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.

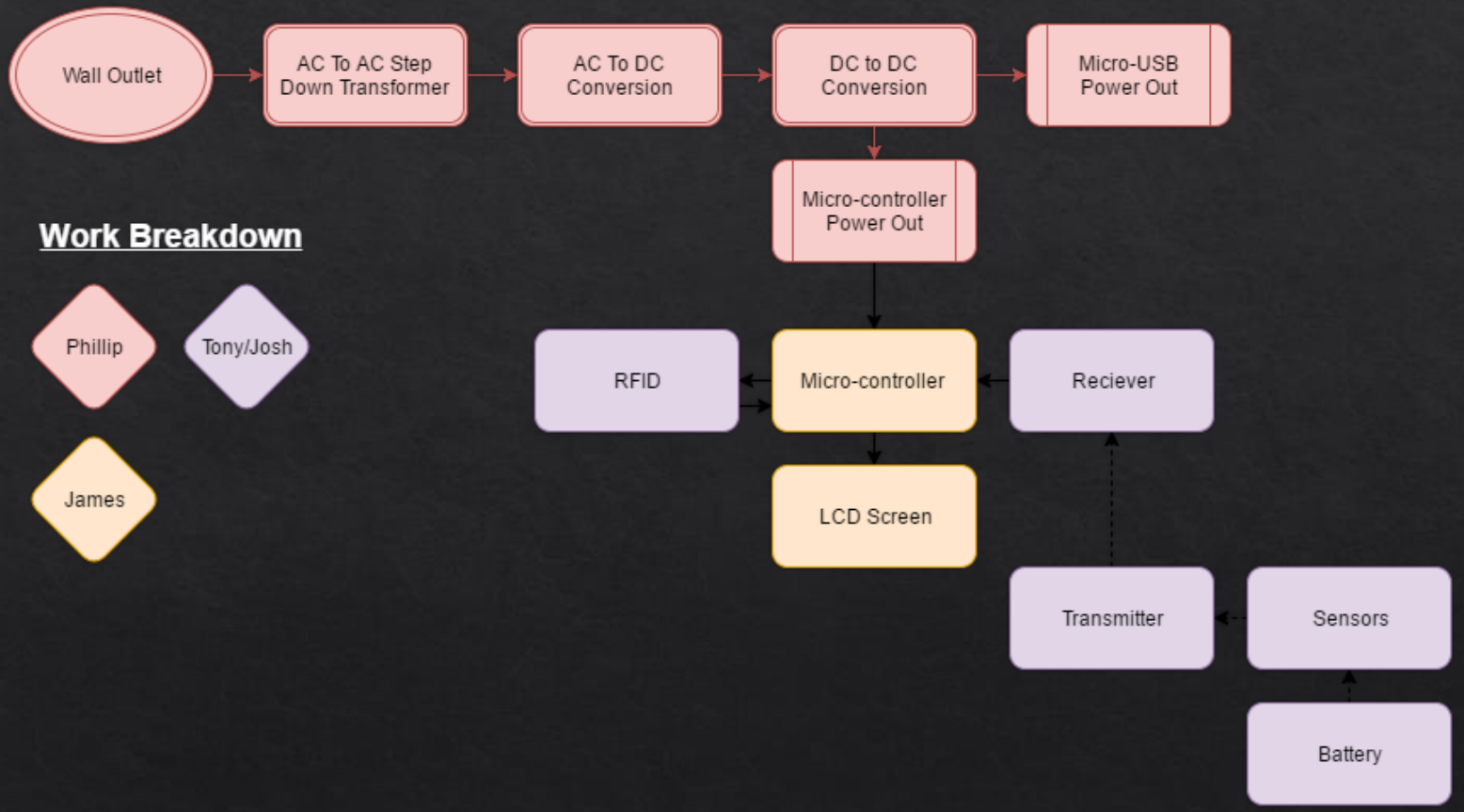
Goals and Objectives

- 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

Component	Parameter	Design Specification
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

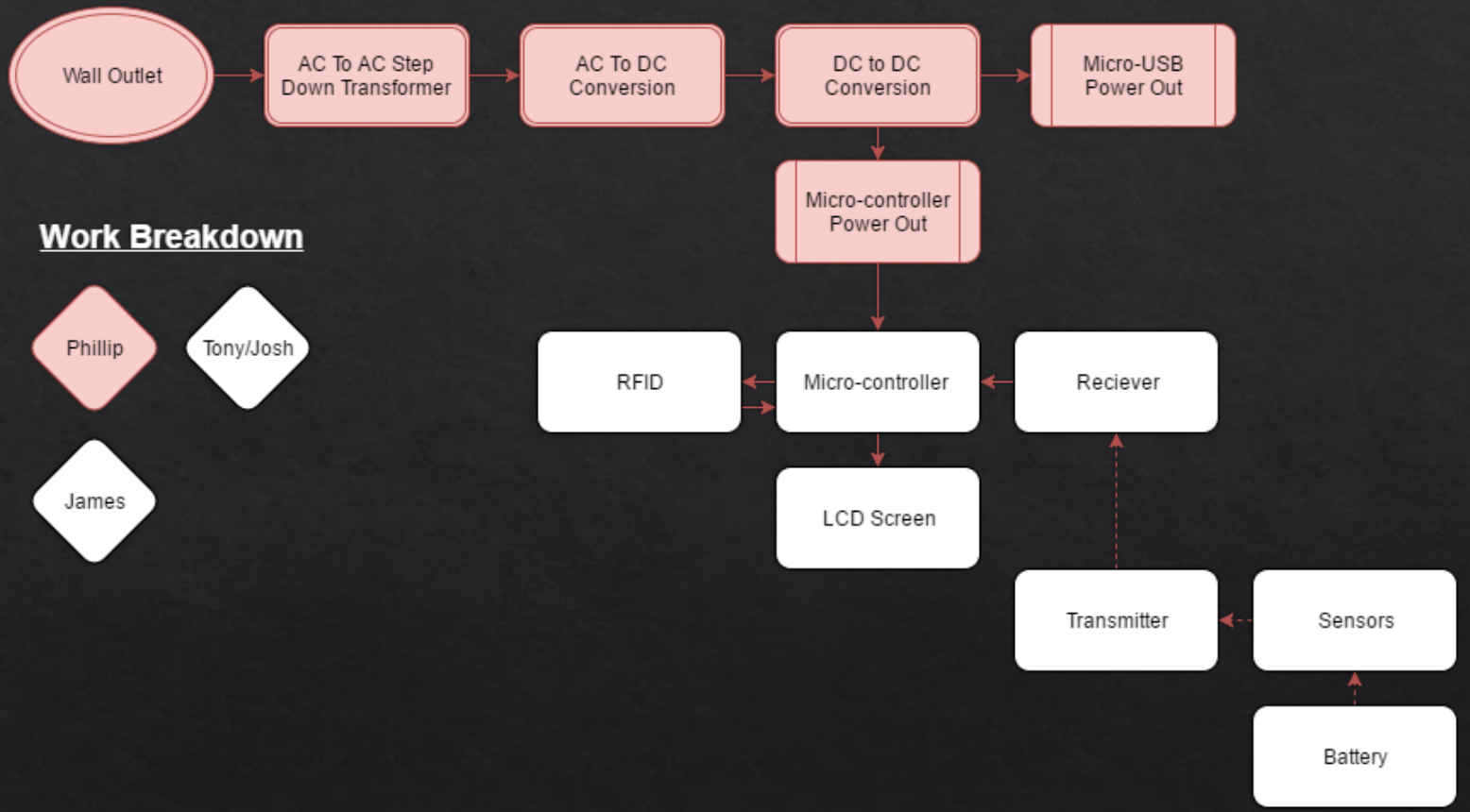
Overall Block Diagram



Work Breakdown

- Phillip
- Tony/Josh
- James

Power System

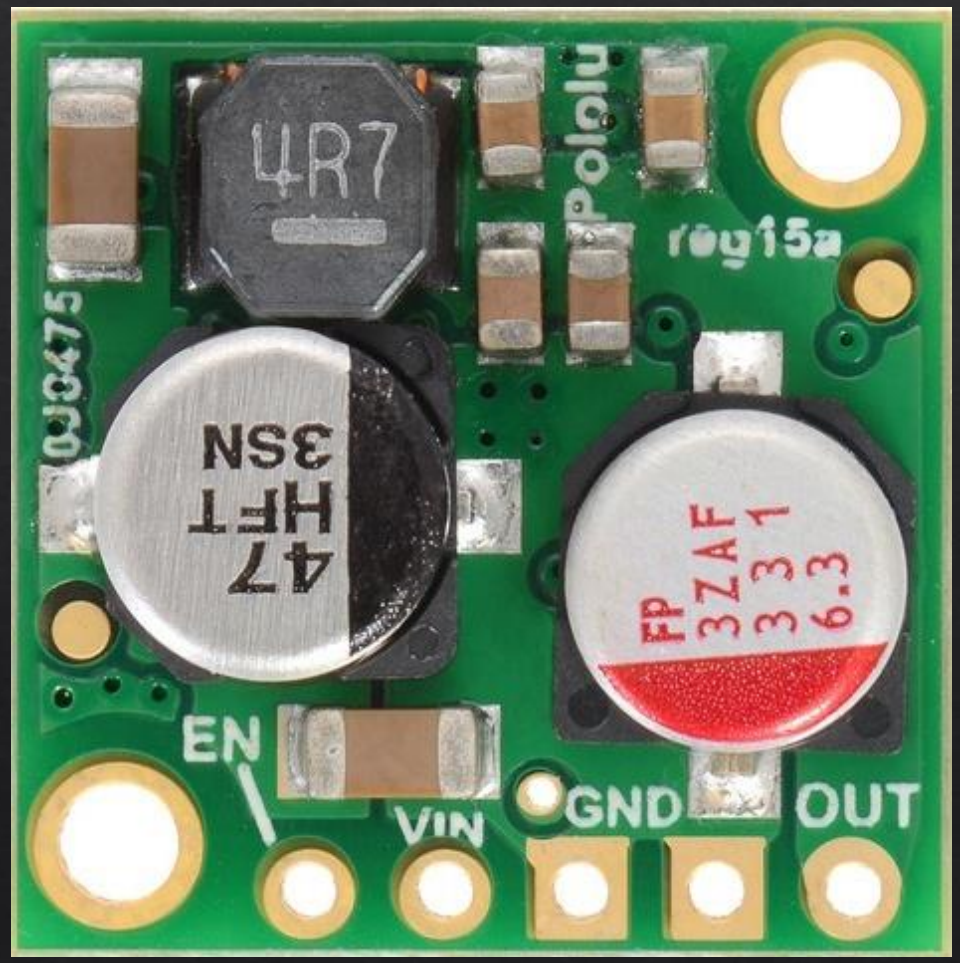


Work Breakdown

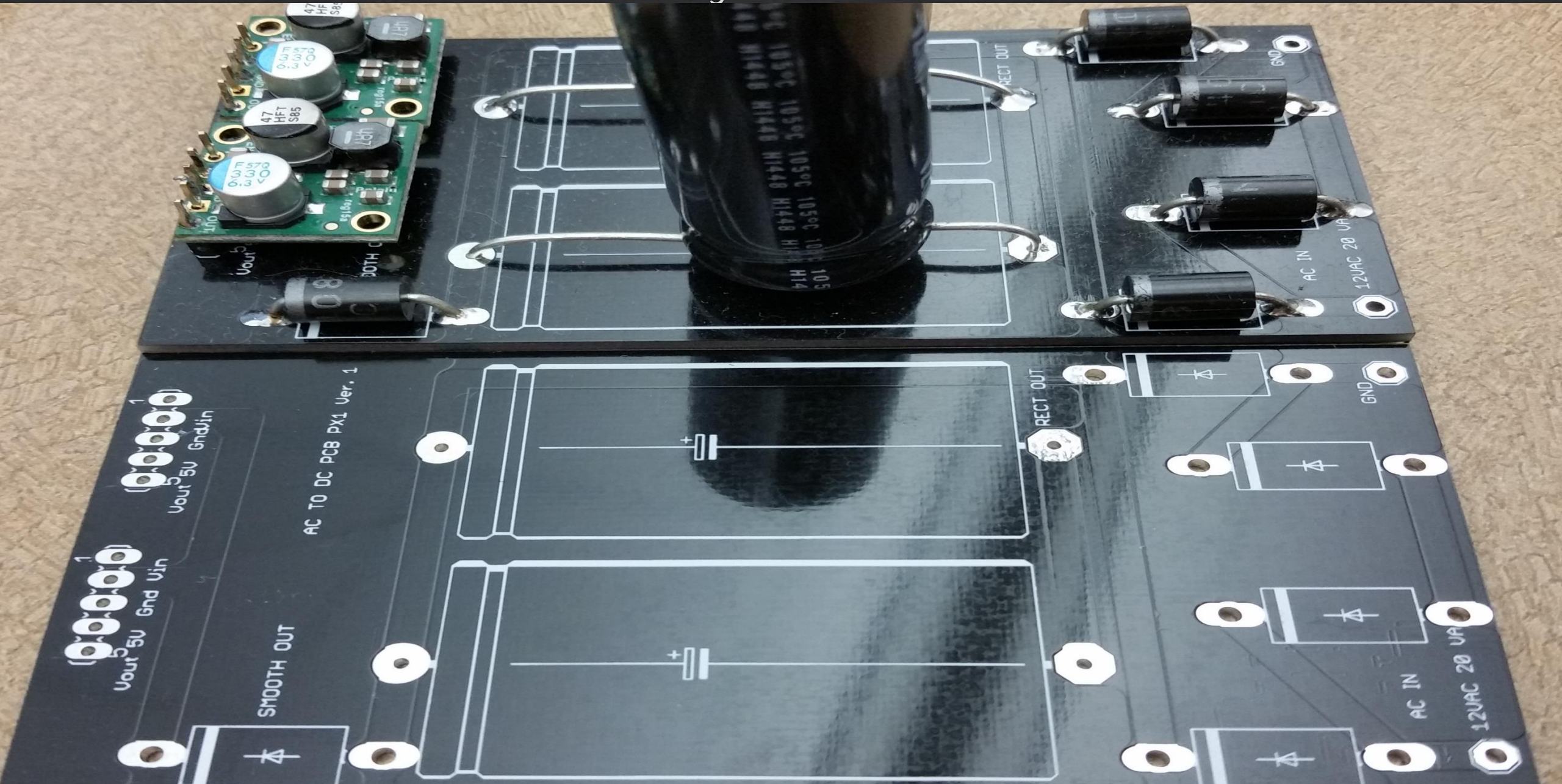
- Phillip
- Tony/Josh
- James

Power System Cont.

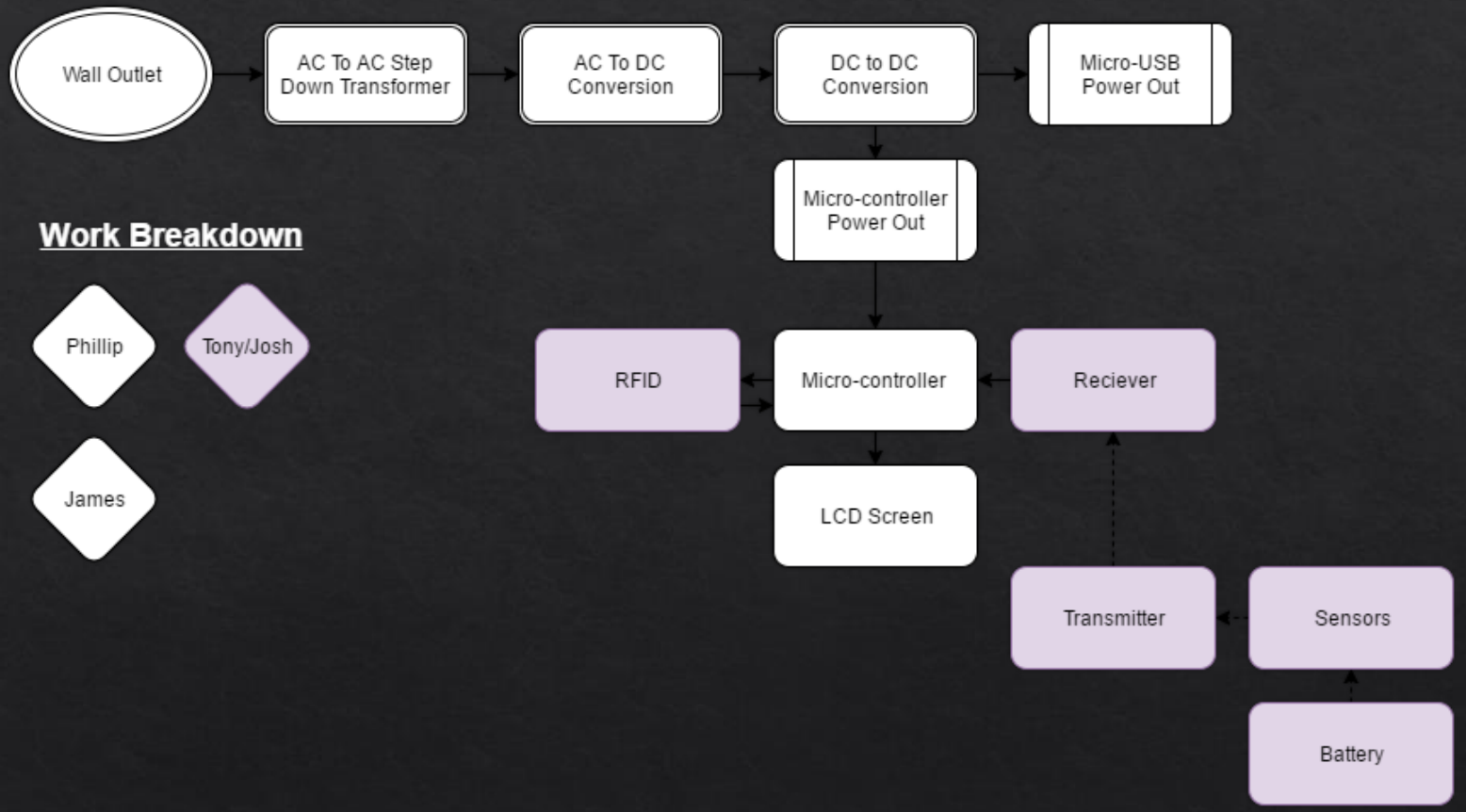
- **D24V25F5**
- 6-38V Input Voltage
- 5V and up to 2.5A Output Voltage.
- Reverse Flow Protection.



Power System PCB



Sensors and Communication System



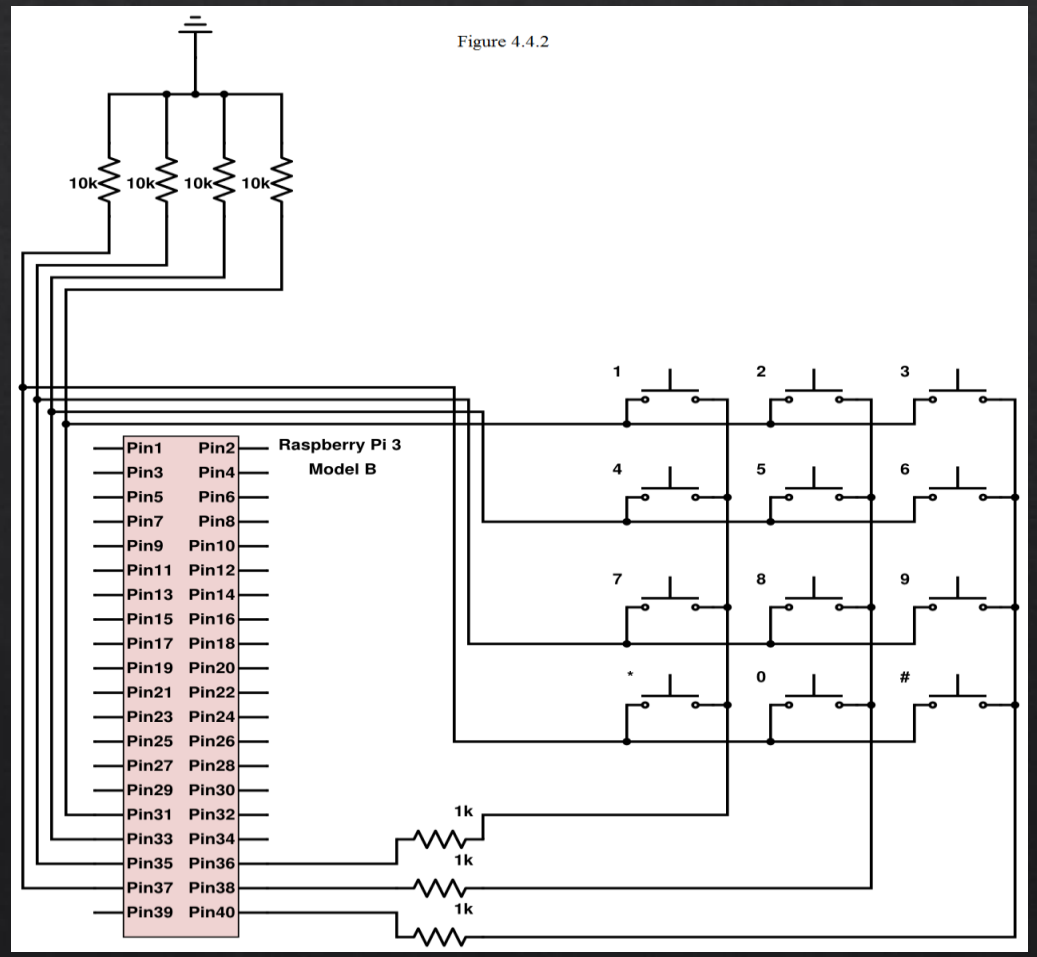
Work Breakdown

- Phillip
- Tony/Josh
- James

Push Buttons

Schematic and Specs

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



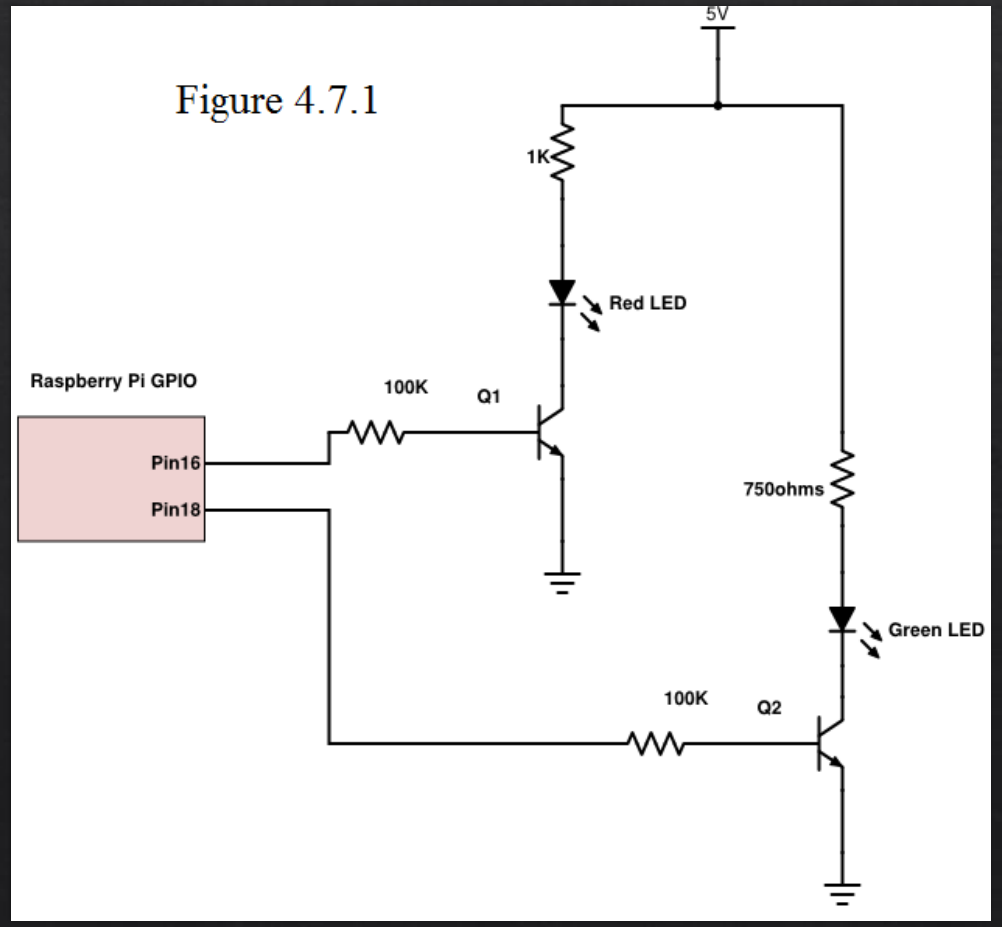
LED’s

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



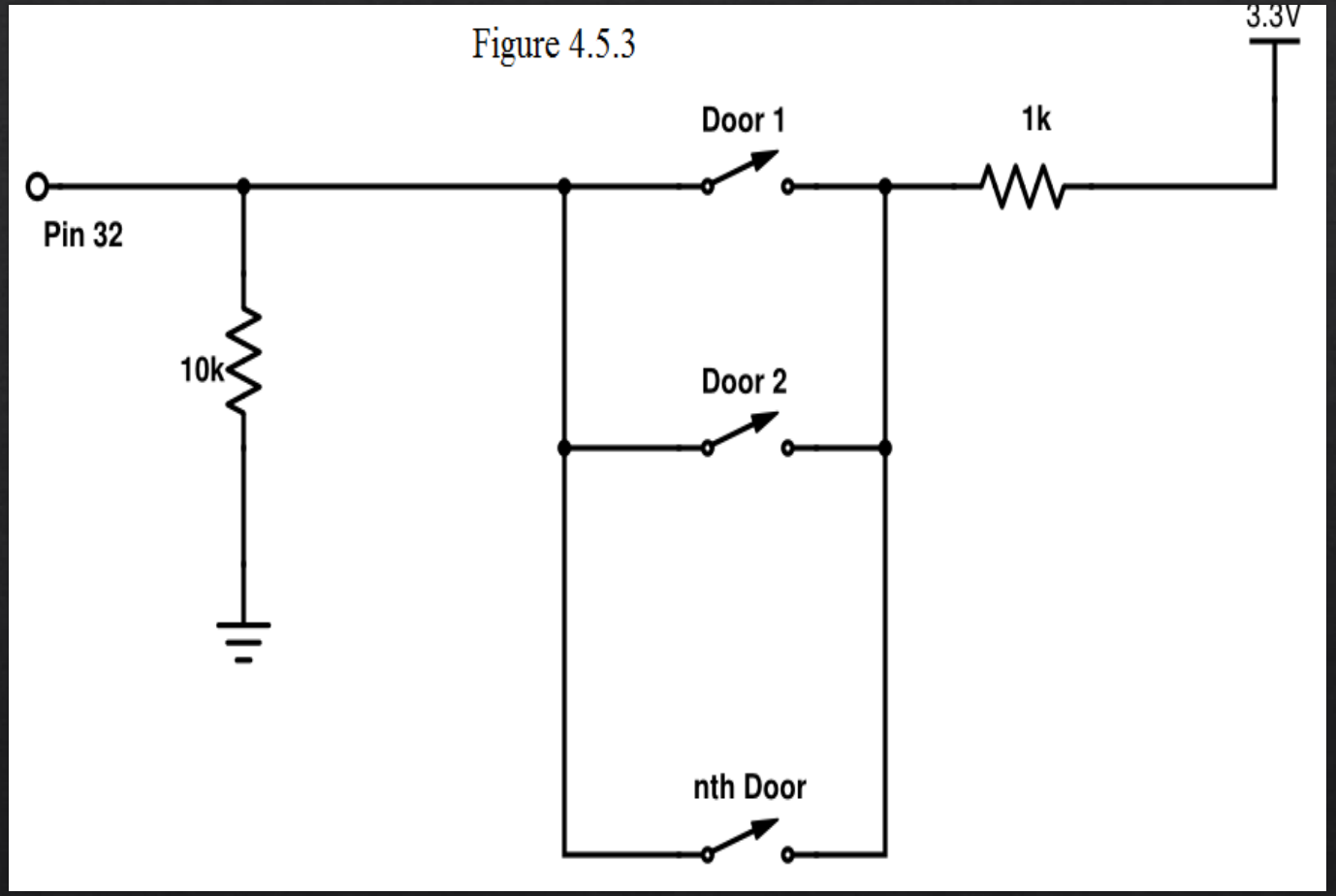
Door Chimes/Reed Switches

Specifications

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

Schematic

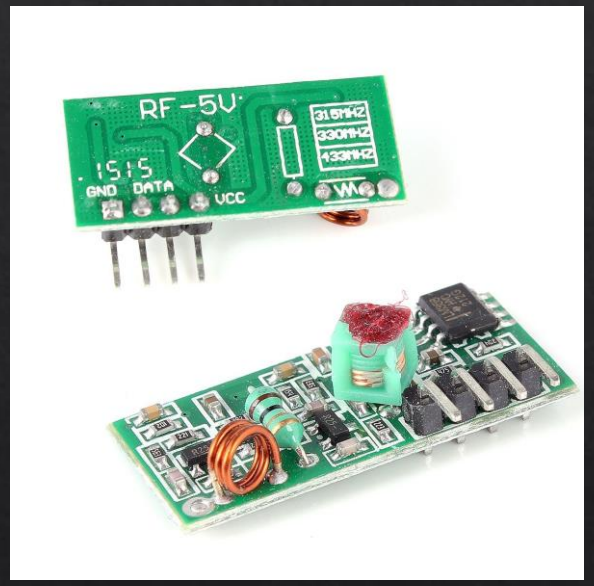
- Current Draw: 0.35mA
- Power Consumption: 1.155mW



Wireless Sensor Communication

Specifications

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



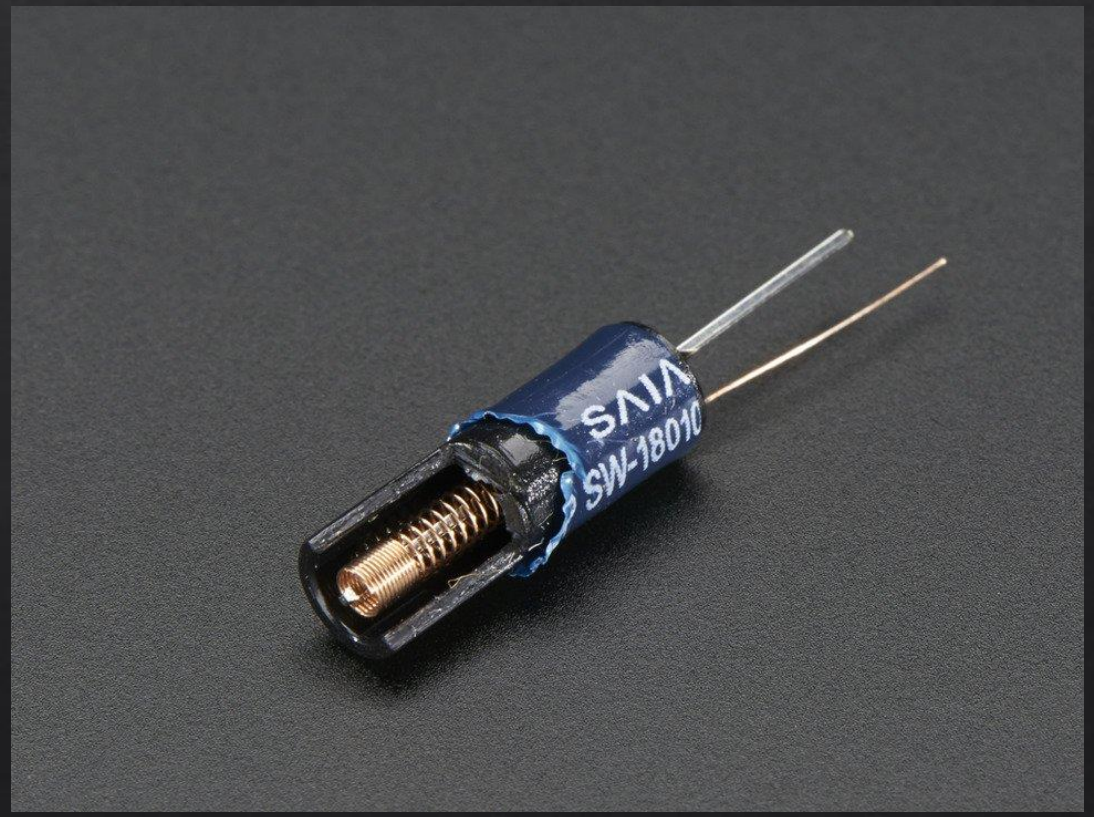
Receiver

Transmitter

Tilt/Vibration Sensor

Specifications

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



Schematic

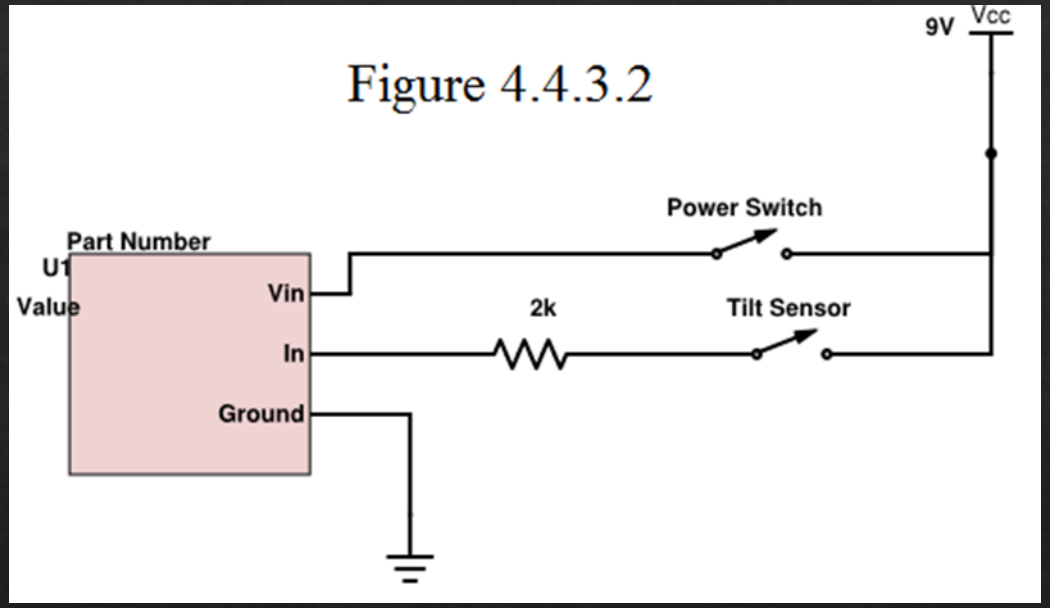


Figure 4.4.3.2
9V
Vcc
Power Switch
Part Number
U1
Value
Vin
In
Ground
2k
Tilt Sensor

Motion Sensor

Specifications

- HC-SR501
- Vin: 5-20V
- Digital Out: High=3.3V, Low=0V
- Repeating Trigger Mode
- Nonrepeating Trigger Mode
- Detection Range: 20ft

Schematic

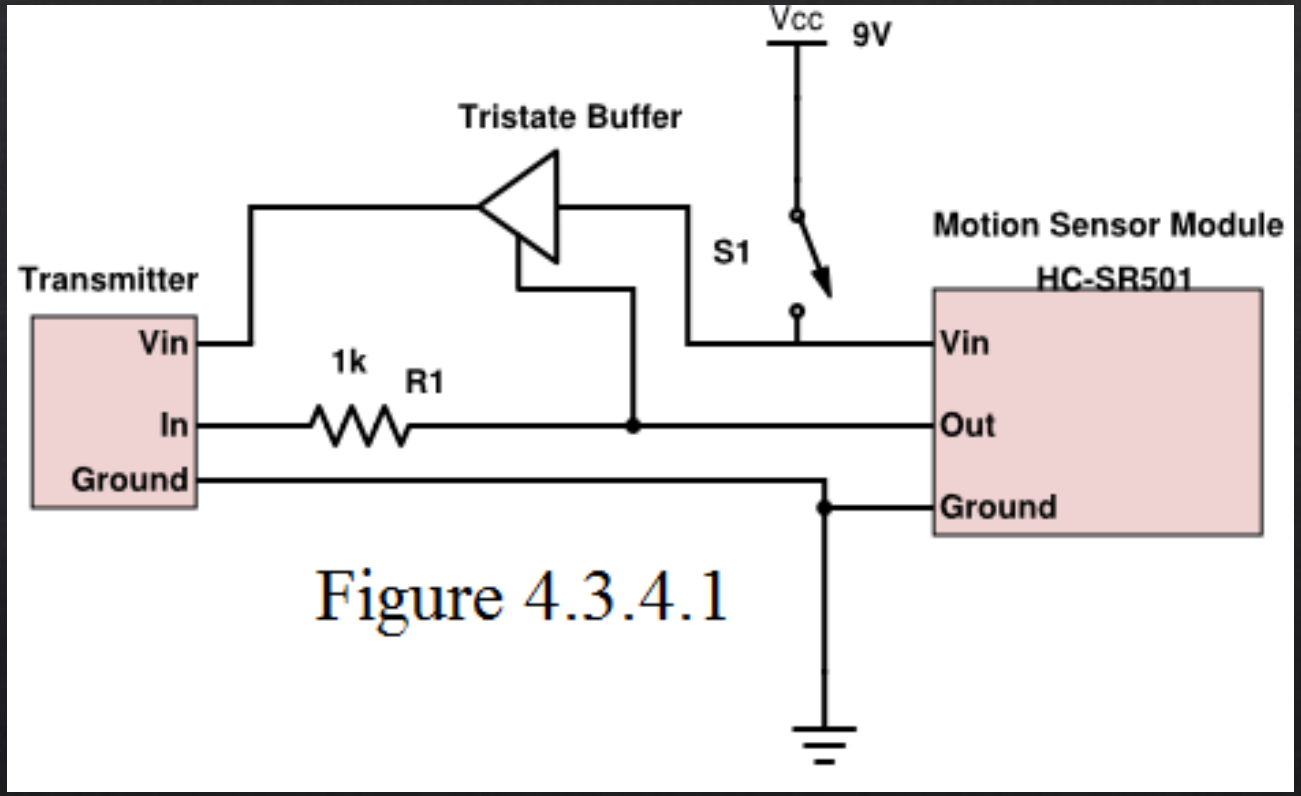
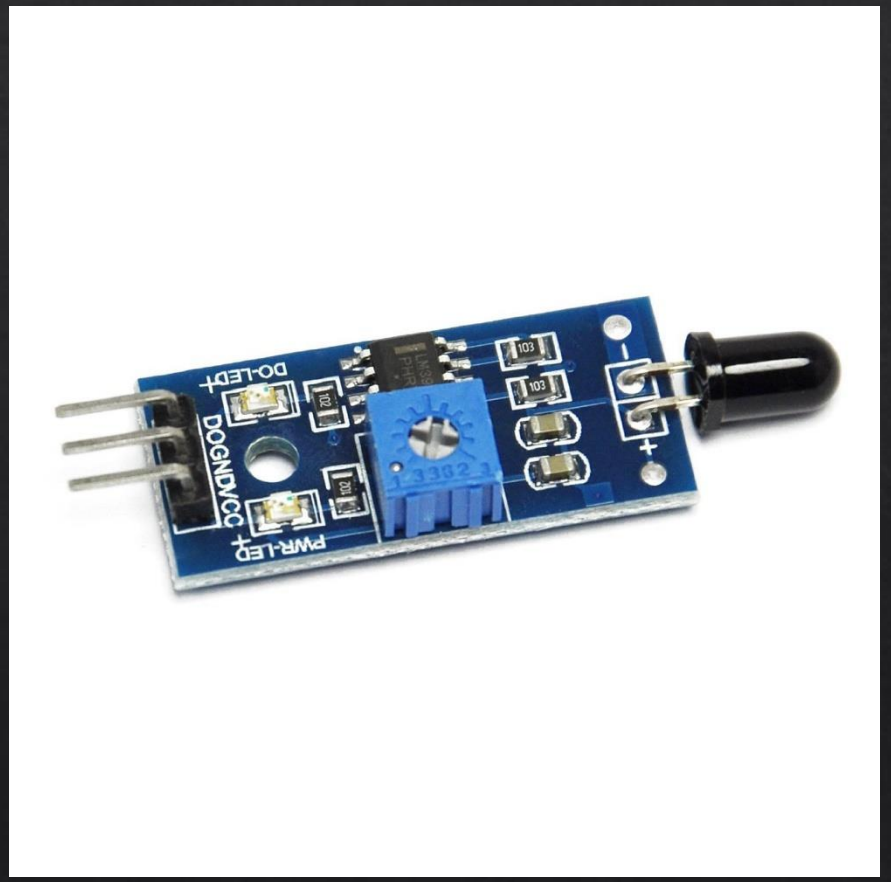


Figure 4.3.4.1

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

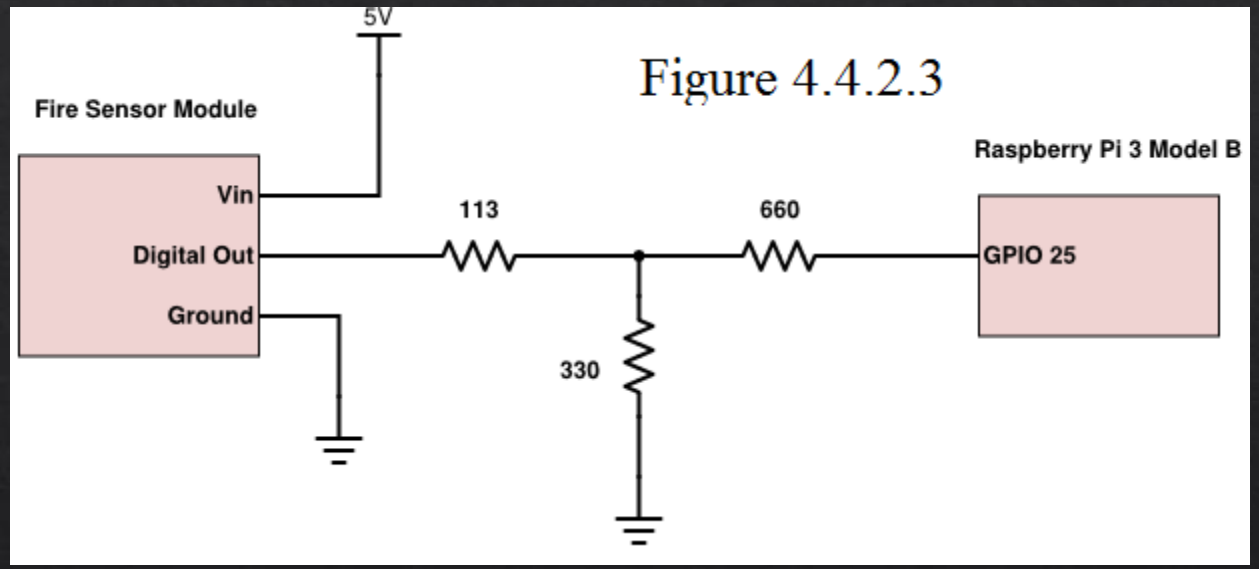


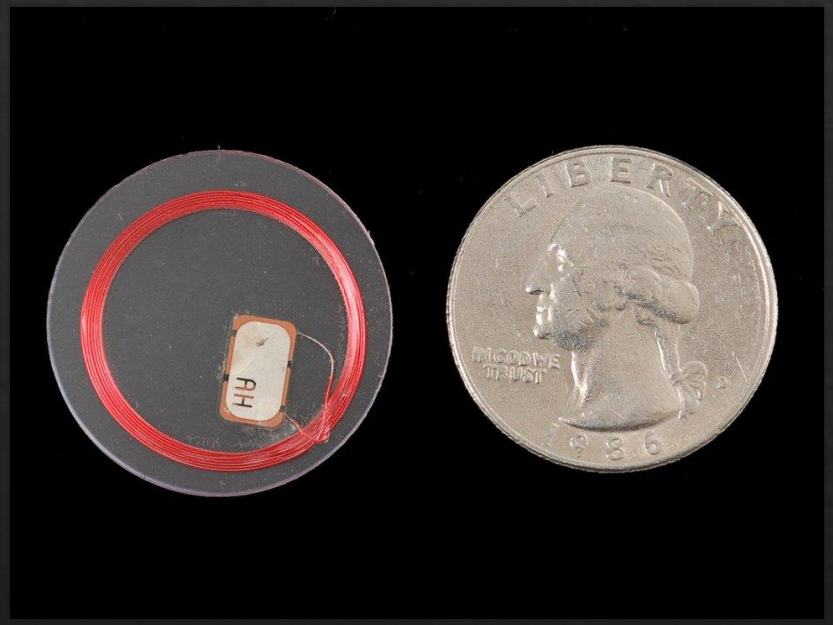
Figure 4.4.2.3

RFID Overview

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

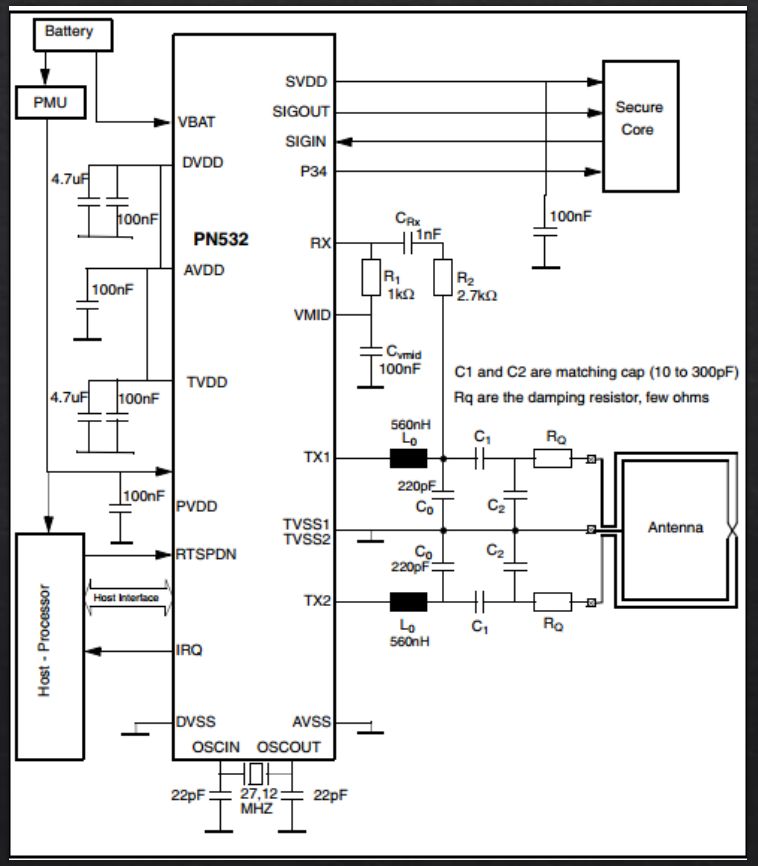
RFID Tag – NXP Mifare S50

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



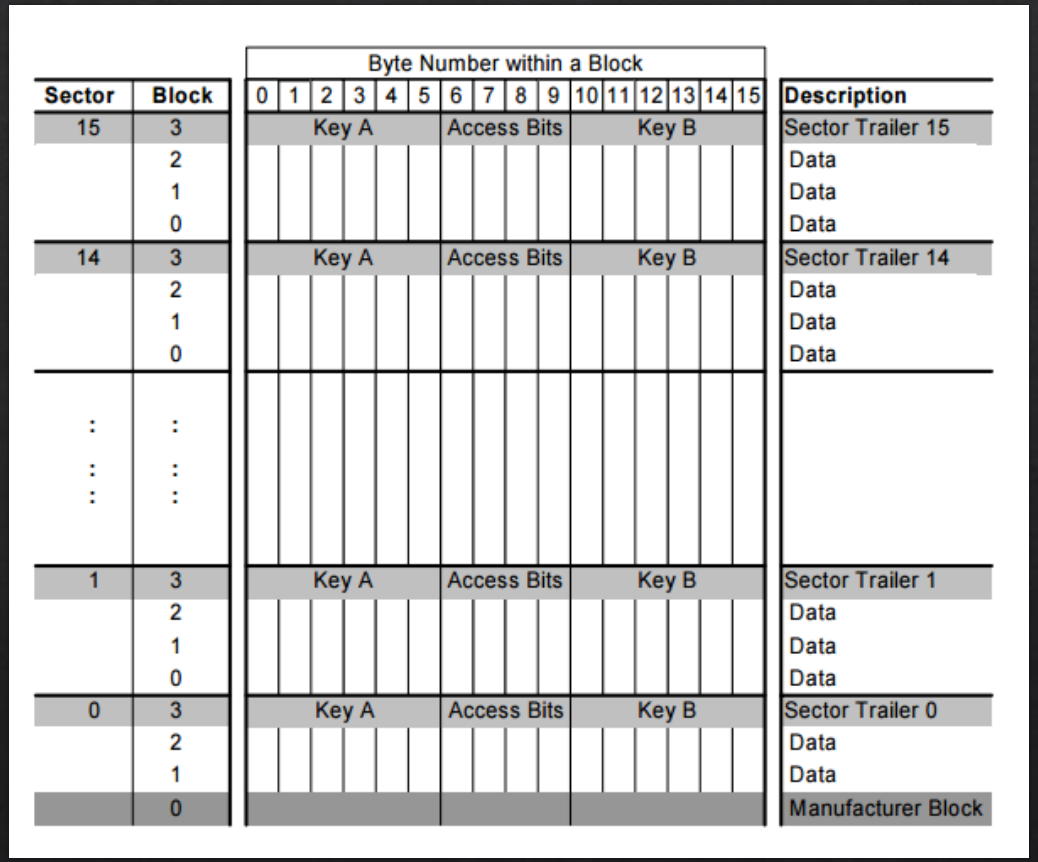
RFID Reader-PN532

- 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

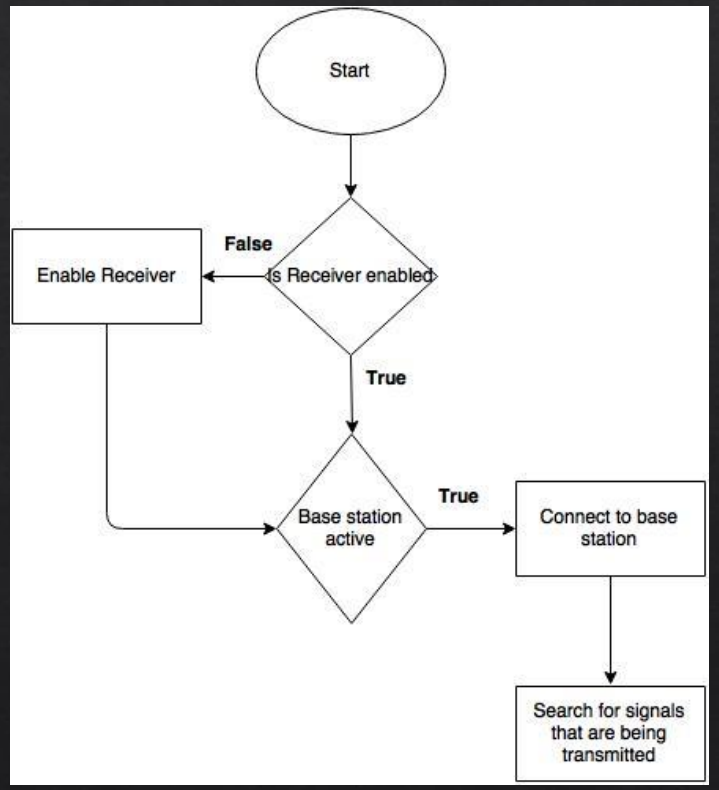


		Byte Number within a Block														
Sector	**Block**	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	**Description**
15	3	Key A						Access Bits				Key B						Sector Trailer 15
	2																	Data
	1																	Data
	0																	Data
14	3	Key A						Access Bits				Key B						Sector Trailer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

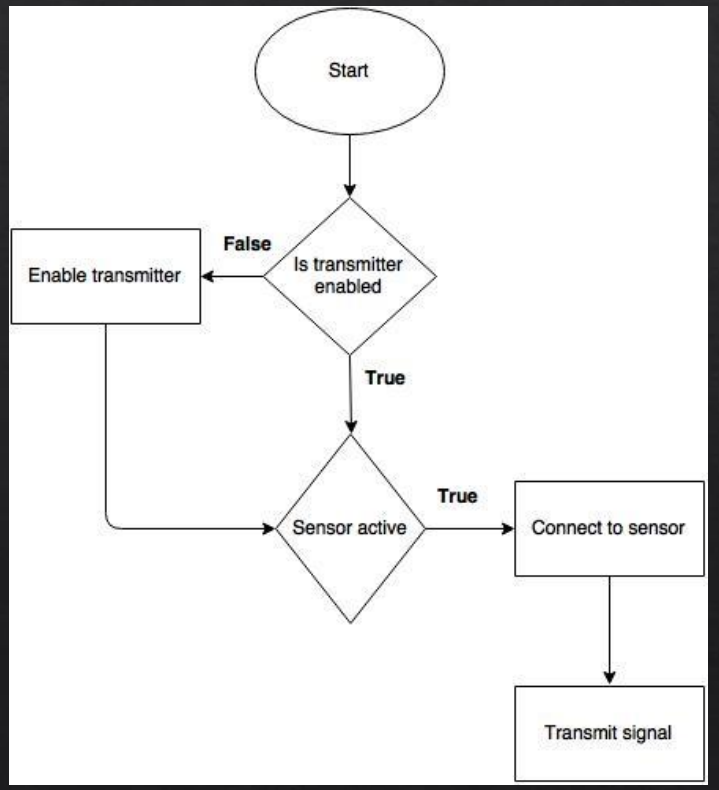
Wireless Communication Software

Sensor Software

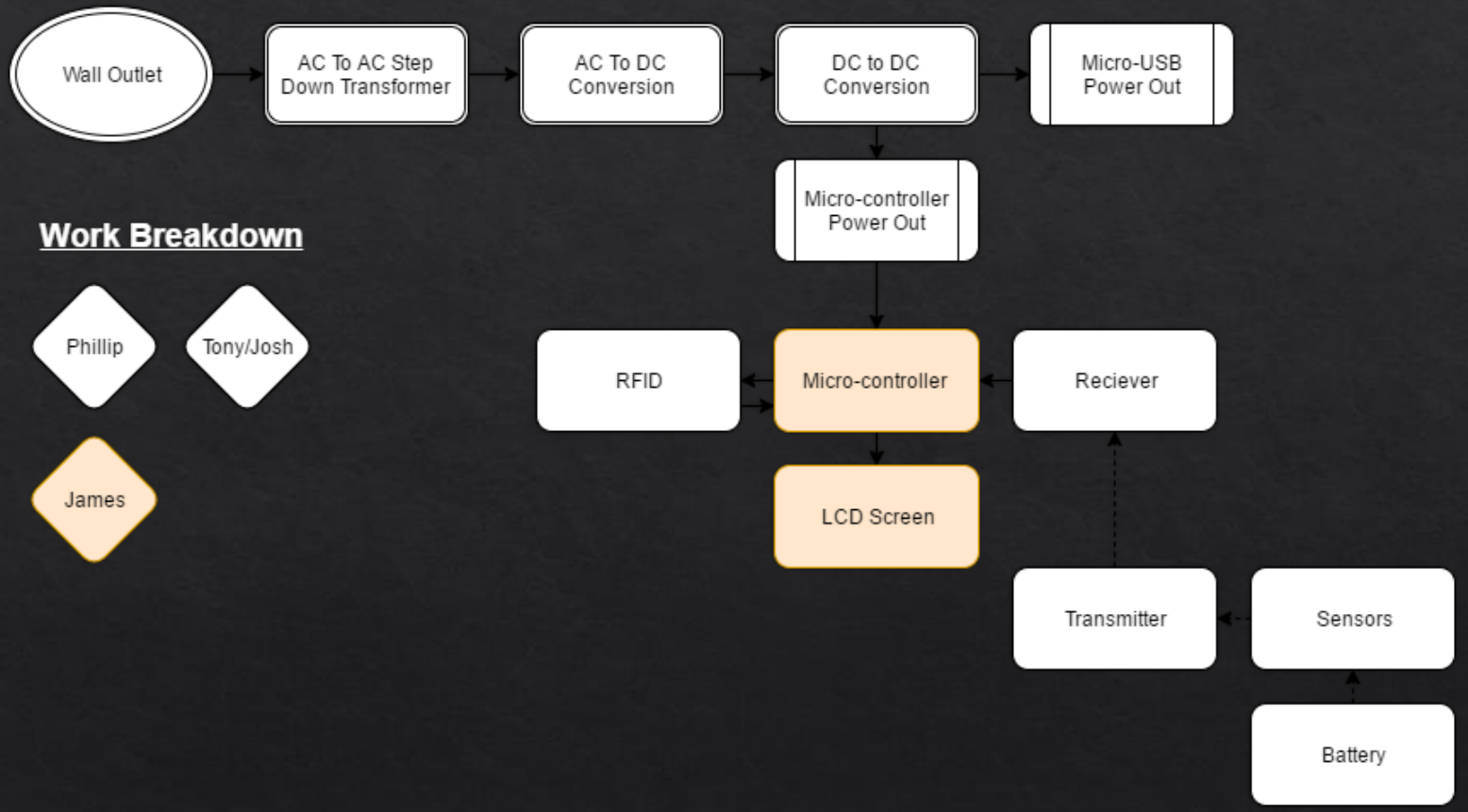
- Receiver



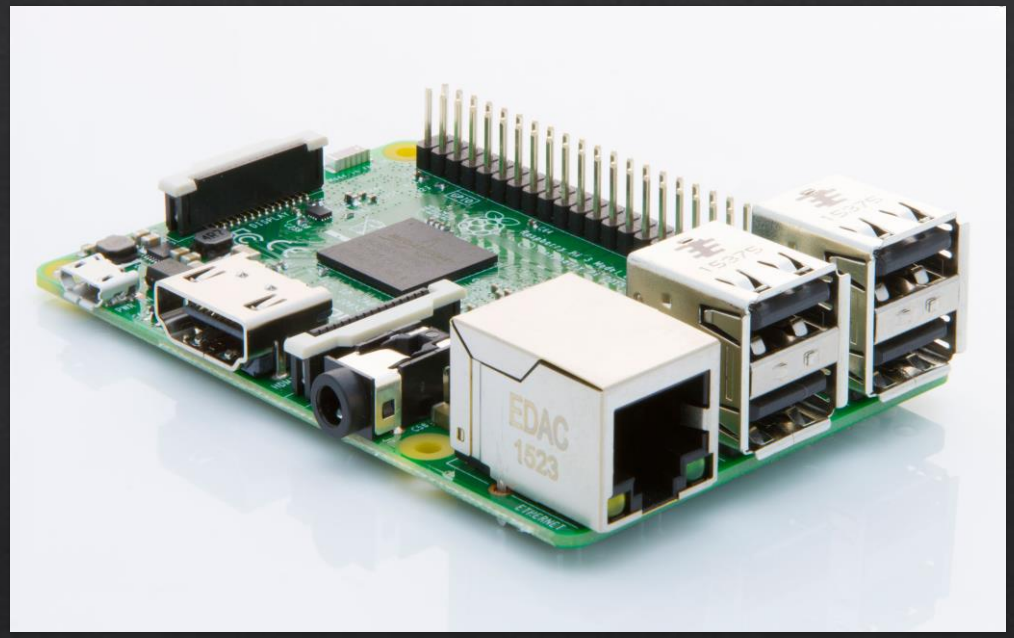
- Transmitter



Base


Wall Outlet
AC To AC Step Down Transformer
AC To DC Conversion
DC to DC Conversion
Micro-USB Power Out
Micro-controller Power Out
Work Breakdown
Phillip
Tony/Josh
James
RFID
Micro-controller
Reciever
LCD Screen
Transmitter
Sensors
Battery

Microcontroller

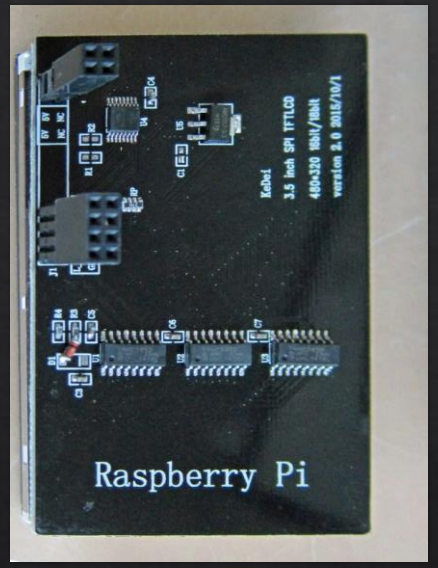


Specifications

- 1.2GHz 64-bit quad-core ARMv8 CPU
- 802.11n Wireless LAN
- Bluetooth 4.1
- Bluetooth Low Energy (BLE)
- 1GB RAM
- 4 USB ports
- 40 GPIO pins
- Full HDMI port
- Ethernet port
- Combined 3.5mm audio jack and composite video
- Camera interface (CSI)
- Display interface (DSI)
- Micro SD card slot (now push-pull rather than push-push)
- VideoCore IV 3D graphics core

LCD Display

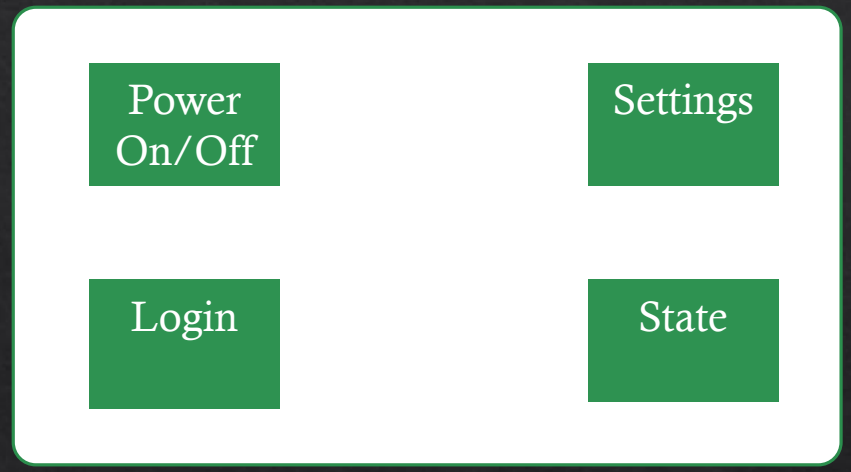
Specifications



- 3.5 inch Serial Peripheral Interface (SPI), (Thin-Film Transistor) TFT/lcd display
- 320x480 pixels 16bit/18bit
- 32 MHz speed
- Comes with a touchpen

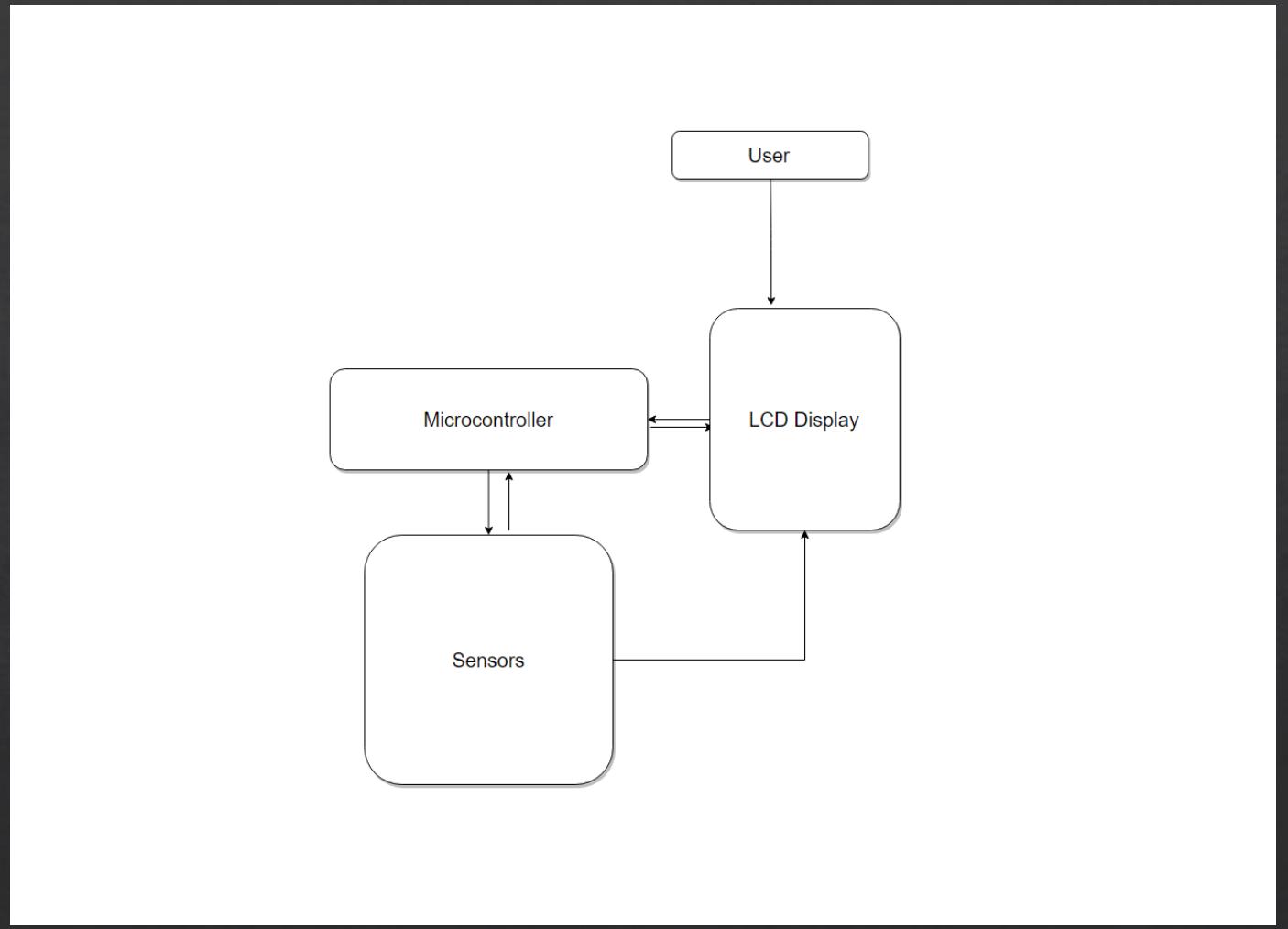
Interface

- Our menu will be simple and easy to use
- With 4 basic functions:
  - On/Off (to turn system on and off)
  - Login (to give administrator access to user)
  - Settings (to make changes into the system)
  - State (to indicate the state of the system)



Interface Diagram

- The user will interact 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



Issues

- Unfamiliarity with use of copper ground pour.
- Capacitor shape/size combination.

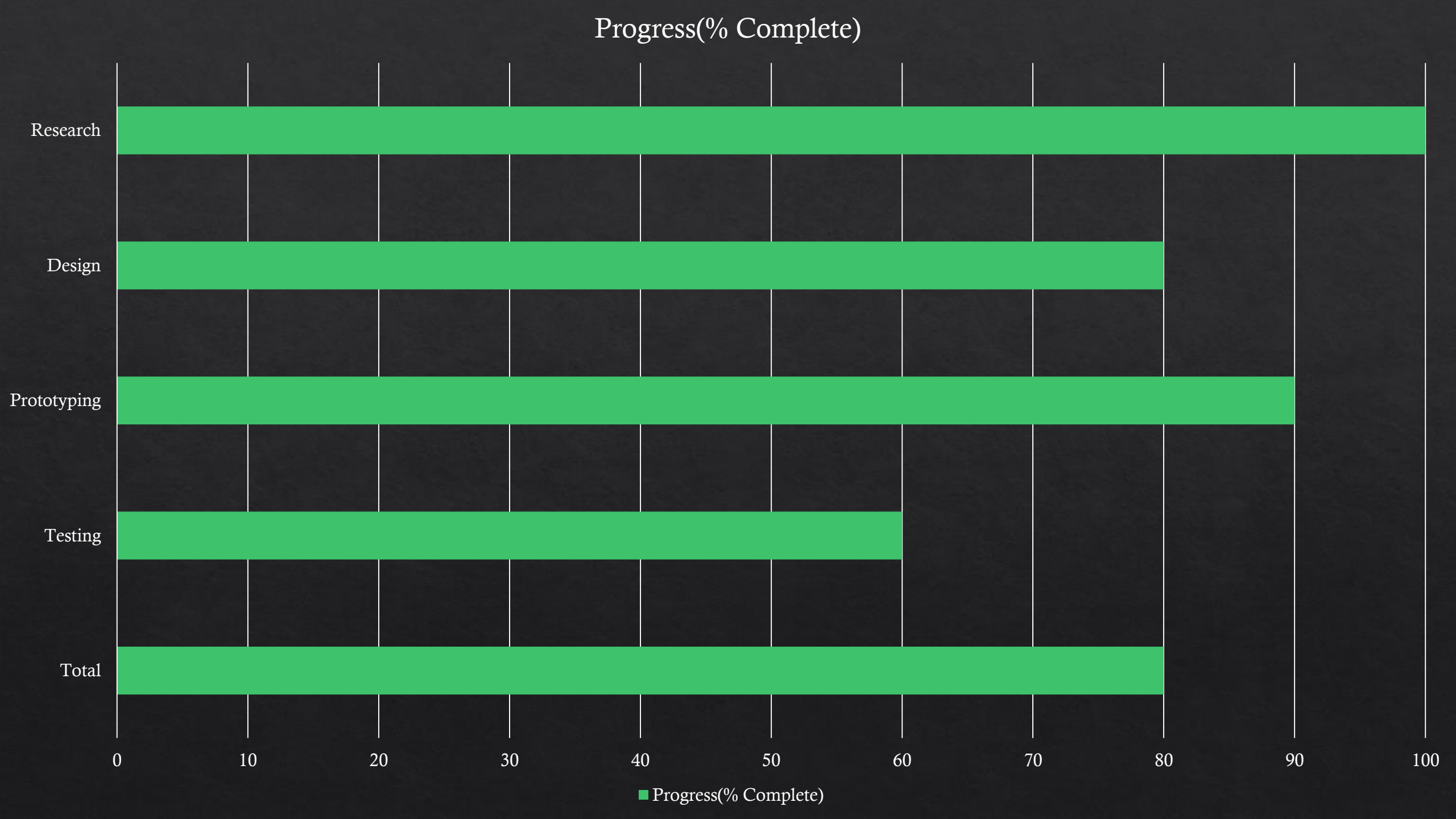
Work Distribution

Name	Power Design	Sensor Design	Sensor Programming	Microcontroller/LCD
Phillip	X	Y		
Josh	Y	X		
Tony			X	Y
James			Y	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


Progress(% Complete)
Research
Design
Prototyping
Testing
Total
0
10
20
30
40
50
60
70
80
90
100
Progress(% Complete)

Questions?