System Architecture Specification

Bowen Brooks (Lead) & Samuel Wu

Contents

1 Block Diagram

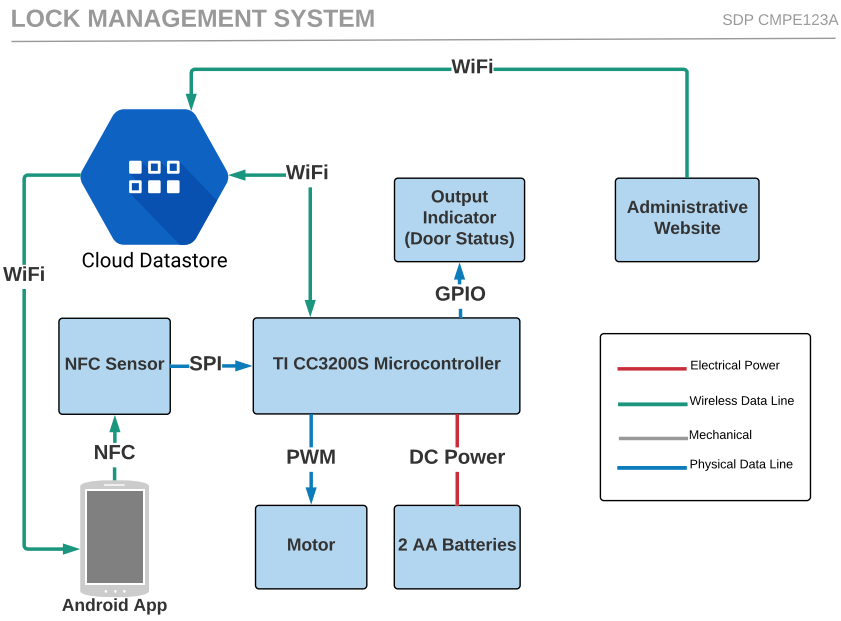

Figure 1: Block Diagram of System

2 Software Flow Chart

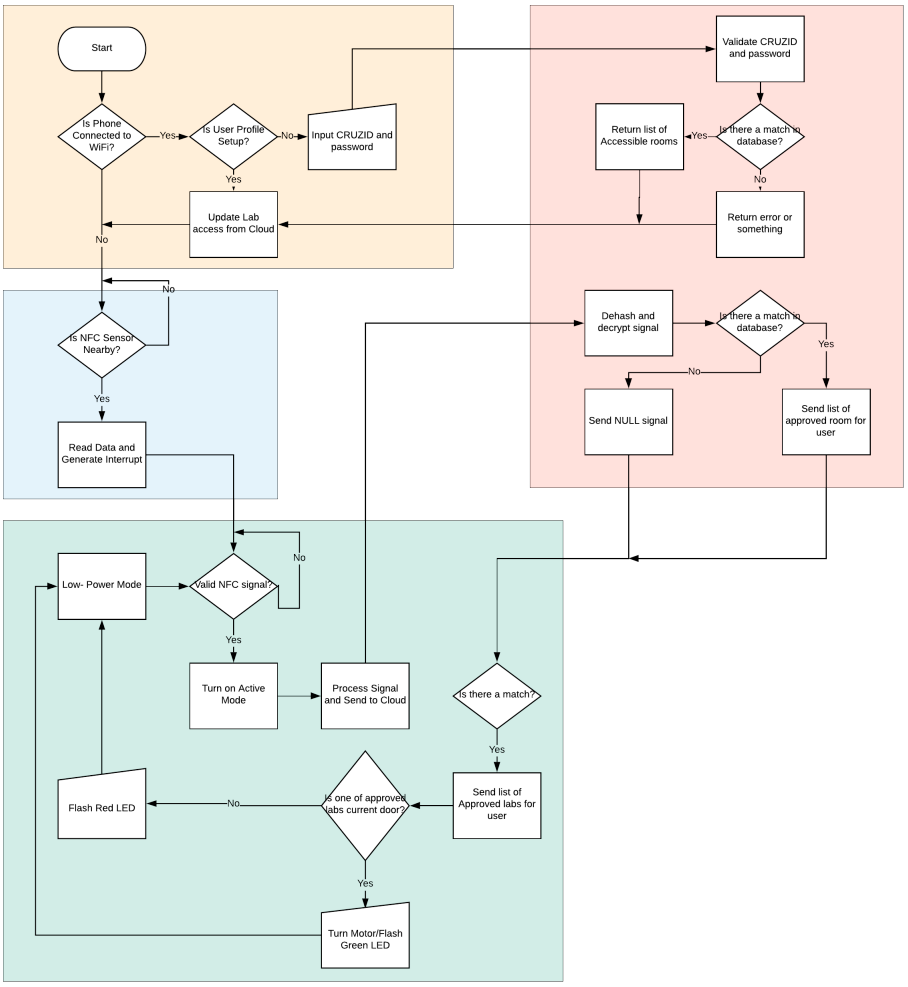

Figure 2: Yellow: Android app; Blue: NFC sensor; Green: microcontroller; Red: Google Cloud

3 Components

3.1 NFC Sensor

The chip is connected to the Micro running at 3.3V. It sits idle until an RFID or NFC chip comes and triggers a read. The chip will be using the SPI interface to transmit the cruzID to the microcontroller.

3.2 TI 3220S Microcontroller

The microcontroller is hooked up to an NFC sensor which reads in a CruzID. This be sent to Google Cloud which returns the room_numbers that the user has access to. If the given lab is in the list it will turn a motor to unlock the door. The microcontroller will be cycling through low power mode in order to preserve the battery life from the AA batteries.
API Protocols for MCU to Cloud

- GetUserLab(cruzID)
- updateLogInfo(room_number)

3.3 Google Cloud

Students, Faculty and labs are all stored in Google Cloud. The cloud will respond from results from the microcontroller which will determine if a user has access to the labs. The cloud storage can only be updated and from the administrative website. Students and labs can be updated at anytime giving real-time access to the labs. The cloud also logs all the login information for each lab and which can be view on the administration website
API Protocols for Google Cloud

- AddNewLabs(index, room_number, class_list = [])
- AddNewStudents(index, name, cruzID, class_list = [])
- ModifyLabEntity(lab_index, room_number, class_list = [])
- ModifyStudentEntity(student_index, name, cruzID, class_list = [])
- QueryAllLabsEntities()
- QueryAllStudentEntities()
- DeleteLabEntity(lab_index)
- DeleteStudentEntity(lab_index)
- LoginRoom(room_number, cruzID)
- LogoutRoom(room_number, cruzID)
- CountRoomPopulation(room_number)
- ClearRoomLog(room_number)

3.4 Administration Website

The administration website is where faculty can add/revoke student access to labs. They can also view analytics from Google Cloud such as peak usage time and current lab capacity. The website will use our Google cloud APIs which is defined above in order to gain access to Google cloud storage.

3.5 Android App

The android application allows for a user to sign in using their CruzID and password. When the phone is tapped against an NFC sensor the application will transmit the CruzID to the microcontroller. The application will have access to the Google cloud in order to view which labs they have access to.