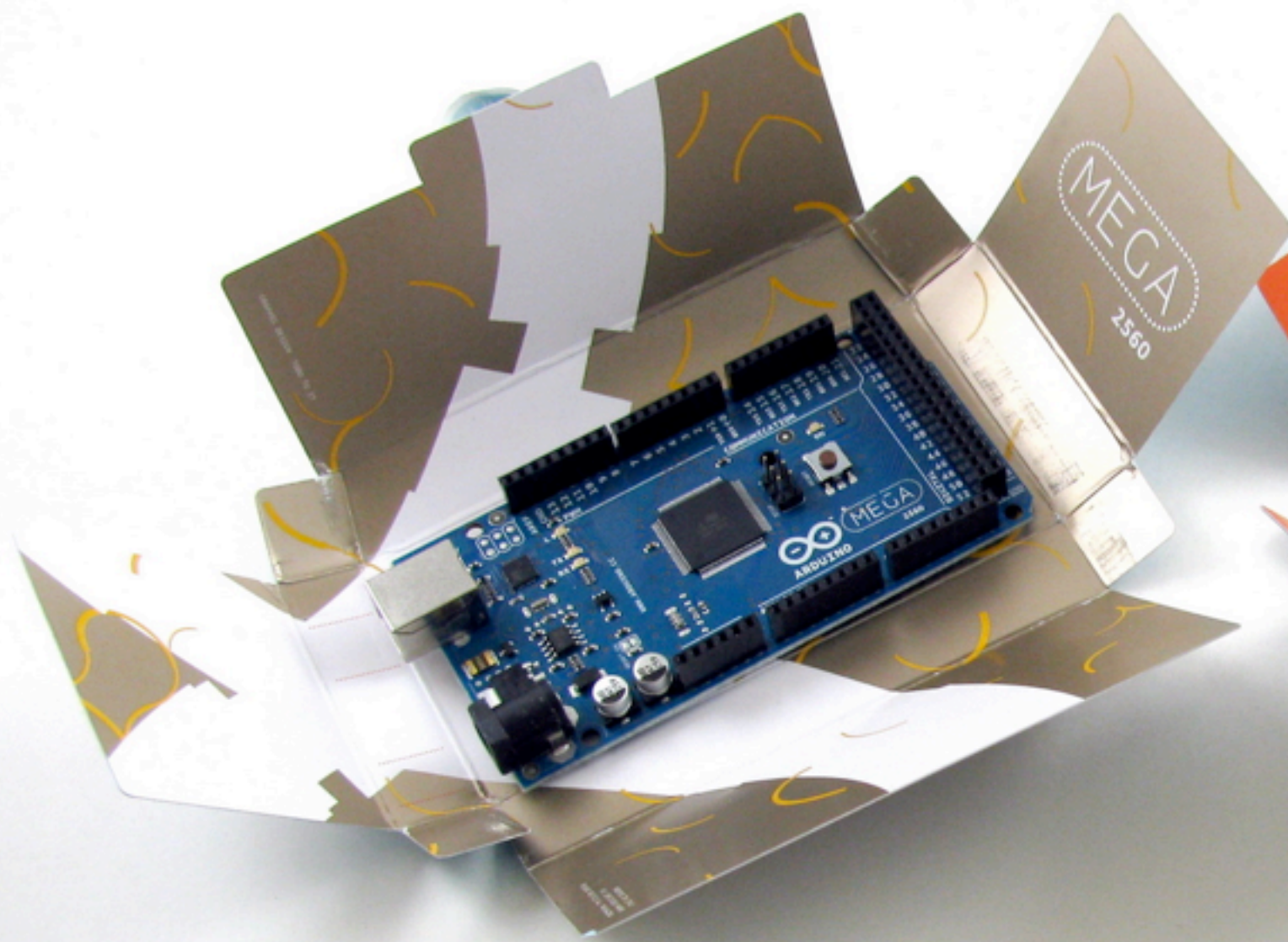
- a diffraction grating (a slice of a DVD-R)
- a piece of black card paper from which to cut your aperture slit
- a small HD webcam and USB cable
- an aluminum Type LB conduit enclosure
- a strip of double-sided foam adhesive for mounting
- instructions and a copy of the CERN Open Hardware License

- Alternative Energy >
- Anatomy >
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# Unboxing







See your home  
from above!

Make your own  
'satellite imagery'!

Have you open-sourced  
your data yet?

Turn your photos into  
maps at [MapKnitter.org](http://MapKnitter.org)



We collaborate and share our research and resources in an open, accessible "Do-It-Yourself" technical community. We are an underserved community to identify, research, and create awareness and accountability around environmental concerns. But it only works if we all share our ideas and information! This means that you have some responsibilities:

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But it also comes with benefits!

- a community of diverse and helpful fellow researchers to ask for support and advice -- by signing up on the website you may join several relevant mailing lists
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[PublicLaboratory.org/getting-started](http://PublicLaboratory.org/getting-started)

Contributors to Public Lab's spectrometer project:

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matthias  
Dave Haffner  
Monty

Jeff  
Shannon  
Alex McCarthy  
spota  
Stewart Long  
Sara

If you contribute to this project, you have the right to be attributed for your work. A full and up-to-date list of contributors can be found at:

[PublicLaboratory.org/tool/spectrometer](http://PublicLaboratory.org/tool/spectrometer)

This is open source hardware

This is an open source hardware design and is released under the CERN Open Hardware License 1.1, a copy of which you can read below, or online at <http://ohwr.org/cernohl>

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# Customer vs. Contributor



# [PLOTS] Spectrometer - Not Ready for Prime Time



 **dstoft@gmail.com** via [googlegroups.com](#)

Mar 19 



to publiclaborato. 

I recently ordered the \$50 Spectrometer kit from the PublicLab site and assembled it via the combined instructions from the web and from the kit. Unfortunately, neither this kit nor the on-line software app are not ready for prime time. I'm an engineer and very experienced with prototyping so I'd expected something more complete in a kit for public sale. However, I write this not as a rant, but as a list of issues which should be solvable or, perhaps, have been solved but just not documented. I'd like to find the answers as I have a need for a spectrometer.

Below are a number of observations / problems which resulted from attempting to follow the build / use instructions.


1 - The web-cam was not difficult to modify though the instruction description of the easiest way to 'un-snap' the housing.

2 - Focusing the camera was attempted via the CD driver/app. The lens depth of field is so large that finding an actual focus at 9 inches ended in just a "rough-estimate" at best -- but nowhere did the instructions mention there is a better way of determining the best lens setting?

3 - There is no description as to why the 9-in focus is required. The imaging system is to that distance. I still can only guess it is more related to the imaging chip width but there may be other factors. Why was this not on the web? It is always helpful to understand the objective during the assembly. A procedure blind, is much more likely to end in failure.

4 - The cardboard housing folding procedure looks ok, at first glance. However, later. Again, the instructions lack clarity of purpose.

5 - The double-stick tape is used to hold the end of the box to the cardboard box. However, the bottom of the housing has a heavy offset label on the cardboard box end not being flat with the flaps, the entire box is mounted out of square which makes the slit no longer square. This is the assembly which will guarantee the slit is square to the camera.


 [PLOTS] Spectrometer - Not Ready for Prime Time - jywarren@gmail.com - Gmail

 <https://mail.google.com/mail/u/0/?ui=2&view=bt&ver=1pxvtfa3uo81z&q=non-funct>



Move to Inbox



More 

However, having a need for a spectrometer, I'm still interested in solving these issues and would appreciate any thoughts, techniques, solutions or links to them.


Perhaps the designer would like to help clarify? That might be the most efficient method.

Thanks, in advance, for any help from the community.

...



**Jeffrey Warren** <[jeff@publiclaboratory.org](mailto:jeff@publiclaboratory.org)>

Mar 19 

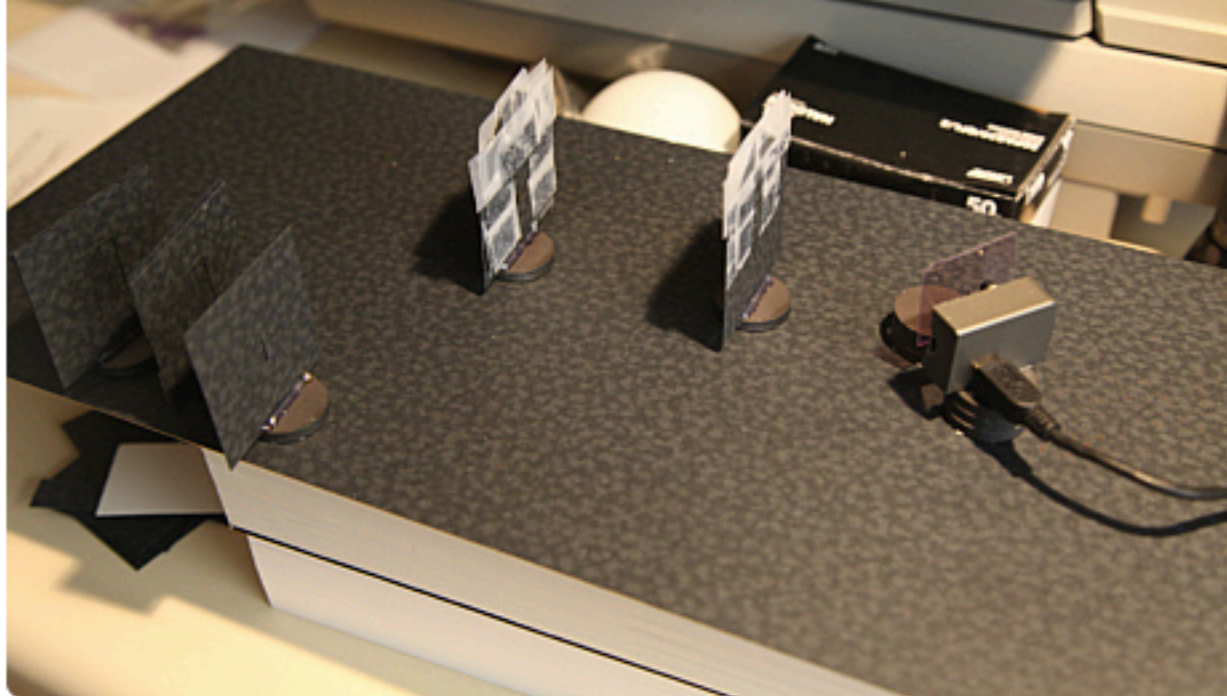


to plots-spectrom., dstoft, bcc: publiclaborato. 

Hi, Dave - it looks like you've just discovered open source hardware -- exciting! Namely: we are a community which [collaboratively develops new technologies](#) based on the contributions of folks like yourself, who are dissatisfied with how things are! The spectrometer (bumping msg to the spectrometry list) is the latest in our effort to improve upon expensive, proprietary tools, and it's great that you're interested in contributing your own expertise. The device is certainly NOT ready for "prime time" -- it's an evolving design -- and we're all doing our best to improve it! Let me suggest some places where you might join us in improving it:

\* Hardware design - luckily, almost all of the issues you highlighted in your email are unimportant to construct a working spectrometer, so once you resolve your software issues, you should have a working device. I do, however, wholeheartedly agree that there is a lack of thorough documentation (if only to reassure folks that they don't have to worry about some of these questions, or to offer more detail to those who are interested in the theory), and some of your suggestions would find a great home in the [Hardware Troubleshooting page](#) or the [Spectrometer FAQ page](#) -- i suggest you add them there!





# Spectrometer focus

Edit

Delete

Spam



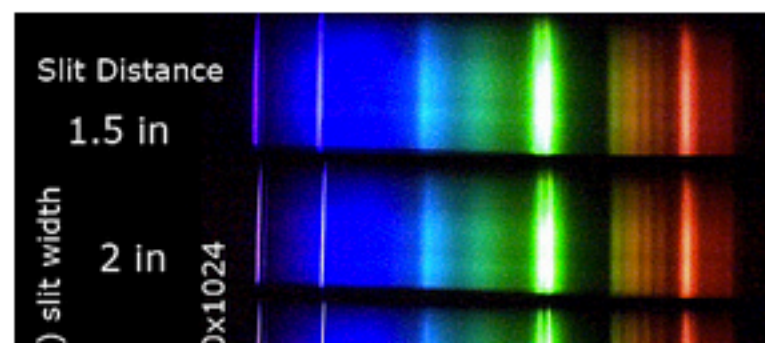
by [stoft](#) | 03 May 20:02



An area of concern for me in rebuilding my spectrometer has been the camera focus. The spectrometer's slit provides pseudo-collimated light so the camera lens should be focused on the slit for best resolution. This is more difficult than it might appear. So, I'm posting two sets of observations:

Setup: - My prototype "bench" setup where I can move components mounted on magnets - movable but stable (what's not shown in the photo is the black cloth cover) - A CFL (EcoSmart 5000k 27W at 5-ft) - A very narrow slit (exacto-blade prototype) - The camera positioned immediately next to the dvd grating - The default Syba camera viewer software with resolution set to 1280x1024

1) First, I used the default technique of the kit to adjust the Syba lens for "9 inches" using room light and small-font text on a card -- the DOF is high so this is very hard to do with any accuracy, so it was just my best guess. Then, I adjusted the slit distance while observing the spectrum. The first attached photo shows that the optimal slit distance for this specific default focus is actually close to 4-inches. This is about double the distance provided by the kit.





Identity





Hacking interactions?



Ask me  
about  
balloon  
mapping.



Public Lab  
**Balloon  
Mapping  
Kit**  
DIY Aerial Photography

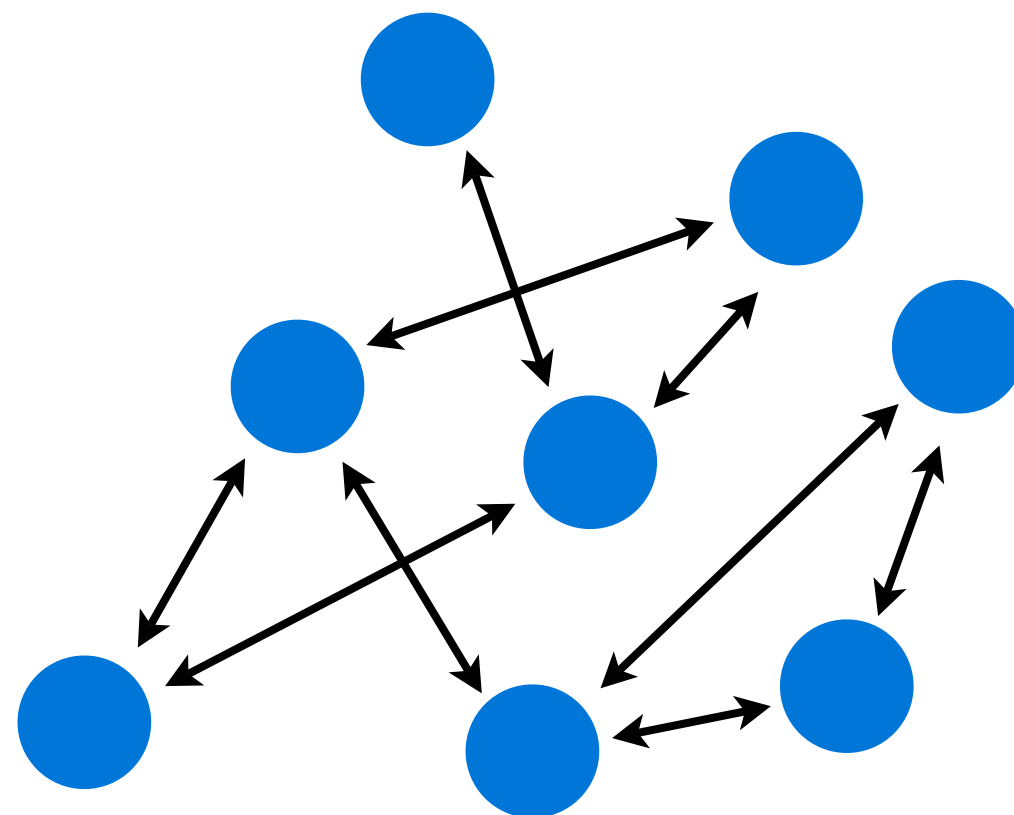
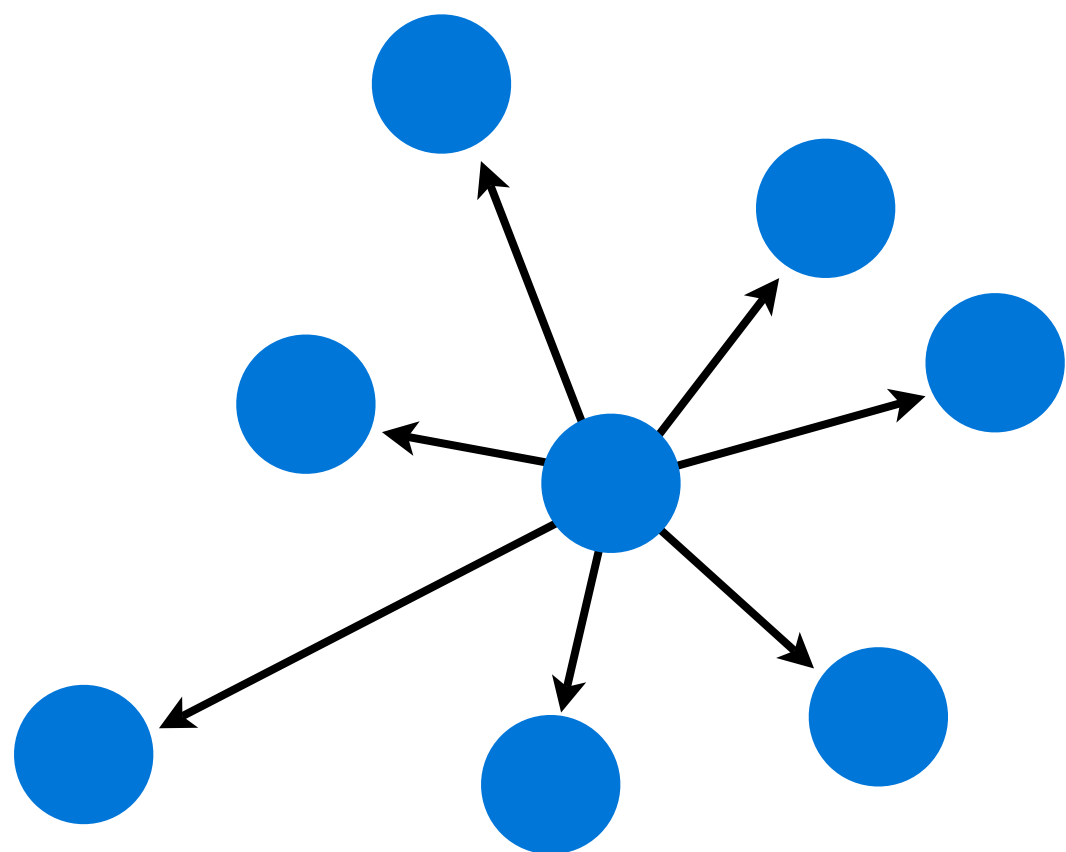








Connecting ~~hardware~~  
people





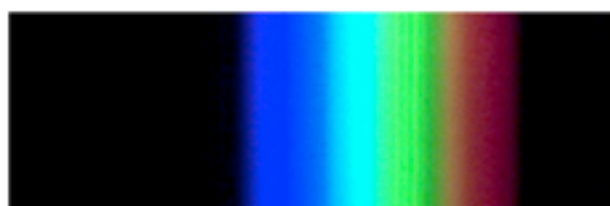
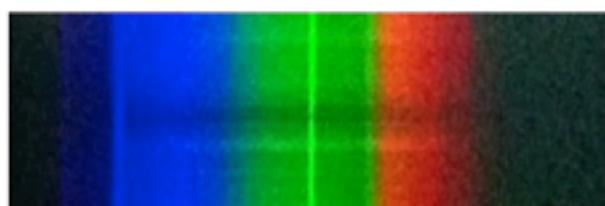
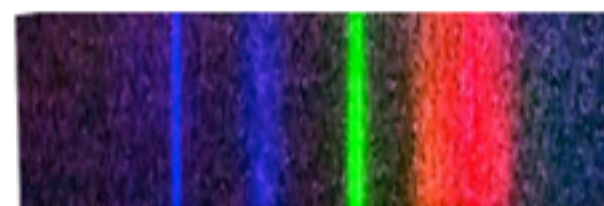
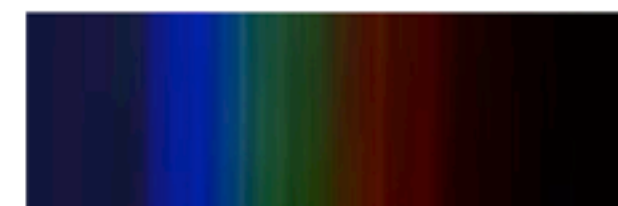
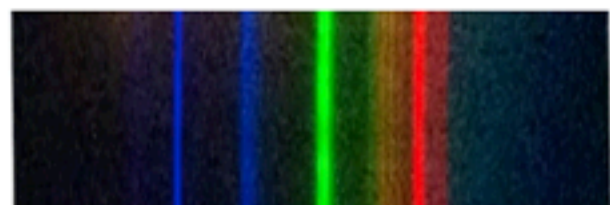
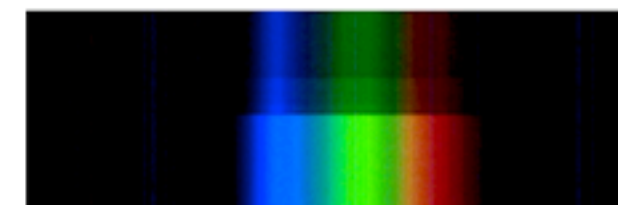


## DIY materials analysis

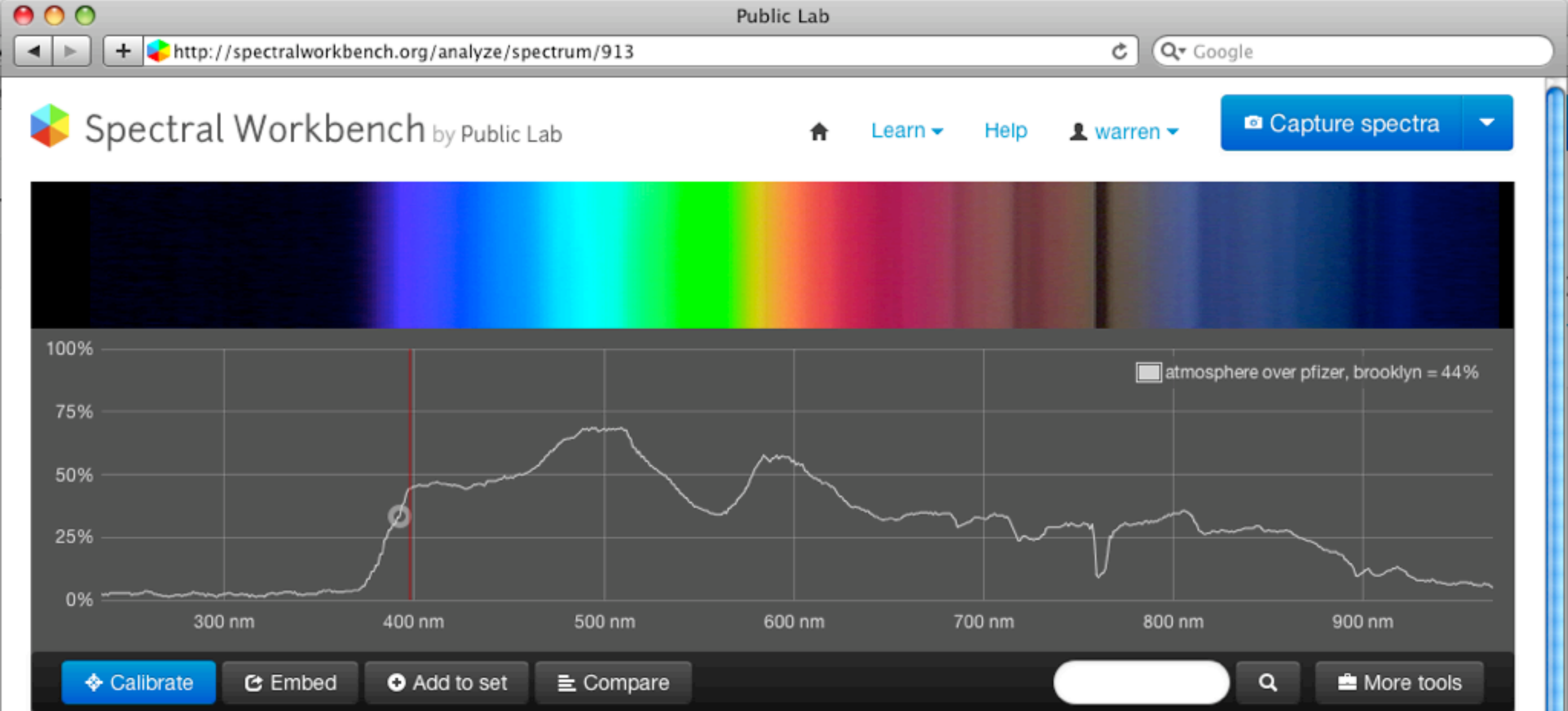
Use a homemade spectrometer to scan different materials, and contribute to an open source database for as little as \$10.

[Build one](#)[Preorder one »](#)

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## Comments (2)

2 months ago, [warren](#) wrote:

[https://en.wikipedia.org/wiki/Fraunhofer\\_lines](https://en.wikipedia.org/wiki/Fraunhofer_lines) Fantastic O2 lines at ~900nm, 760nm and 685nm! 760 especially. The double line at 717 and 725 that we were wondering about seems to be H2O according to the graph on Wikipedia: [https://en.wikipedia.org/wiki/File:Spectrum\\_of\\_blue\\_sky.svg](https://en.wikipedia.org/wiki/File:Spectrum_of_blue_sky.svg) I think that if it weren't as overexposed in the blue-green region we'd have gotten some of those lines as well.

[Delete](#)

about 1 month ago, [Fernando](#) wrote:

By the way, the spectrum you took looks really interesting! You can see the Oxygen absorption around 760nm quite well. Although there is a whole world of information in the IR which is not present, where you can see CO2, water vapour and other greenhouse gases: <http://www.stellarnet-inc.com/images/solar%20image%20200-2400nm.gif>

[Delete](#)



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## cfastie 451 research notes and wiki edits | Admin

The ecology and history of forests and landscapes, and new ways to see these things. High-resolution stitched images of vegetation, including low elevation aerial photography. Enlightening communities about where they live by revealing new perspectives on their environment.

Research

Comments

Liked (5)

MapKnitter maps

Joined over 1 year ago



### FungalFest

by cfastie | about 9 hours ago | 1 | 51 views | 0

It's been a damp summer, and last week was wet. So there are mushrooms popping up everywhere. The...

[Read more »](#)



### LEAFFEST project

by cfastie | 2 days ago | 0 | 113 views | 0

Image above: Marzano tomatoes, RGB and infrablue.



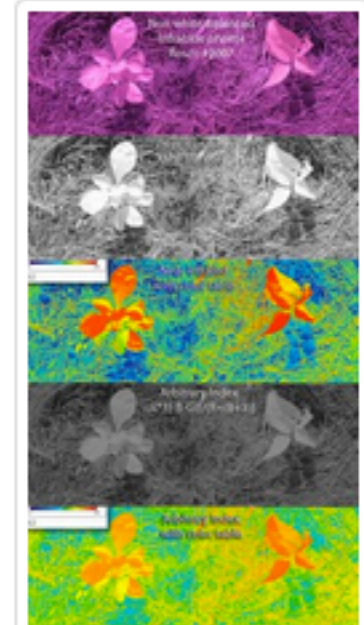
### LEAFFEST 2013

by cfastie | 6 days ago | 0 | 284 views | 0

Image above: I don't have any photos from the first week of September, so please interpolate betw...

[Read more »](#)

[near-infrared-camera](#) [kite-mapping](#) [events](#)



### Recover your balance

by cfastie | 15 days ago | 2 | 277 views | 1

Greg asked about getting useful information from

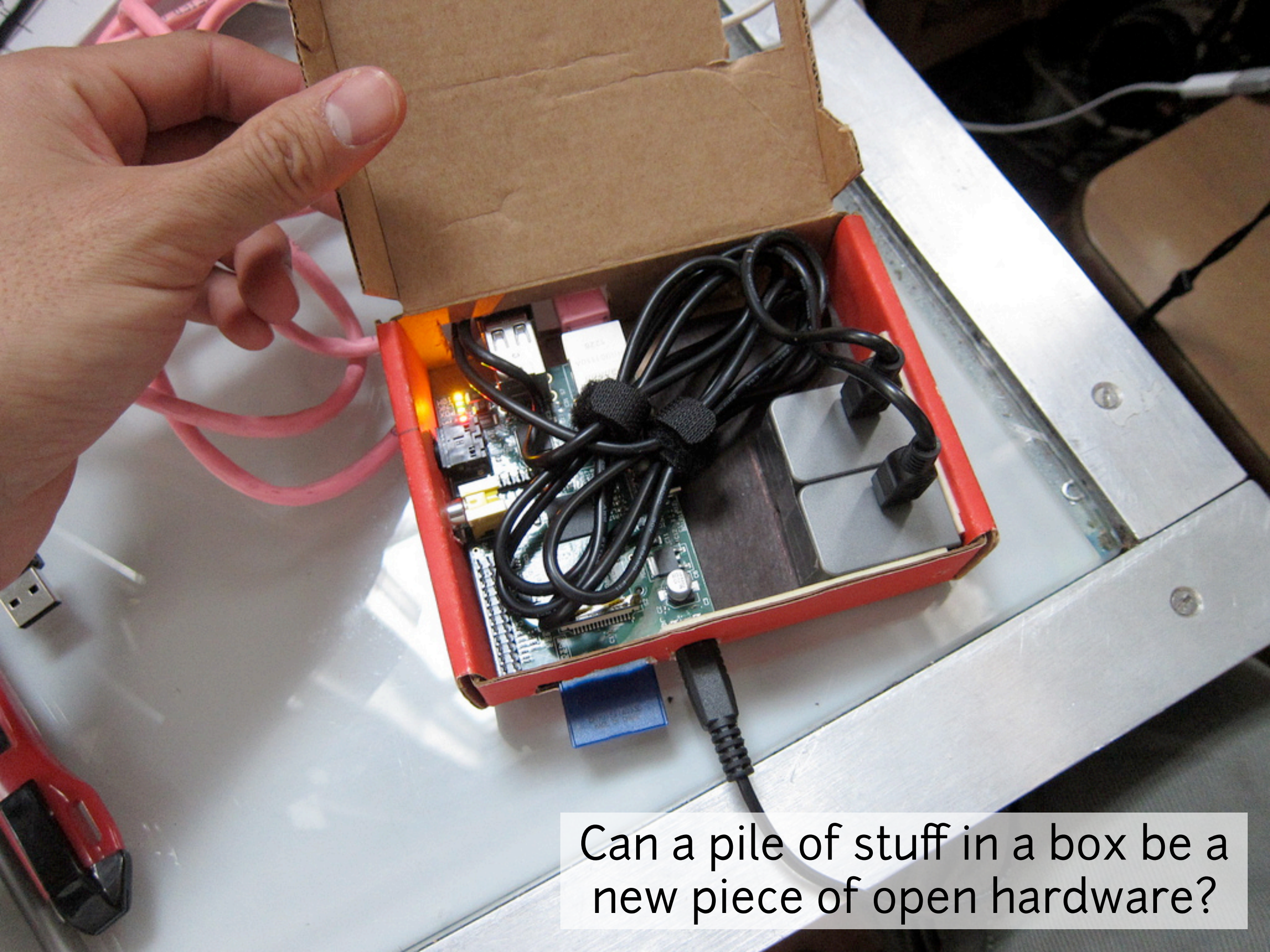
Scale & black boxing



TRICORDER

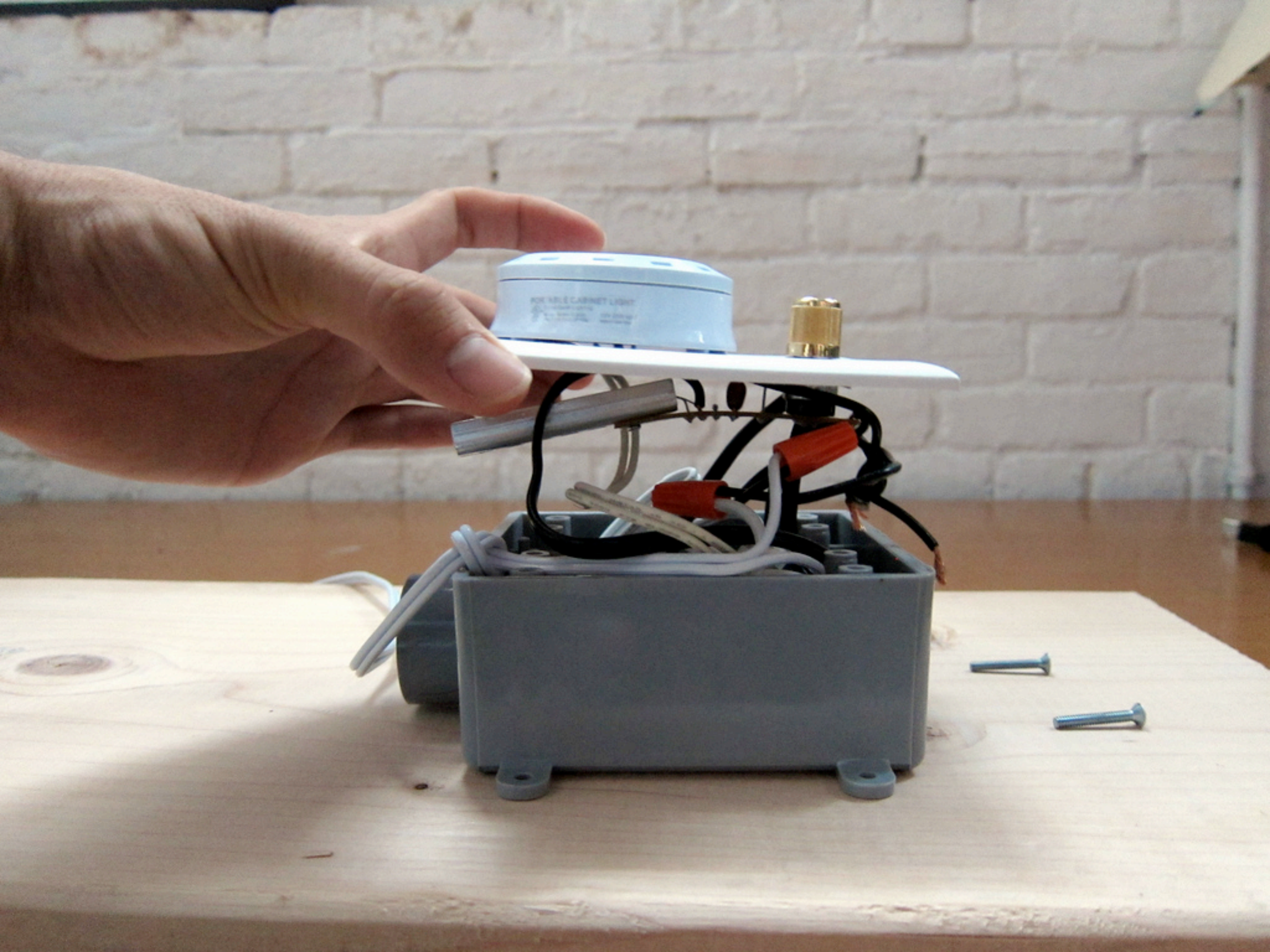




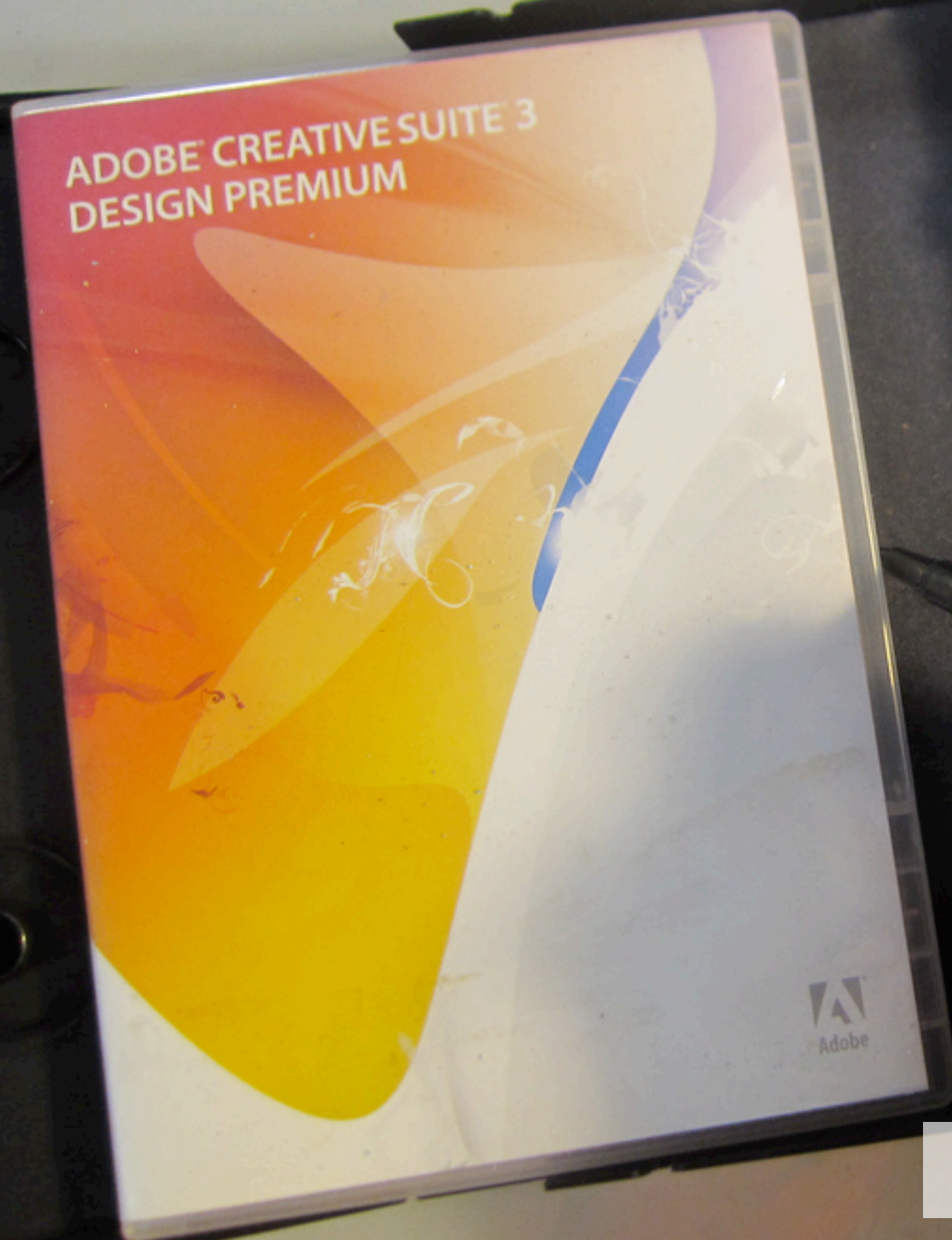


Can a pile of stuff in a box be a new piece of open hardware?









Using proprietary software









Designing for one-off and/or mass manufacturing



# Open Hardware Kit Checklist

- \* Credit contributors
- \* Rely on communal, peer support
- \* Parts list -- on outside of box
- \* Widely available parts
- \* Provide peer network point of contact (forum, etc)

## Intangibles:

- \* Think of how your object/box will make people feel
- \* Help newcomers identify as part of the community
- \* Make your object/box a gateway to that community



# PublicLab.org



This presentation uses the open source font Junction