Computers in the Ham Shack

JEFF KASHINSKY W2UA

OCTOBER 2021 CARS MEETING

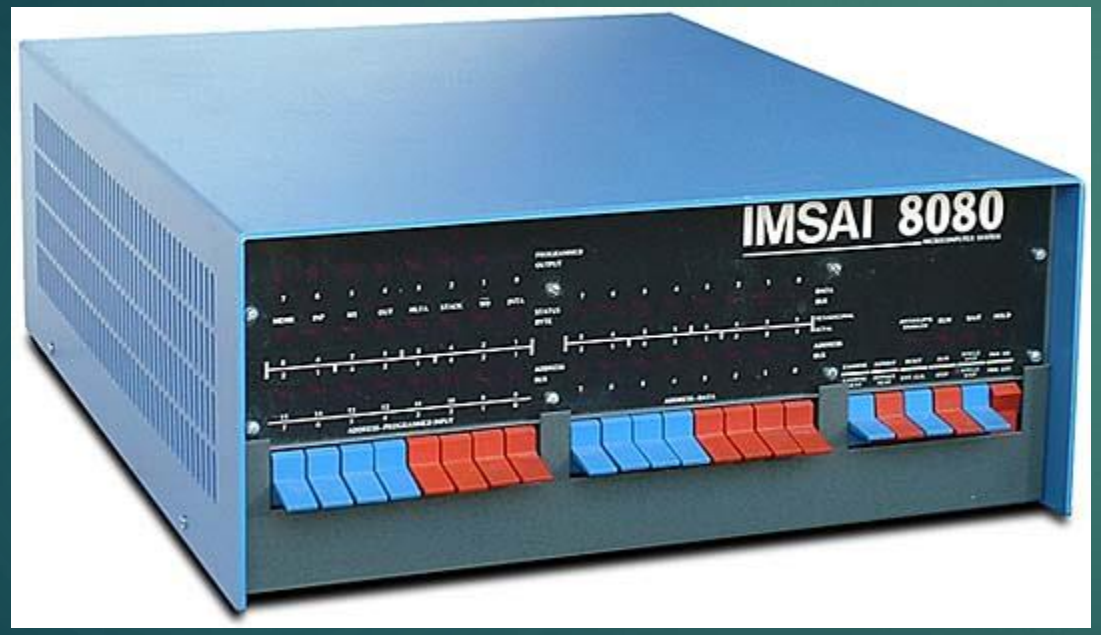
Jeff W2UA

- Licensed since 1961 (60+ years)
- First computer program written in 1964 (Fortran)
- Started designing Mainframe Computers in 1969 (Burroughs)
- Minicomputer design in 1973 (Raytheon)
- Microcomputer design in 1974 (Raytheon)
- First computer in shack 1976 (Imsai 8080)

First Microcomputer Product Design (1975)

These instruments were the first to be microprocessor based using the Intel 8080 CPU, LED numeric displays, silk screened mimic, the program was burned into EPROM chips.

First Shack Computer (1976)



W2UA HAM/Computer Shack -2021

Uses of shack computer (1980's)

- Antenna Bearing Calculator (Basic)
  - Input prefix
  - Output bearing
- Rig Control Software (C)
  - Set / Read frequency, mode, etc. Also logging
  - Kenwood, Icom
  - Sold at Dayton Hamvention 1989 (pre Internet)
    - Distributed on 5 ¼" floppy disks

Shack Computers (As best I can recall)

- Imsai 8080
- Other S100 bus computers (Zilog Z80) CP/M operating system
- Intel 286 IBM PC clone MS-DOS operating system
- Intel 386 IBM PC clone Window 3.1
- Intel 486 IBM PC clone Windows 95
- Intel Pentium IBM PC clones Window NT (many)
- Intel i7 (many, all self constructed) Vista, 7, 8, 10

How many of you DO NOT have a computer in the shack?

Are you sure?

There are computers everywhere

- If you have a radio with a digital display, odds are you have a computer in your shack
- If you use your cell phone or tablet you have a computer in your shack

Desktop / Laptop / Tablet

- What do you use for?
  - Email and other non ham related
  - Logging
  - Rig Control
  - Digital Modes
  - Propagation
  - Spotting
  - Antenna Design
  - Other

Desktop? Laptop?

- Should my shack computer be a desktop or a laptop?
  - Yes
  - Depends
    - What are you using the computer for?
      - Laptops are just as powerful as desktops these days
      - Desktops are more expandable
        - More memory
        - Bigger (multiple) hard drives
        - Bigger display
        - Multiple monitor screens
        - More interfaces

Windows? Linux? MacOS?

- Windows
  - Most professional ham related software available
- Linux
  - Most user developed ham related software available
    - HamPi
    - HamPC
- MacOS
  - Least ham related software available
- iOS / Android
  - Many useful apps including rig control

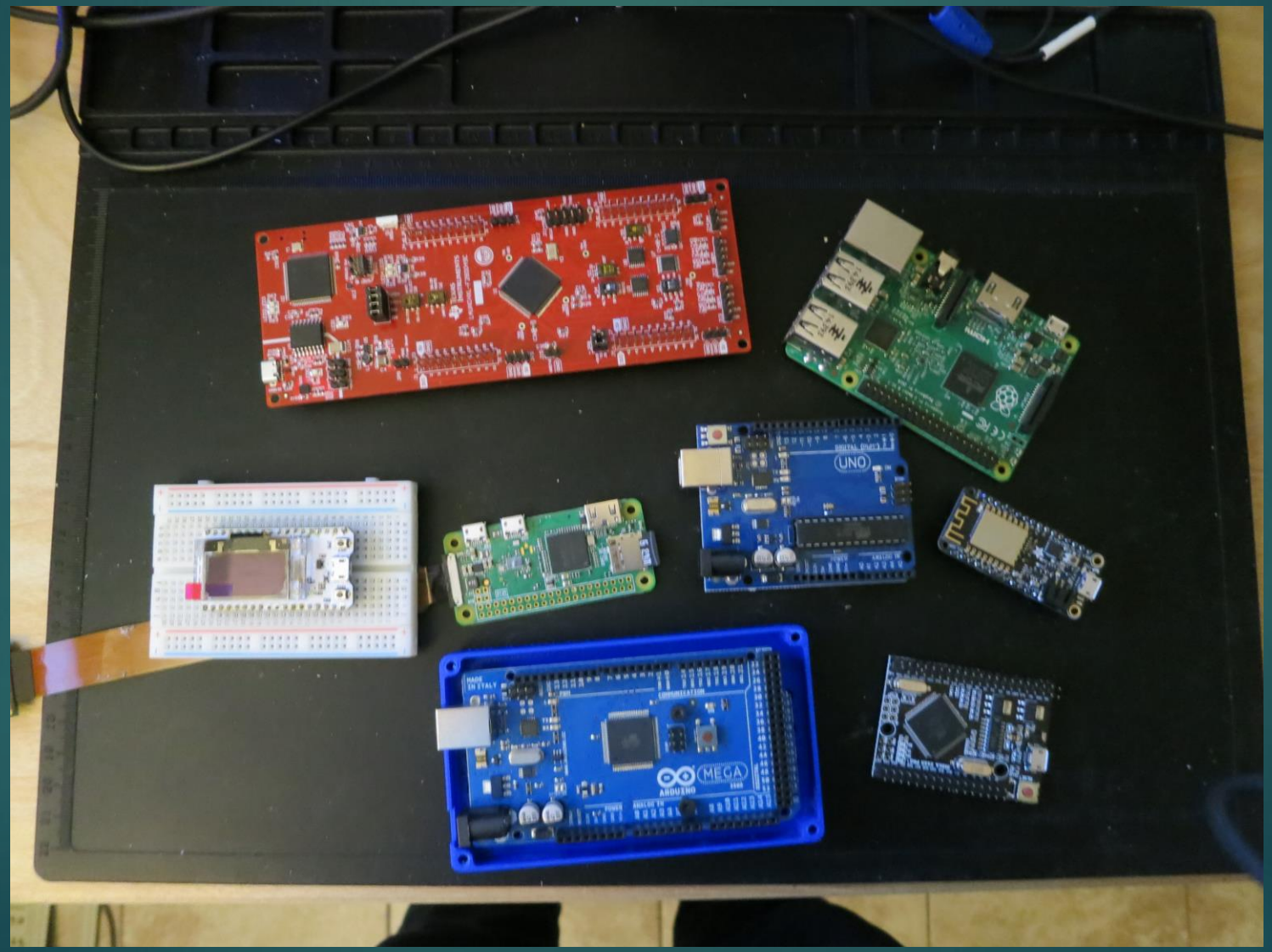
General Purpose? Dedicated Purpose?

- To me, the most interesting use of computers in the shack are for dedicated purposes
  - Arduino and Arduino like
  - Raspberry Pi and other single board computers(SBC)

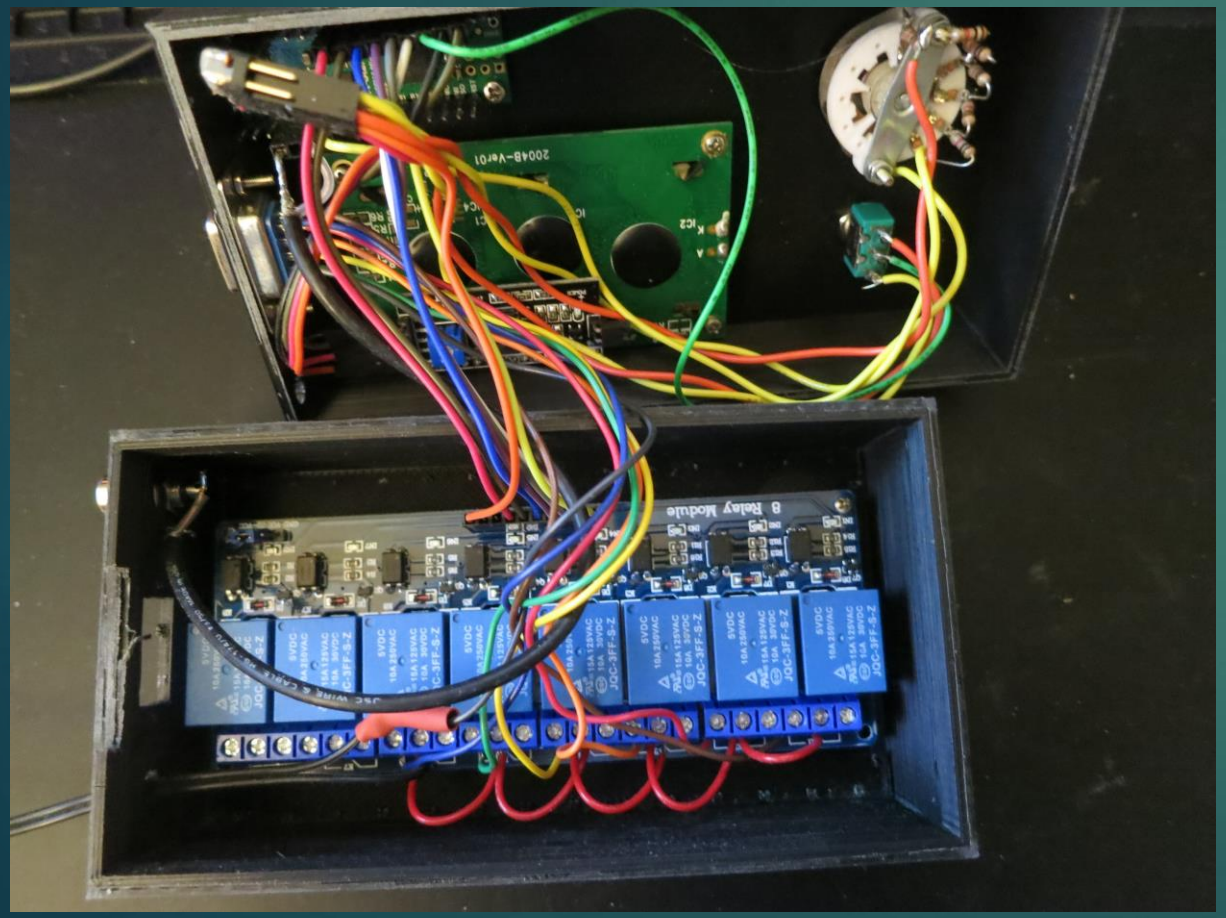
Dedicated Purpose Computer

- In addition to the computer(s) in my rig(s)
  - Automated antenna switch (Arduino)
  - Lightning detector (Arduino)
  - Rotor controller
  - GPS Time Server (NTP) (Raspberry Pi / ESP32)
  - CAT controller (Arduino)
    - Protocol converter
  - HF Screwdriver Antenna Controller
  - Weather Station
  - NanoVNA
  - Tiny Spectrum Analyzer
  - RFZero

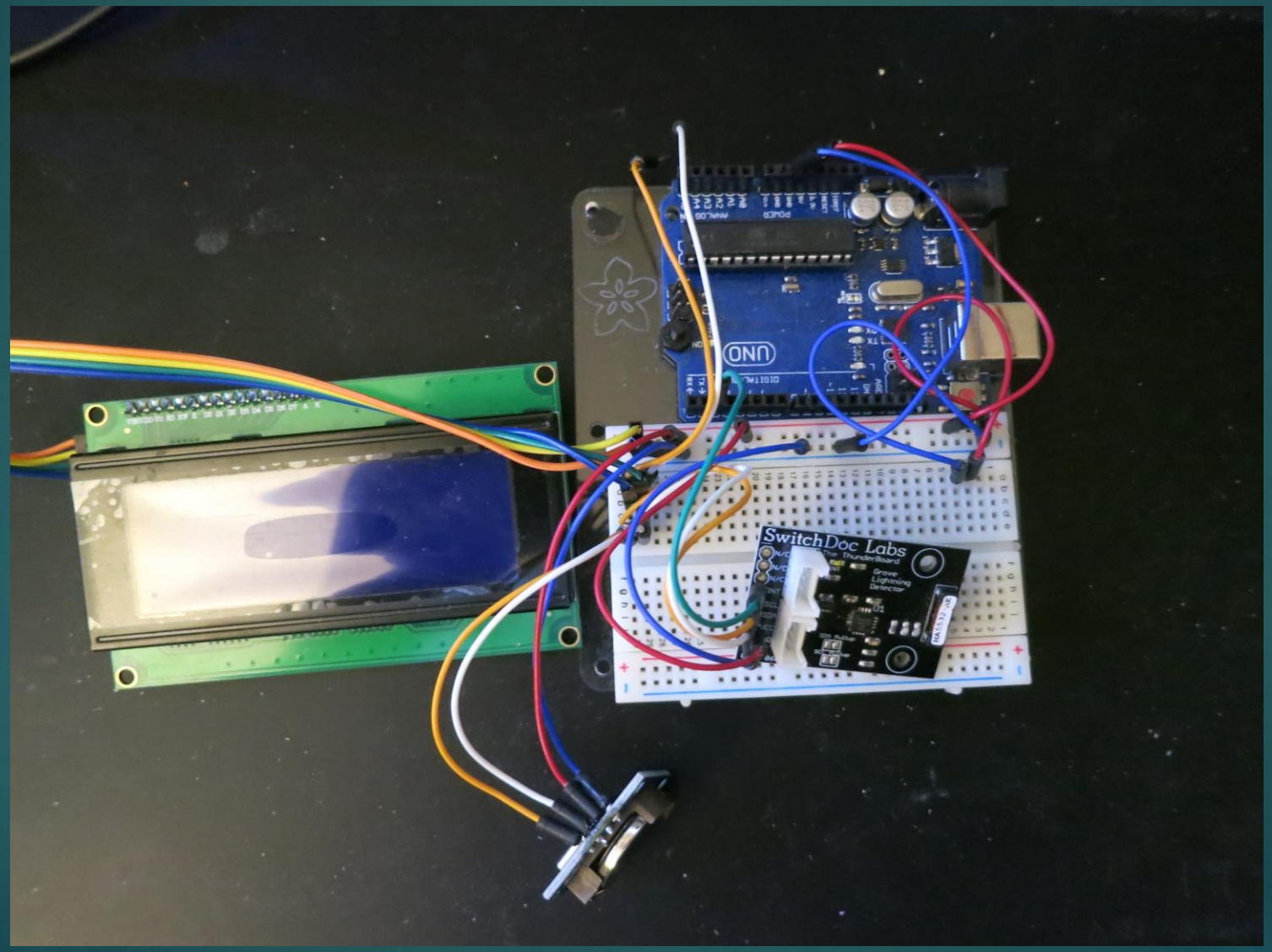
Various Computers



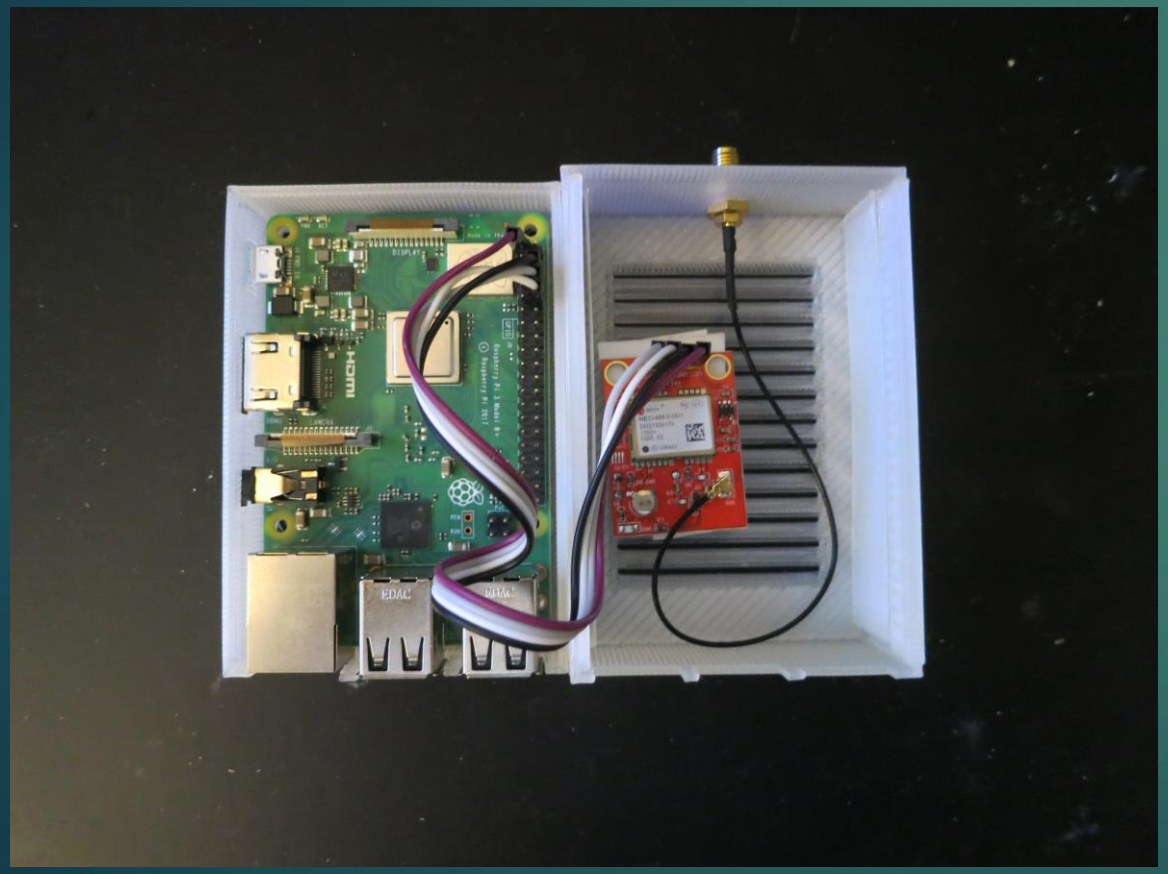
Automated antenna switch (Arduino)

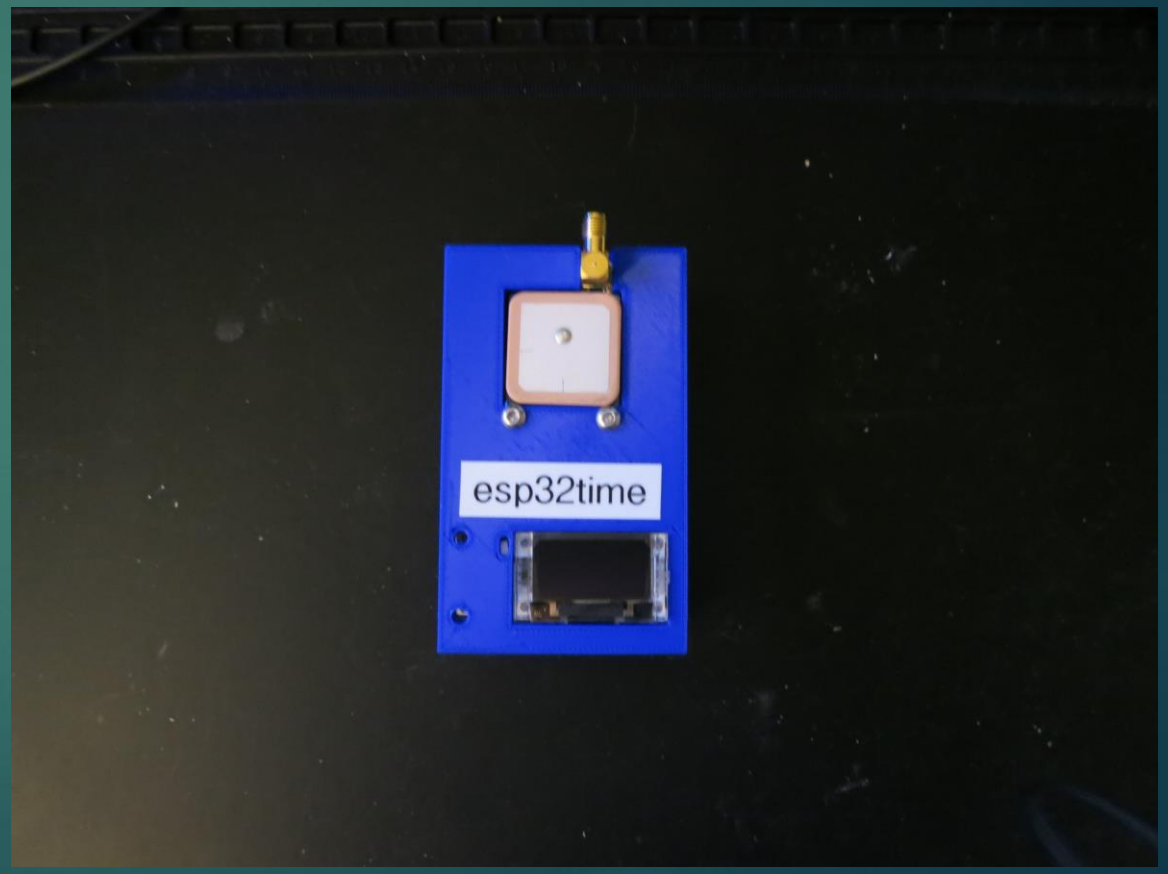


Lightning detector (Arduino)



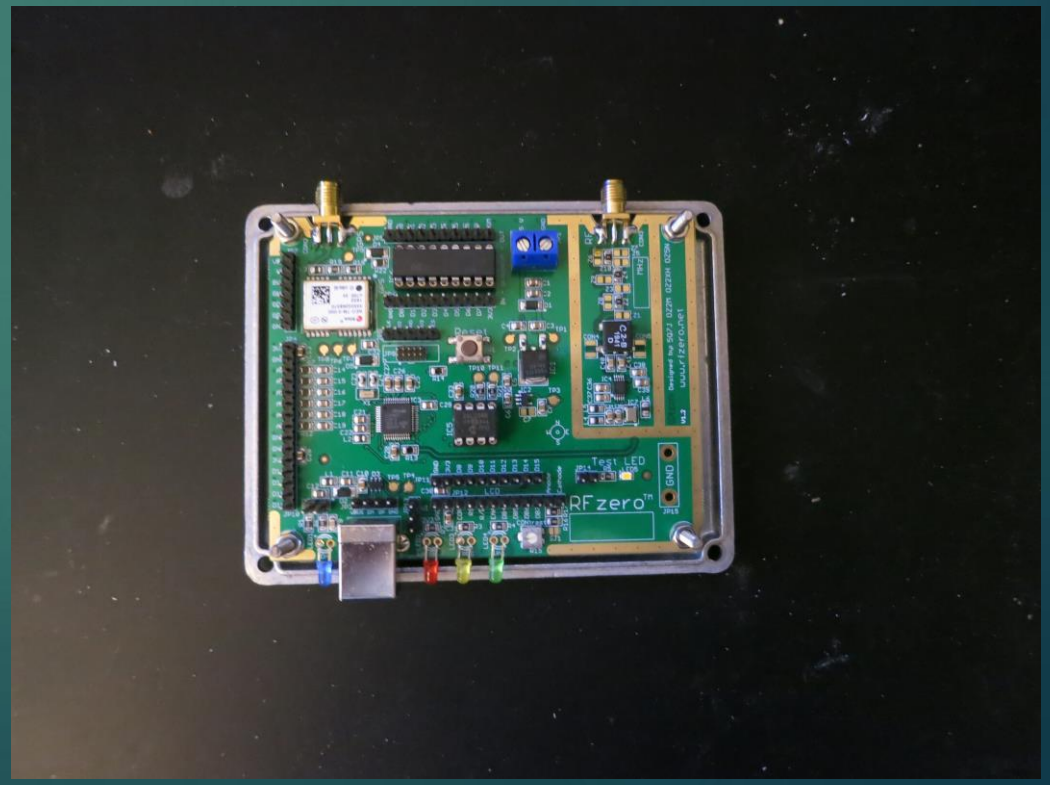
GPS Time Server (NTP) (Raspberry Pi / ESP32)





RFZero

The RFzero™ is a multi-purpose GPS controlled RF unit. It can be used as a beacon (IBP, SPB, CW, FST4, FST4W, FT4, FT8, JS8, JT9, ModeX, PI4, WSPR, …), **signal generator**, VFO, QO-100 dual LO, **low cost GPSDO**, e.g. for 10 MHz, or … Furthermore, is the RFzero™ an Arduino compatible platform. So it is possible for you to write or modify the software yourself. More than 30 programs, Arduino sketches, are integrated into the Arduino IDE. With the RFzero Manager you don't even have know anything about Arduino to use the RFzero™.



You can do it

- But…
  - What is an
    - Arduino?
    - Raspberry Pi? (I don't like raspberries)
  - I'm not a Programmer
    - Basic?
    - C?
    - C++?
    - Python (Is that a snake)?

Let's pick a project

- Screwdriver antenna controller
  - Screwdriver antenna is a DC motor driven loading coil
- How do I control it?
  - Apply DC to drive the coil up
  - Reverse the polarity to drive the coil down
    - Use a double pole double throw momentary rocker switch
      - What fun is that?
    - Use a microcontroller

How to start the project

- Identify and procure the components
  - DC motor controller
  - Up/Down buttons
  - LCD display
  - Arduino UNO
- Load the Arduino IDE (**I**ntegrated **D**evelopment **E**nvironment)
  - Find Drivers / Libraries for the components
    - Google is your friend
    - They normally come with example programs

Continuing with the Antenna Controller

- Hook the components together
  - Again Google is your friend
- Load an example program on the Arduino
  - I loaded an example program for the LCD/Keypad shield that I am using
  - Looking at the code showed how to read the buttons and output to the LCD
  - Using the example program as the base, I modified it to display what I wanted
  - Next I loaded an example program for the DC motor controller
    - I found out how to control direction and speed from the example
  - I copied the direction and speed control code from that example into the LCD/Keypad example

Compile & Test

- Compile your program
  - Convert the human readable program into something the Arduino understands.
  - Fix the errors that the compiler finds
- Load the compiled program onto the Arduino
- Run the program and check that it does what you expect.
- Add more features
  - Compile
  - Load
  - Run
- Rinse and Repeat!

Questions?

For help with anything we talked about including help with your own projects, either hardware or software:

Email: w2uajeff@gmail.com