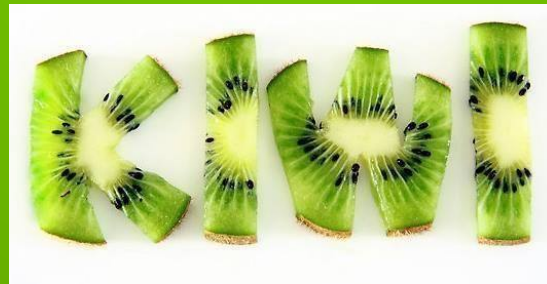


# Final Presentation (Weatherbox)

Advisor: Dr. Kuh  
Team

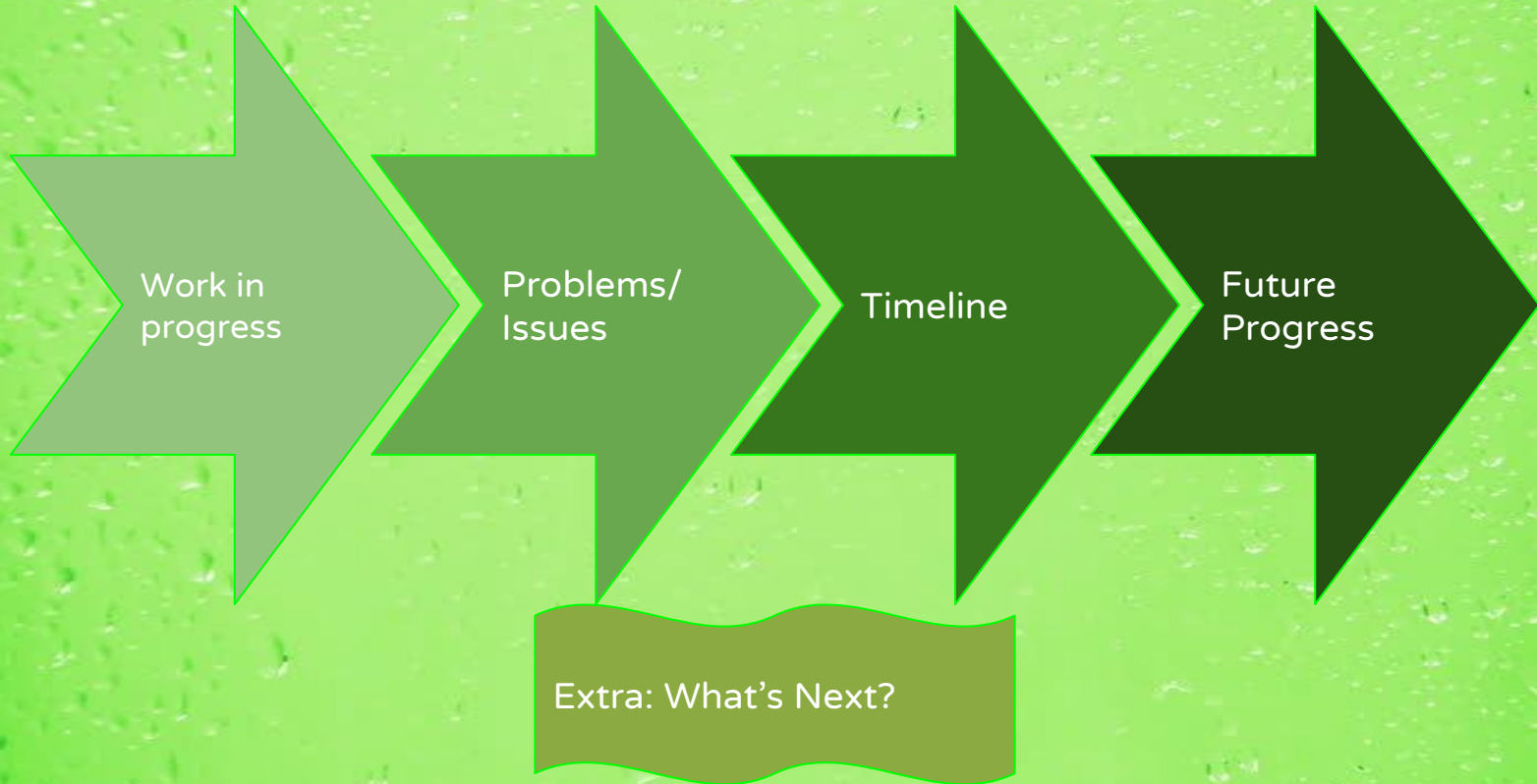




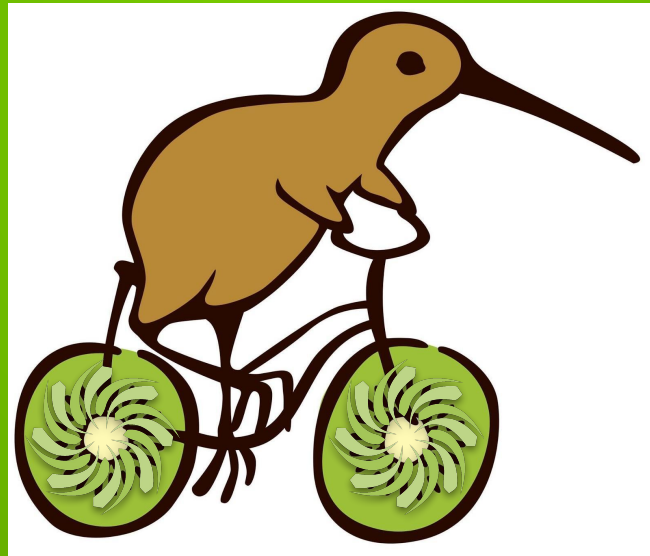
- 🌍 Sustainable Energy for a positive environmental future!
- 🌍 To get more experience with hardware and software!



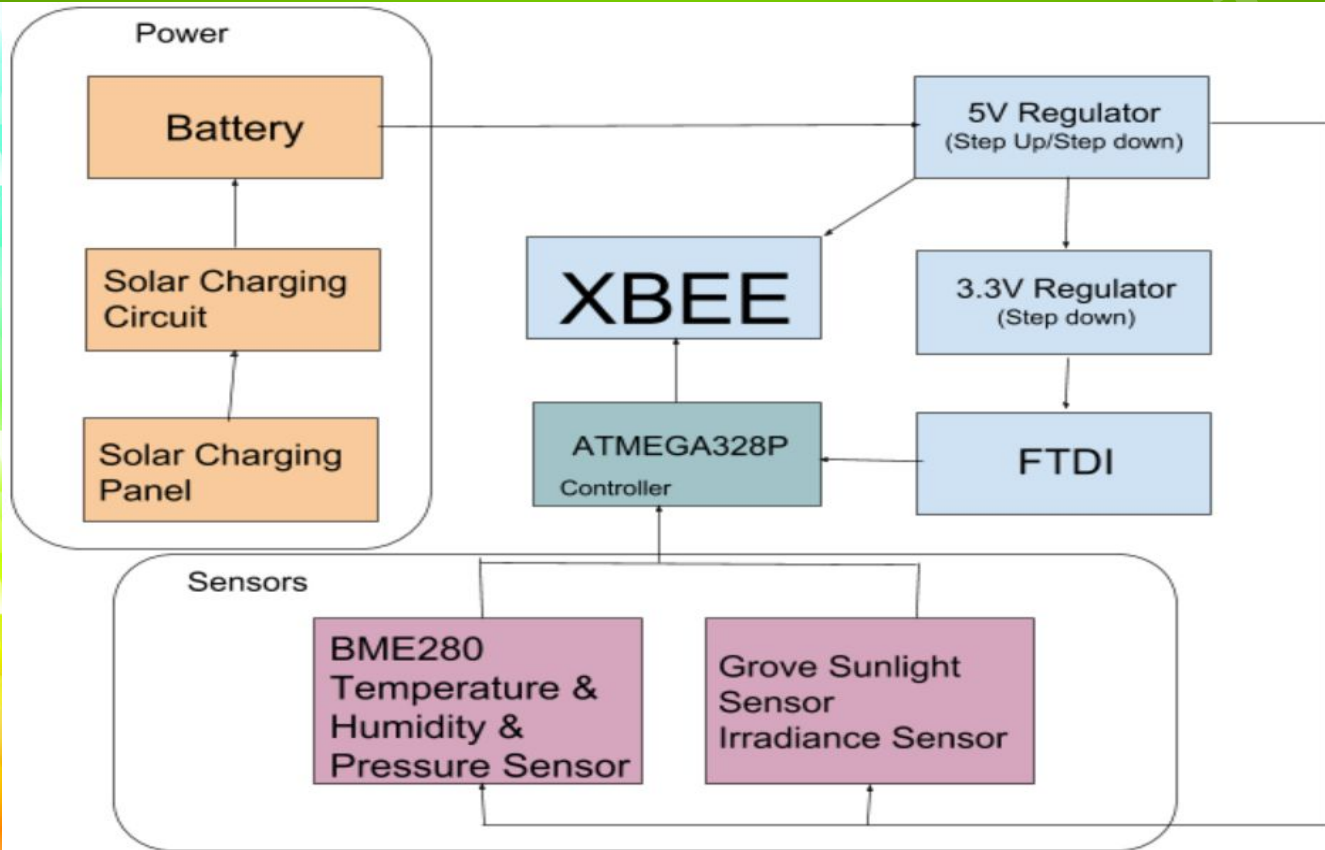
# Overview



# What's Kiwi working on?



# Block Diagram



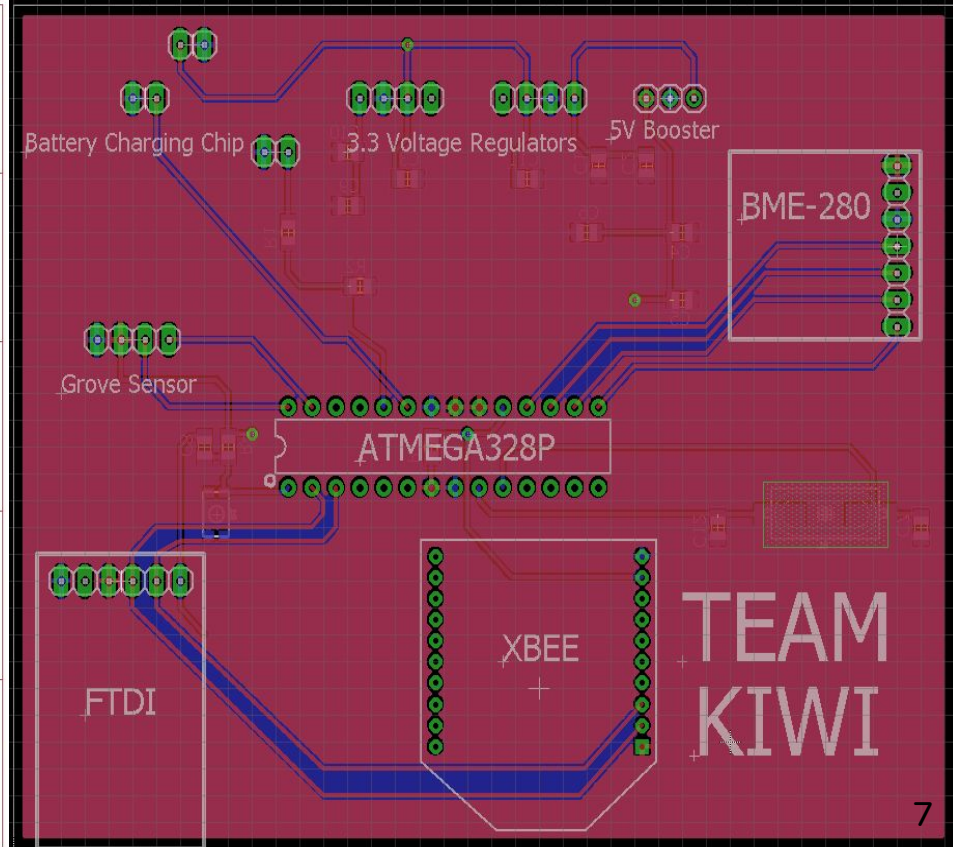
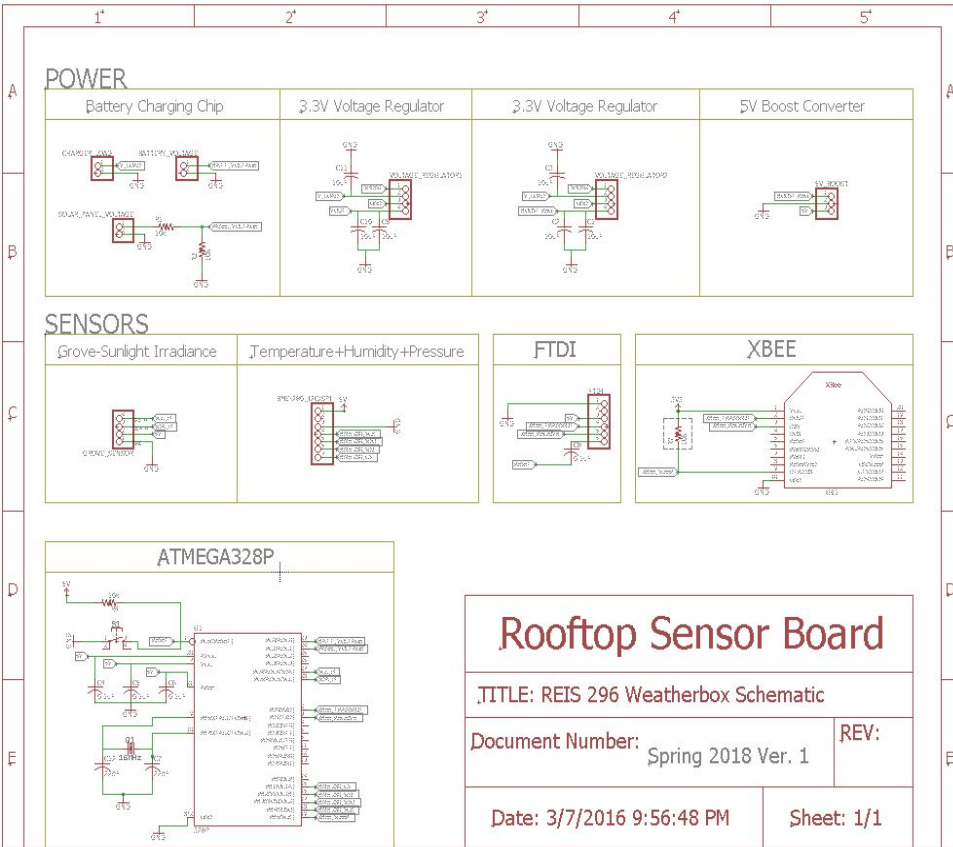


# Pseudo Algorithm

- × Main Driver (Weatherbox): Initializes the sensors and clears the initial packet, then runs the routine in a loop.
- × Setup(Config.h): Sets the pins on the ATMEGA
- × Schema: Creates the structs where data is saved as packets
- × Sensors: Obtains the data from the BME280 and Solar Irradiance sensors
- × Transmit: Clears the previous packet and creates a new one containing sensor data
- × Routine: Takes the packet created and sends it every 60 seconds

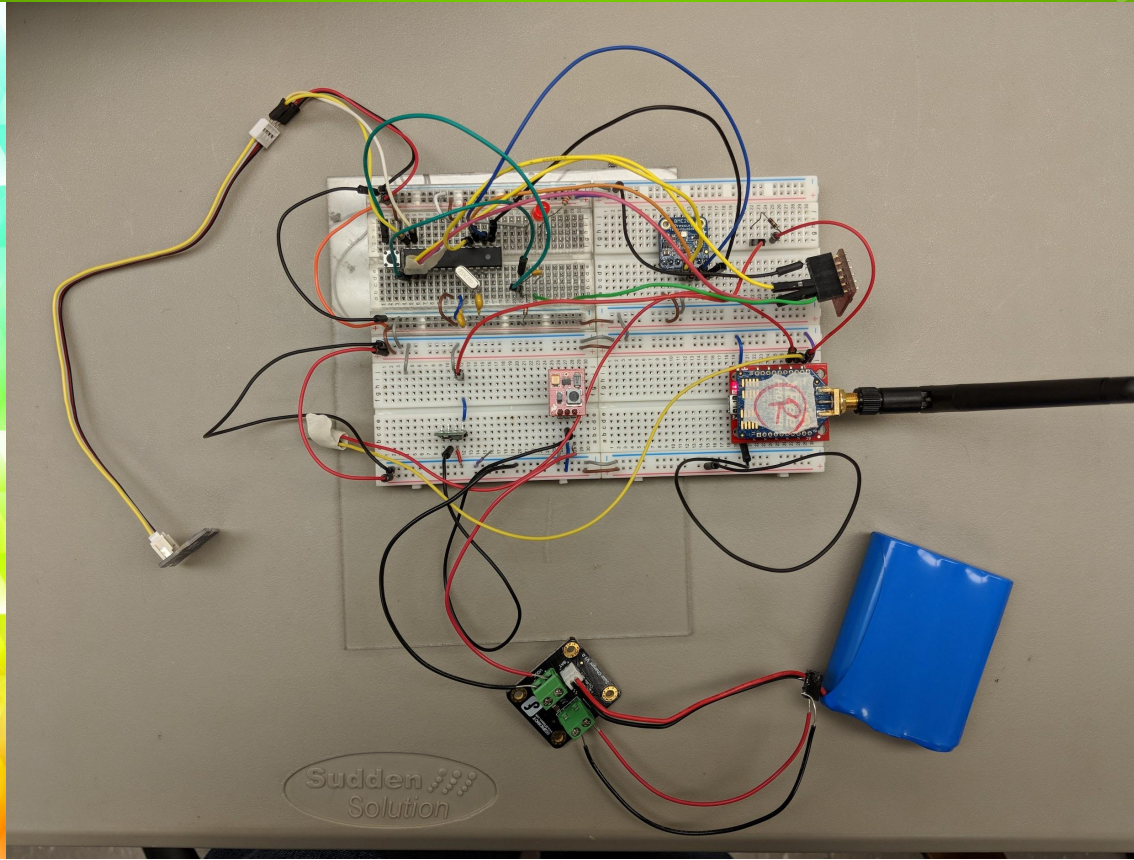


# Schematic and PCB





# Kiwi's Breadboard







# Kiwi be sent!

XCTU Working Modes Tools Help

Radio Modules

- Name:** GUAVA\_R  
**Function:** ZigBee Router API  
**Port:** COM11 - 9600/8/N/1/N - API 2  
**MAC:** 0013A200408D9DCB
- Name:** GUAVA\_R  
**Function:** ZigBee Coordinator API  
**Port:** COM10 - 9600/8/N/1/N - API 1  
**MAC:** 0013A200409F29AB

GUAVA\_R - 0013A200408D9DCB - 0013A200409F29AB

Close Record Detach

CTS CD DSR DTR RTS BRK Tx frames: 0 Rx frames: 2

### Frames log

| ID  | Time         | Length | Frame          |
|-----|--------------|--------|----------------|
| ← 0 | 16:00:26.389 | 52     | Receive Packet |
| ← 1 | 16:01:26.414 | 52     | Receive Packet |

### Frame details

02

#### RF data

| ASCII                                  | HEX |
|----------------------------------------|-----|
| 29 01 00 00 54 D1 01 00 95 04 CF 04 40 |     |
| 05 CA 04 FB 04 3B 05 B4 08 16 09 D9 09 |     |
| 0C 09 78 09 D9 09 00 00 00 00 00 00    |     |
| 00                                     |     |

#### Checksum

6D

Copy packet information

### Send frames

| Name | Type |
|------|------|
|------|------|

### Send a single frame

Send selected frame

### Send sequence

Transmit interval (ms): 500

Repeat times 1

Loop infinitely

Start sequence



# Kiwi's Future Goals

## Yet to work on:

- × Making our housing
- × Future Debugging

## Overall Goal:

Our goal is to create an environmental sensor that can detect weather patterns in an area.



# Kiwi's Problems/ Issues



# Kiwi's Problems

- 🌐 Debugging errors when compiling code
- 🌐 When testing the voltage regulator, the new 5V regulators would output 5.12V
- 🌐 Remapping the PCB to make it easy to nest without cutting out connections GND (bottom layer) and 5V (top layer)
- 🌐 Wiring issues on board that prevented code from being uploaded



# Kiwi's Ongoing Problems

- × Check if the data packet sent was correct (HEX files)
- × Figuring out if the breadboard needs one or two 3.3 voltage regulators
- × Extra: Creating a kiwi logo for our PCB

# Kiwi's Timeline





|                         | Project<br>(Gantt Chart) |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
|-------------------------|--------------------------|-----------|----------|----------|-----------|-----------|----------|----------|-----------|-----------|-------------|----------|-----------|-----------|-----------|----------|
| Week                    | 1                        | 2         | 3        | 4        | 5         | 6         | 7        | 8        | 9         | 10        | SpringBreak | 11       | 12        | 13        | 14        | 15       |
| Date                    | 1/19/2018                | 1/26/2018 | 2/2/2018 | 2/9/2018 | 2/16/2018 | 2/23/2018 | 3/2/2018 | 3/9/2018 | 3/16/2018 | 3/23/2018 | Week 11     | 4/6/2018 | 4/13/2018 | 4/20/2018 | 4/27/2018 | 5/4/2018 |
| <b>Presentations</b>    |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
| Proposal                |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
| Design                  |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
| Final                   |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
| Demonstration           |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
| <b>Training</b>         |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
| Git/GitHub              |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
| Arduino/Bare Arduino    |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
| Eagle                   |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
| <b>Modules</b>          |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
| Microprocessor          |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
| Sensors                 |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
| Charging Circuit        |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
| Xbee                    |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
| <b>Build</b>            |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
| System Integration      |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
| Overall System Firmware |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
| Design/Print PCB        |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
| Housing                 |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
| <b>Test</b>             |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
| Debug                   |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
| <b>Reports</b>          |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |
| Final Report            |                          |           |          |          |           |           |          |          |           |           |             |          |           |           |           |          |

# Kiwi's Progress



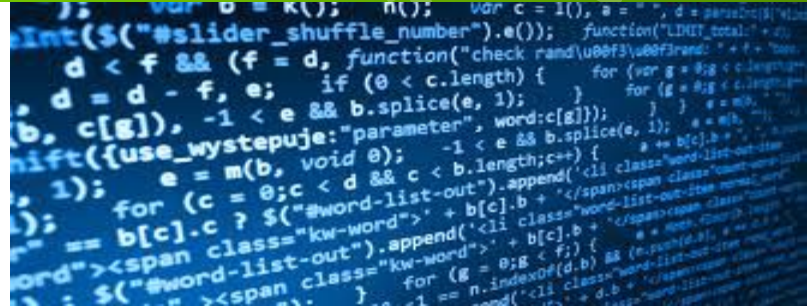




# Kiwi's Progress

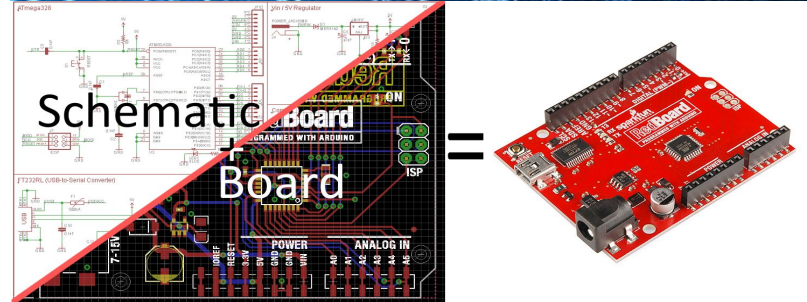
## Completed the software

Able to send packets and receive through XCTU.



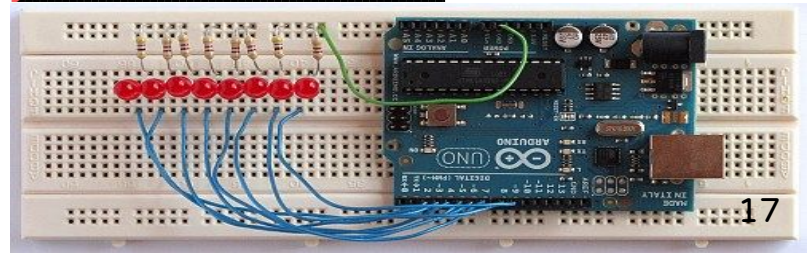
## Eagle

Completed the PCB design.



## Breadboarding

Finished with the building the breadboard.





# What's Next, Kiwi?

## Future debugging

If needed, when we come back to find there's a problem.

## 2 day test

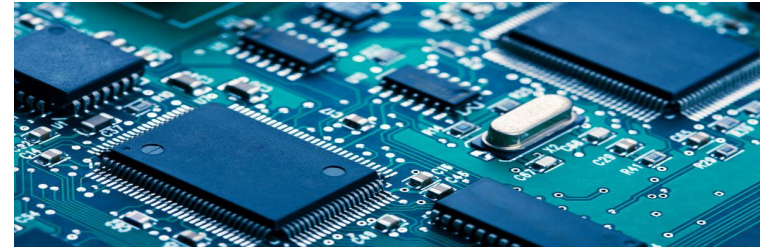
Be able to run our Weatherbox

## Print out PCB

Finalize the PCB and send it out the print.

## Housing for the PCB design

Think about how our house should be designed to suit our PCB.





Thanks!

Any questions?

