LID CAPSTONE

PROJECT DESIGN SPECIFICATION

January 30, 2017

OVERVIEW

1. Project Background and Description

The L.I.D. is a lab for rapidly prototyping electronic projects. It is meant for students and the community to be able to walk in with an idea and walk out with a fully functioning prototype. The tools range from small soldering irons, to 3D printers, and laser cutters.

The sponsor, Chris Clark, requested a way to limit the usage of various devices within their laboratory to only those persons specifically trained in their proper use. They would like a database to be setup for recording which users have been trained, as well as to track usage of the tools.

Project Scope

The 2017 LID Capstone team will be responsible for creating the Admin user interface, Manager's User Interface and User Database. The team will also create a prototype Station Module, able to wirelessly communicate with the Database via a web framework and control access to a piece prototyping equipment, whether through power switching or a computer interface.

2. High-Level Requirements

The Station Module **must** include the following:

- Ability to receive and transmit encrypted information wirelessly to and from the database via the web framework.
- Ability to control access to the restricted equipment.
- Ability to add authorization to user accounts on specific stations.
- Ability to read RFID cards, specifically the kind of card technology used at PSU.
- Have visual and audible signal for go/ no-go acknowledgement.
- Must have an enclosure.

The Station Module **should** include the following:

- Station module should be easily swapped for another station module.
- Station module should be able to communicate over USB to station computer.

The Database and User Interface **must** include the following:

- Ability to receive and transmit encrypted information wirelessly to and from a Station Module.
- Ability to add/modify a station module database entry
- Ability to add/modify a user account
- Log authorization and station usage in the LID
- Manager User Interface
- Administrative User Interface

3. Deliverables

- Database
- Website Interfaces and Source Code
- Station Module Source Code
- Station Module
    - Bill of Materials
    - CAD files
    - Analog Power Disruptor (APD)
- Design Documentation
    - All design files must be checked continuously into a repository ("live" documentation)
    - User's manual, for admin *and* system users.

4. Proposed Design

Each Station Module will contain an RFID scanner for users to request access to the station. Once the badge has been scanned, the SM will send an encrypted packet of info containing Badge ID, Station Module ID and wirelessly to the database via the web framework

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The database will then determine whether or not the user has authorization for using the station and send back a go/no go signal to the SM. Upon receiving the go/no-go signal, the SM will either display a green LED and allow access to the station, or display a red LED and emit a sound to alert the on shift supervisor while denying access to the station.

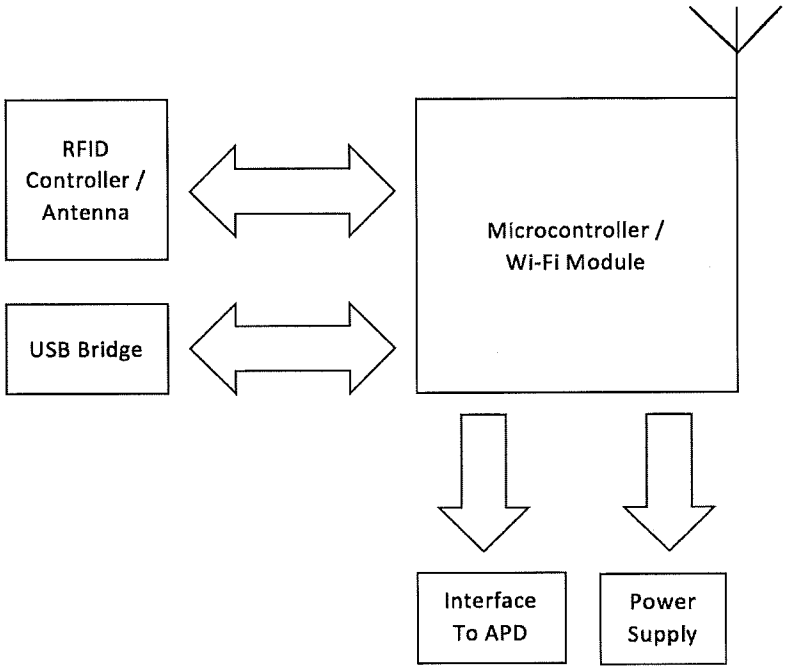
The SM will be able to utilize an Analog Power Disruptor (APD) to switch power on and off to applicable equipment. If it is not acceptable to use an APD for control, the SM should be capable of sending a signal to unlock a control computer.

The Database will be hosted by the CAT at Portland State University and contain at least three tables. The first table will have a record of users, including data such as: linked badge ID, name, email, phone number, and emergency contact with number, user status (admin, manager, user). The second table will contain a list of stations and their linked SMs. The third table will contain a log of badge authorizations and station usage. This information will be available for reports from the website GUI.

The web interface will be where managers can log in to manage the system and pull reports. The website will be accessible for any internet connection over SSL, requiring a login and password of the manager.

Appendix A shows the high-level design and connections between each interrelated unit. Appendix B shows a possible LID setup scenario and the connections between each interrelated unit.

5. Proposed Station Module Architecture



Approval and Authority to Proceed

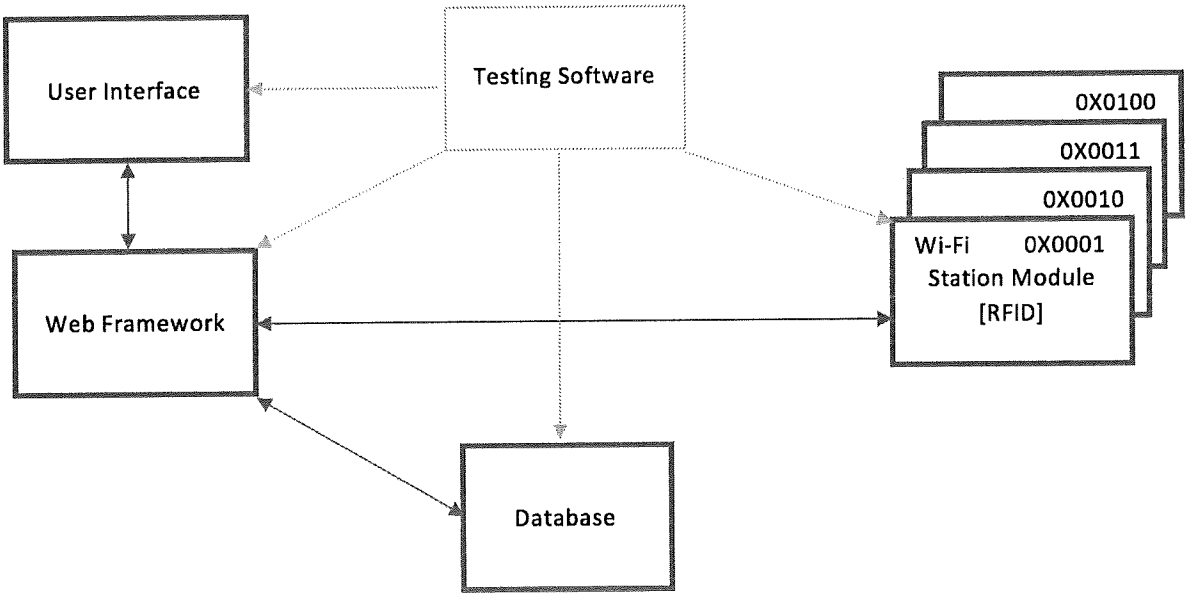
We approve the project as described above, and authorize the team to proceed.

Name	Title
Chris Clark	LID Administrator

Approved By Chris Clark

1-30-17
Date

Appendix A: High Level Design



APPENDIX B: LID SETUP SCENARIO