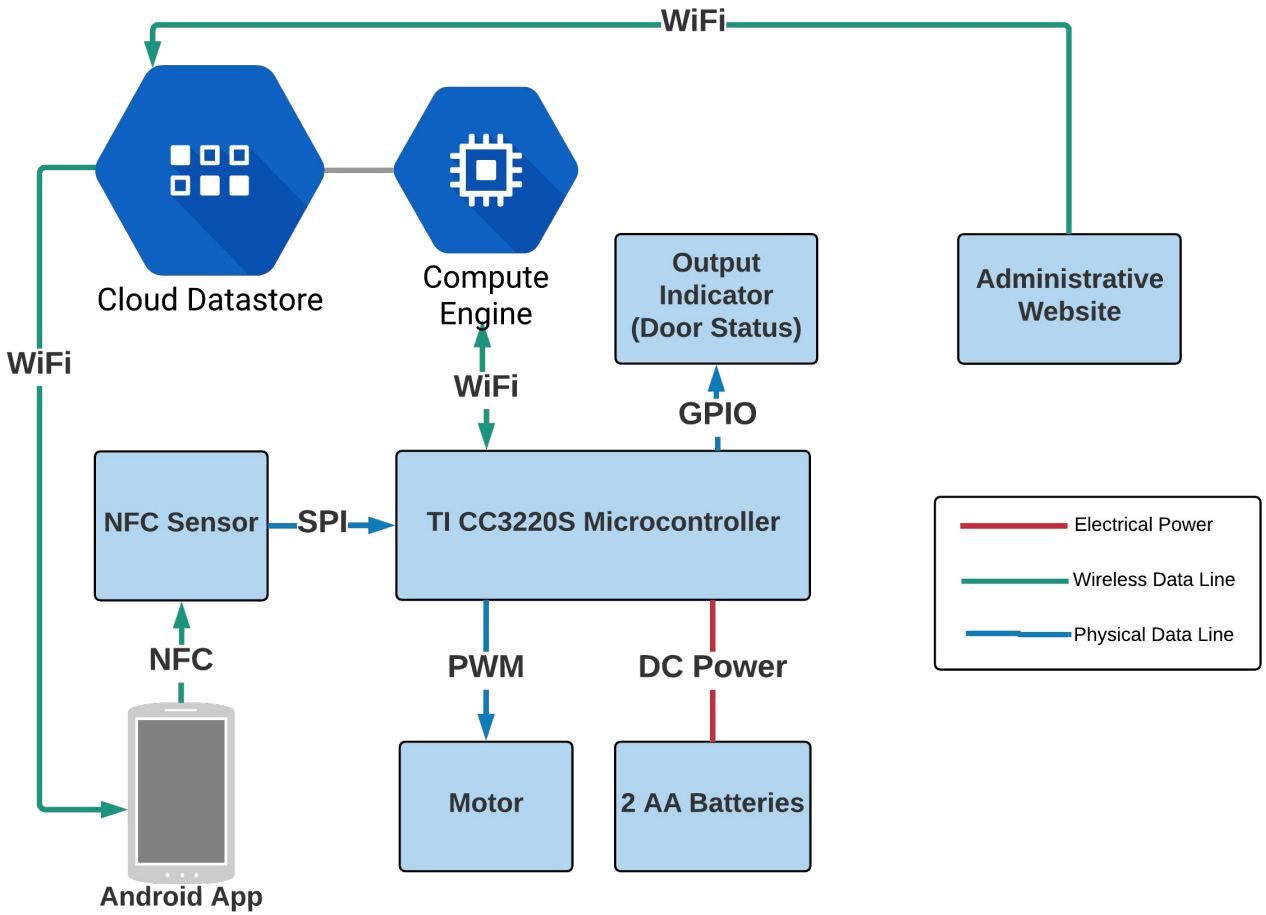
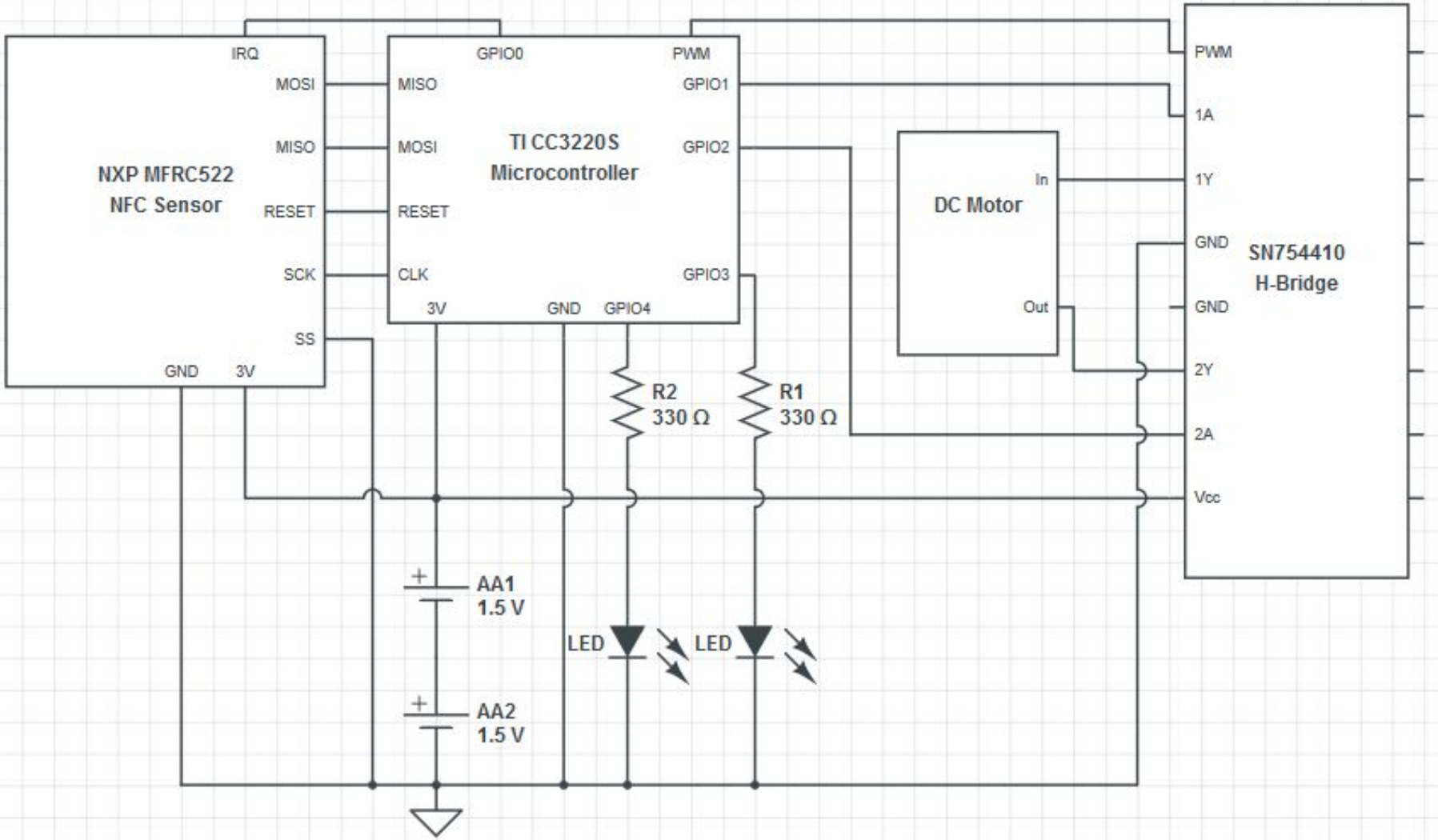
Lock Management System

Samuel Wu & Bowen Brooks


WiFi
Cloud Datastore
Compute Engine
Output Indicator (Door Status)
Administrative Website
WiFi
WiFi
GPIO
NFC Sensor
SPI
TI CC3220S Microcontroller
Electrical Power
Wireless Data Line
Physical Data Line
NFC
PWM
DC Power
Motor
2 AA Batteries
Android App


IRQ
MOSI
MISO
RESET
SCK
SS
GND
3V
NXP MFRC522
NFC Sensor
GPIO0
MISO
MOSI
RESET
CLK
3V
GND
GPIO4
PWM
GPIO1
GPIO2
GPIO3
TI CC3220S
Microcontroller
In
Out
DC Motor
PWM
1A
1Y
GND
GND
2Y
2A
Vcc
SN754410
H-Bridge
R2
330 Ω
R1
330 Ω
AA1
1.5 V
AA2
1.5 V
LED
LED

Responsibilities

Sam

- Datastore APIs
- Power Calculations
- TI CC3220S
- NFC Sensor

Bowen

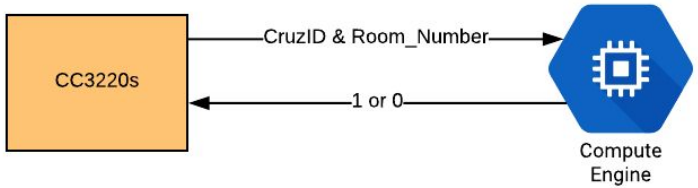
- Gateway using Cloud Compute Engine
- TCP/SSL connections in Gateway/MCU
- Query/Log users in Compute Engine
- Designing the Datastore layout
- WIFI on TI CC3320S

Gateway using Google Compute

- Running Linux VM with a static IP
  - Uses Google Datastore APIs
- Accepts a cruzID and room_number from TCP connection
- Sends TCP message back with a 1 or 0;
- Will log all information to google datastore
- Tested using my own computer

WIFI connection on CC3220

- Sensor Starts up and establishes to Network. Hard coded in for the time
- Establishes TCP Connection to VM Gateway
  - Sends CruzID and room_number
- Waits for a 1 or 0 response from TCP



Google Datastore

Nosql approach using json files

Room Entity		
ID	Room #	Groups
name=index0	E2-399	[”BELLS”,”AMS147”,”CMPS101”]
name=index1	BE340A	[”CMPE123A”,”CMPE123B”, ”CMPE129B”]

Student Entity			
ID	Name	cruzID	Groups
name=index0	Samuel Wu	sazwu	[”AMS147”,”CMPS12B”]
name=index1	Bowen Brooks	bojbrook	[”CMPE123A”]

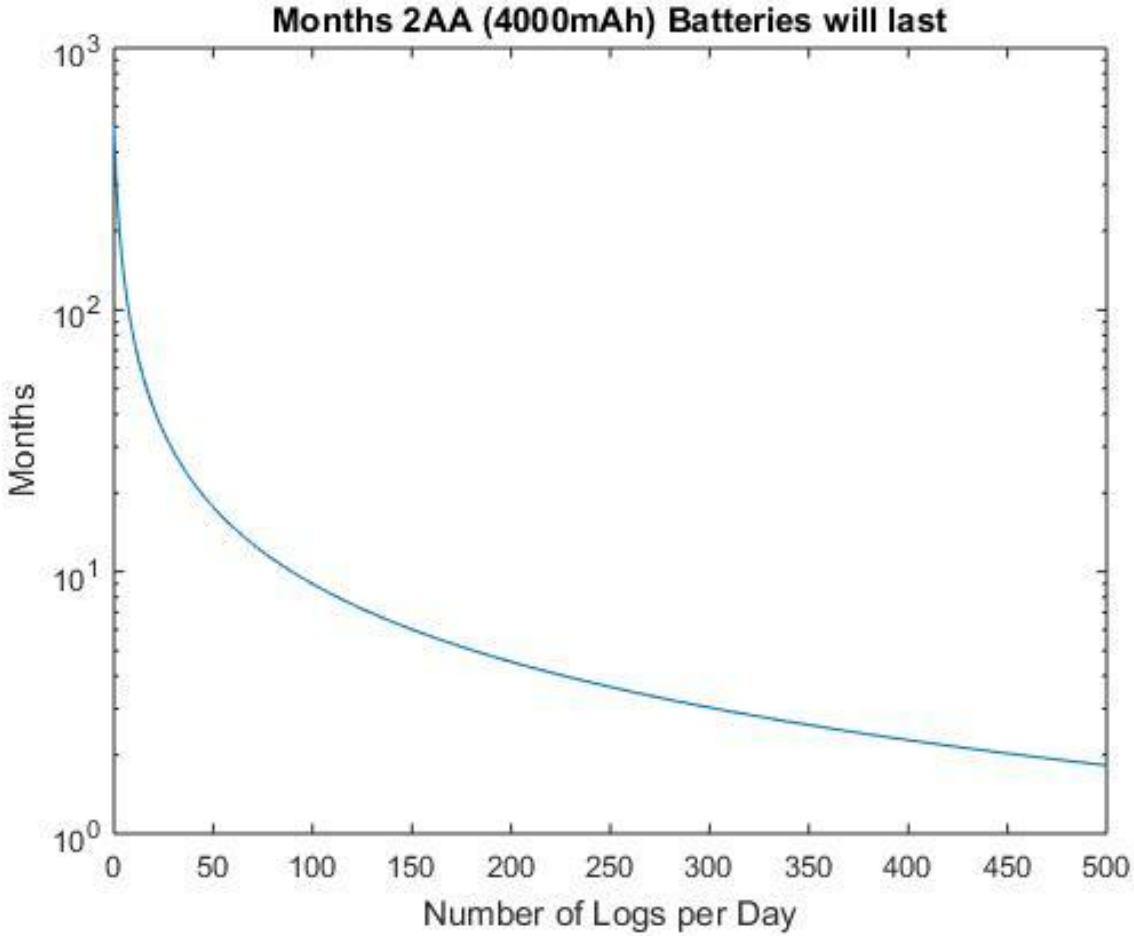
BE340 Log Entity				
ID	cruzID	Enter Time	Exit Time	Cumulative
name=sazwu0	sazwu	02-07 17:26:55	02-07 17:27:02	0:00:07
name=bojbrook0	bojbrook	02-07 17:26:55	02-08 11:30:22	18:03:26
name=sazwu1	sazwu	02-08 11:27:19	02-08 11:27:57	0:00:44
name=hello0	hello	02-08 11:31:02	null	null

Datastore APIs

- Learn Python
- Create, read, update, and delete (CRUD) elements from each entity
- Login and logout each user with a timestamp
- Analytics for rooms and users
  - Histogram for enter times
  - Histogram for exit times
  - Count population in room
- Can populate entities directly from .CSV file

Power Calculations

- Math and derivation in document



TI CC3220S

- Learned basic IDE functionalities
- Can do basic GPIO access
  - Flash LED
  - Read/Write GPIO
  - GPIO interrupt
- Can use microcontroller as WiFi access point

TI CC3220S

- UART
  - Can loop UART TX and RX pins
  - Works for different baudrate and with/without parity bit
  - Correct bitstream on Oscilloscope
  - Can loop over USB and over external pins
- Trying to get SPI to work with CC3220s as master
  - MOSI, CLK do not output anything
- Working on comparing power consumption for UART and SPI