

# Home Secured

## Group 8

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# Motivation

- ◇ Product Improvement – Addition of systems not regularly found within an alarm system.
- ◇ Convenience – To help cut down on the task of arming and disarming systems.
- ◇ Expanded Control – Allows greater warning, customization and monitoring of a home.

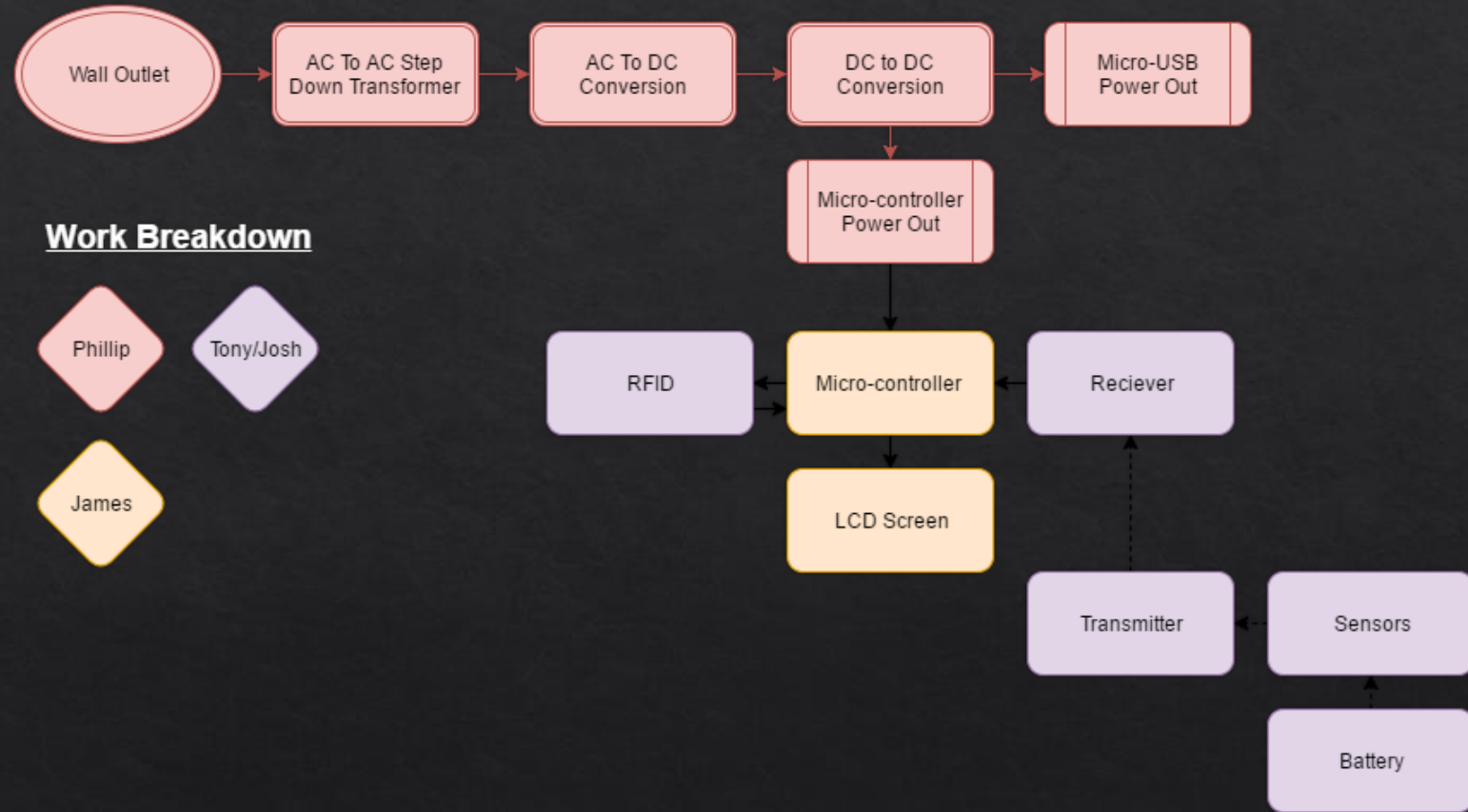
# Goals and Objectives

- ◇ Introduction of RFID and standard arming/disarming of a system.
- ◇ LCD screen for easy viewing of system status and notifications.
- ◇ System logs that indicate when the system is accessed.
- ◇ Addition of standard and nonstandard sensors.
- ◇ Addition of micro USB charging system.

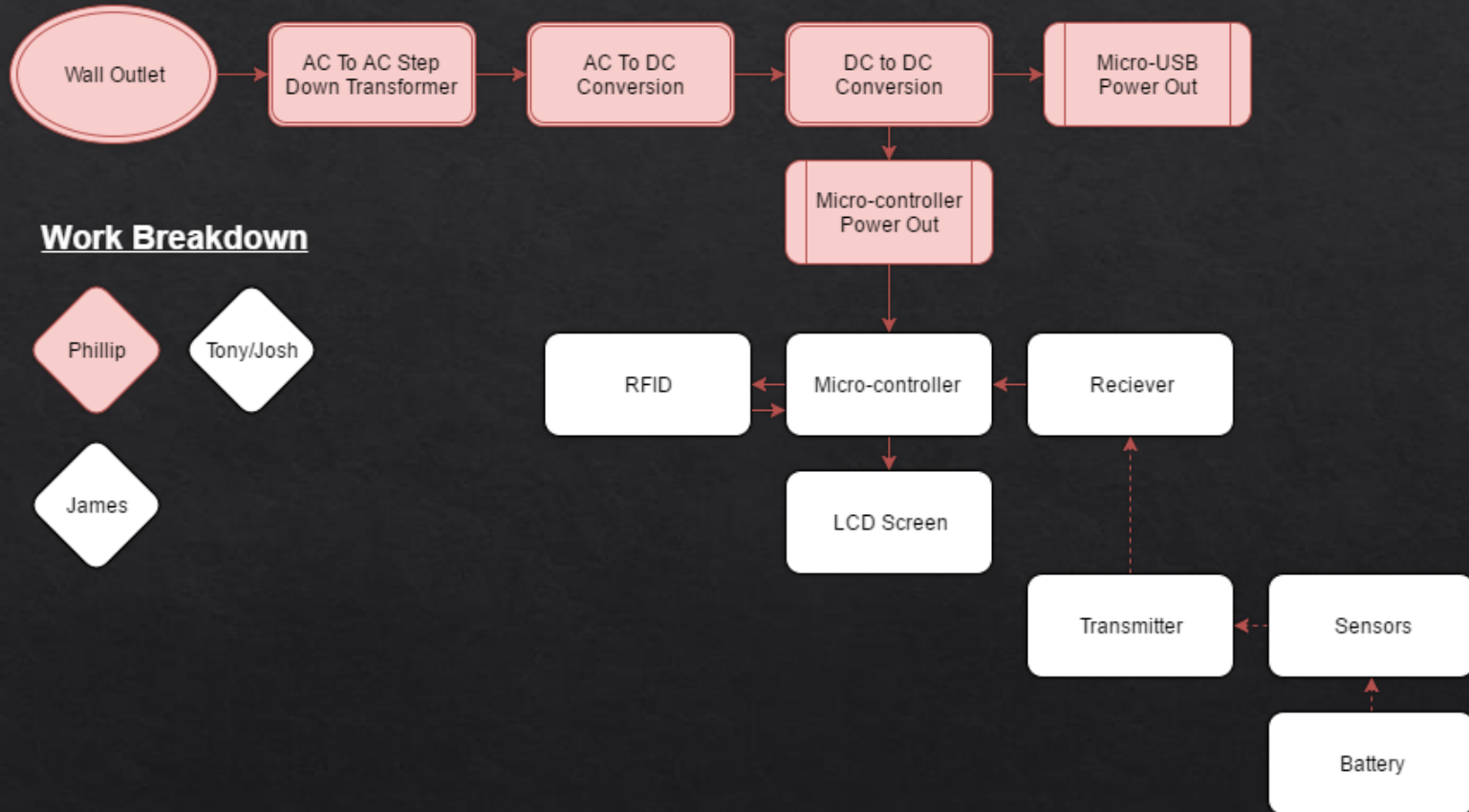
# Specification

<b>Component</b>	<b>Parameter</b>	<b>Design Specification</b>
Power System	Interrupt Protection	1 Minute
Power System	USB Power	Up to 2.5A with a 5V output.
Sensor 1	Battery	9V @1200mAH
Sensor 2	Battery	9V @1200mAH
Base	Size	TBD

# Overall Block Diagram



# Power System

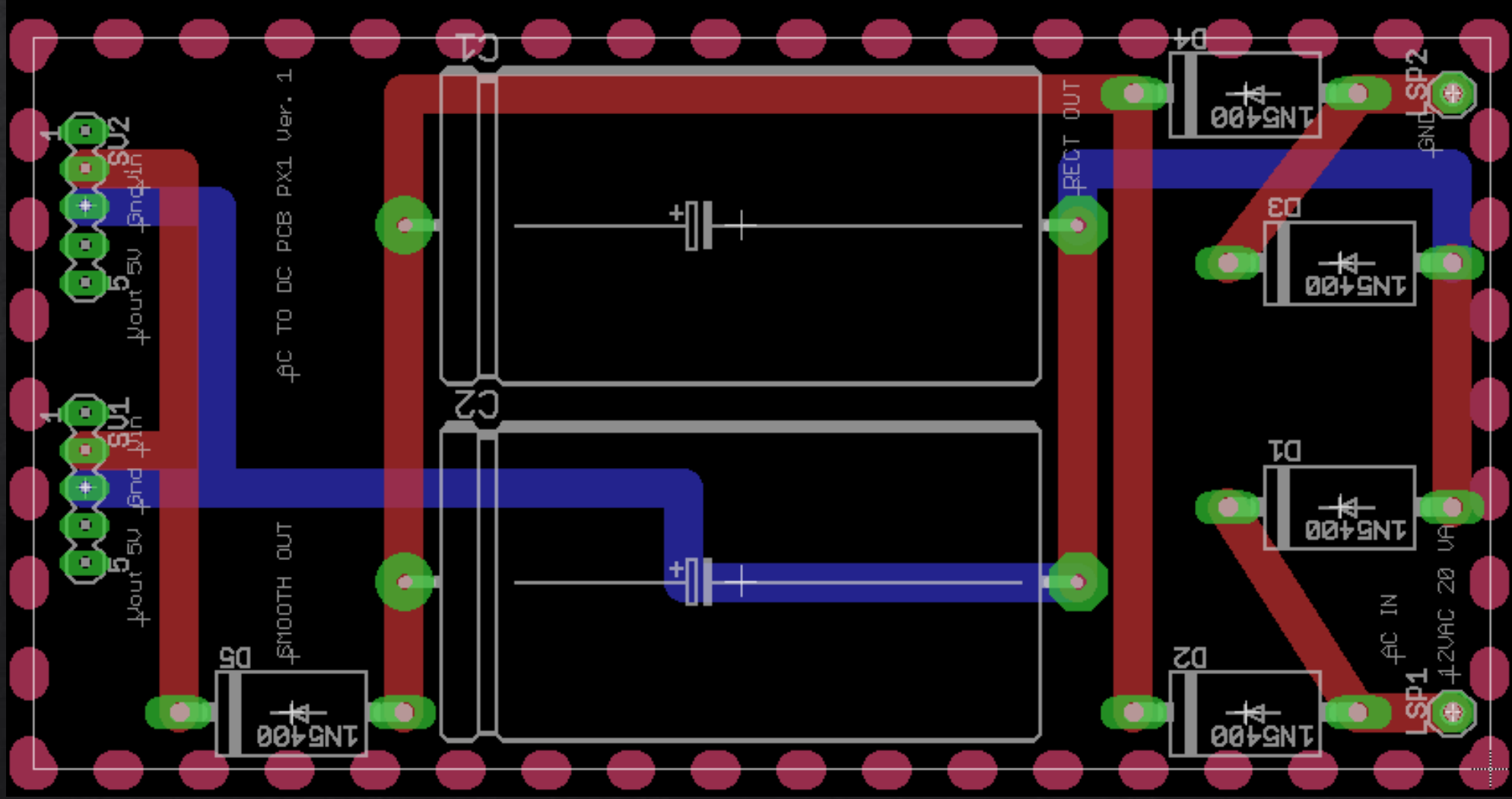


# Power System Cont.

- ◇ D24V25F5
- ◇ 6-38V Input Voltage
- ◇ 5V and up to 2.5A Output Voltage.
- ◇ Reverse Flow Protection.
- ◇ Smaller Profile
- ◇ LT8967
- ◇ 5-42V Input Voltage
- ◇ 5V and up to 2.5A Output voltage
- ◇ Programmable Current Limit
- ◇ No Reverse Flow Protection

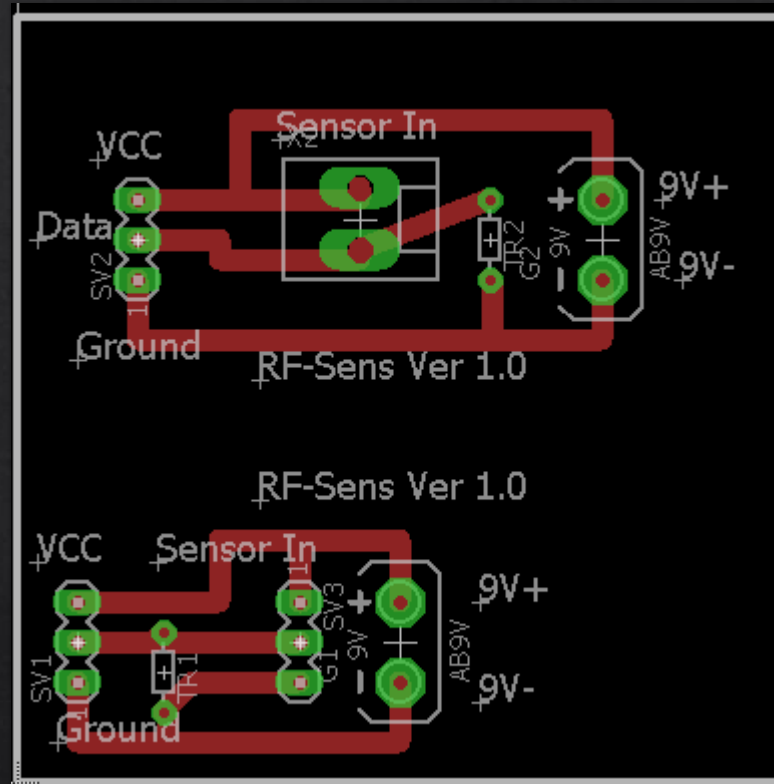


# Power System PCB

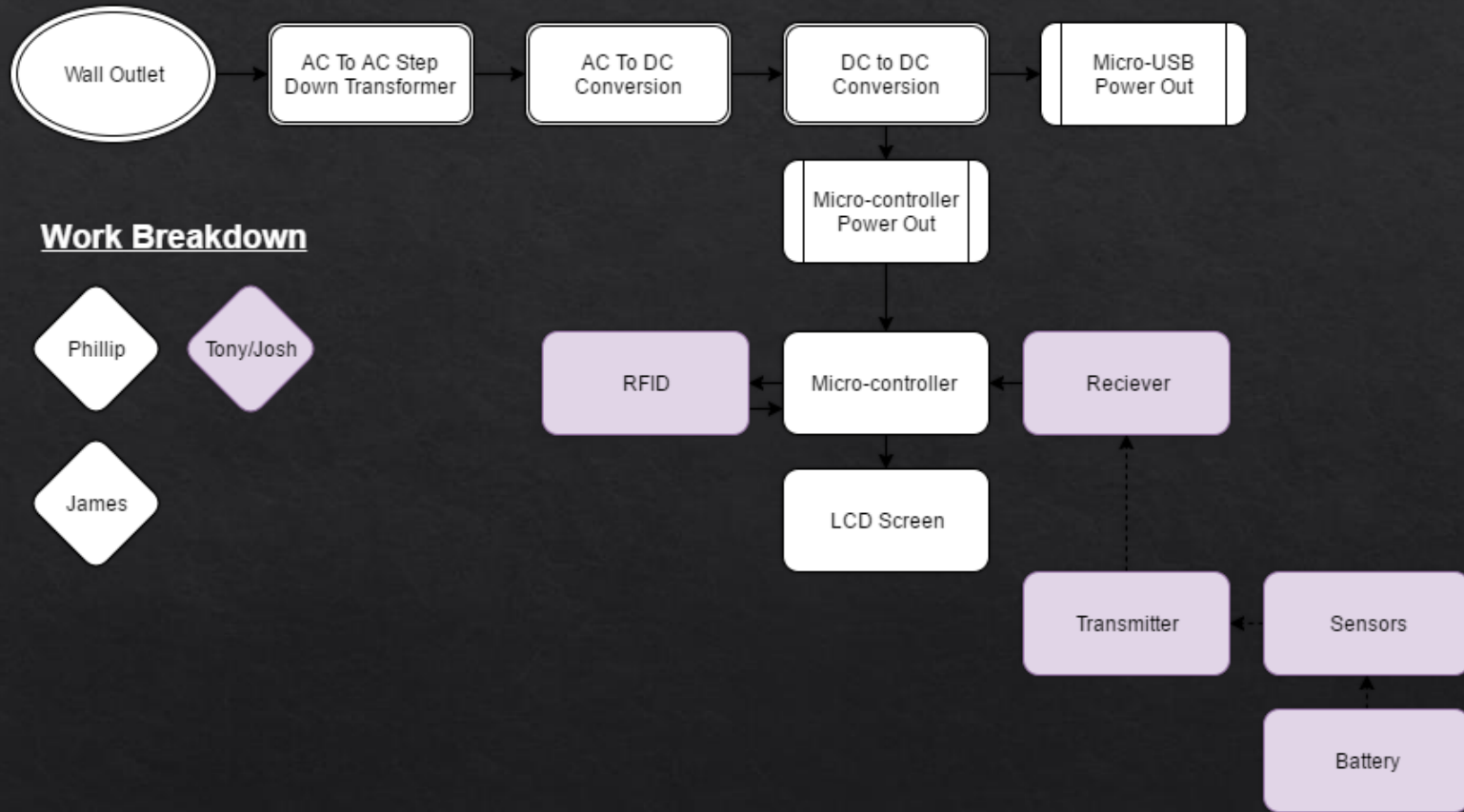




# Sensor PCB Schematic



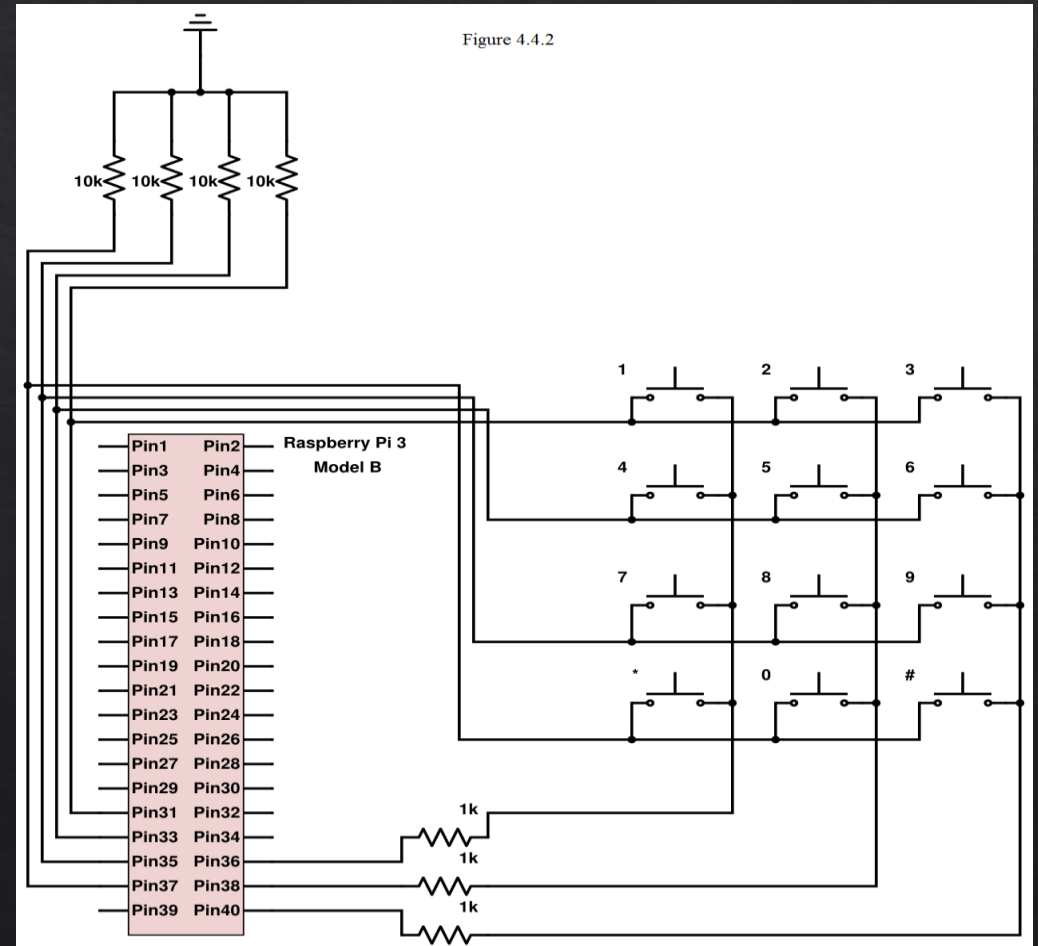
# Sensors and Communication System



# Push Buttons

# Schematic and Specs

- ❑ 3x4 Layout
- ❑ Four Pull Down Resistors
- ❑ Three Current Limiting Resistors
- ❑ Single button pressed:  $0.264\text{mW}$  @  $0.08\text{mA}$
- ❑ Max Current Draw:  $0.663\text{mA}$  @  $2.178\text{mW}$



LED's

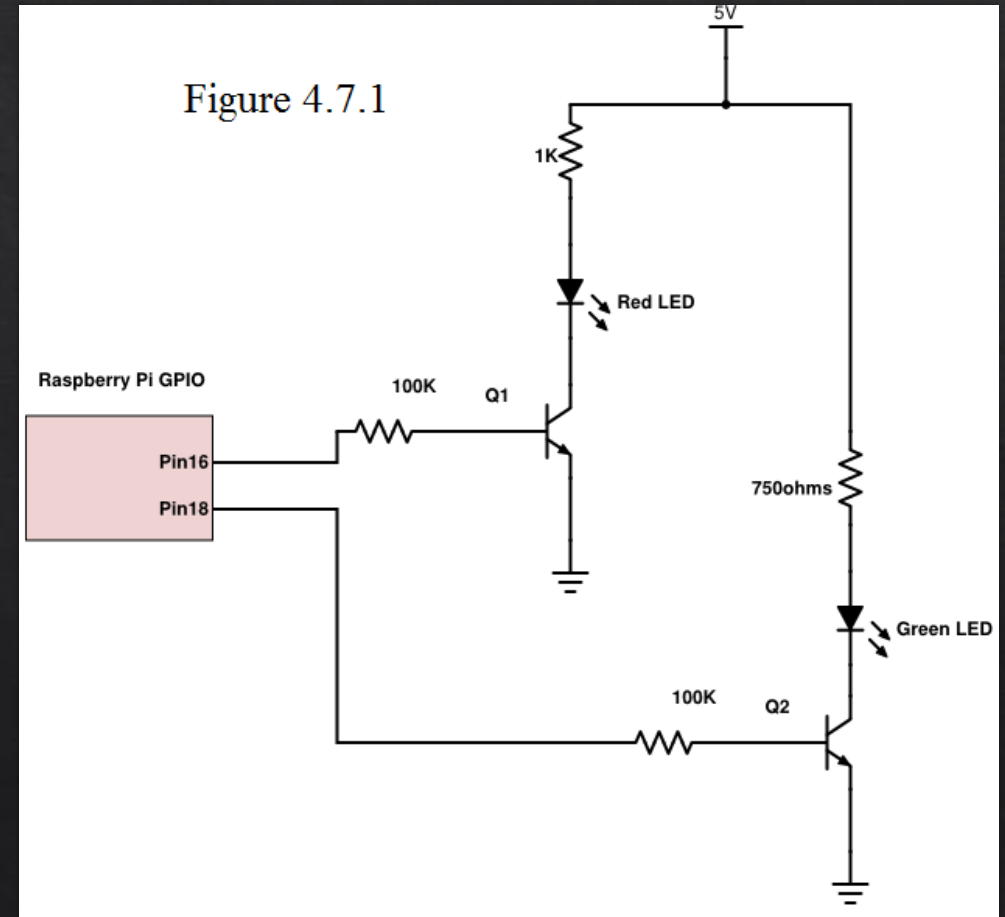
# Specifications

- ❑ Brand: Microtivity
- ❑ Red Forward Voltage: 2V
- ❑ Green Forward Voltage: 3V
- ❑ Current <20mA



# Schematic

- ❑ Two 2n2222 NPN Transistors
- ❑ Base Current: 26.47uA
- ❑ Collector Current: 2.91mA



# Door Chimes/Reed Switches



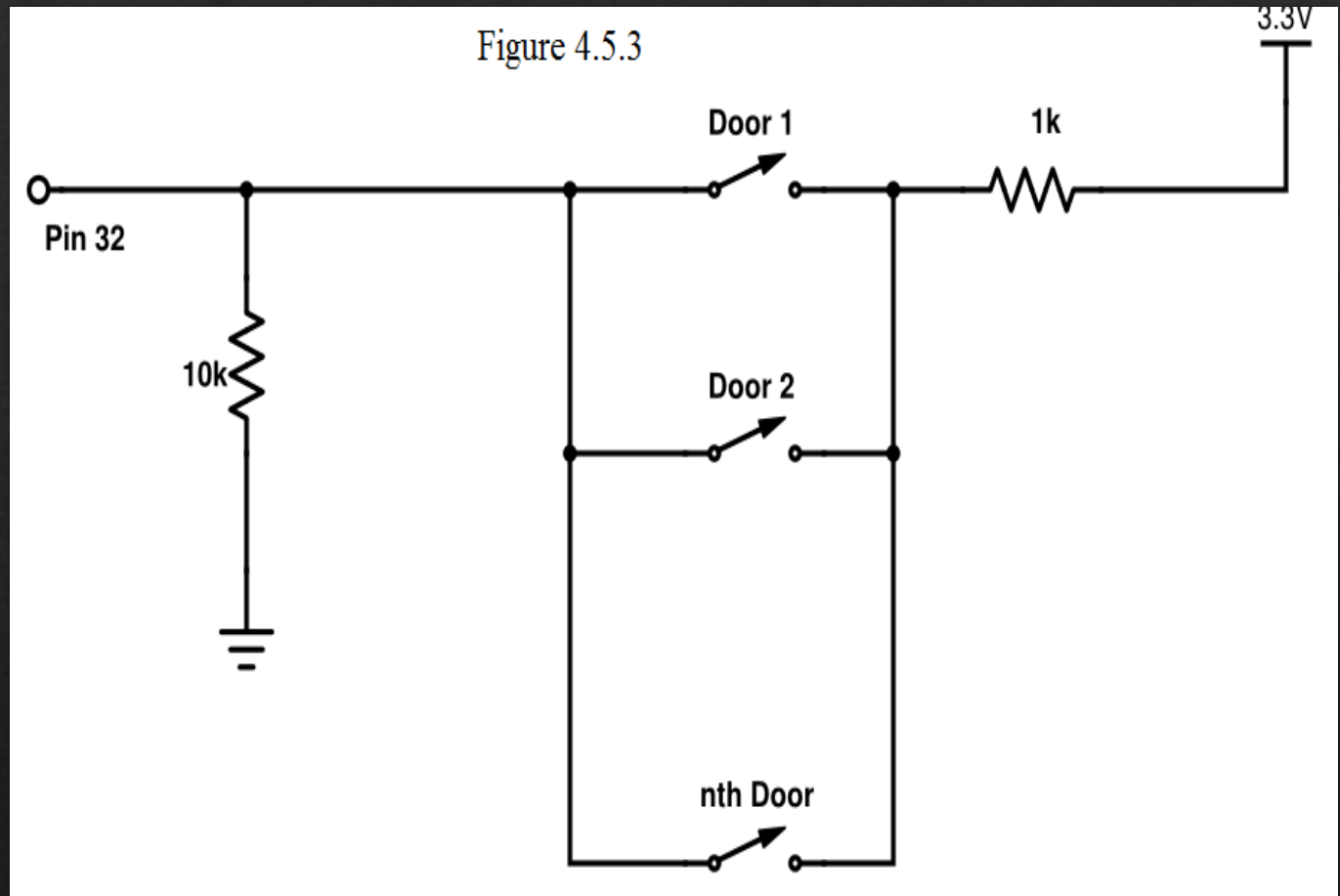
# Specifications

- ❑ Brand: Gikfun
- ❑ Max Power: 10W
- ❑ Max Current: 0.55A
- ❑ Max Voltage: 150V



# Schematic

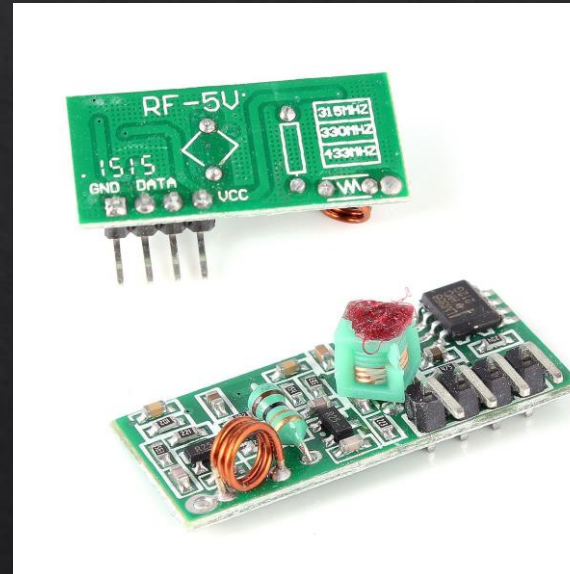
- ❑ Current Draw: 0.35mA
- ❑ Power Consumption: 1.155mW



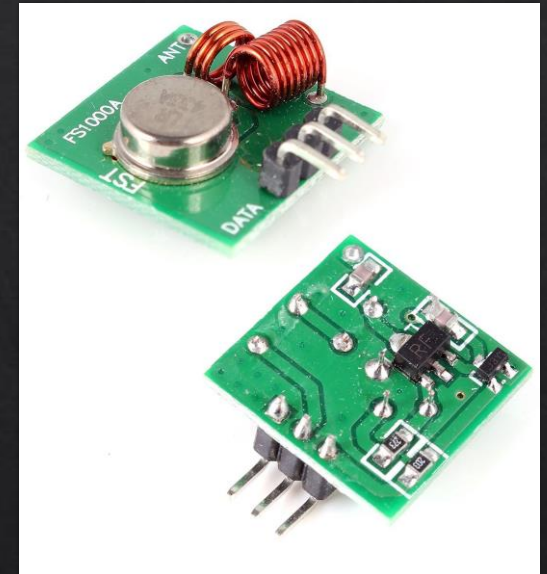
# Wireless Sensor Communication

# Specifications

- ❑ Brand: Aukru
- ❑ 315,330,433MHz
- ❑ Transmitter Vin: 3-12V
- ❑ Receiver Vin: 3-6V
- ❑ Transmitting Power: 10mW



Receiver

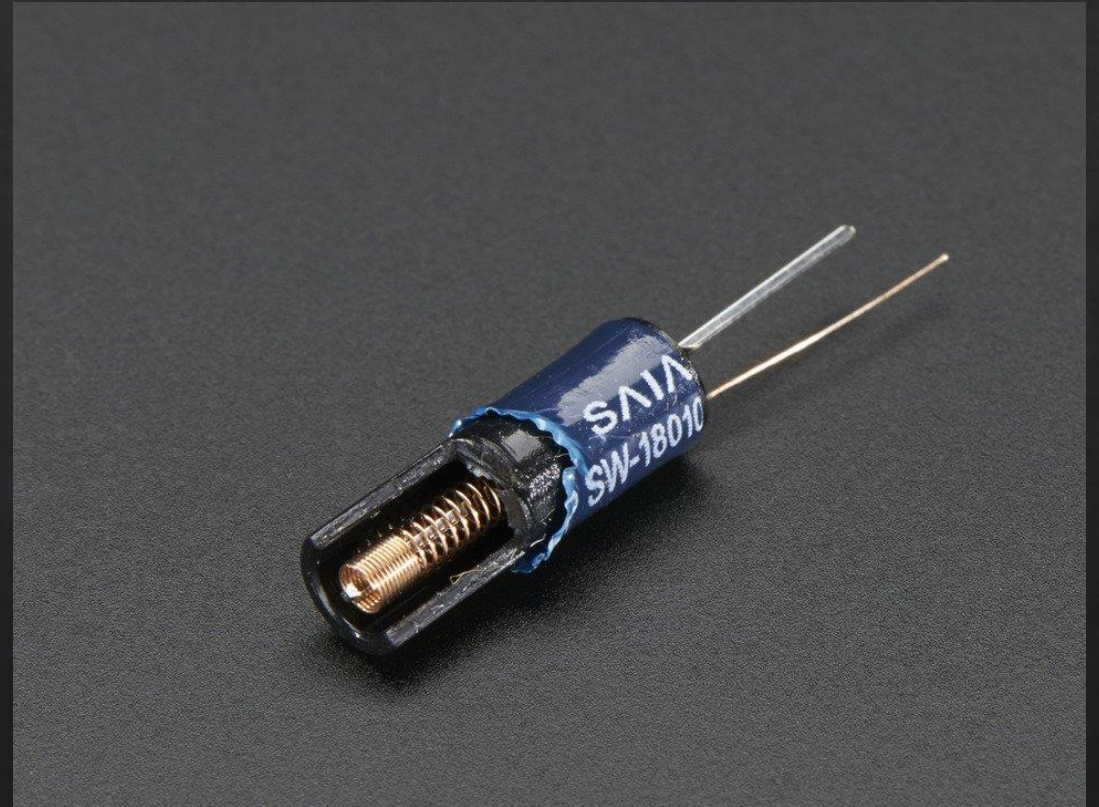


Transmitter

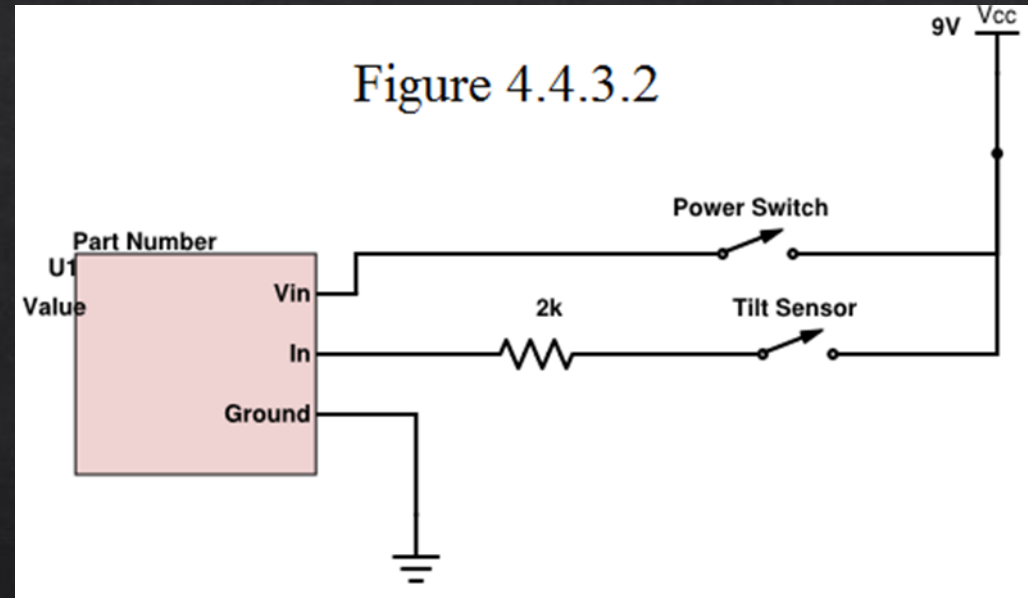
# Tilt/Vibration Sensor

# Specifications

- ❑ Max Voltage: 12V
- ❑ Max Current: 20mA
- ❑ Contact Time: 2ms



# Schematic



# Motion Sensor

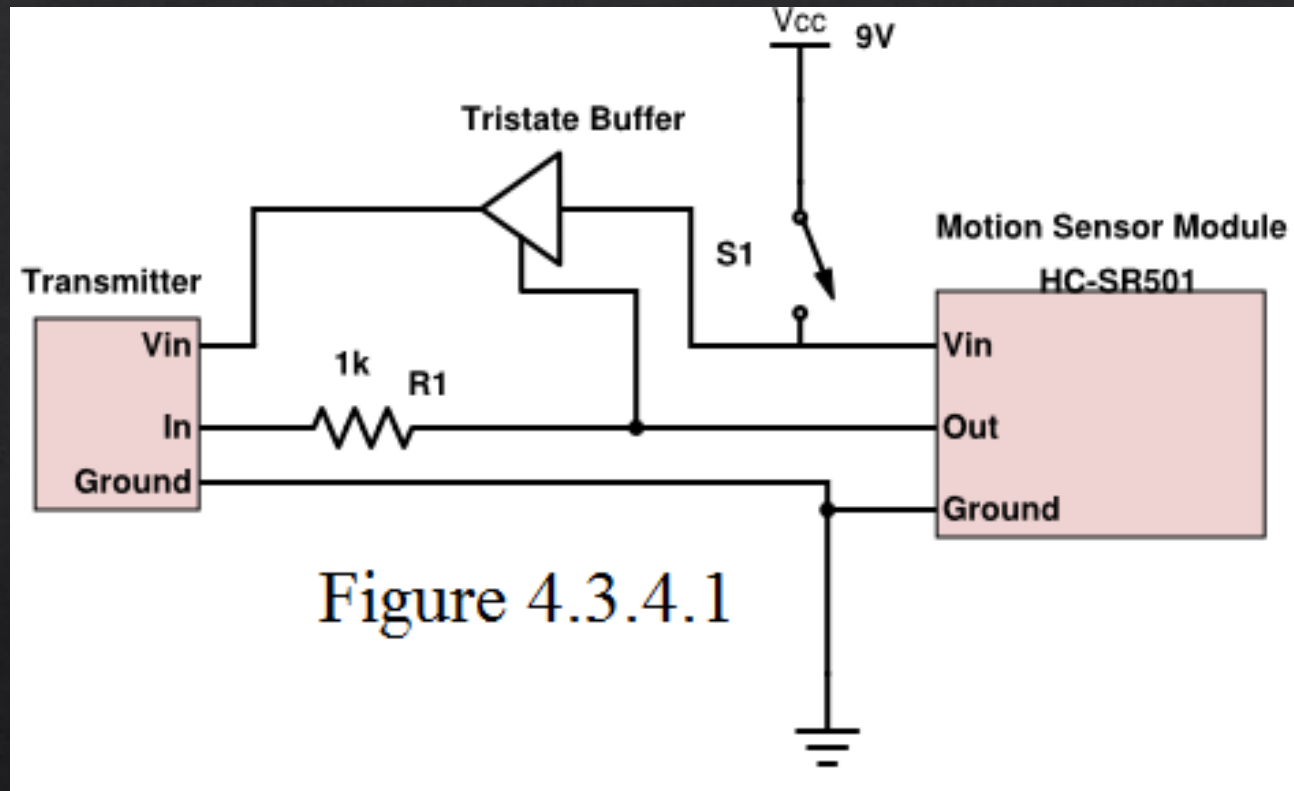


# Specifications

- ❑ HC-SR501
- ❑  $V_{in}$ : 5-20V
- ❑ Digital Out: High=3.3V, Low=0V
- ❑ Repeating Trigger Mode
- ❑ Nonrepeating Trigger Mode
- ❑ Detection Range: 20ft



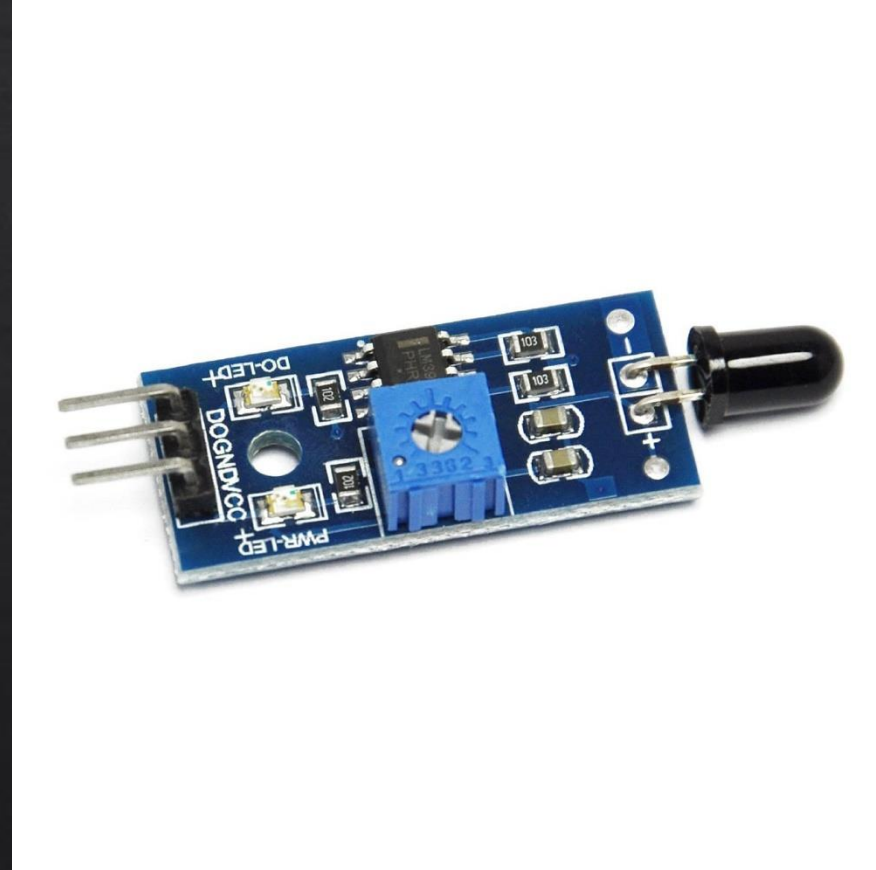
# Schematic



# Fire Sensor

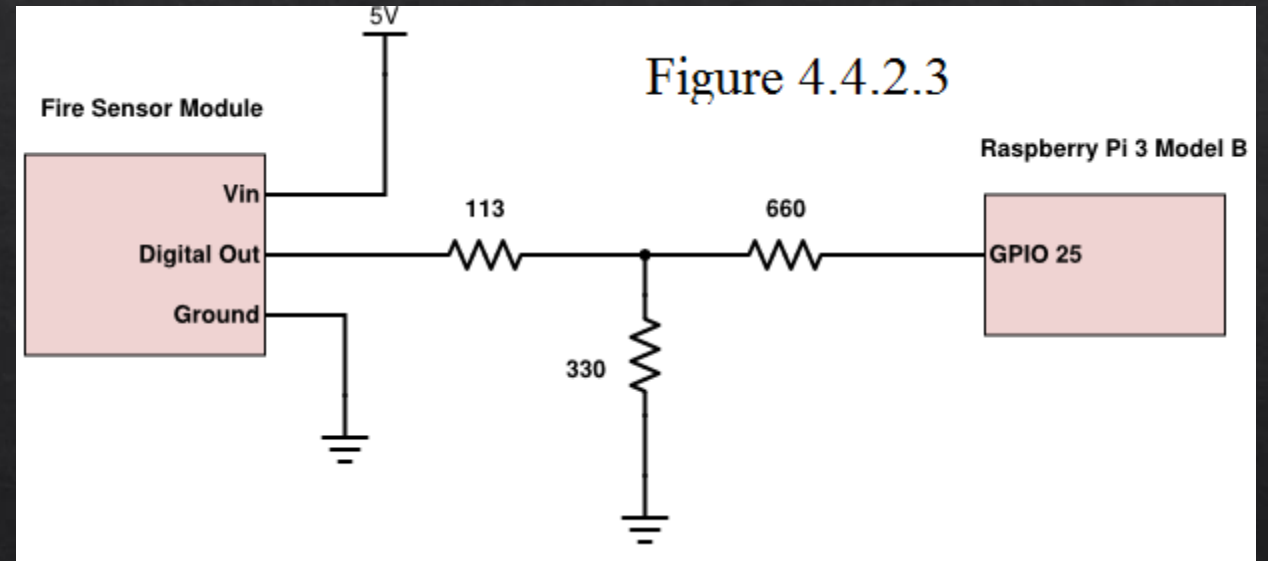
# Specifications

- ❑ Brand: Atomic Market
- ❑ Vin: 3-5.5V
- ❑ Digital or Analog Output Signal
- ❑ Detection Range: 10ft



# Schematic

- ❑ Digital Out: No Flame=1.68V
- ❑ Flame=0.08V
- ❑ Actual Detection Distance=6ft

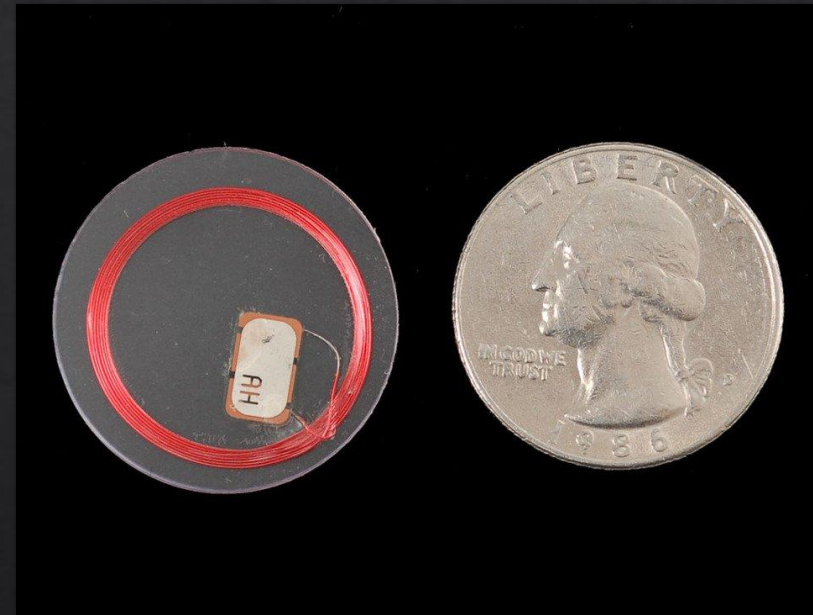


# RFID Overview

- ◇ Wireless transmission of data
- ◇ Tags don't require a power source
- ◇ Each tag has its own unique identification
- ◇ Data can be read or written from the tags memory

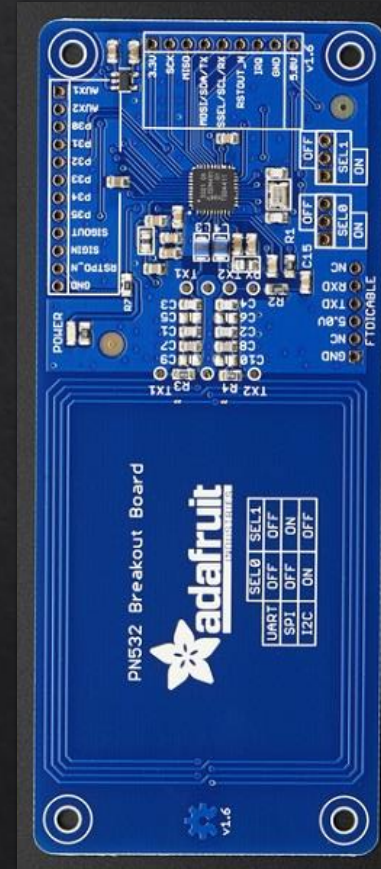
# RFID Tag – NXP Mifare S50

- ◆ 1kB of EEPROM memory
- ◆ 4 byte unique ID
- ◆ 13.56 MHz
- ◆ ISO/IEC 14443A
- ◆ 13 kB/s Max data transfer rate
- ◆ 2” read distance



# RFID Reader-PN532

- ◆ Compatible with Microcontroller and selected tags
- ◆ 5V supply voltage
- ◆ 26 kB/s Max data transfer rate
- ◆ Communicates using SPI





# RFID Memory

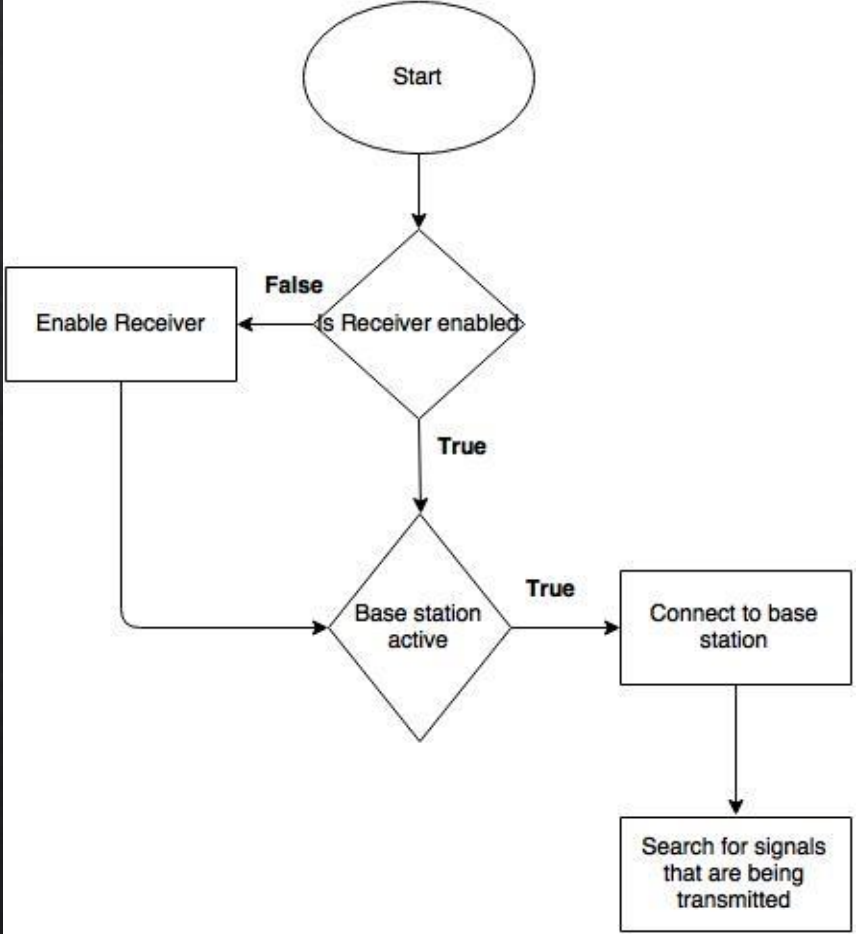
- ◆ 16 Sectors with 4 Blocks
- ◆ Each block contains 16 Byte
- ◆ Sector 0 and 3rd block of each
- ◆ Sector are not user editable
- ◆ 720 Bytes of editable memory

Sector	Block	Byte Number within a Block																Description
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
15	3	Key A				Access Bits				Key B								Sector Trailer 15
	2																	Data
	1																	Data
	0																	Data
14	3	Key A				Access Bits				Key B								Sector Trailer 14
	2																	Data
	1																	Data
	0																	Data
:	:																	
:	:																	
:	:																	
1	3	Key A				Access Bits				Key B								Sector Trailer 1
	2																	Data
	1																	Data
	0																	Data
0	3	Key A				Access Bits				Key B								Sector Trailer 0
	2																	Data
	1																	Data
	0																	Manufacturer Block

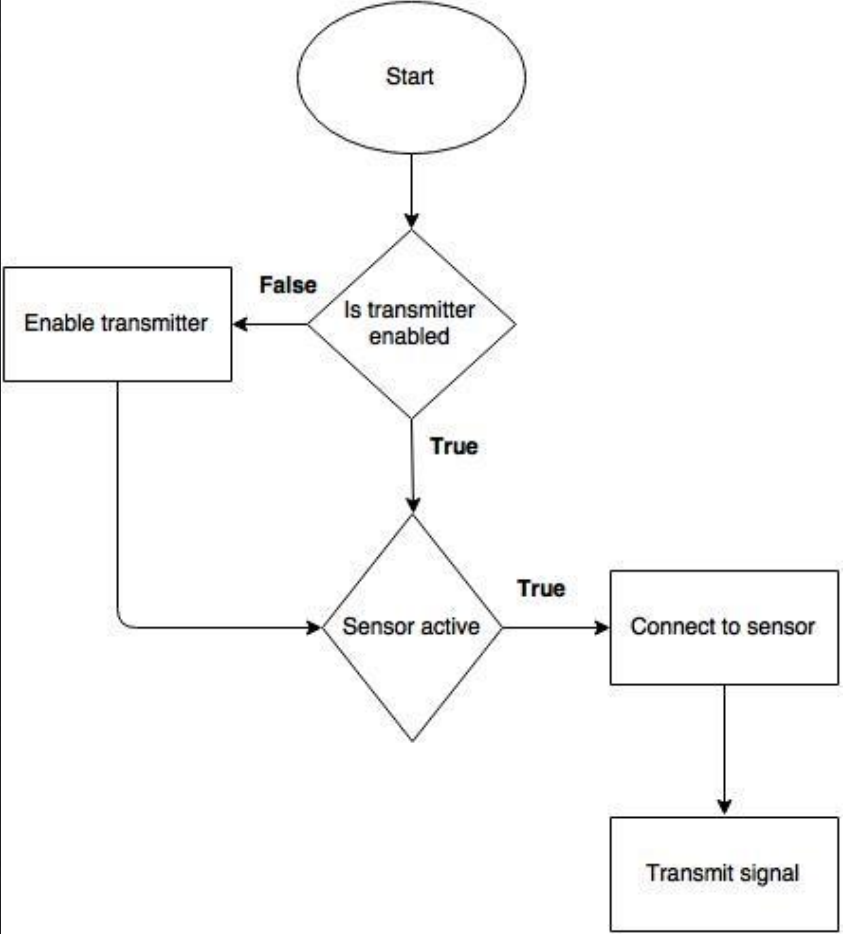
# Wireless Communication Software

# Sensor Software

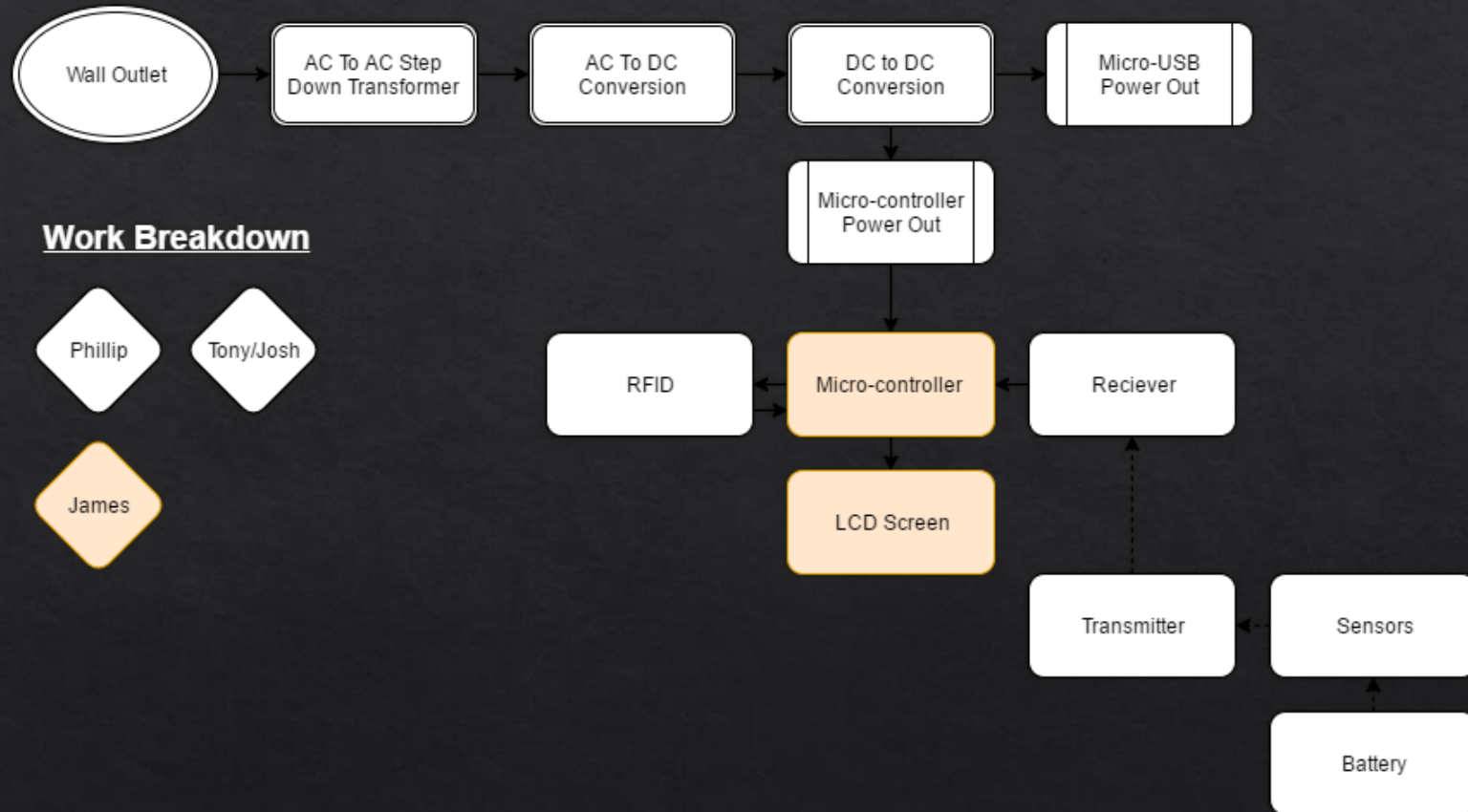
## ◇ Receiver



## ◇ Transmitter



# Base



# Microcontroller

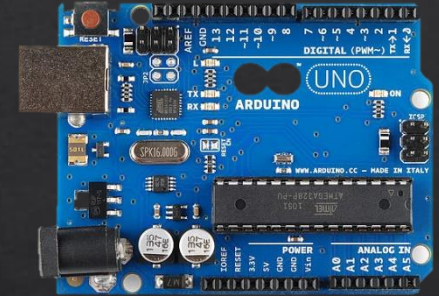
## Specifications

- ◇ Bluetooth 4.1
- ◇ 32 GB Memory
- ◇ 40 GPIO pins
- ◇ Camera interface (CSI)
- ◇ Display interface (DSI)
- ◇ VideoCore IV 3D graphics core



## Specifications

- ◇ Bluetooth 4.1
- ◇ 32 KB Memory
- ◇ 14 Digital/6 Analog pins
- ◇ SPI fed graphics only.



# LCD Display



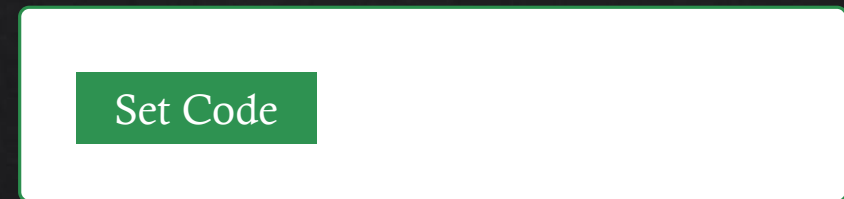
- ◇ 1602 LCD Module
- ◇ Smaller profile.
- ◇ Simple to program for



- ◇ Osooyo LCD Display
- ◇ 320x480 pixels 16bit/18bit
- ◇ Requires utilization of graphics chip

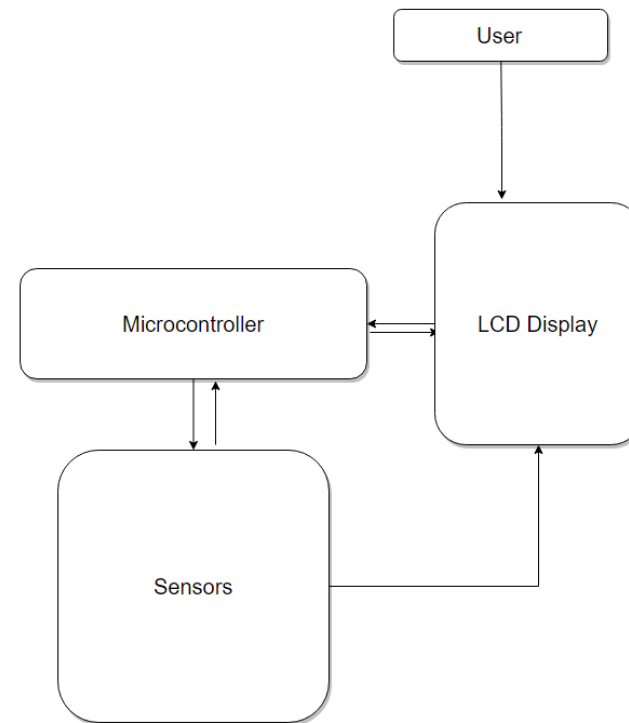
# Interface

- ◇ Our menu will be simple and easy to use
- ◇ With 4 basic functions:
  - ◇ Arm/Disarm (to turn system on and off)
  - ◇ Settings (to make changes into the system  
Changing pass code)
  - ◇ State (to indicate the state of the system)
  - ◇ RFID can also activate or deactivate the system



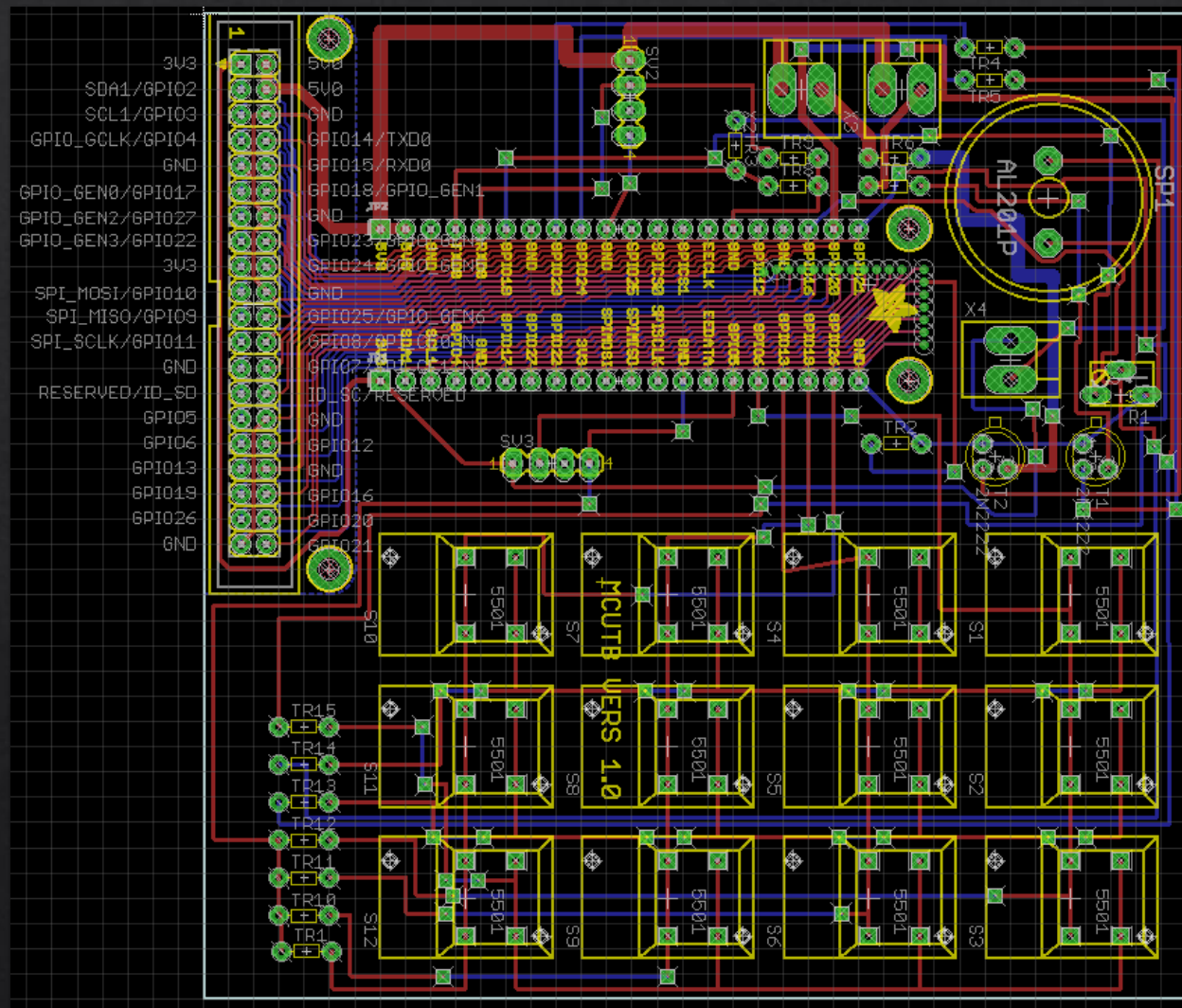
# Interface Diagram

- ◆ The user will interact with the LCD to input data
- ◆ The LCD will communicate with the Microcontroller
- ◆ The Microcontroller will be communicate with both the LCD and the sensors
- ◆ The sensors will send signals to microcontroller and then displays message through the LCD





# Base PCB



# Issues

- ◇ Unfamiliarity with use of copper ground pour.
- ◇ Capacitor shape/size combination.
- ◇ RFID kept cycling between arming and disarming the system

# Work Distribution

<b>Name</b>	<b>Power Design</b>	<b>Sensor Design</b>	<b>Sensor Programming</b>	<b>Microcontroller/LCD</b>
Phillip	X	Y	Y	Y
Josh	Y	X	Y	Y
Tony	Y	Y	X	X

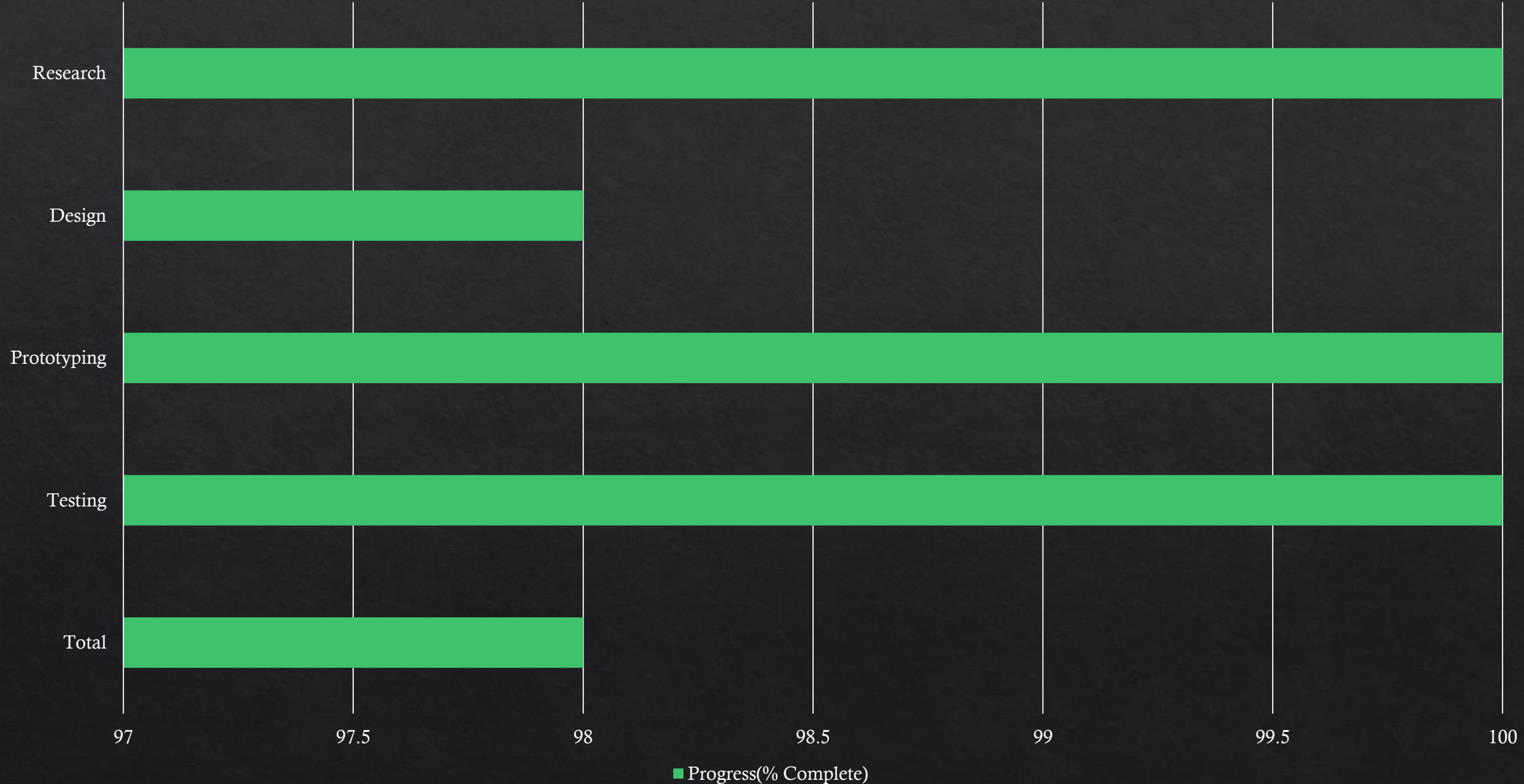
\*X = Primary Job

\*Y = Secondary Job

# Budget

Item	Supplier	Price/Unit	# Units	Total Cost
Power System				
Miscellaneous	Amazon	\$50		\$50
PCB	Elecrow	\$8	5	\$8
Sensors/Base				
RFID	Amazon	\$10	1	\$10
Sensors	Amazon	\$50		\$50
LCD	Amazon	\$50	1	\$50
Raspberry Pi	Amazon	\$50	1	\$50
Total				\$218

# Progress(% Complete)



Questions?