Weaponizing your Pets

The War Kitteh and the Denial of Service Dog

DefCon

10 August 2014

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Introductions

- Gene Bransfield @gbransfield
- Principle Security Engineer @ Tenacity
- I Love My Job
- They want my job
- They can’t have it

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What is This About?

- Having a humorous idea
- Bringing Ideas to Fruition
- Stories of Triumph and Woe
- Valuable Lessons Learned

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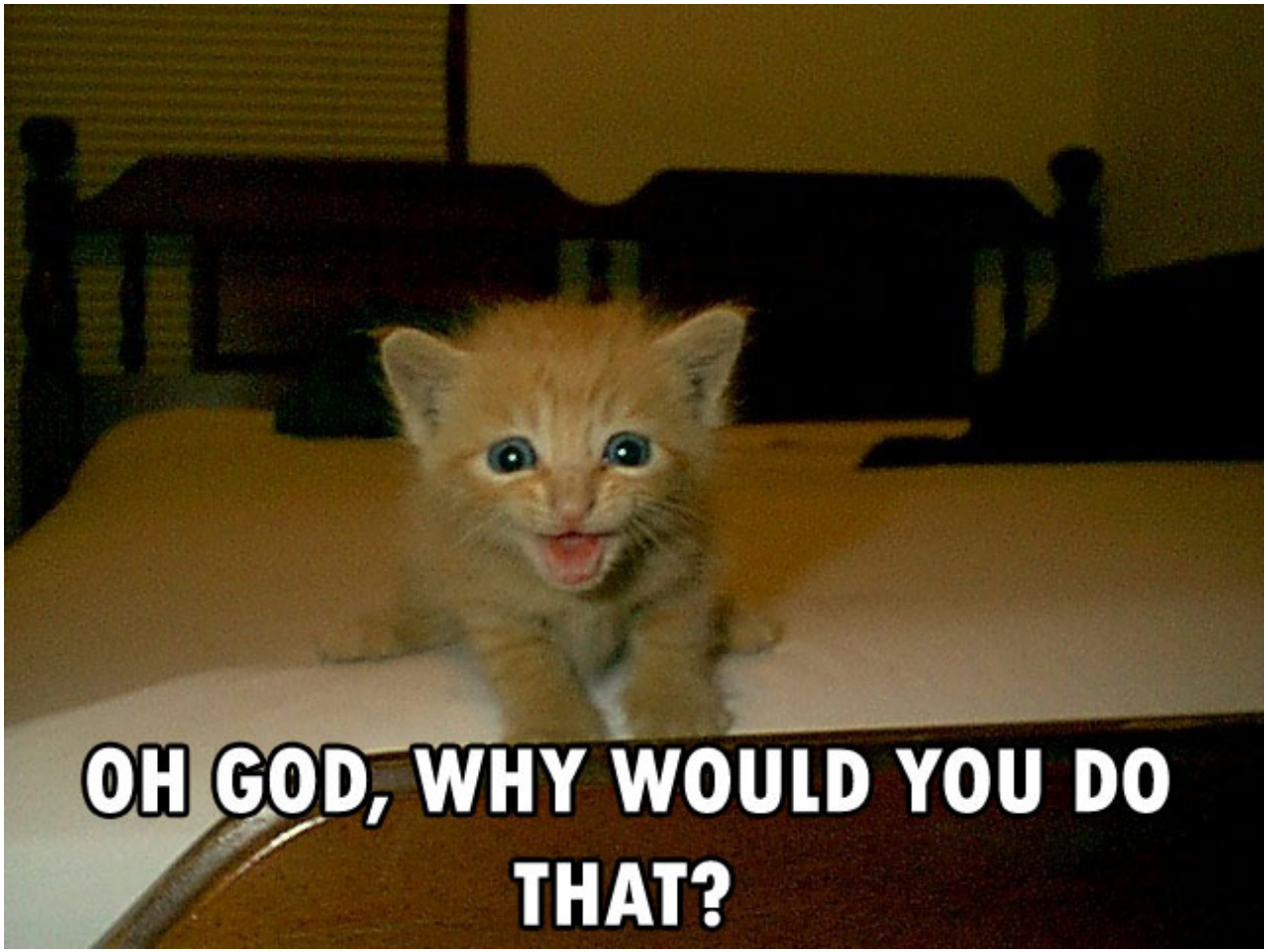
Weaponize your PETS!?!?!



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Background:

- 15% of the world's Internet traffic is dedicated to Cats
- I find most tech briefings boring, so I use pics of cats to help keep people awake

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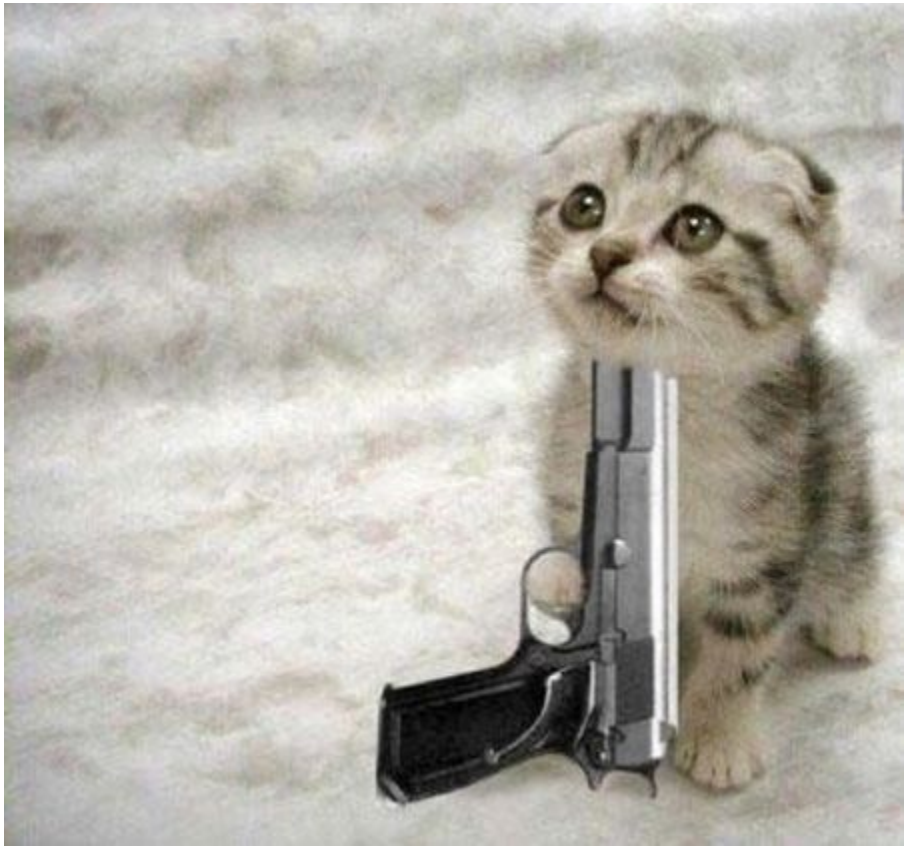
The pic that started it all:



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Just Finished a Presentation…

- Someone told me they were going to give me this tracking collar that they won
  - GPS
  - Cellular
  - Told you where the Kitteh was at all times

- …add a little wifi sniffer and we'd have a WAR KITTEH!!!!

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What about the DoS Dog?

- AT Outerz0ne
- LadyMerlin walked in with a dog wearing a harness that said Denial of Service Dog
- I said “Is there a Pineapple in there?”
  - No, the dog is a pain, but that’s a geat idea!

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Working Animals

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Bad Ass Working Animals

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Badder Ass Working Animals

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Real Navy Seal

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Flipper Pic

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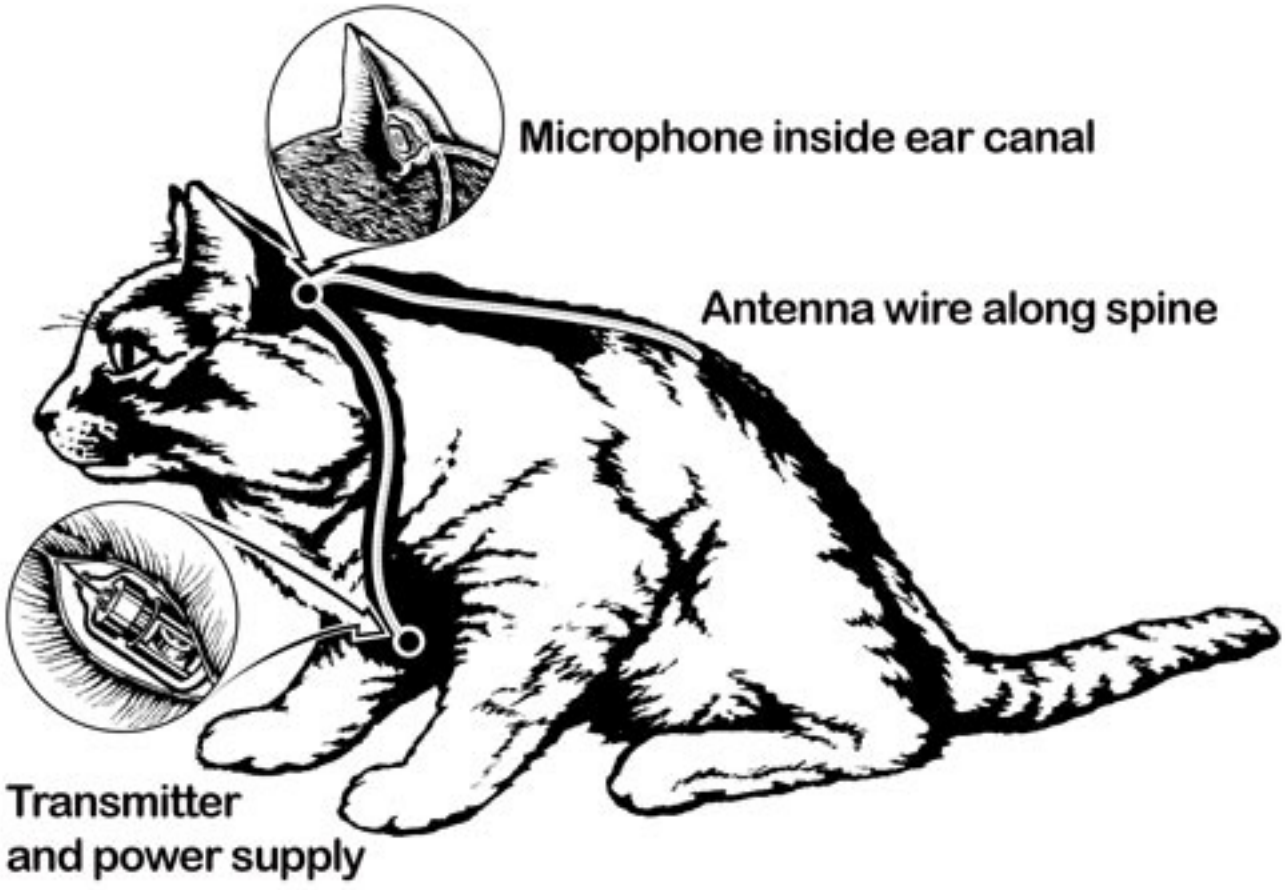
Other Research Efforts

- Accoustic Kitty



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MY STUFF -- Requirements

- War Kitteh Requirements:

- CONOP: Put a collar/harness on a cat and allow said feline to roam the neighborhood normally. The collar/harness shall contain a GPS tracking device and a wireless sniffer/scanner. We'll be looking to map WiFi Access points similar to war driving.
  - 0.) CAT SHALL NOT BE HARMED
  - 1.) Cat shall be able to comfortably wear stuff and should not be harmed by said stuff or by wearing said stuff
  - 2.) GPS shall record waypoints with associated date/time stamp for collection post-walkabout (e.g. when the cat returns).
    - a.) optionally, solution to provide on-demand locational data as well so we can find a lost kitteh or kitteh harness
  - 3.) WiFi sniffer scanner shall sync time with GPS device and collect wifi SSIDs and other WiFi-related signals for later Analysis

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Other Products

- Mr Lee Cat Cam
  - http://www.mr-lee-catcam.de
- Pet Tracker
  - http://www.pettracker.com
- Garmin
  - https://buy.garmin.com/

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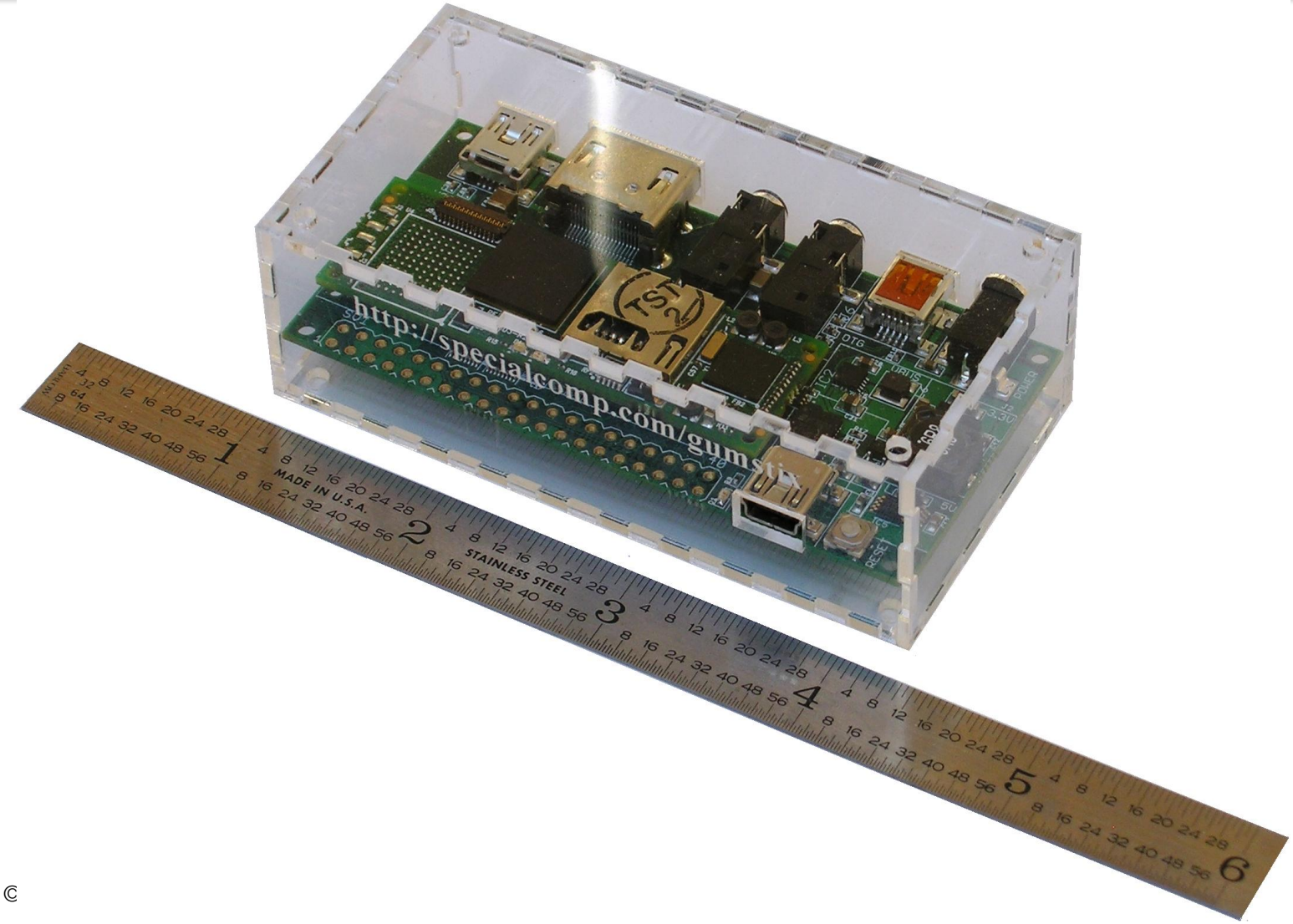
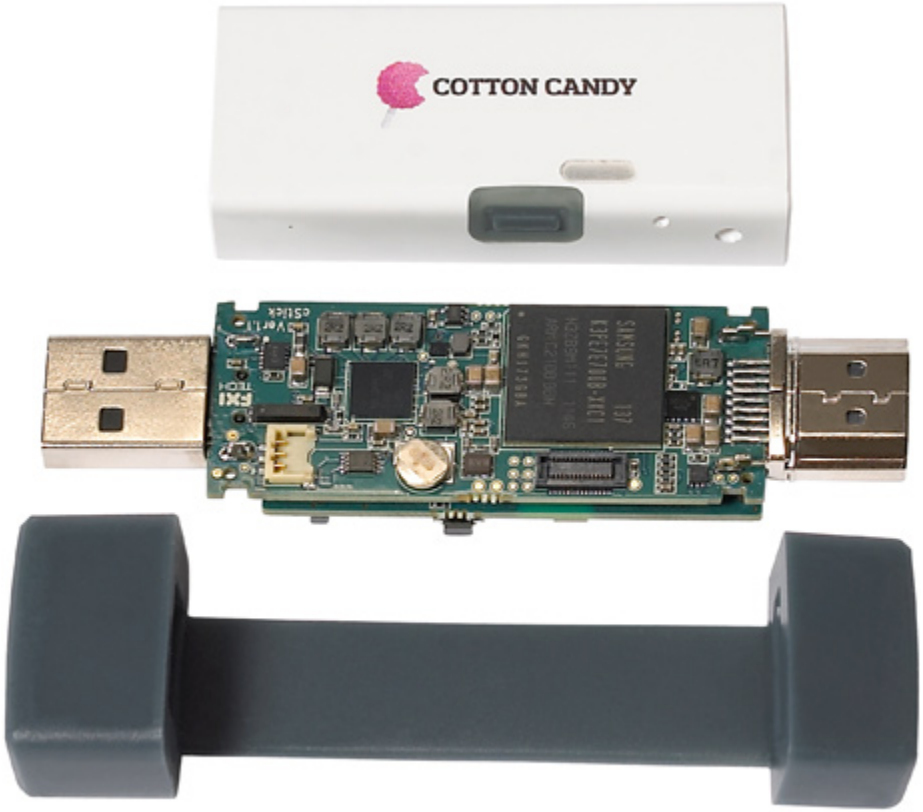
GumStix



Cotton Candy



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RockChip 3066

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Thinking about it…

- Small form factor
- GPS
- Wifi
- Cellular

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How ‘bout a Cell Phone?

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Now make an APK!?!?

- Need to code a wifi war driving
- Let's do some android coding…?
- They already thought of that…

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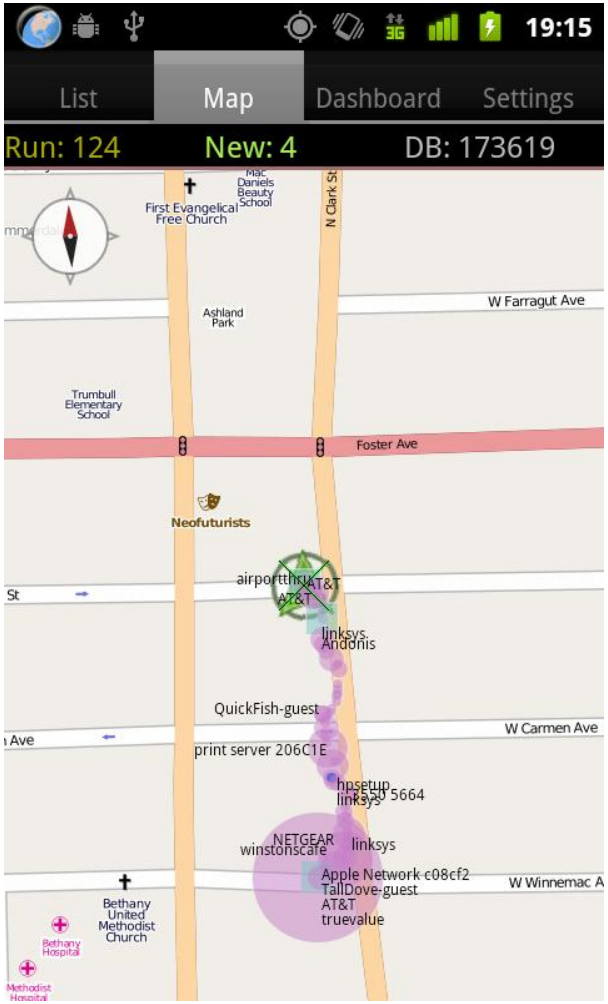
WiGLE WiFi



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Volunteer Cat

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Cat Coat?

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“Cat” Coat

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Plan:

- Put Tech in Coat
- Put Coat on Cat
- Send cat on walkabout
- Recover data when cat returns
- Profit!

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Step 1

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Step 2

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Step 2 cont

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Step 3

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Step… 4?

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…yeah…

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Trying this again….

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Ummm….

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FAIL!

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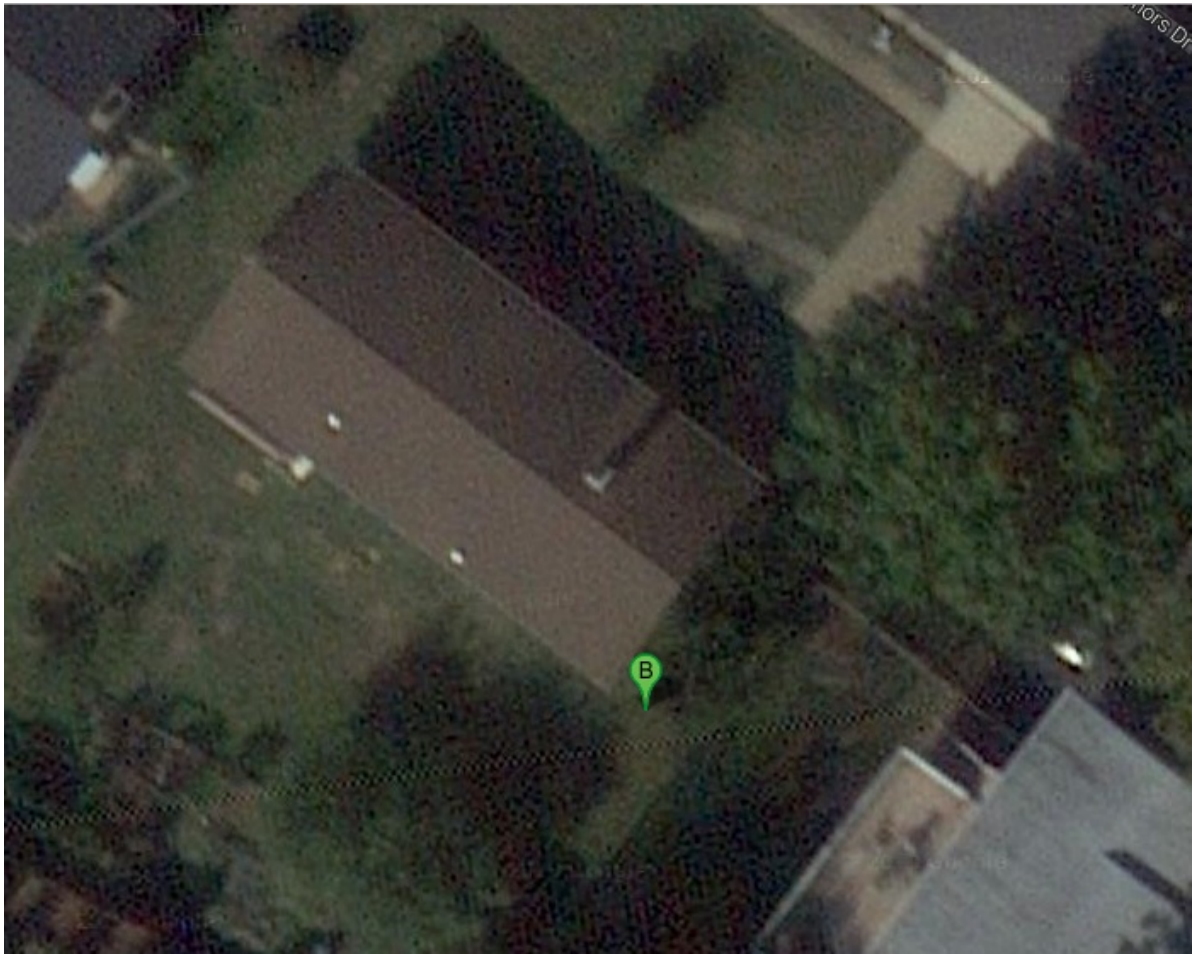
Last Known GPS…?



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Lessons Learned

- Cats are damn hard to work with
- Always test before you send out ‘spensive stuff
- Amazon Prime account
- Worried about cat, so no more coat
- Smaller form factor with same capability

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Talked to my Friend Bill…

- Hobbiest & Technologist

- What about Arduino
  - Small form factor
  - Low power consumption
  - Does what you need it to do and no more
  - Many chips, variety of solutions

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What is Arduino?

- Arduino is an open-source electronics platform based on easy-to-use hardware and software. It's intended for anyone making interactive projects.
- Lots of expansion boards of “Shields”
- Make robots, remote control cars, home security products, etc.

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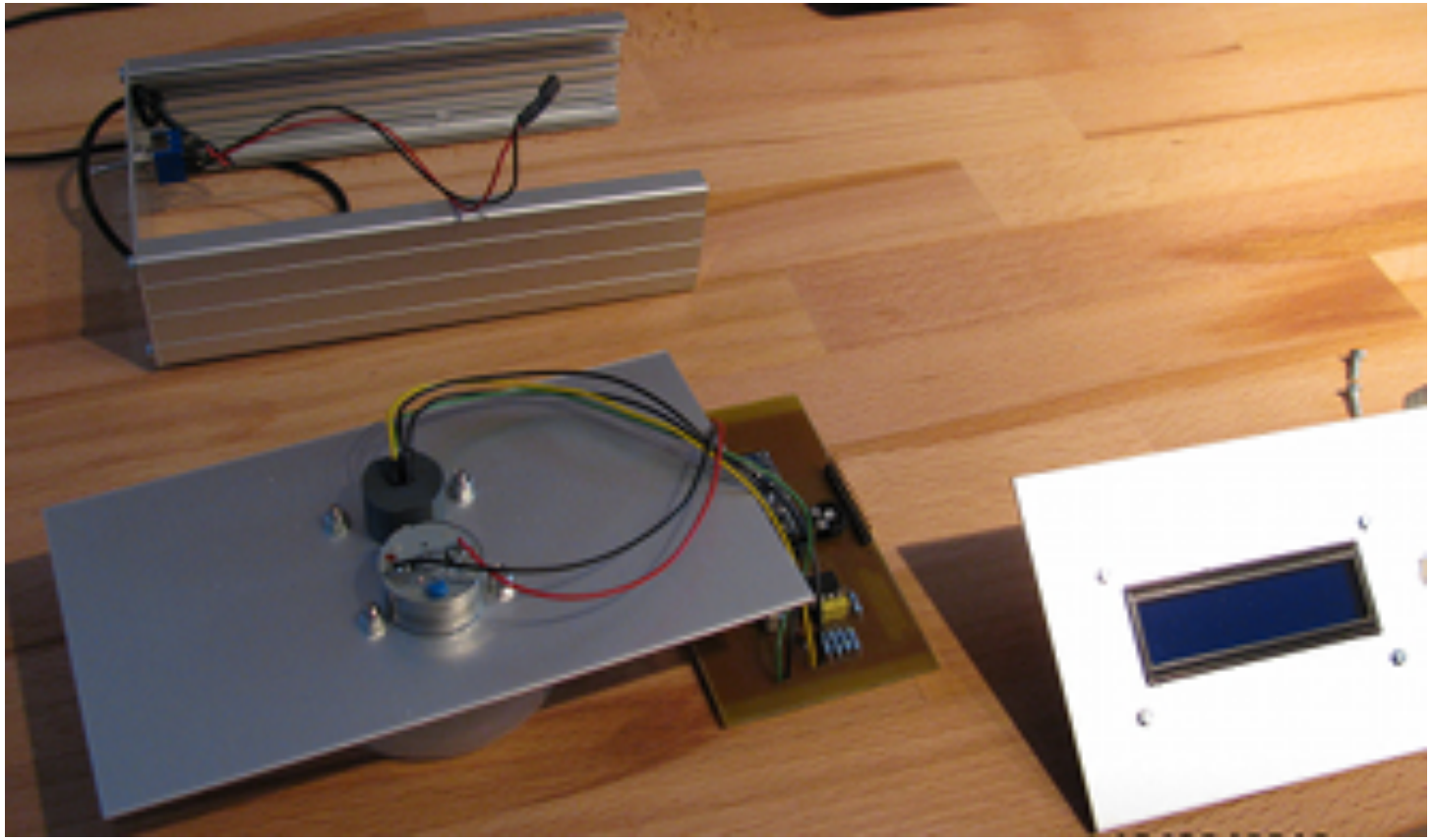
Freezer check



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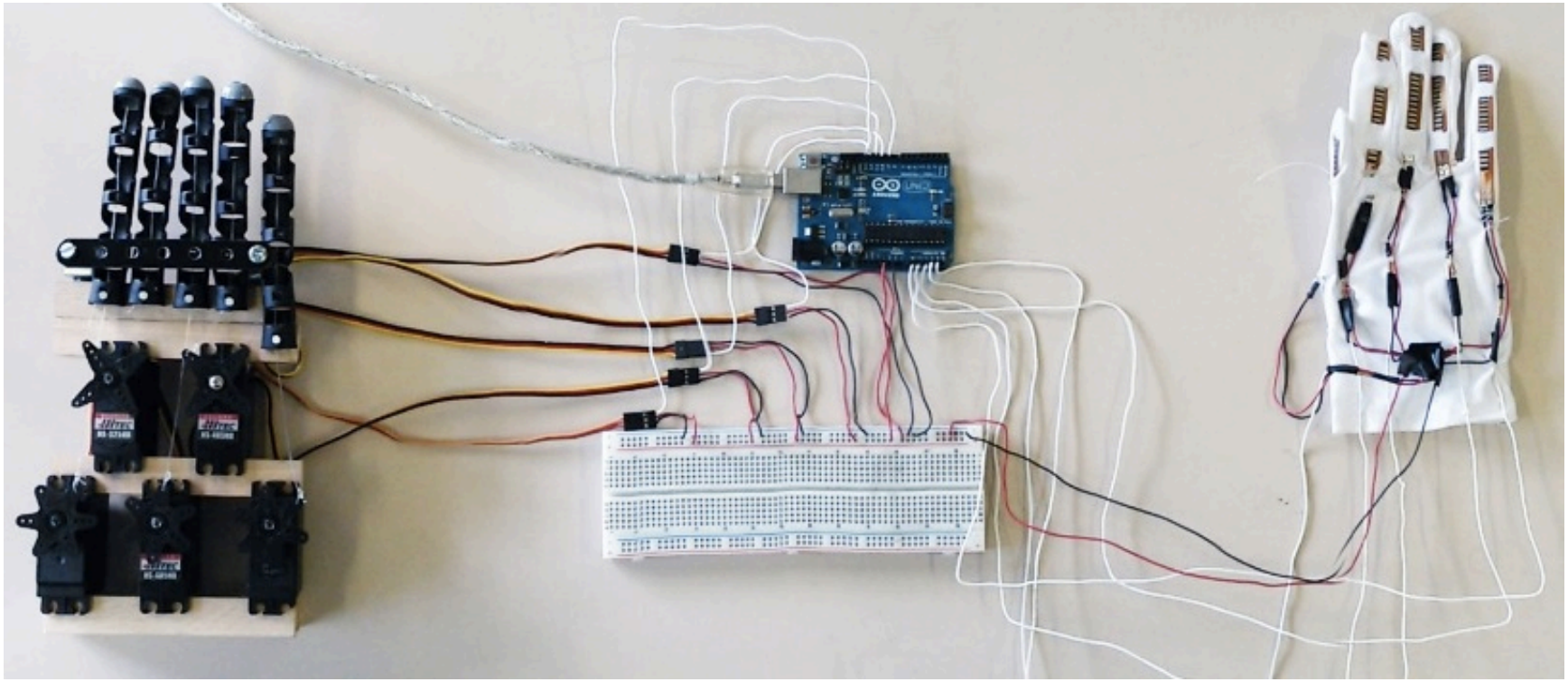
Robotic Hand



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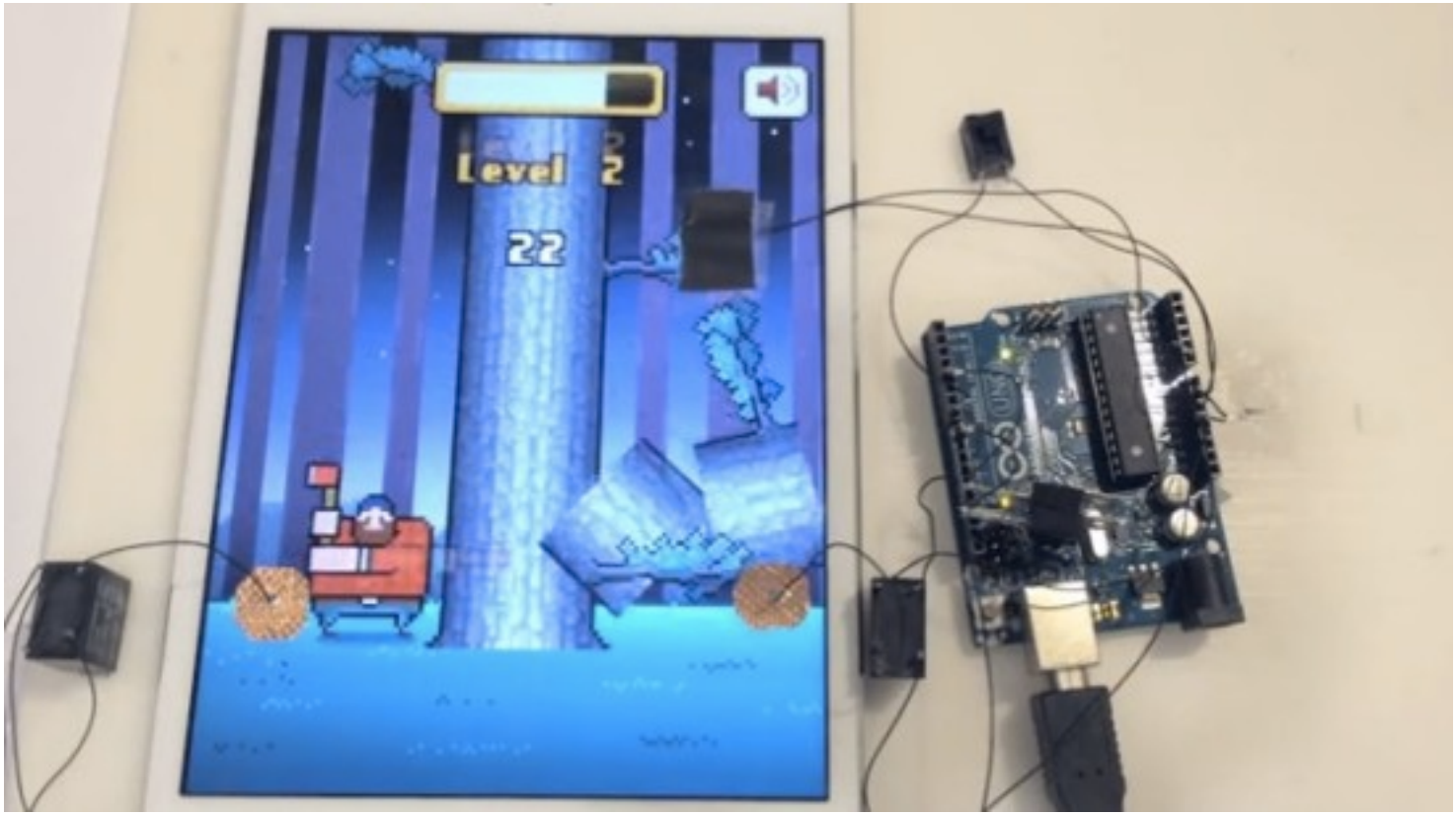
Video Games



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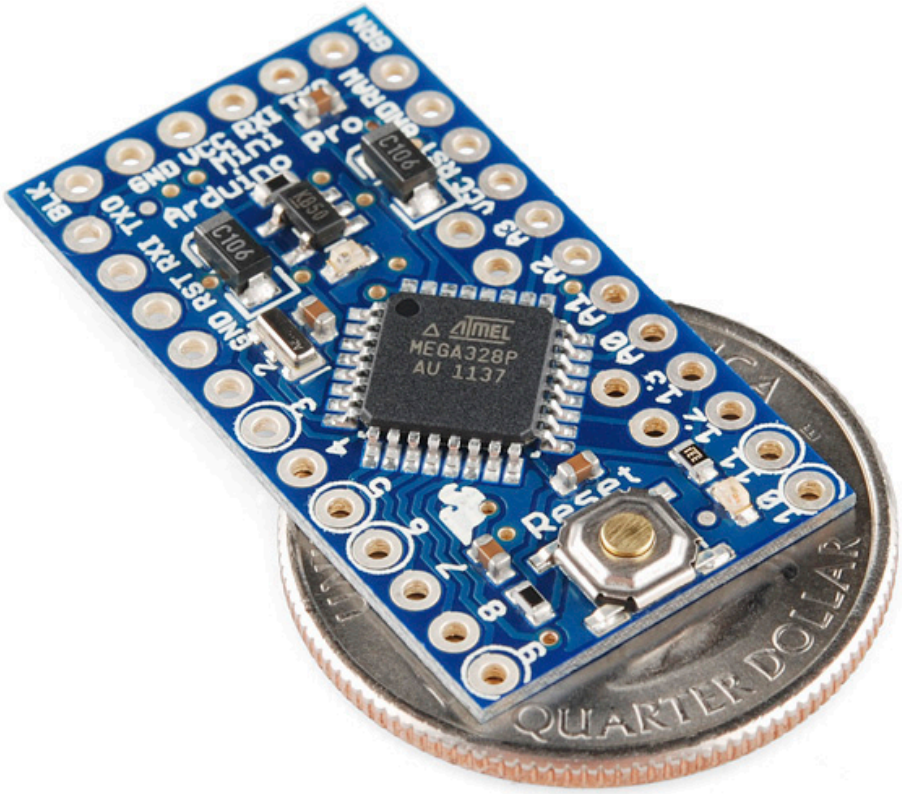
Small Form Factor…

- Arduino Mini…



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Good News… Bad News…

- Good News!
  - Open Source
  - Inexpensive
- Bad News!
  - Poorly Documented
  - Takes forever to get to you
  - Questionable performance…

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Well I Never…

- Done Anything with Arduino
- Worked with firmware/small chip sets
- Not a professional coder…
- Soldered

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Don’t Worry

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Plan…

1.) Learn about Arduino

-- Get some basic stuff

2.) Decide on most accommodating form factor for WarKitteh

3.) Put it all together in a collar FTW

4.) Do some stuff with DoS Dog…

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Learning Arduino…

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Basic Stuff…

- Arduino Uno

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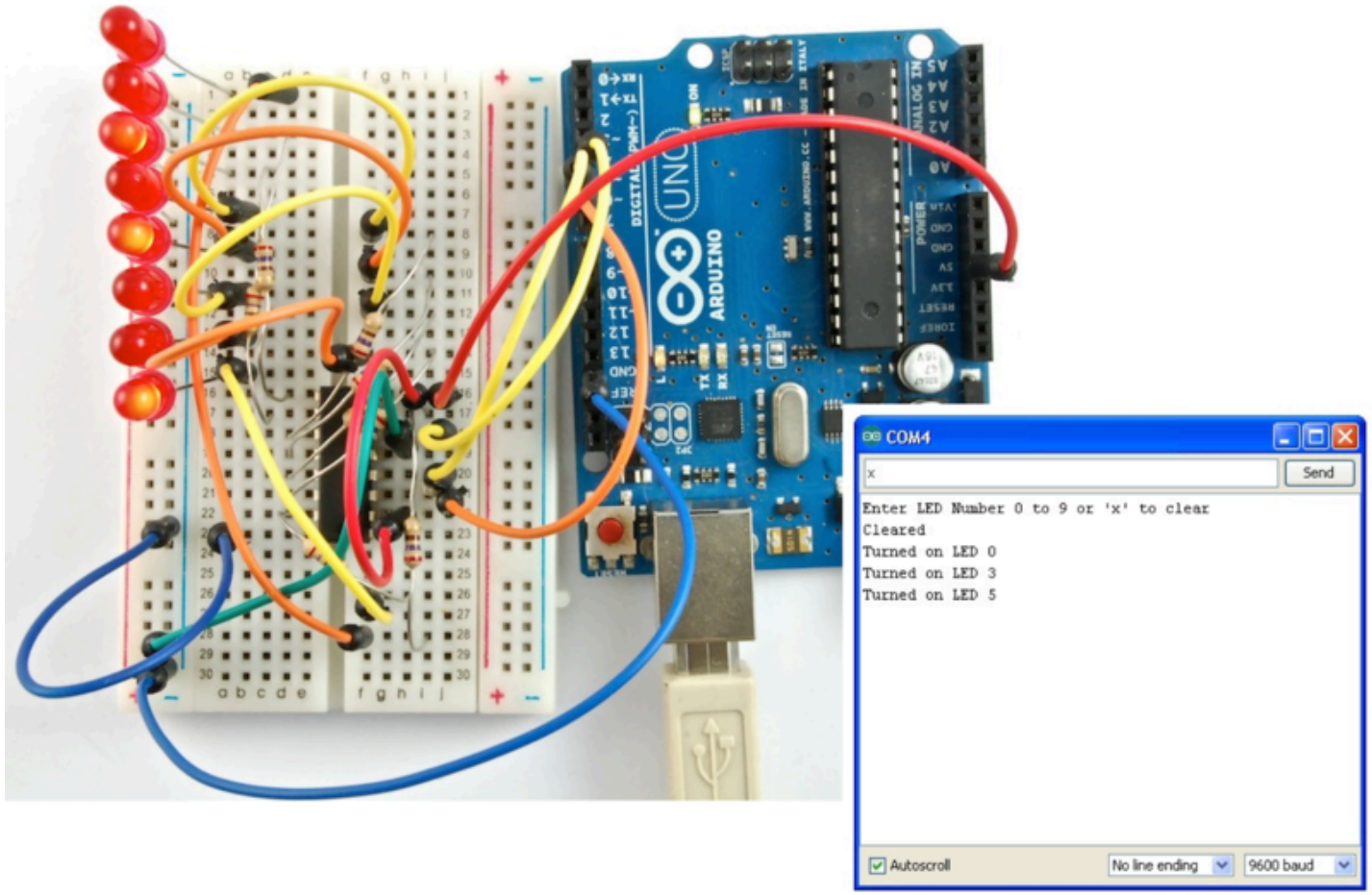
Flashy Things…



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Cooler Stuff!

- I need software libraries for WiFi
  - They got it!
- I need software libraries for GPS
  - They got it!
- I need software libraries for SD card stuff
  - They got it!!

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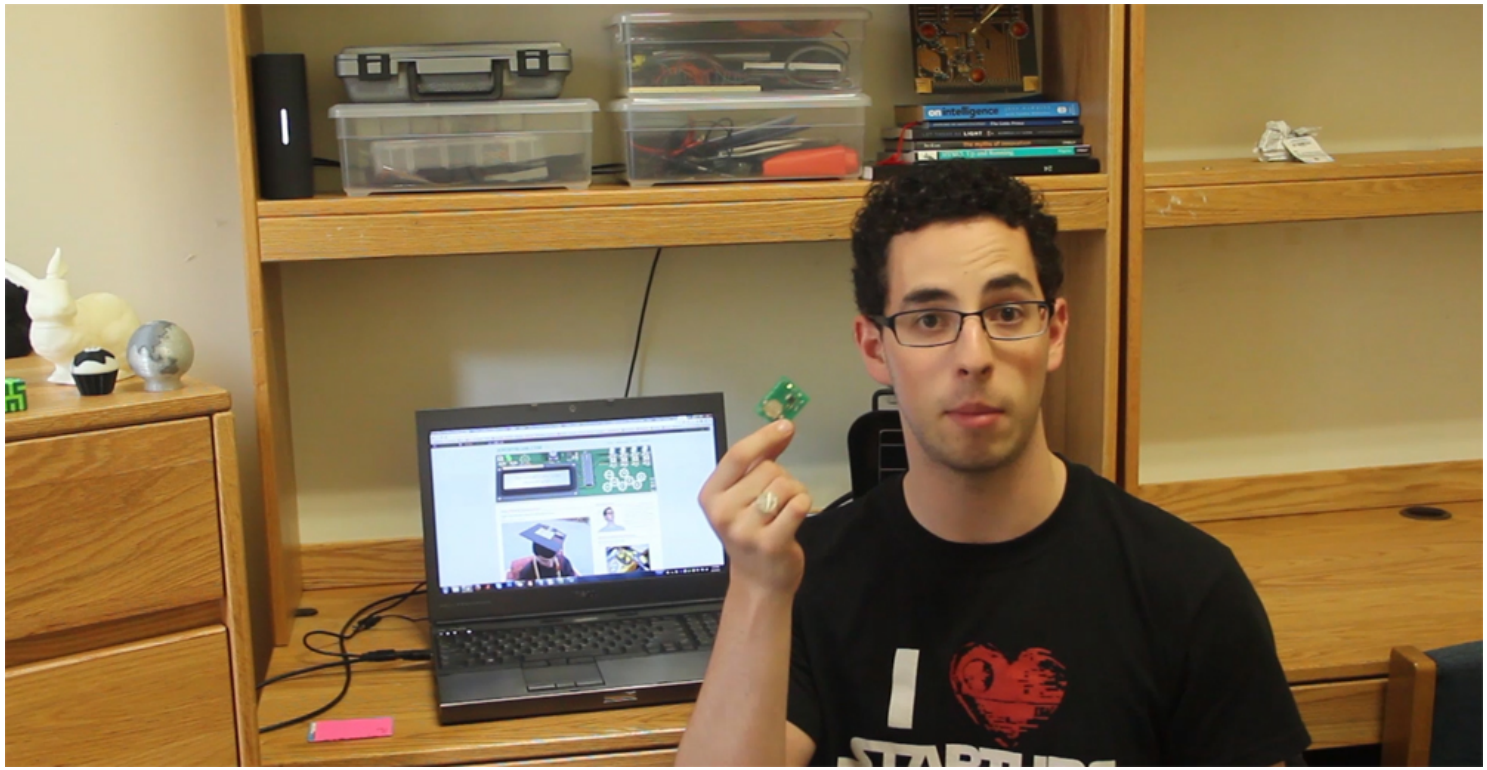
Shout Out…

- Jeremy Blum Videos
  - Jeremyblum.com



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I r a Expert!

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So I got…

- Arduino WiFi Shield

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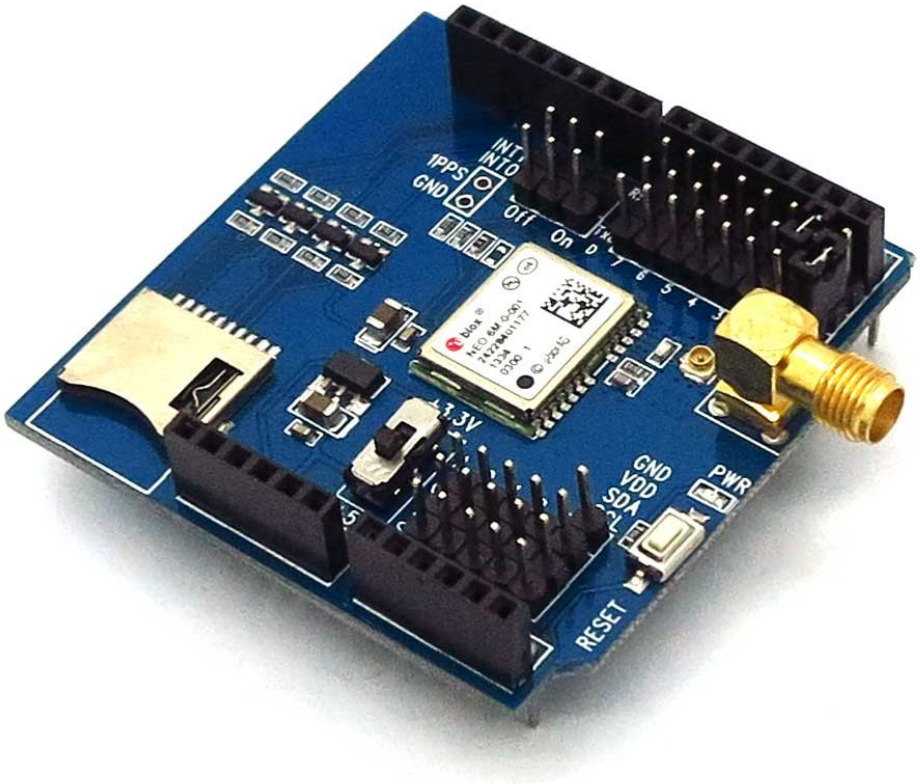
And Finally…

- Itead Studio GPS Shield



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The plan…

- Get a WiFi collection function
  - Write to SD Card
- Get a GPS tracker
  - Write to SD card
- Combine

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WiFi Shield

- Set up was easy
- Drivers worked
- Messing around with parameters and variables and
- VICTORY!!!

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EASY!!!

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A bit about GPS

- NMEA string
  - National Maratime Electronics Association

    $GPGGA,123519,4807.038,N,01131.000,E,1,08,0.9,545.4,M,46.9,M,,*47

- Boot process
  - Start up
    - Where am I…?
  - Listen to SPACE
  - Get a lock (at least 3 satellites)
    - 2-15 minutes!!! (depending on conditions)

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GPS Shield

- Poorly Documented
- No docs in kit
- Searched forever to find baudrate of 34800
- Now I can’t NOT find it

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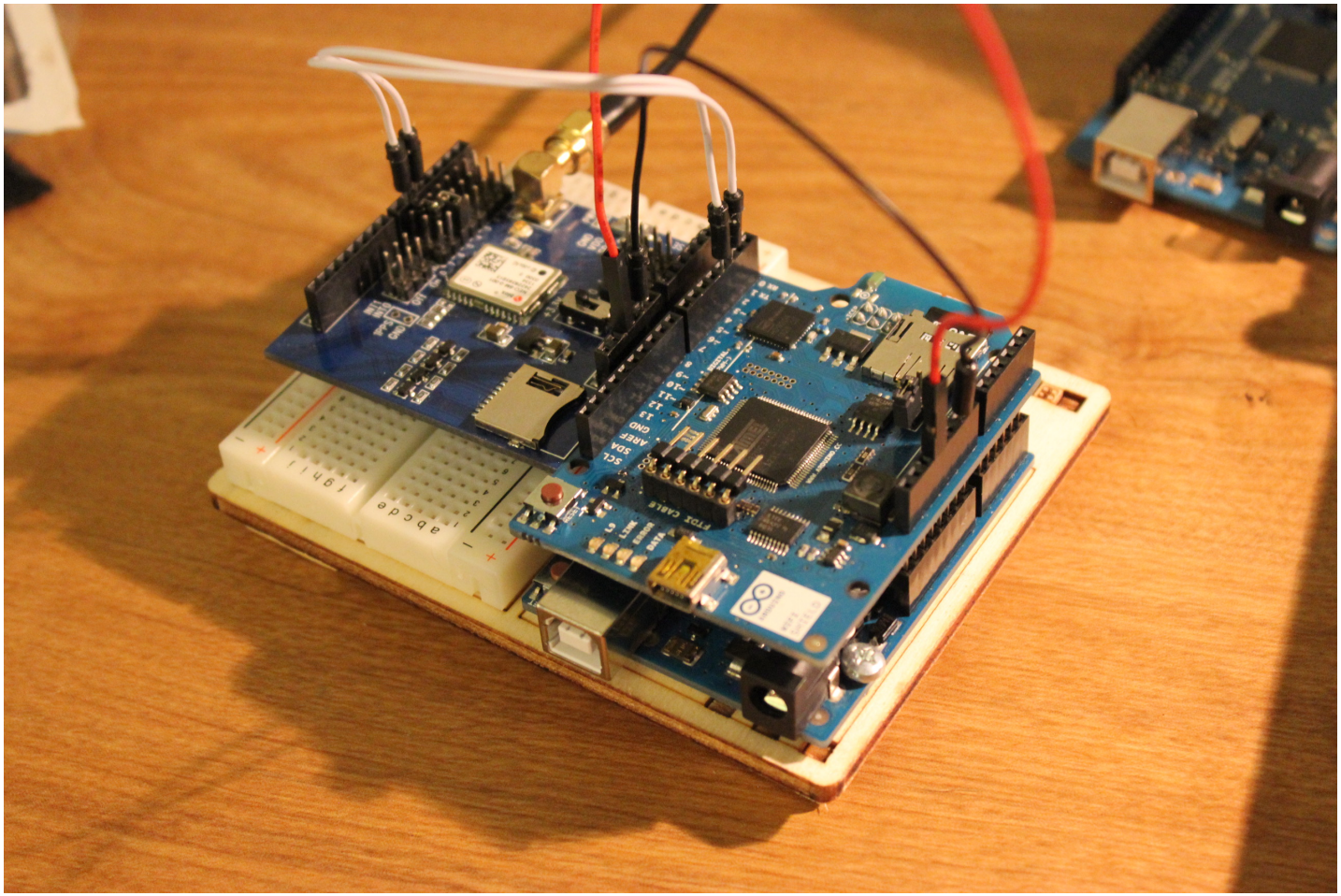
Put all the components together



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So weird error…

- Something about 80% of memory utilized…
- Libraries and variables were too much…
- Arduino Uno – 32K
- Arduino Mega2560 – 256K

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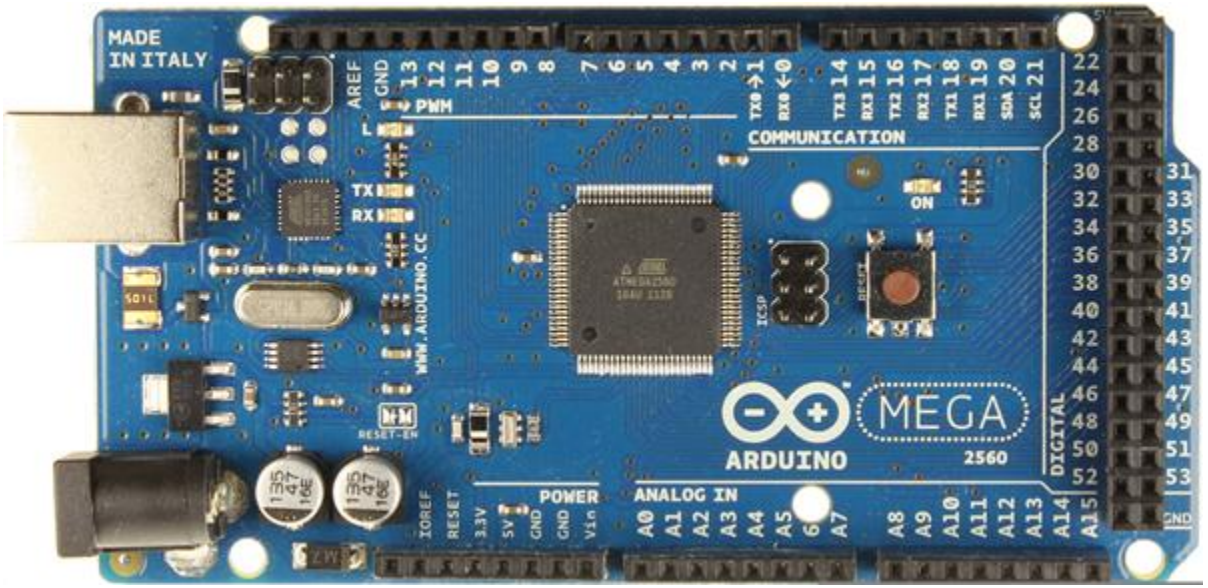
Purchased the Mega…



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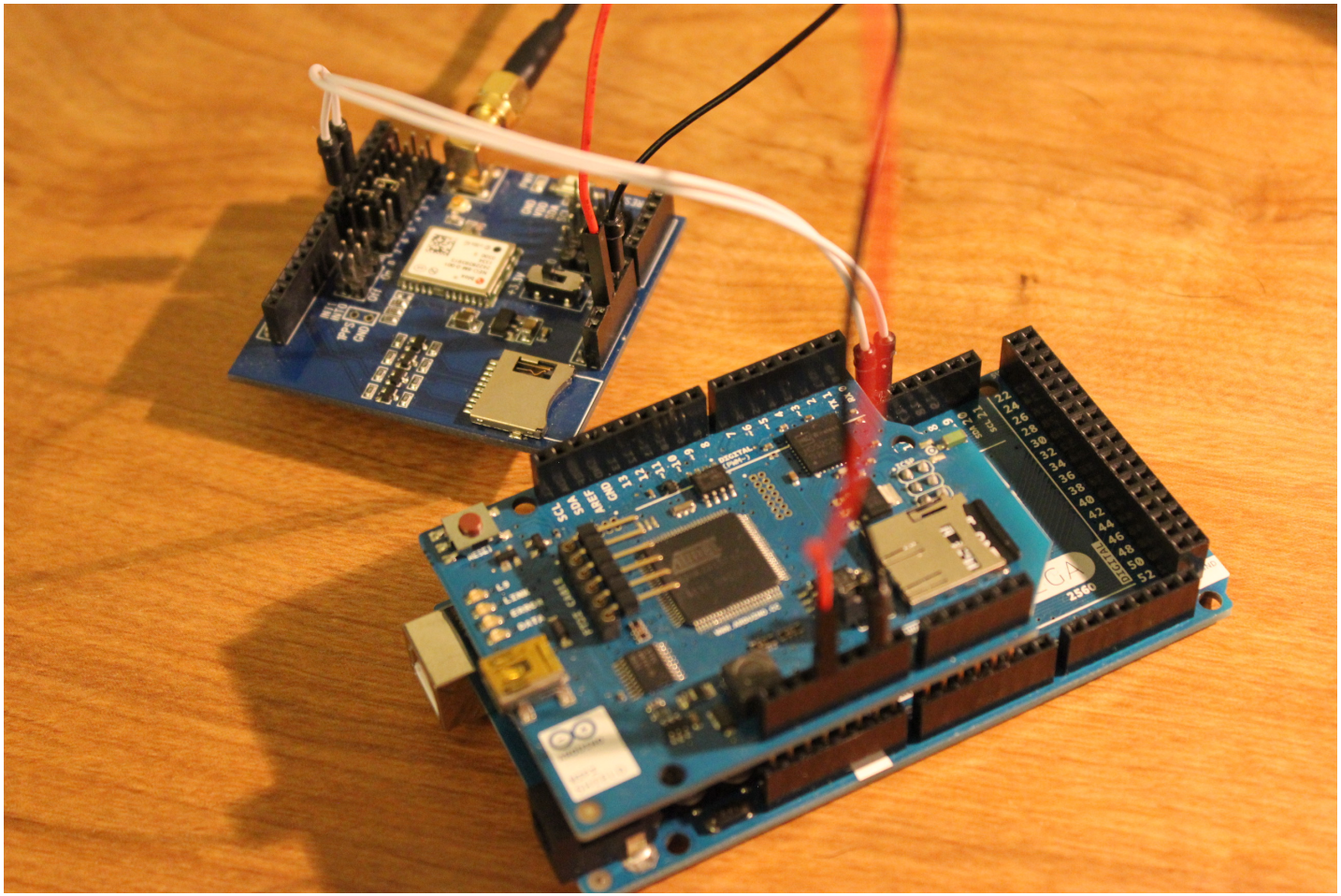
Put THAT all together



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It WORKS!!!

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Arduino Mega2560

- Mo Memory
  - Mo betta
- Mo Ports
  - Mo betta
- Mo Size
  - Not Mo betta

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Tiny Arduino2560?

- Arduino MegaMini from JK Devices

- DON'T DO IT!!!!! more later…

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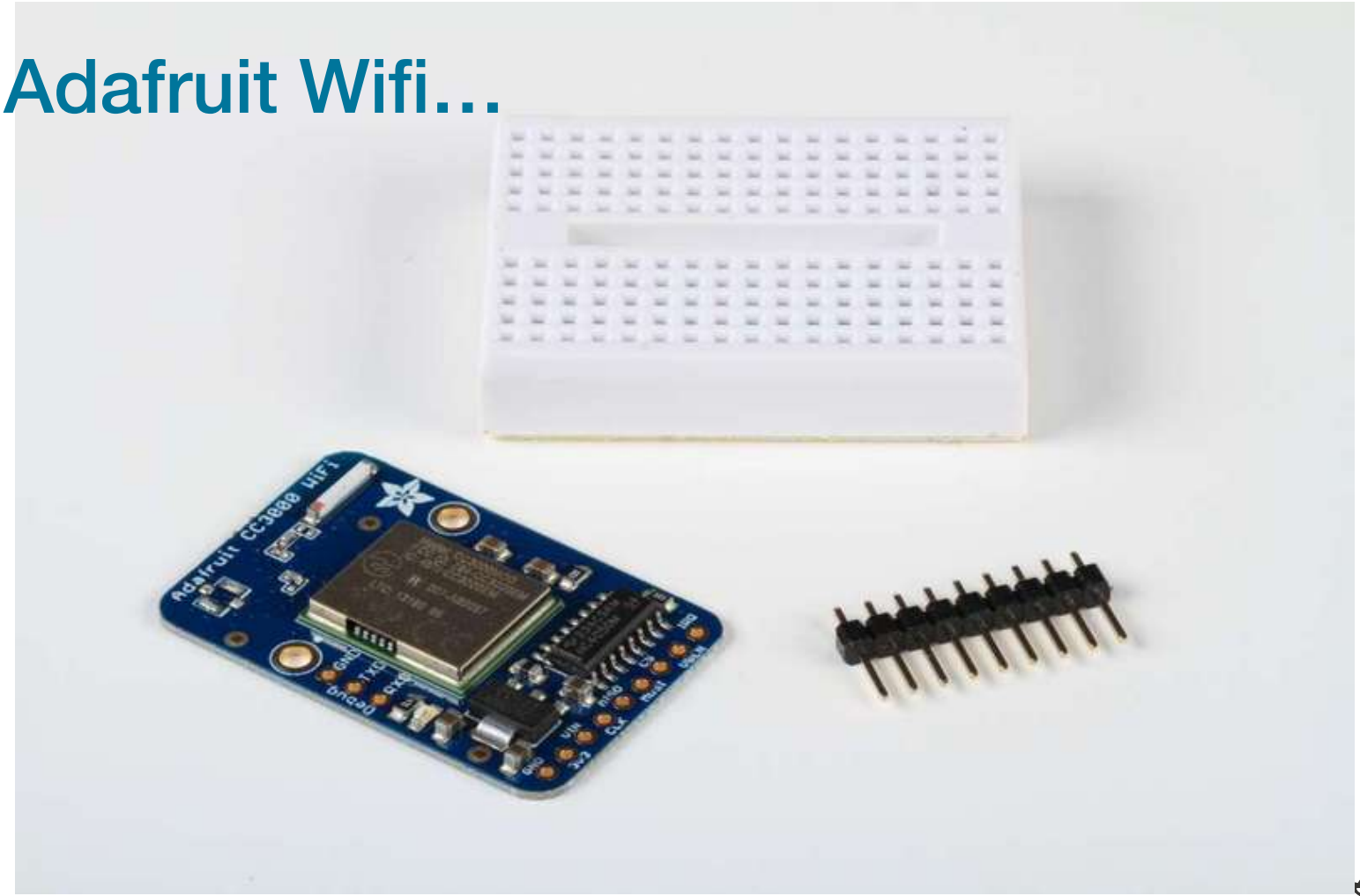
Small Form Factor

- Adafruit Wifi…



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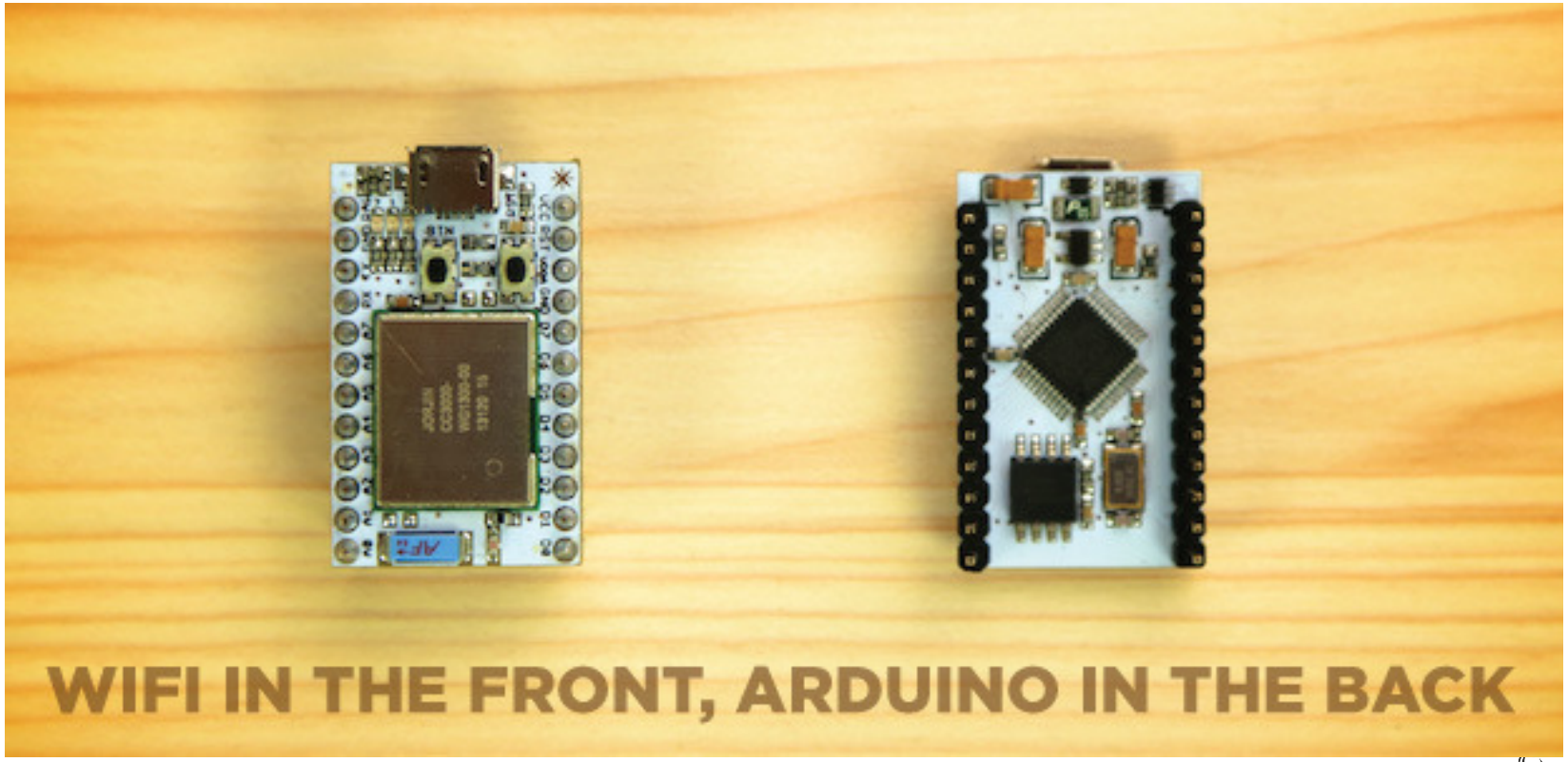
Spark Core

- Spark.io



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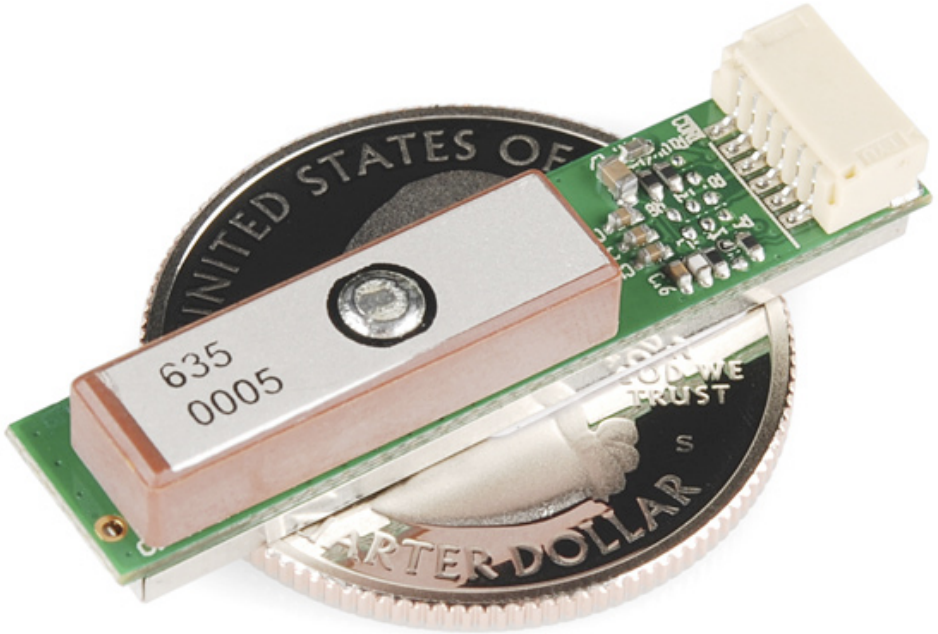
GPS chip

- GP-635T



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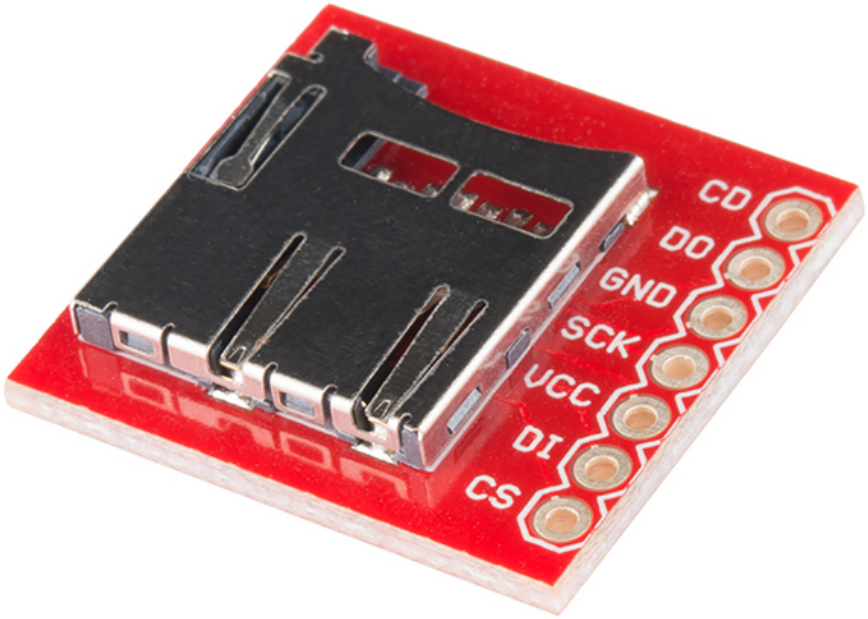
Micro SD Card

- SparkFun MicroSD Breakout Board



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So it works, but…

- MegaMini says it's going to be 4 weeks to ship at least…
- Other solutions are too big (size) or too small (memory)
- Spark.io Spark Core
  - Shipping problem, had to borrow one

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Real Tech on Spark

- ARM 32-bit M3 CPU √
- 128KB Memory (wooHOO!!!) √
- SPI and I2C compliant √
- TI CC3000 WiFi chip √
- "Arduino Compatible" X
  - Worked with external components
  - Coding wouldn't work

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OMG

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Start-up Product

- Starting everything from scratch
  - Didn't have libraries for the stuff I needed
- To spite that, VERY COOL
- Dedicated core group of developers
  - Shout out to peekay123
- Lets see what happens…

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Libraries

- Someone Posted SD Card Libraries to the forums
  - They Compiled!
- Someone posted GPS libraries to the forums…
  - They Compiled & Worked with GPS Shield!

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WiFi Libraries

- …no readily available stuff for what I wanted to do
- Spark is an “Internet of Things” device
- WiFi as a service – not to mess with

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Adafruit FTW!

- Adafruit CC3000 Breakout board
- Libraries available on the Adafruit website for Download
- Messed with it earlier… let's see if it works!

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It WORKS!!!

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So now…

- Got GPS working on Spark
- Got SD compiled on Spark
- Got SSID collection working on Spark
- Now to work with tiny components

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Now, onto soldering

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Rule 1

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Rule 2

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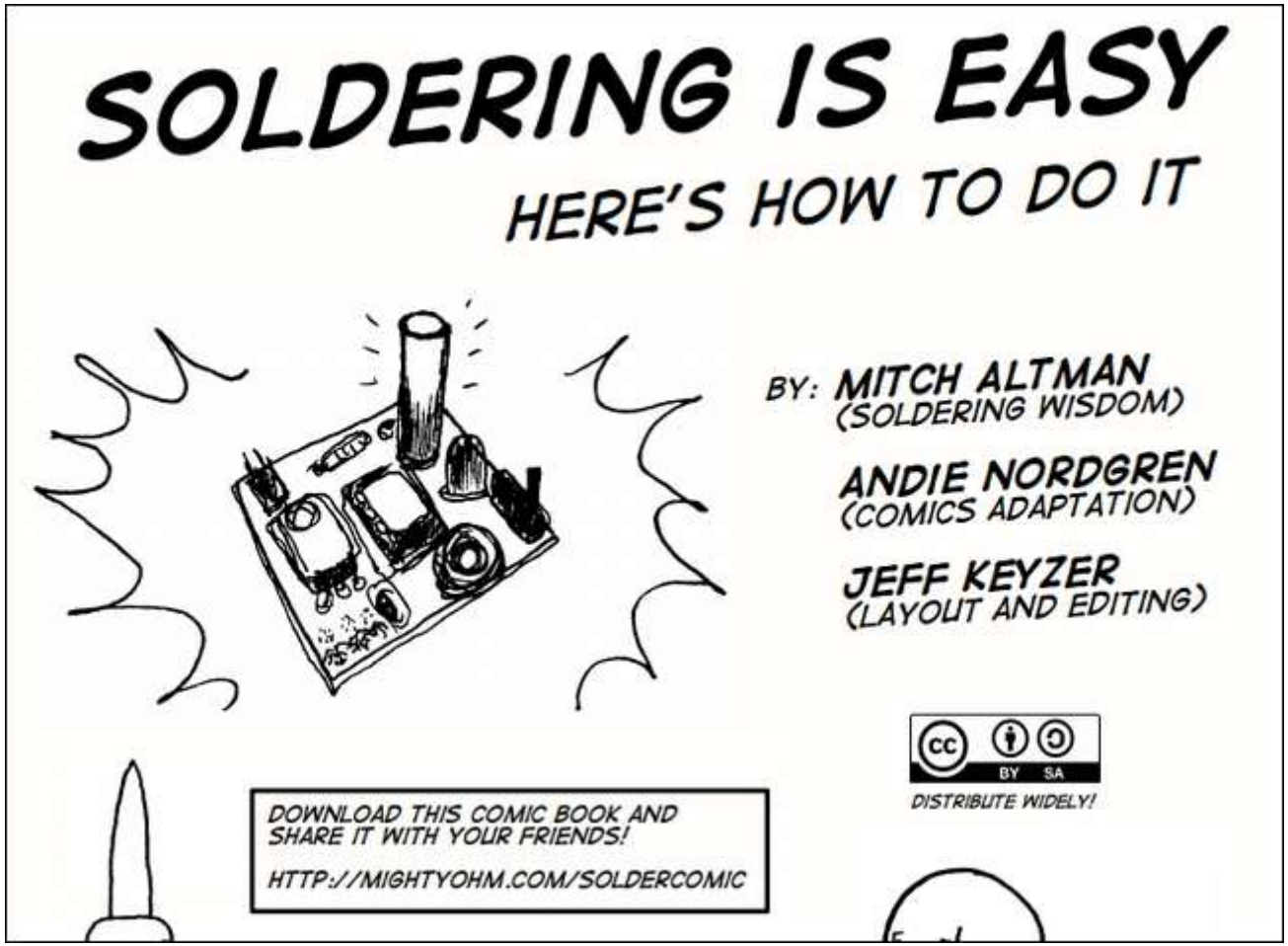
Rule 3



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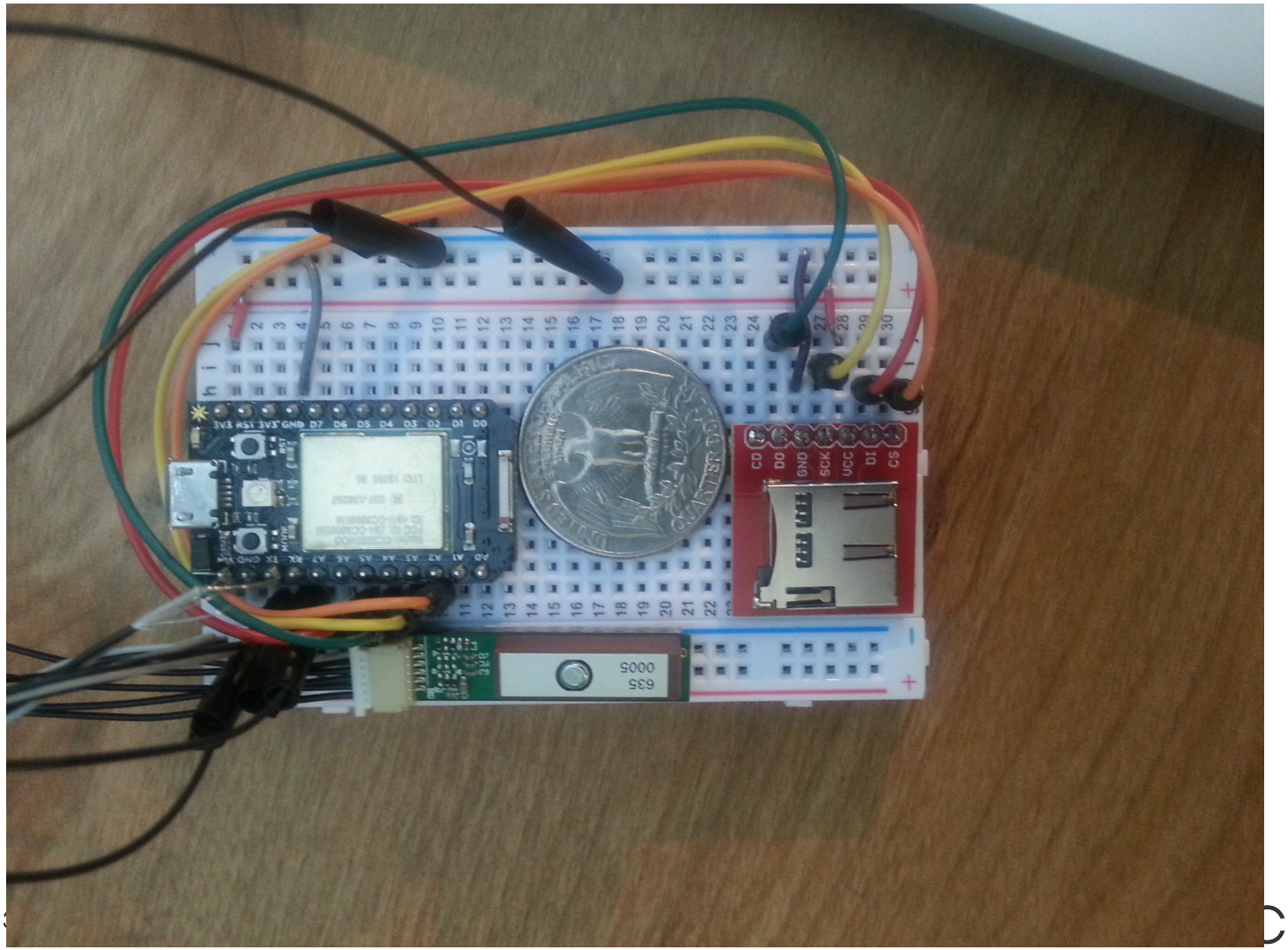
First attempts went very well…



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Testing…

- At home everything went Great!
- Took it out for a walk around the yard and it was great!
- Took it for a ride in the car and FAIL!!!
- What happened…?

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Spark Concept

- Internet of Things device
- Never meant to be disconnected from the Internet
- Encased in a “If status == WIFI_ON” clause
  - Must be connected to a known WAP to return true

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What to do

- Noticed that I could scan SSID's before I associated with the AP
- Removed code from clause
- That's all I need anyway!

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More testing…

- Took it for a drive
- Got Data back!!!!
- Looked at the GPS cords… they were off by about half a mile…
- GPS Libraries were wrong

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TinyGPS++

- LOVE to use TinyGPS++
  - Everything I need
  - Didn't work in Spark
- How to Port Libraries? Talk to Bill
- Rocket Science
  - Replace Arduino with Spark and fix what blows up

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It WORKS!!!

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Next Problem

- Power Consumption
  - How to do it best…?

- Eflite 3.7v 500mAh batteries

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Testing for Power Consumption

- Originally tried cycling everything on and off
  - That really didn't work well
- Put main chip in Deep sleep to save juice
  - Keep GPS chip on
- Collections every 30 sec lasted 4 hours
- Collections every 10 minutes lasted 8 hours

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Time to Make Collar

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Form Factor

- DeSoldering is TWICE as much fun as soldering
  - NOT
- Internet again NOT helpful
- YouTube makes it look TOO easy

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NOVALabs Shout Out

- Reston, VA
- Ted
  - Mad Scientist/Evil Genius
  - Helped me learn EAGLE
- Brian
  - Soldering Tutor
  - Right Iron, Right Solder

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Now… where my Maker's at?

- Need to make a cat collar…
- How do I make a cat collar???
  - Lots of Ways
- Friend Joe suggested ribbons
  - Sew them together

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Ribbon

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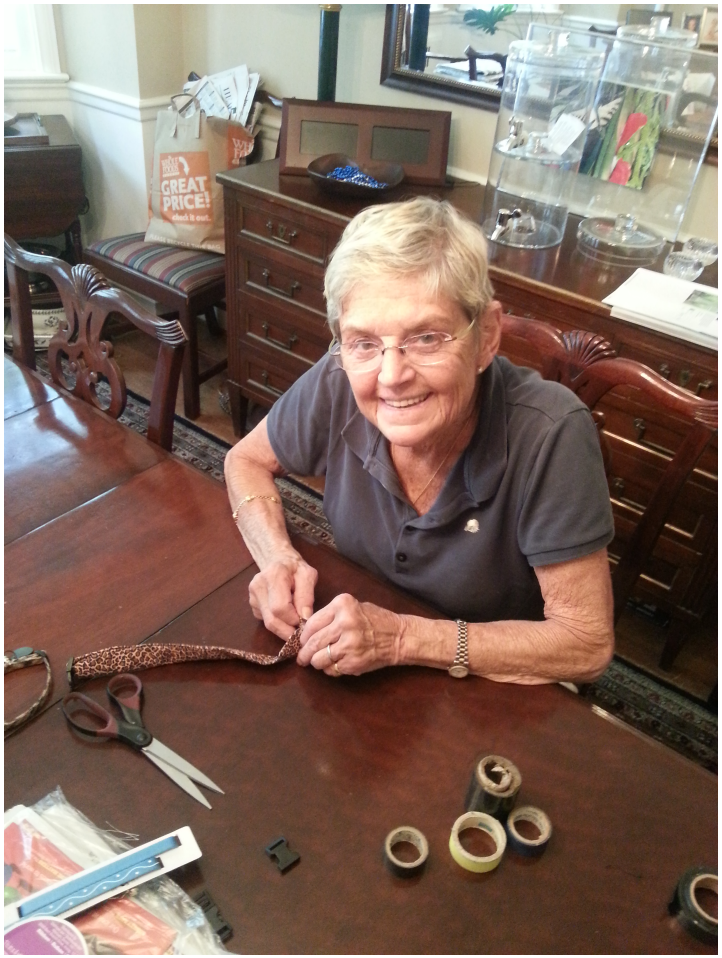
Get a Grandma



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Collar Assembly

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Volunteer Cat

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So let's PRACTICE first..

- Let cat out with no-tech collar and see if he tolerated it…
- HE DID!

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Old Way…

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New Collar

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Weight…

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So… New plan

- Tech goes in the Collar
- Collar goes on the cat…
- Cat goes on a walk about…
- Profit

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Initial results

- …Nothing….!?!?!?!?
- Put collar on cat
- Cat walked under a bush
- Hung out and licked himself for 20 minutes

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New Deployment procedures

- Let collar sit outside for 5-10 min
- Bring cat to collar, put it on cat
- Let cat go for a walk about…
- …profit…!?!?!?????

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SUCCESS!!!!

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Results

Date	Time	Lat	Lon	SSID	Signal	Encrypt
7/4/2014	11:46:31	39.09994	-76.******	walker2	-87	WPA2
7/4/2014	11:46:31	39.09994	-76.******	UDRK2	-92	WEP
7/4/2014	11:46:31	39.09994	-76.******	walker	-83	WPA
7/4/2014	11:46:31	39.09994	-76.******	KNPI1	-95	WEP
7/4/2014	11:46:31	39.09994	-76.******	HOME-BAC6	-93	WPA2
7/4/2014	11:46:31	39.09994	-76.******	8NBN8	-93	WPA2
7/4/2014	11:46:31	39.09994	-76.******	sportsfans	-96	WPA2
7/4/2014	11:46:31	39.09994	-76.******	6RZDB	-95	WPA2
7/4/2014	11:51:38	39.09986	-76.******	walker2	-88	WPA2
7/4/2014	11:51:38	39.09986	-76.******	8NBN8	-98	WPA2
7/4/2014	11:51:38	39.09986	-76.******	KNPI1	-95	WEP
7/4/2014	11:51:38	39.09986	-76.******	sportsfans	-96	WPA2
7/4/2014	11:51:38	39.09986	-76.******	HOME-BAC6	-94	WPA2
7/4/2014	11:51:38	39.09986	-76.******	walker	-83	WPA
7/4/2014	11:51:38	39.09986	-76.******	NOTyourWiFi	-94	WPA2
7/4/2014	11:56:46	39.09987	-76.******	walker2	-90	WPA2
7/4/2014	11:56:46	39.09987	-76.******	VCET0	-98	WEP
7/4/2014	11:56:46	39.09987	-76.******	UDRK2	-98	WEP
7/4/2014	11:56:46	39.09987	-76.******	8NBN8	-96	WPA2
7/4/2014	11:56:46	39.09987	-76.******	walker	-81	WPA
7/4/2014	11:56:46	39.09987	-76.******	P41R1	-95	WEP
7/4/2014	11:56:46	39.09987	-76.******	KNPI1	-94	WEP
7/4/2014	11:56:46	39.09987	-76.******	HOME-BAC6	-92	WPA2
7/4/2014	11:56:46	39.09987	-76.******	NOTyourWiFi	-96	WPA2
7/4/2014	11:56:46	39.09987	-76.******	6RZDB	-94	WPA2

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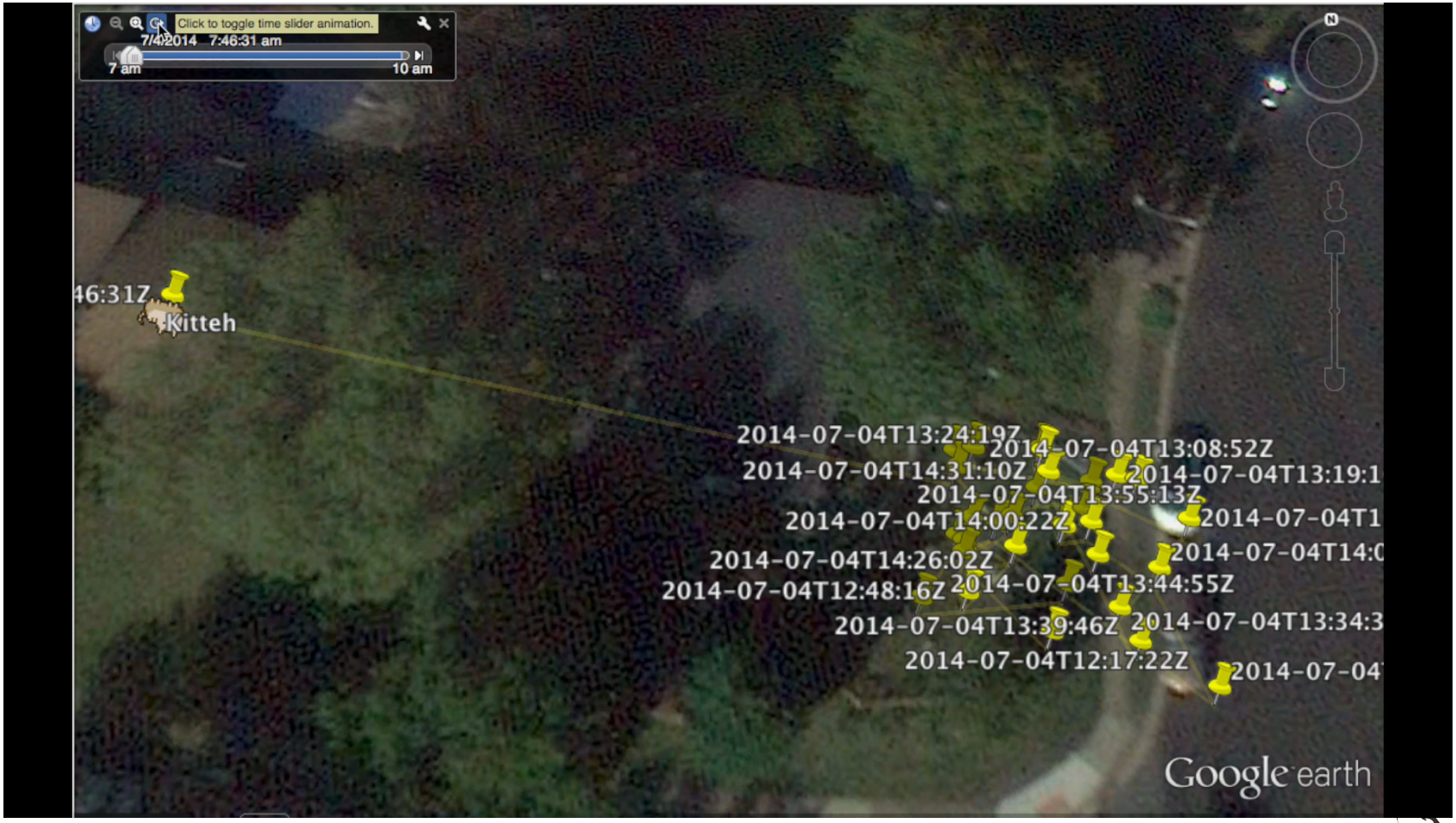
Video



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Coco

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Results

Date	Time	Lat	Lon	SSID	Signal	Encrypt
7/19/2014	16:59:07	38.94373	-77.******	6WWV8	-94	WPA2
7/19/2014	16:59:07	38.94373	-77.******	CROWLEY	-93	WEP
7/19/2014	16:59:07	38.94373	-77.******	DIRECT-roku-09C2C5	-88	WPA2
7/19/2014	16:59:07	38.94373	-77.******	xfinitywifi	-82	OPEN
7/19/2014	16:59:07	38.94373	-77.******	CoxWiFi	-80	OPEN
7/19/2014	16:59:07	38.94373	-77.******	CableWiFi	-80	OPEN
7/19/2014	17:04:16	38.94365	-77.******	Apple Network 6b7973	-89	WPA2
7/19/2014	17:04:16	38.94365	-77.******	6WWV8	-92	WPA2
7/19/2014	17:04:16	38.94365	-77.******	CQXPP	-76	WPA2
7/19/2014	17:04:16	38.94365	-77.******	P6829	-96	WPA2
7/19/2014	17:09:25	38.94386	-77.******	NETGEAR	-94	WPA2
7/19/2014	17:09:25	38.94386	-77.******	DIRECT-roku-409	-93	WPA2
7/19/2014	17:14:34	38.9435	-77.******	7LXJ3	-83	WEP
7/19/2014	17:14:34	38.9435	-77.******	peri	-93	WPA
7/19/2014	17:14:34	38.9435	-77.******	Ward3DC	-88	WPA2
7/19/2014	17:14:34	38.9435	-77.******	MYI14	-96	WEP
7/19/2014	17:19:43	38.94323	-77.******	7LXJ3	-94	WEP
7/19/2014	17:19:43	38.94323	-77.******	LuckyWhale_2GEXT	-93	WPA2
7/19/2014	17:24:52	38.94373	-77.******	LKMY4	-96	WPA2
7/19/2014	17:24:52	38.94373	-77.******	MYI14	-94	WEP
7/19/2014	17:40:19	38.94316	-77.******	LuckyWhale_2GEXT	-92	WPA2
7/19/2014	17:40:19	38.94316	-77.******	Motyka Wireless	-88	WPA
7/19/2014	17:40:19	38.94316	-77.******	Ward3DC	-90	WPA2
7/19/2014	17:40:19	38.94316	-77.******	SXJ32	-94	WPA2
7/19/2014	17:40:19	38.94316	-77.******	Q8ZS7	-96	WEP

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Video

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That's the WarKitteh!

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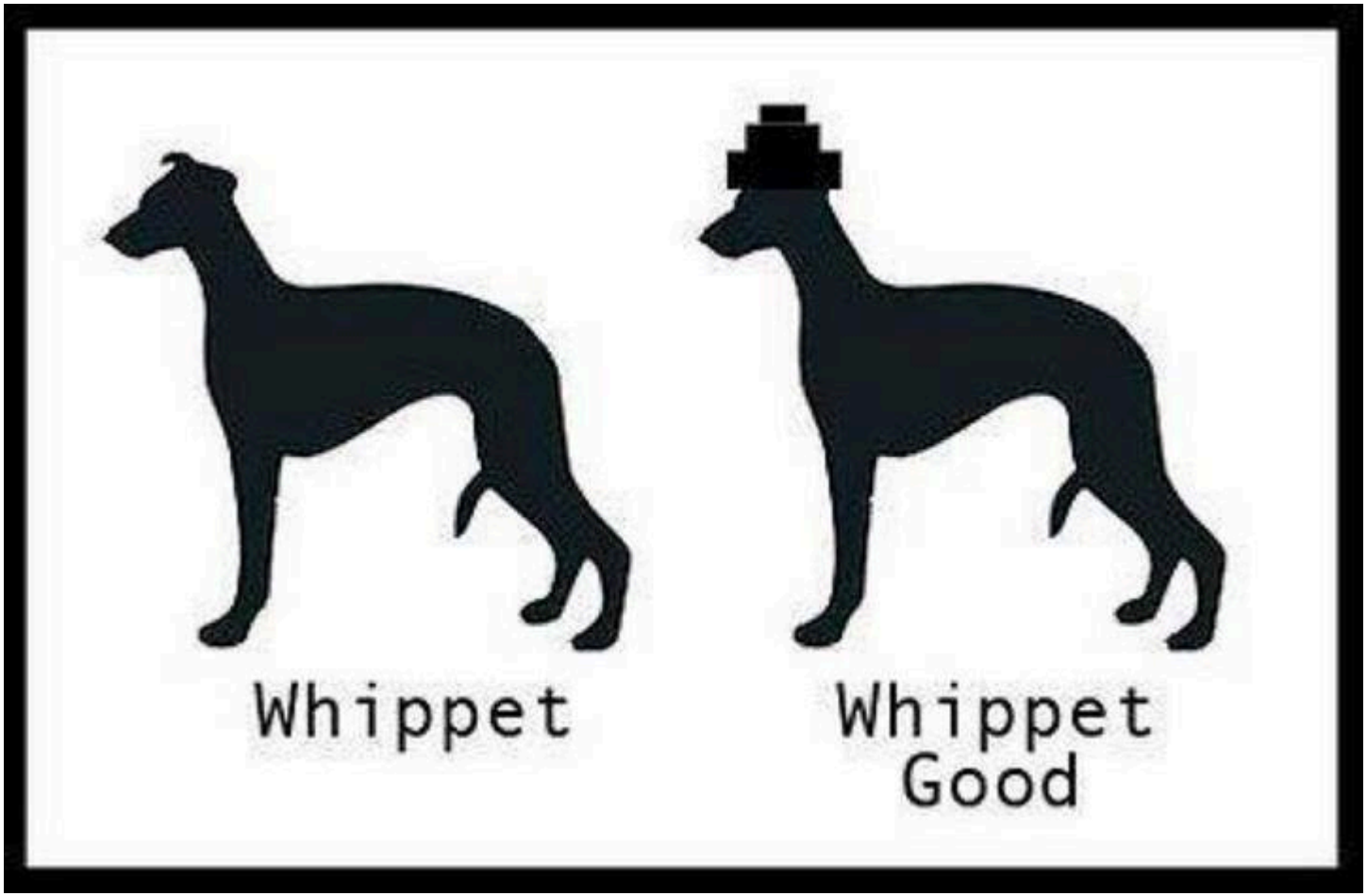
Denial of Service Dog



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DoS Dog

- So…. More trolling than anything
- WiFi Pineapple
  - Procured at ShmooCon
- TV B Gone
  - Adafruit/RadioShack
- Doggie Backpack with “Denial of Service Dog” patches

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WiFi Pineapple

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What I'm gonna do is…

- Karma
  - Answers Probes
- DNS Spoof
  - Redirects all things to Pineapple
- randomroll…
  - 'cause RickRoll makes trolling better

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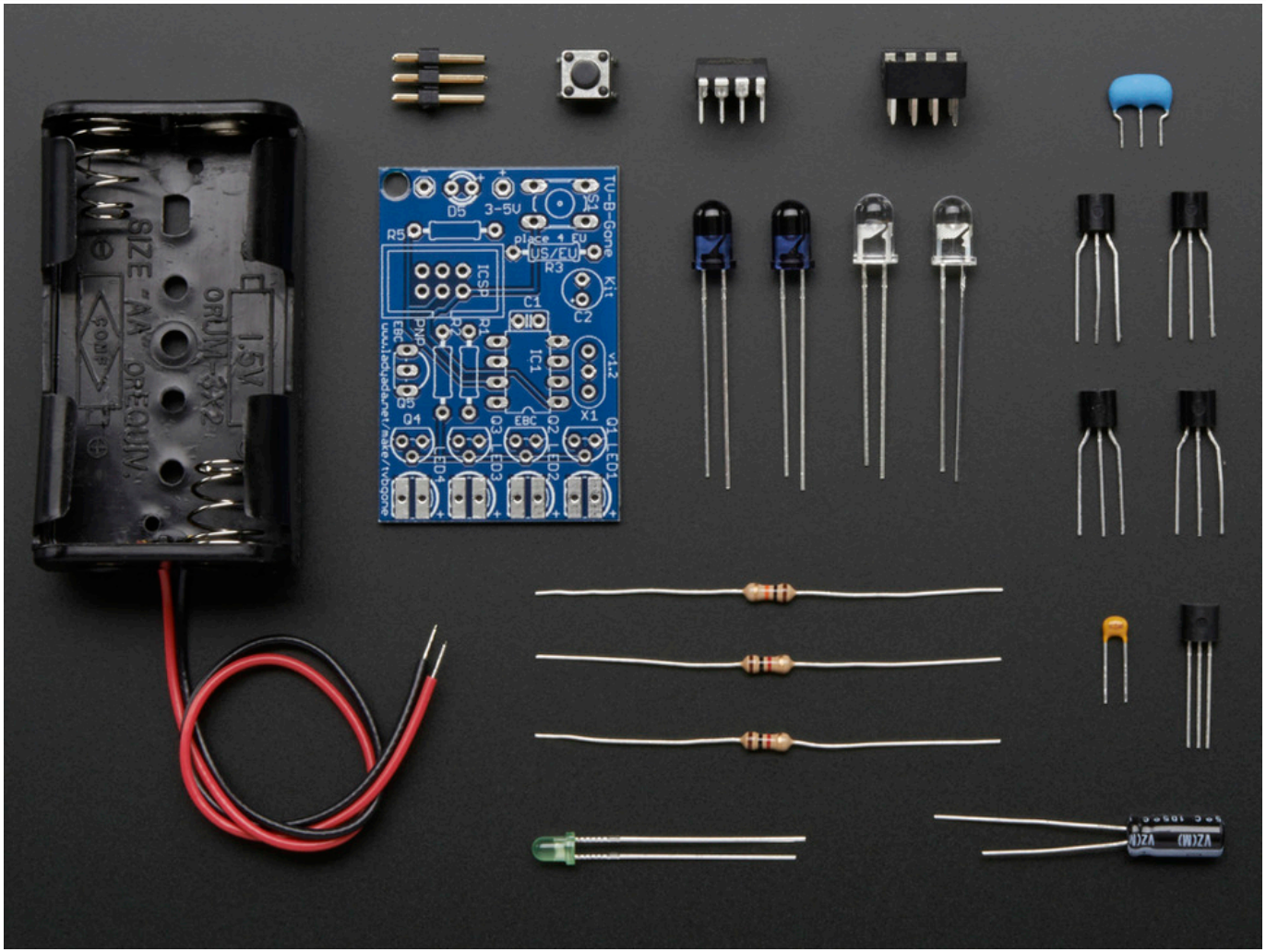
TV B Gone ….in pieces.



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TV B Gone

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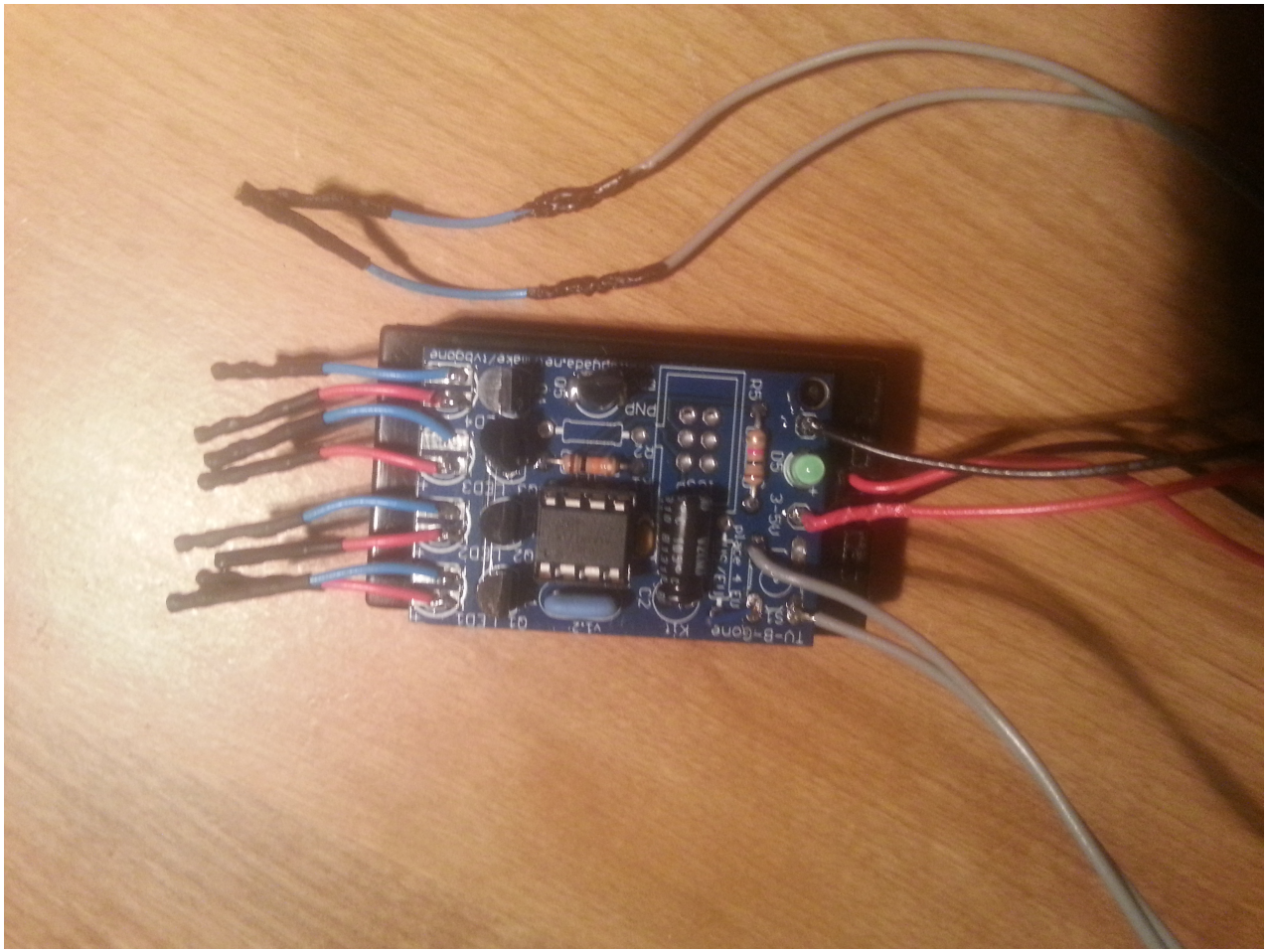
Some minor modifications…



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Patches

- WHOLLY Crap! What a pain in the butt!
- Nobody does it anymore
- ‘Cept Irina & Friends at JoAnn’s Fabrics in Sterling, VA
  - Thank Jesus

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Victory!

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Demo Video

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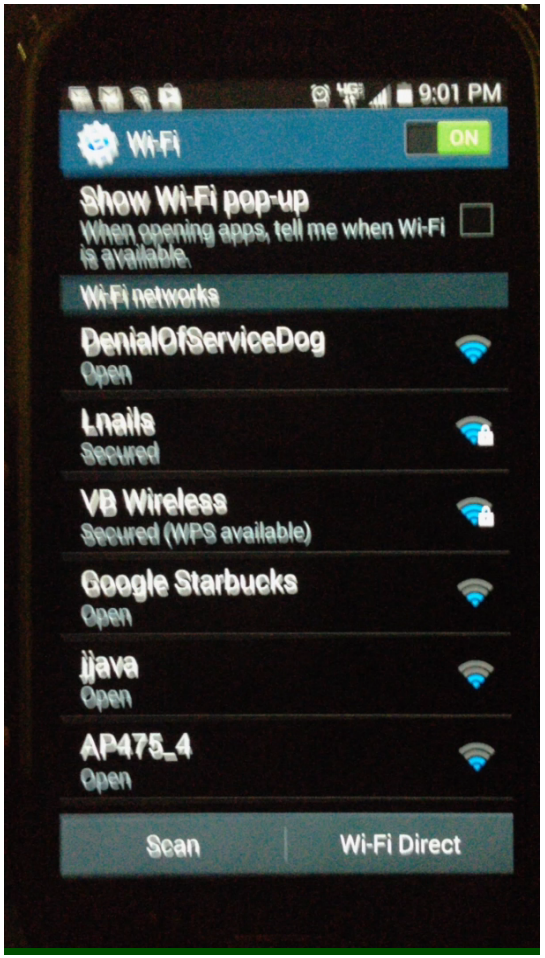
Demo Video



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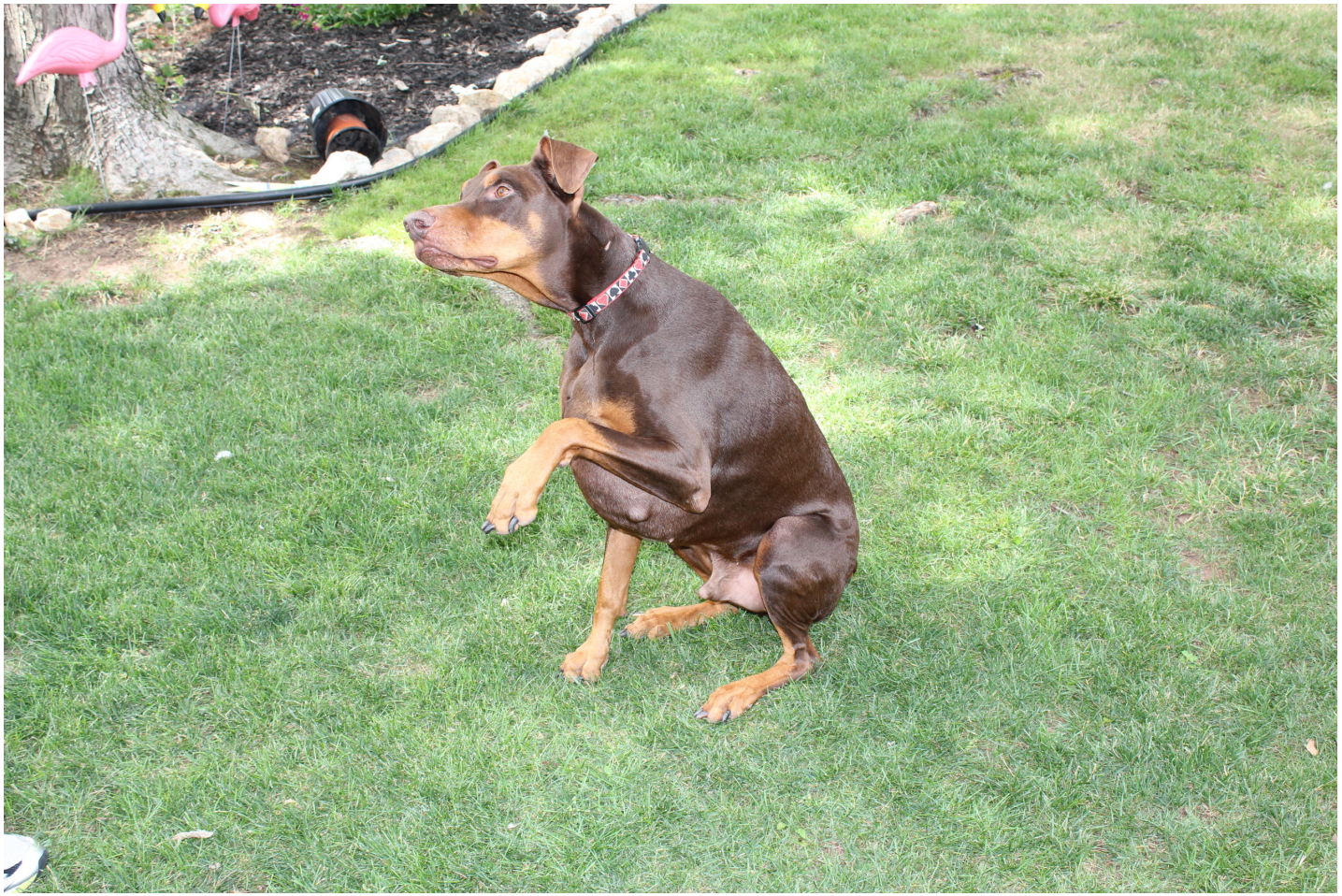
Volunteer Dog



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Volunteer Dog

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Volunteer Dog

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Volunteer Dog Ready to Go!

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Putting it on a Doggie Backpack

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Top View

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LEDs…

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Dog will Shake

- TV B Gone wasn't designed to be shaken in the manner in which V-dog was shaking..
- Also set off the TV-B-Gone

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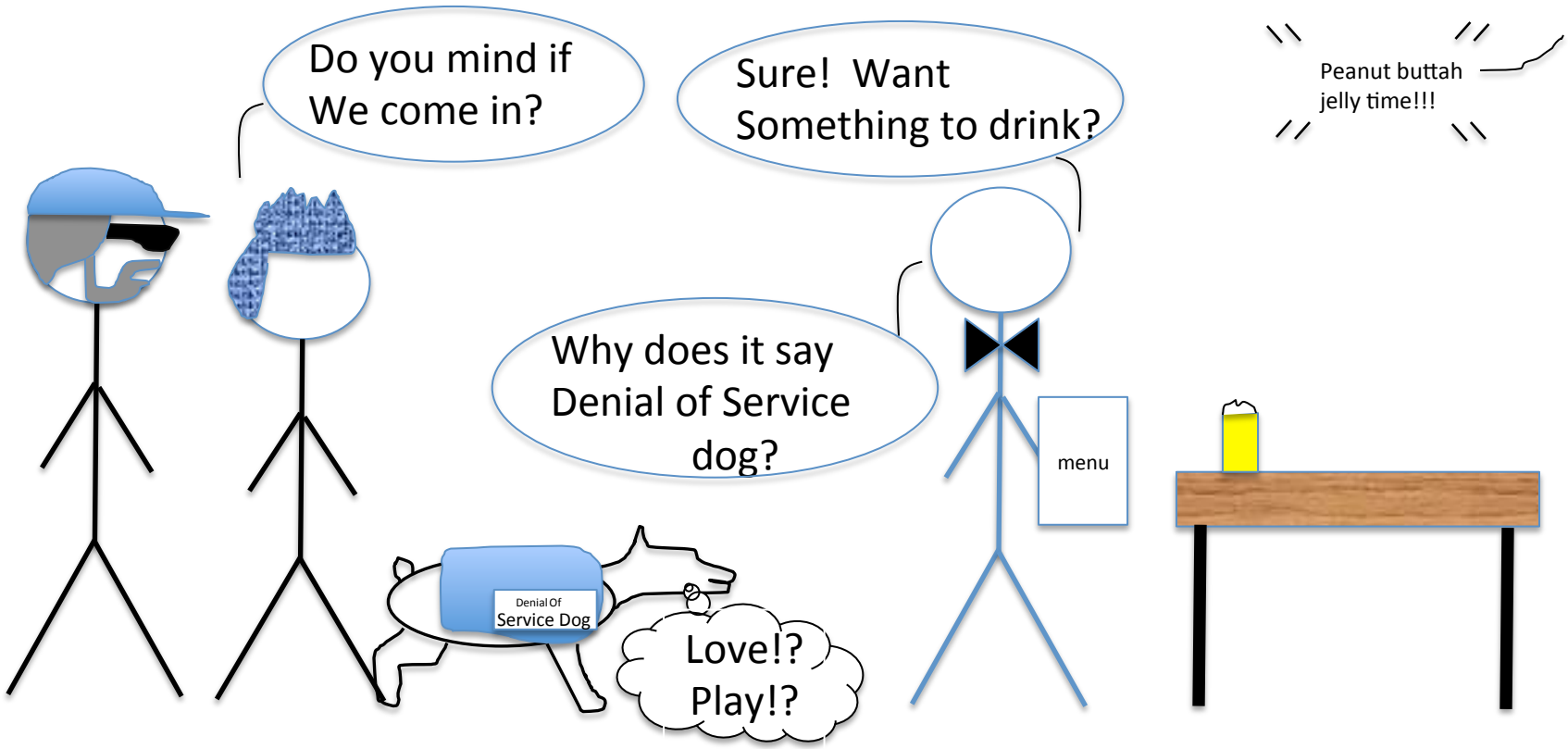
Restaruant



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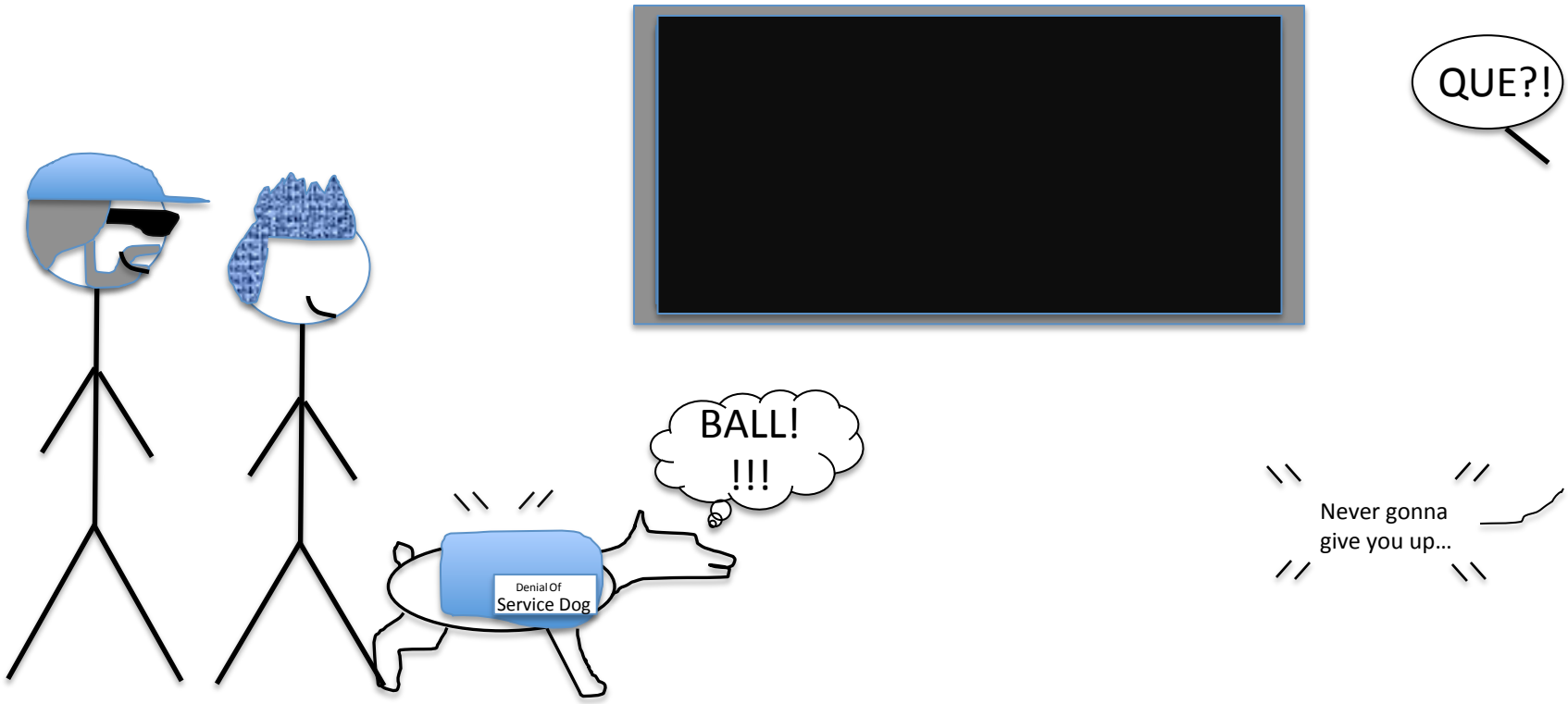
Sports Bar



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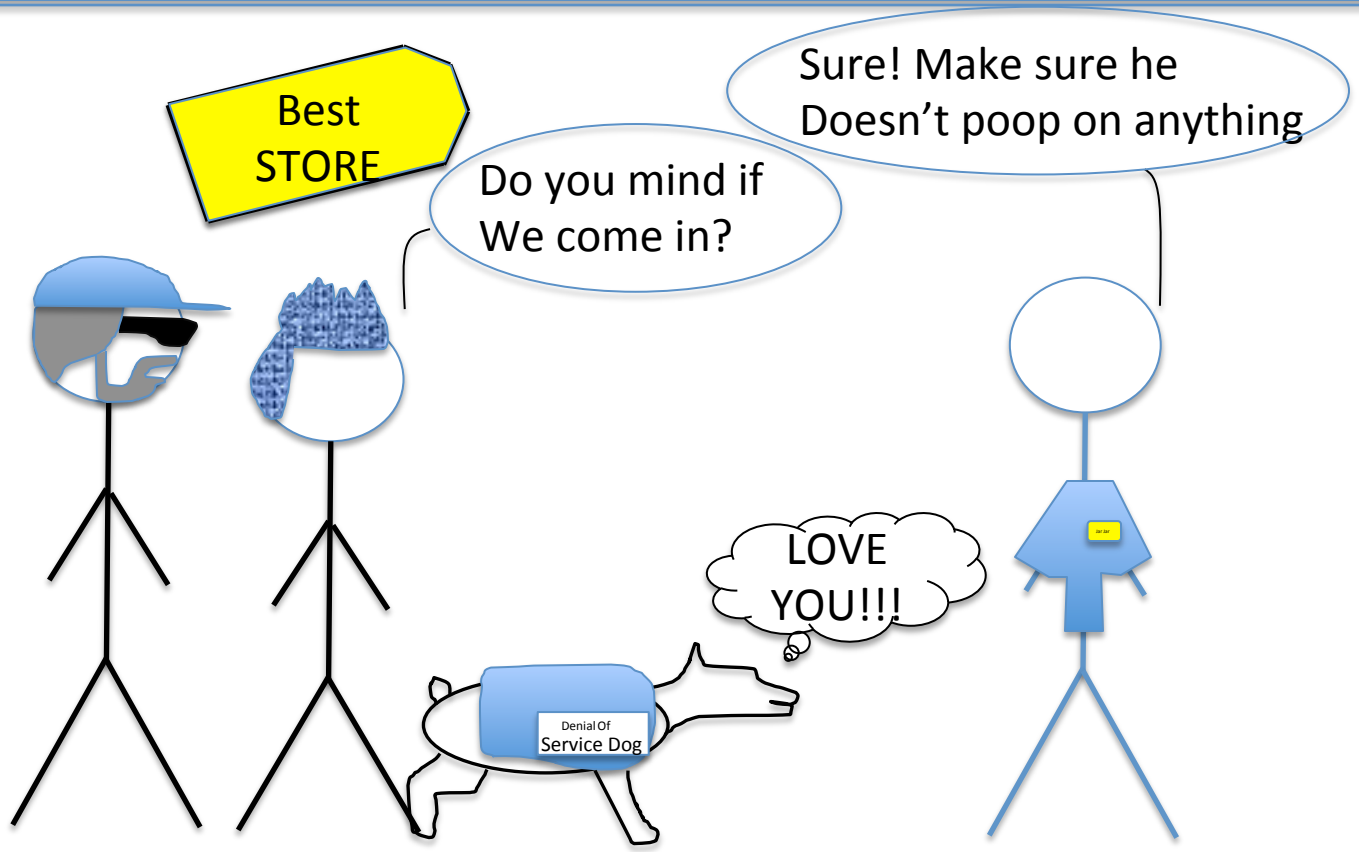
Box Store



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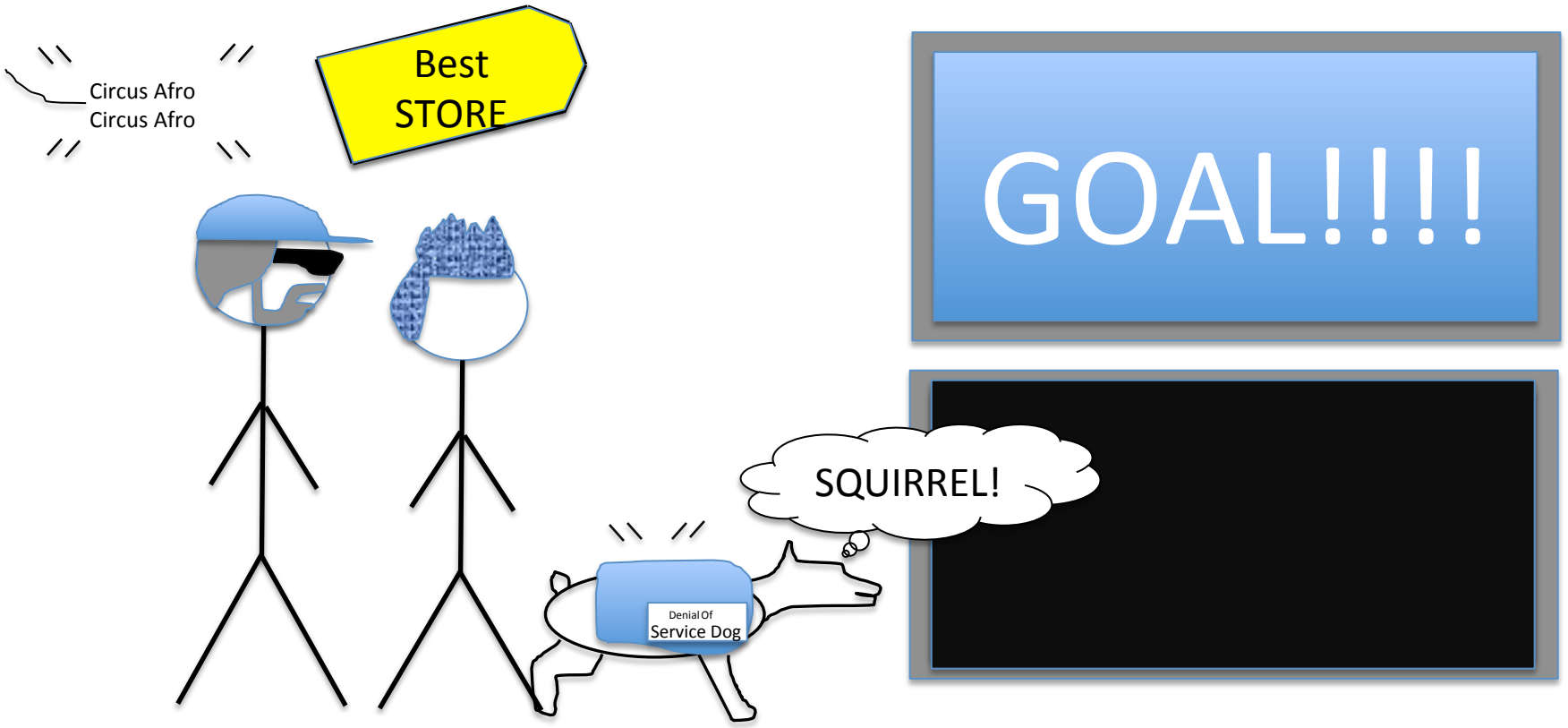
Box Store Cont…



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Results…

- According to results, several hapless victims connected to Karma/Denial of Service dog
  - Logging Fail
- Only one person asked about “Denial Of” service dog
- Most people said “NICE DOGGY!”

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So What Have We Learned???

- A tech hobbyist with no prior firmware experience can create a functional WarKitteh Collar in a short amount of time.
- In 2014 there are STILL unsecured WiFi hotspots
- Lots of devices still probe
- Still no patch for human stupidity
- Cats – AND DOGS – are really hard to work with

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Shout out

- Jeremyblum.com
- Adafruit.com
- Sparkfun.com
- Spark.io
- Arduino.cc

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Oh BTW

- JK Devices (jkdevices.com)
  - Complete Scam
  - Don't waste your money
- No emails
- No contact
- No Product

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Thanks

- Reeves
- Bill
- Joe
- Joey
- Nancy
- Ricky
- V-dog.owners
- Spark.io Guys
- NoVaLabs Guys
- V-dog
- Skitzy
- Coco
- Tenacity
- DefCon

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DefCon Activities

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DefCon WarKitteh

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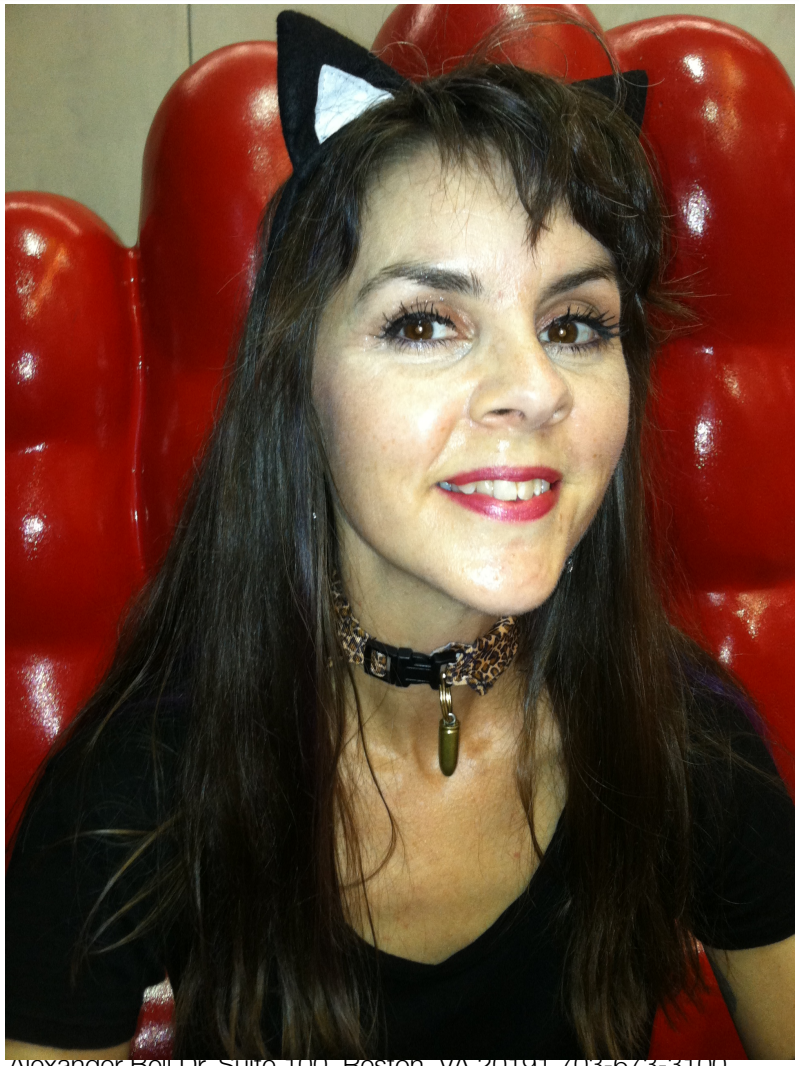
BadKitty



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Walking The Strip

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All Kinds of People

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Street Performers

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Monuments

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Willing Participants

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Drunk Participants

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Results

Date	Time	Lat	Lon	SSID	Signal	Encrypt
8/9/2014	5:34:42	36.12057	-115.173	Cox-Mirage-Rooms	-94	OPEN
8/9/2014	5:34:42	36.12057	-115.173	AirOne	-90	WPA2
8/9/2014	5:34:42	36.12057	-115.173	portthru	-90	OPEN
8/9/2014	5:39:52	36.11833	-115.173	attwifi	-71	OPEN
8/9/2014	5:39:52	36.11833	-115.173	hetwrls	-80	WPA2
8/9/2014	5:39:52	36.11833	-115.173	Gertrude	-80	WPA2
8/9/2014	5:39:52	36.11833	-115.173	i5875b	-86	WEP
8/9/2014	5:39:52	36.11833	-115.173	ALPHA	-96	WPA2
8/9/2014	5:39:52	36.11833	-115.173	GAMMA	-94	WPA2
8/9/2014	5:39:52	36.11833	-115.173	hwip	-89	OPEN
8/9/2014	5:39:52	36.11833	-115.173	MOTOMESH	-76	OPEN
8/9/2014	5:39:52	36.11833	-115.173	BETA	-94	WPA2
8/9/2014	5:39:52	36.11833	-115.173	PENTA Guest Access	-83	WPA2
8/9/2014	5:39:52	36.11833	-115.173	PENTA	-82	WPA2
8/9/2014	5:39:52	36.11833	-115.173	cpc	-96	WPA2
8/9/2014	5:39:52	36.11833	-115.173	ORCH	-94	WPA2
8/9/2014	5:39:52	36.11833	-115.173	LINQ	-90	OPEN
8/9/2014	5:45:01	36.11575	-115.173	Flamingo-Rooms-Cox	-89	OPEN
8/9/2014	5:45:01	36.11575	-115.173	MOTOMESH	-81	OPEN
8/9/2014	5:45:01	36.11575	-115.173	attwifi	-73	OPEN
8/9/2014	5:45:01	36.11575	-115.173	CROMWELL	-88	OPEN
8/9/2014	5:45:01	36.11575	-115.173	GJJ	-93	WPA2
8/9/2014	5:45:01	36.11575	-115.173	GAMMA	-86	WPA2
8/9/2014	5:45:01	36.11575	-115.173	ALPHA	-84	WPA2
8/9/2014	5:45:01	36.11575	-115.173	DELTA	-86	WPA2

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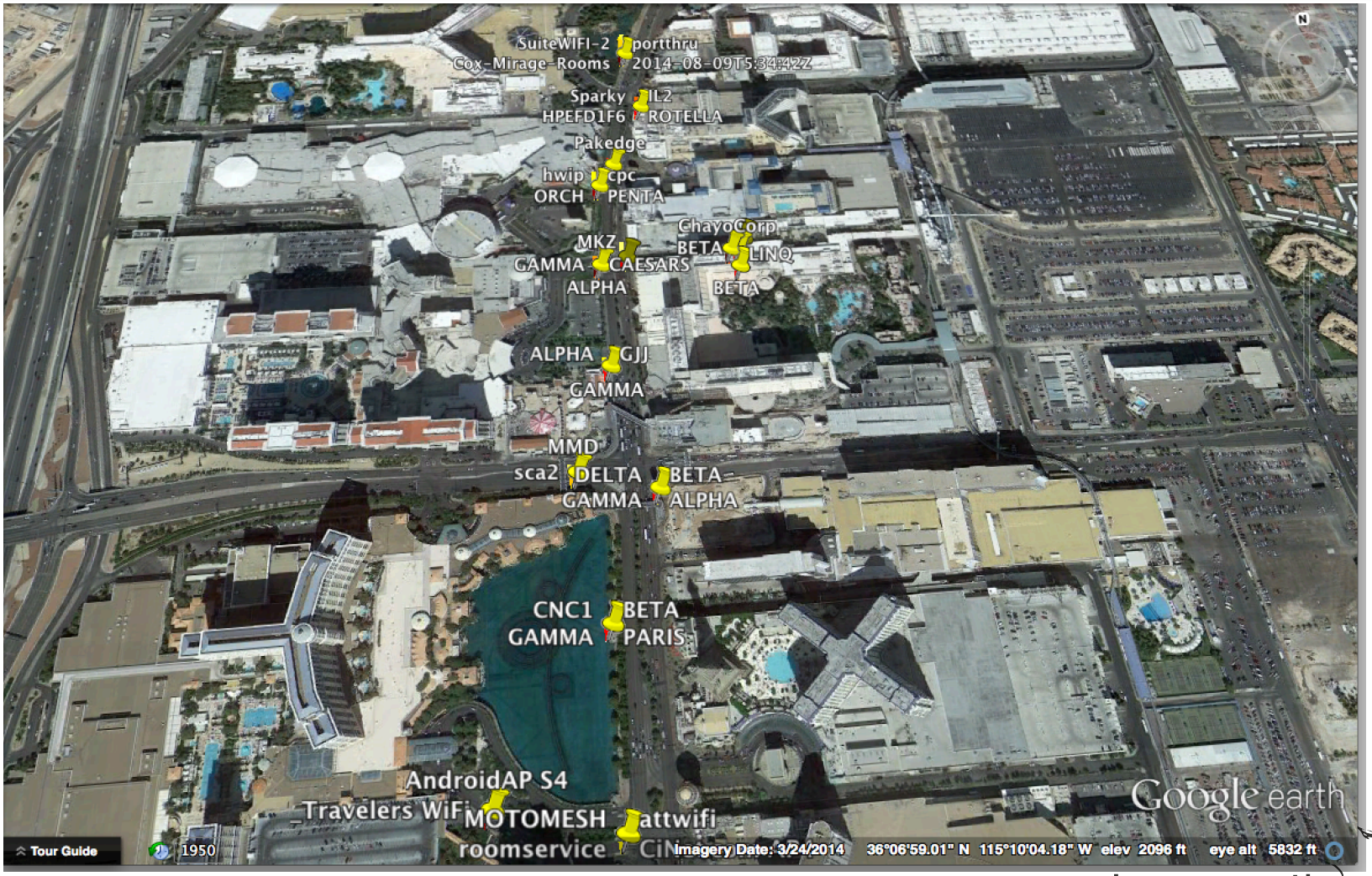
Video… er… PIC!!!



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DefCon DoS Dog

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SkyDog

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CNN Kitteh

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Questions?

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That's all Folks

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