Exploring the Infrared World, Part 2

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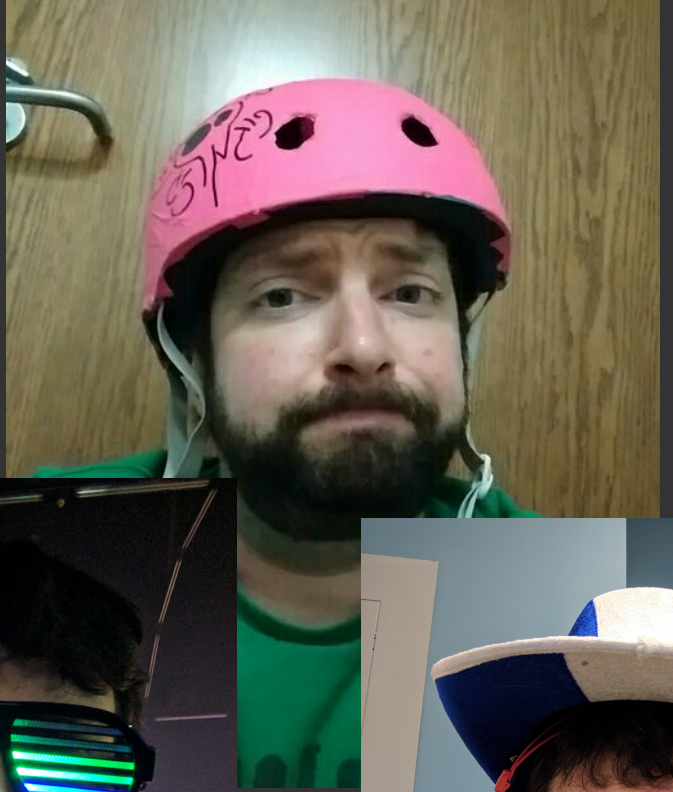
@dominicgs

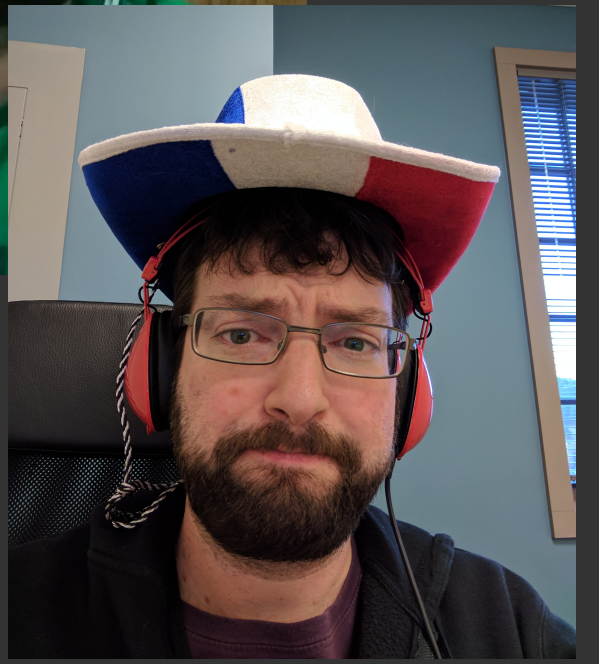
Michael Ossmann
@michaelossmann

Great Scott Gadgets
@GSGlabs

Dominic Spill

- Open source software developer
  - Ubertooth / GreatFET / HackRF
  - fcc.io
- Extraordinary



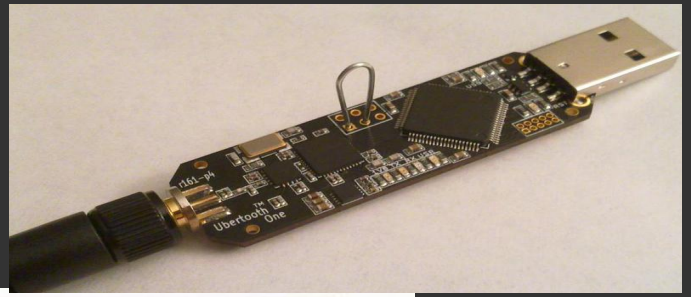


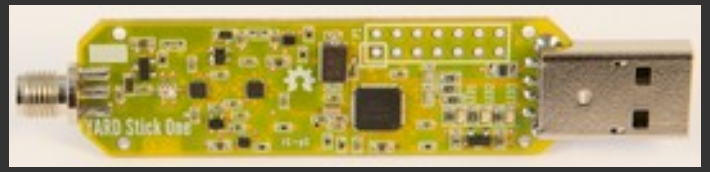
Michael Ossmann

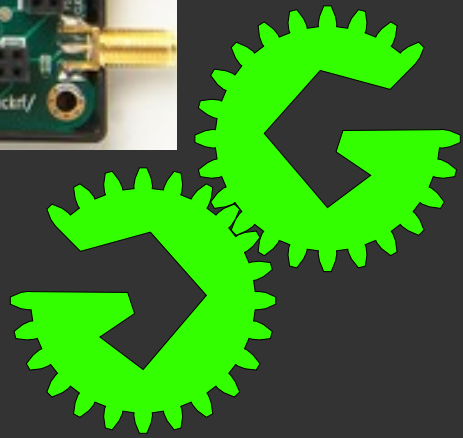
- Open source hardware developer
  - Ubertooth
  - GreatFET
  - HackRF
- Founded GSG
- Ordinary

Great Scott Gadgets

- HackRF One
- Ubertooth
- YARDStick One
- GreatFET



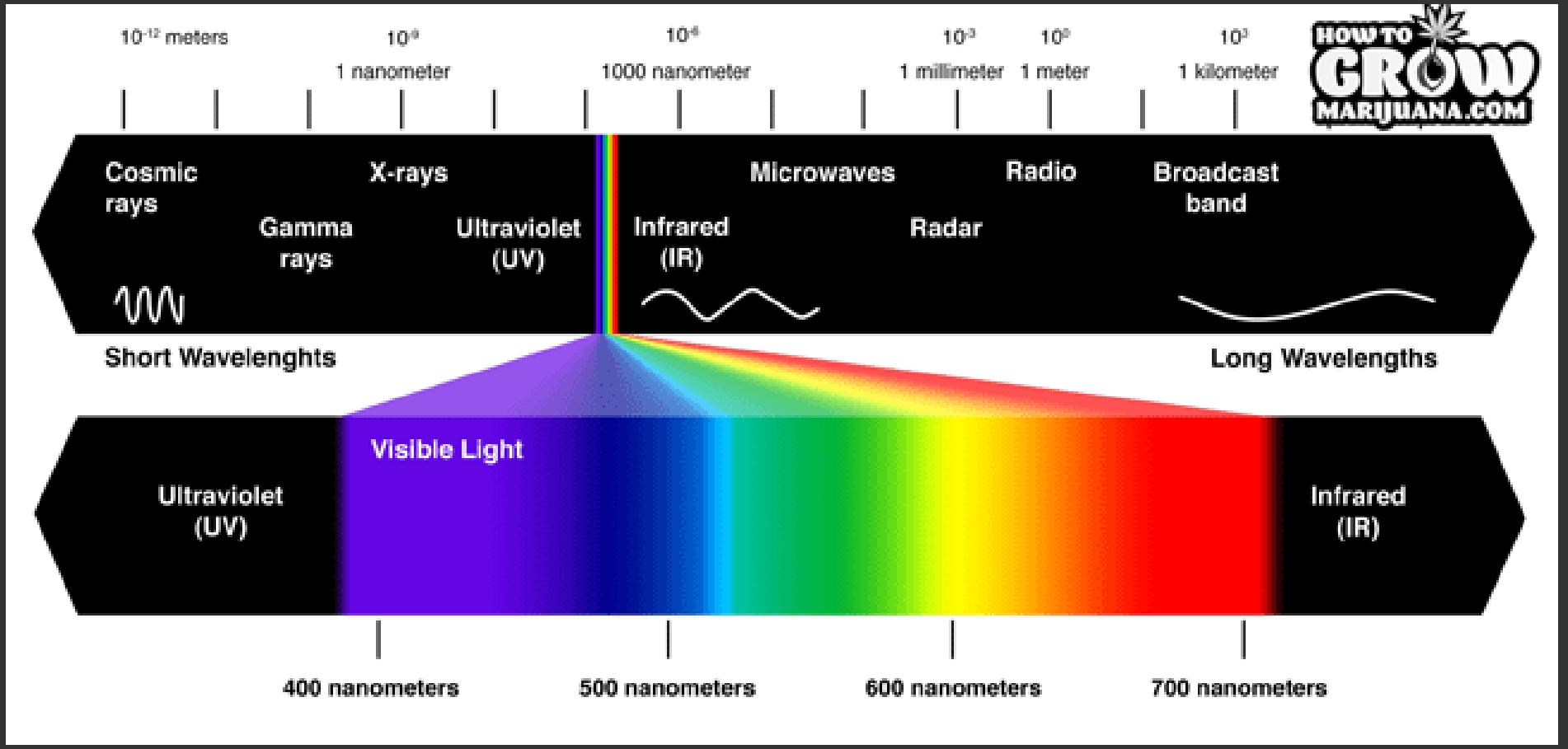




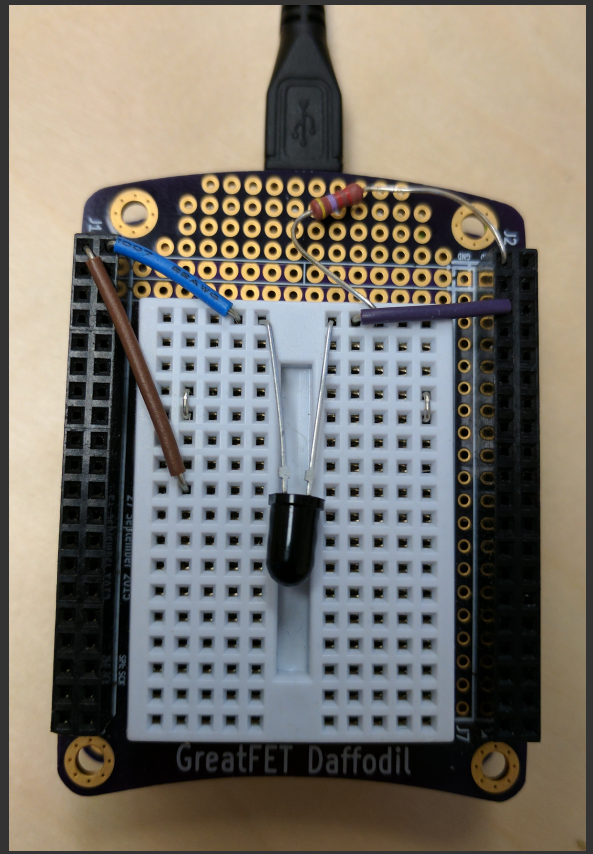
Infrared

- Remote control
  - AV, home automation, lighting
  - Toys
- Communications
  - IRDA
  - Audio
- Sensing
  - PIR
  - LIDAR
- Heat
  - This one’s tricky…

Light

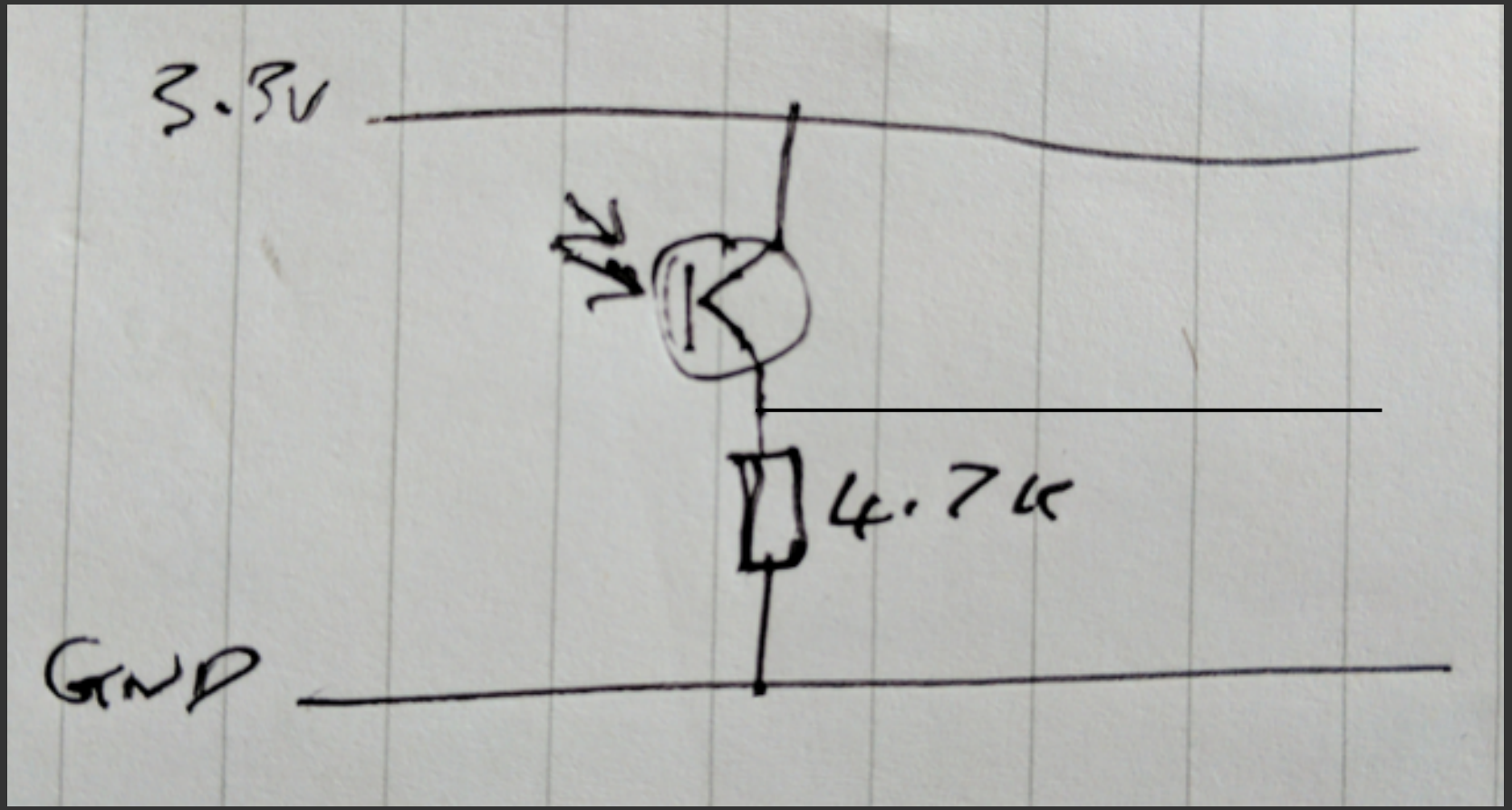

10^{-12} meters
10^{-9}
1 nanometer
10^{-6}
1000 nanometer
10^{-3}
1 millimeter
10^{0}
1 meter
10^{3}
1 kilometer
HOW TO GROW MARIJUANA.COM
Cosmic rays
Gamma rays
X-rays
Ultraviolet (UV)
Infrared (IR)
Microwaves
Radar
Radio
Broadcast band
Short Wavelenghts
Long Wavelengths
Ultraviolet (UV)
Visible Light
Infrared (IR)
400 nanometers
500 nanometers
600 nanometers
700 nanometers

Let’s build some hardware!

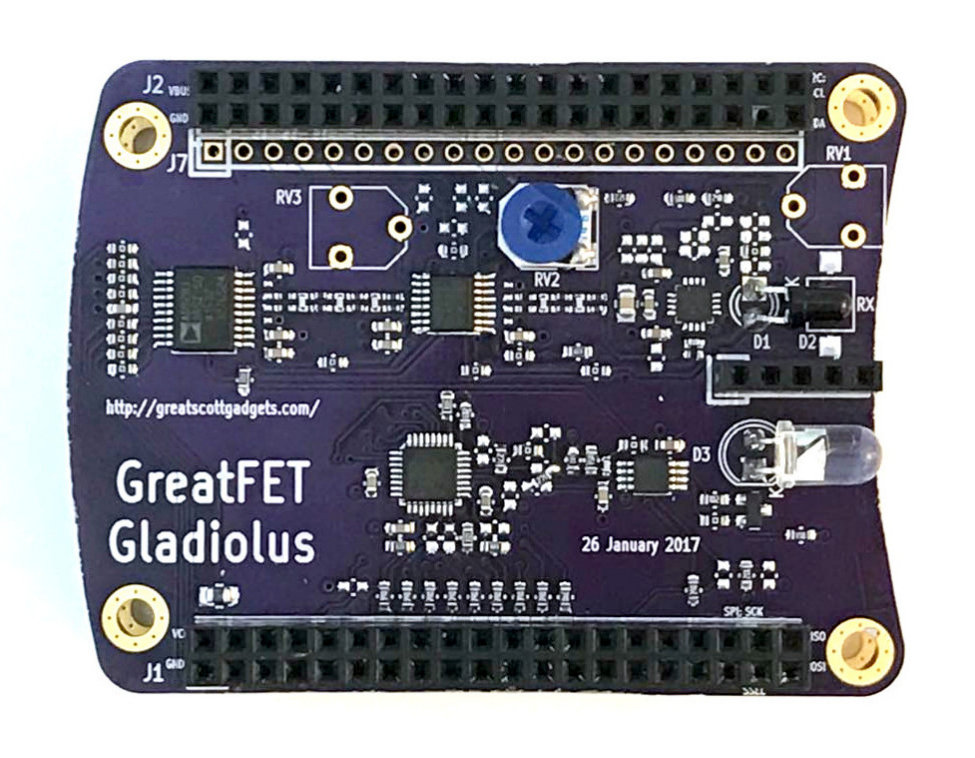


- Simple
  - Really simple
    - I mean so simple that I built it
- Infrared Photo-transistor
- Resistor (4.7kOhm)
- Your favourite microcontroller
  - GreatFET

Circuit Diagram

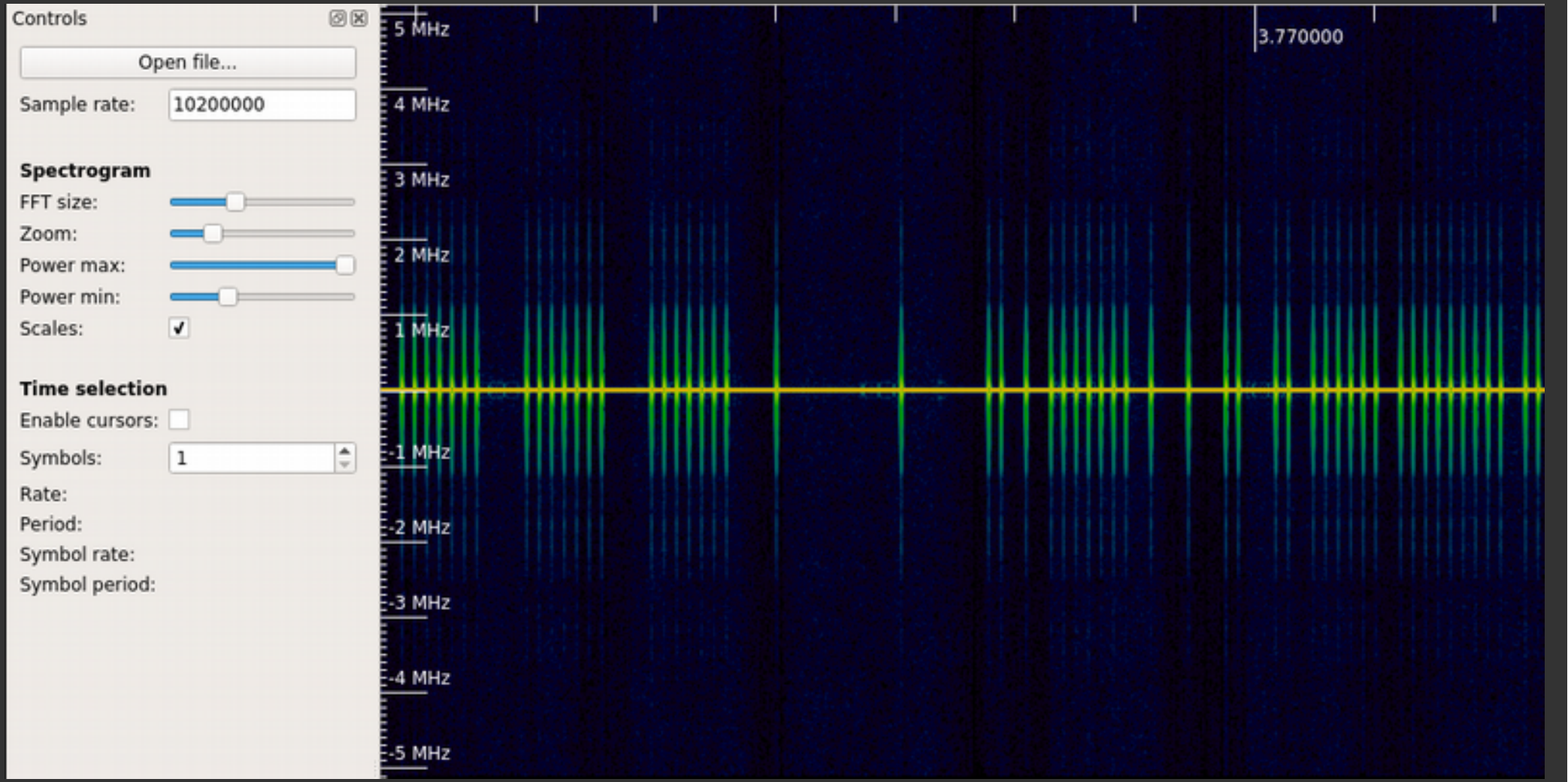


Better Hardware



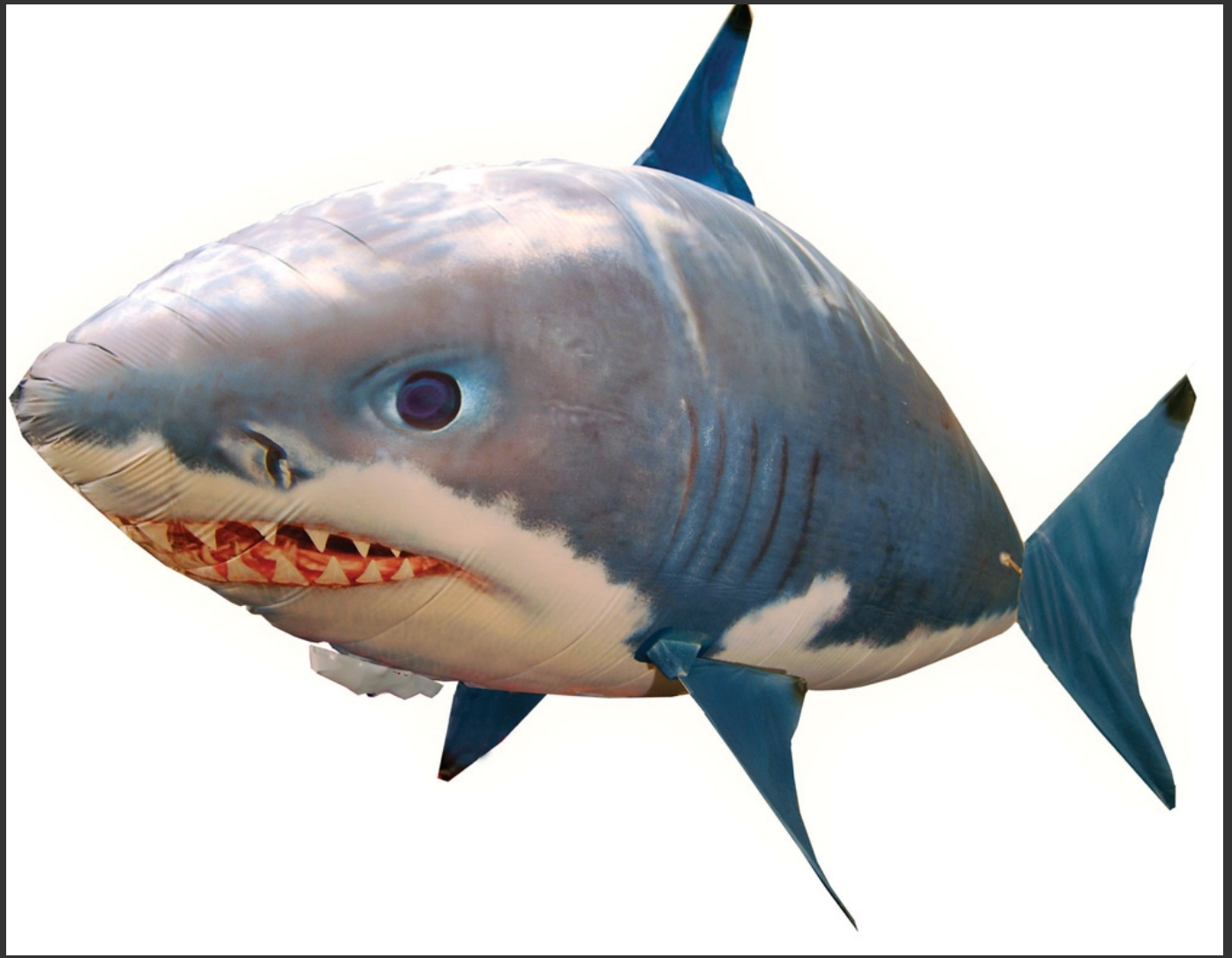
- Gladiolus
  - Mike designed this one
- DC-10MHz
- Variable Gain
- 8 bit samples
  - Up to 40Msps

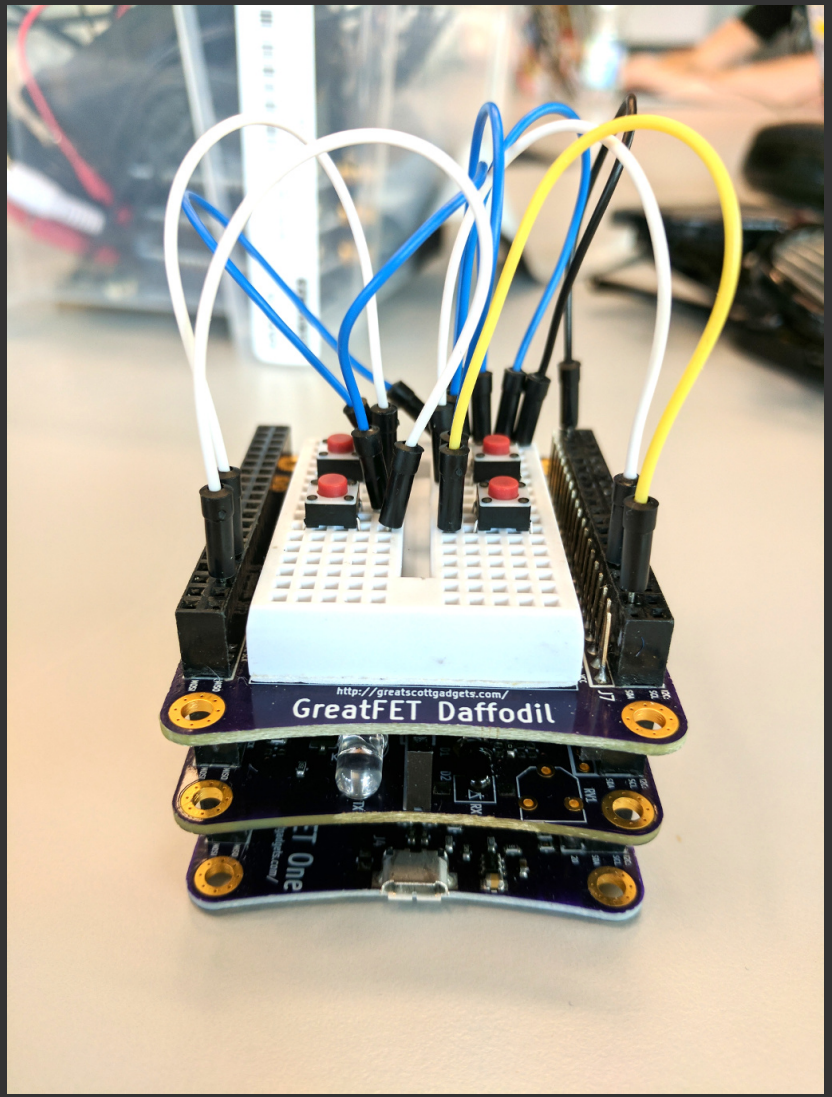
IrDA


Controls
Open file...
Sample rate:
10200000
Spectrogram
FFT size:
Zoom:
Power max:
Power min:
Scales:
Time selection
Enable cursors:
Symbols:
1
Rate:
Period:
Symbol rate:
Symbol period:
5 MHz
4 MHz
3 MHz
2 MHz
1 MHz
-1 MHz
-2 MHz
-3 MHz
-4 MHz
-5 MHz
3.770000


DUCK HUNTER


ERNW
PN2907
Taster
R3
1K
LED
TROOPERS
MAKE THE WORLD A SAFER PLACE
T0
T1
T2
T3
T4
T5
IR1
IR2
IR3
IR4





TR17
Shark
Controller

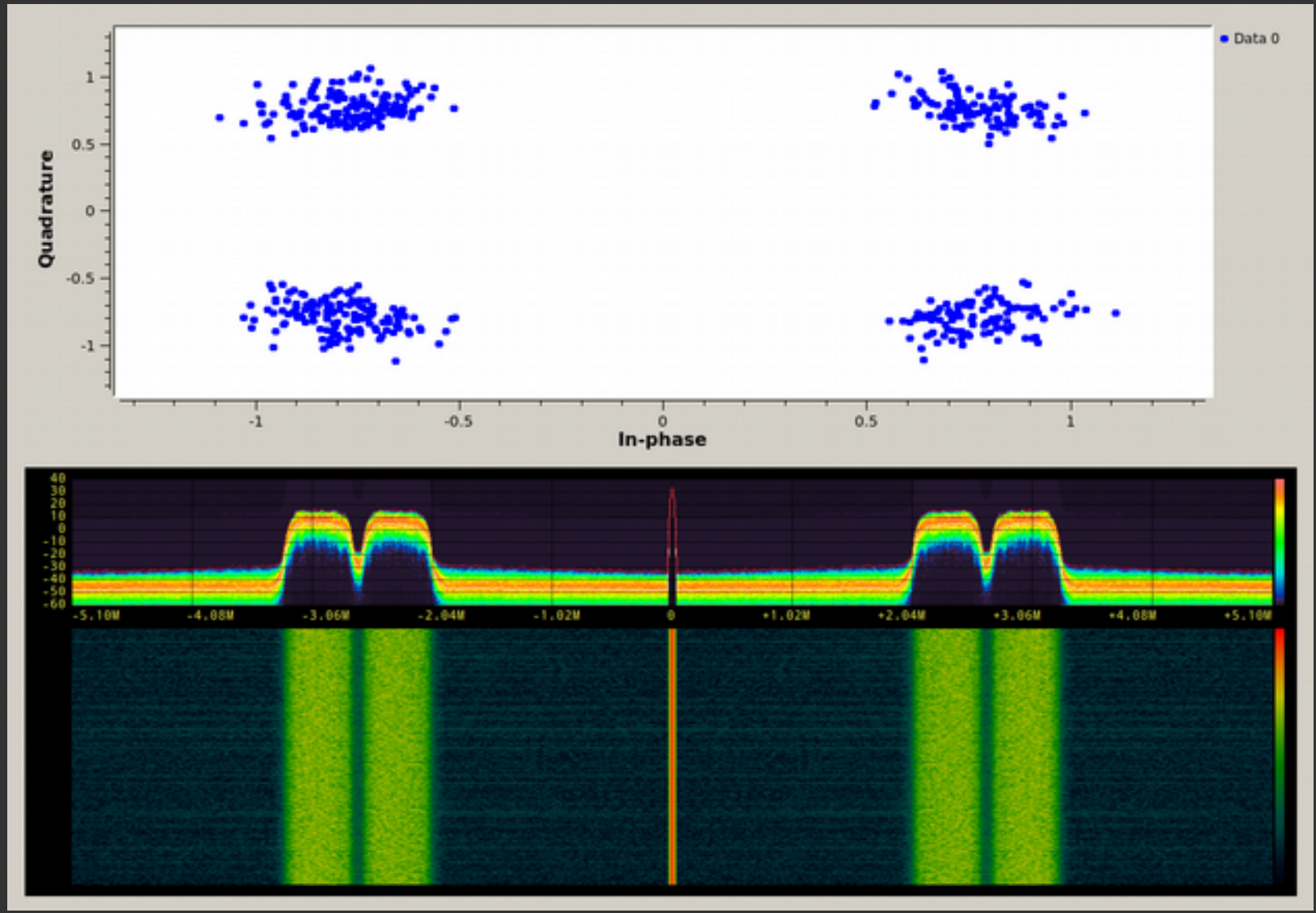

MONITOR
MONITOR
Farenheit

Bosch Integrus

32 digital audio channels

QPSK

~3 MHz carriers



What’s Next?

- Lidar
- Nintendo Switch
- Kinect
- Vive

- IrDA 4 Mbps
- Pixmob
- Visible light
- Industrial Control Systems

Thanks

- Great Scott Gadgets
  - Taylor
  - Elizabeth
- Woody
- Schuyler
- Root Killah

http://greatscottgadgets.com/