



AttendancePlus

CDR

Team 18
SDP 20

Meet the Team! (Again)



**Jonah
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CSE
Team Manager



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CSE
PCB Lead



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CSE



**Professor
David Irwin**

Faculty Advisor

Problem Statement



Teachers waste precious time throughout the day keeping track of where students are, cutting into time they could be spending teaching.

Further, in an emergency situation, it is impossible to know precisely who is in the school or where they are at any given time.

Our Solution



- **An Automated Attendance System**
 - Passive RFID (Radio Frequency Identification) System
 - Geared toward elementary schools
- **Intuitive User Interface**
 - Update when tags (students) enter and exit a room
 - Simple & secure Registration System

System Specifications

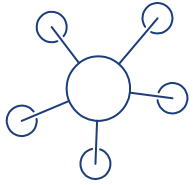


- I.** Automated detection & identification of students entering / exiting a classroom
- II.** Display location of students in school in real-time
- III.** Non-intrusive, low maintenance integration with existing tech in school
- IV.** Interactive GUI for administrators & faculty
- V.** Protect information from unauthorized individuals
- VI.** Keep privacy invasion to a minimum

Quantitative Requirement Specifications

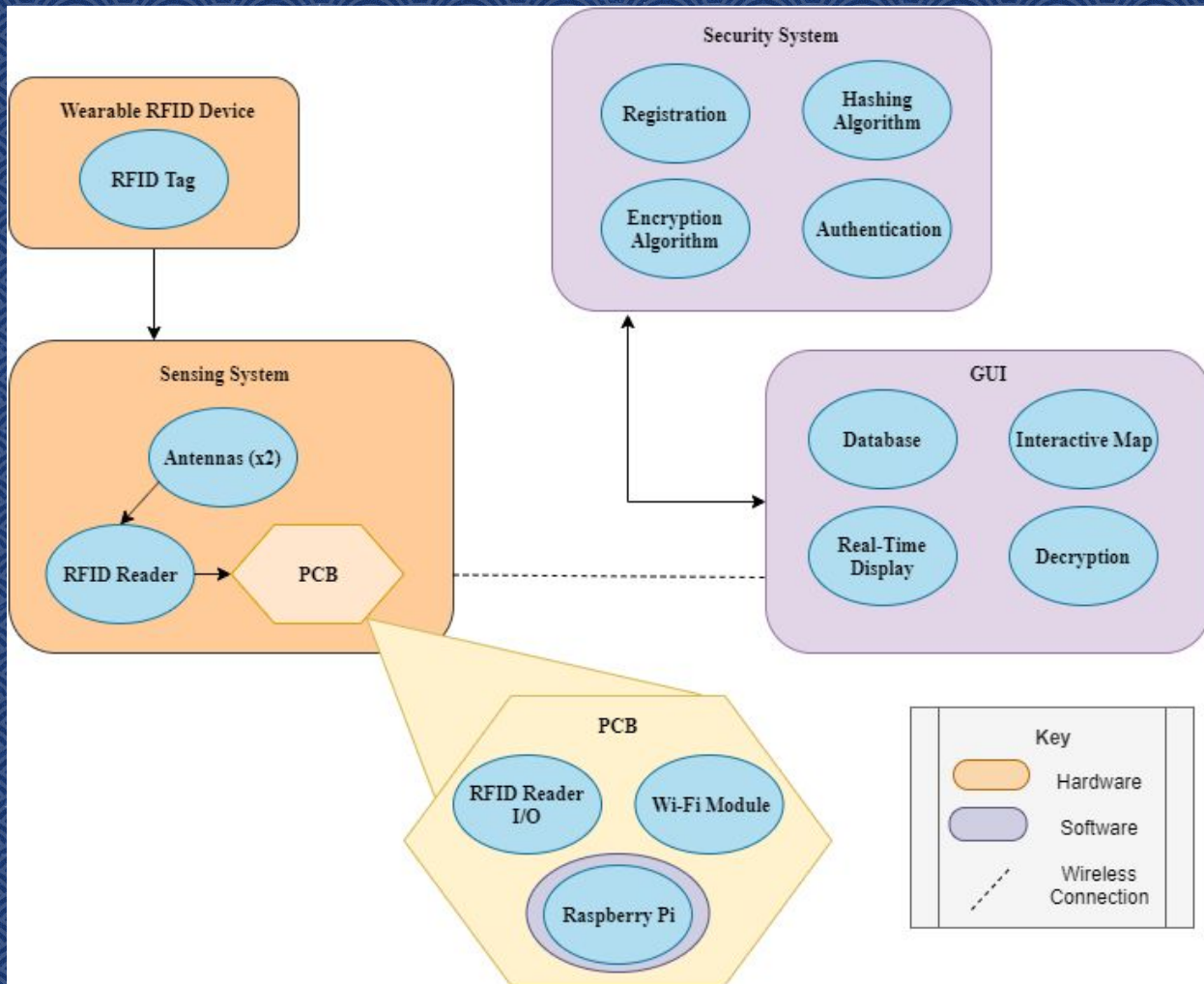


- **High Degree of Reliability: > 95%**
 - Failure to accurately detect tag location < 5% of all detections
- **Easy Installation**
 - System on doorway
 - Connect to existing power source
- **Privacy Protection**
 - Tag registration for tag authentication (e.g. store hash of tag label in database)
 - Secure data transmission
 - Authentication & confidentiality for GUI

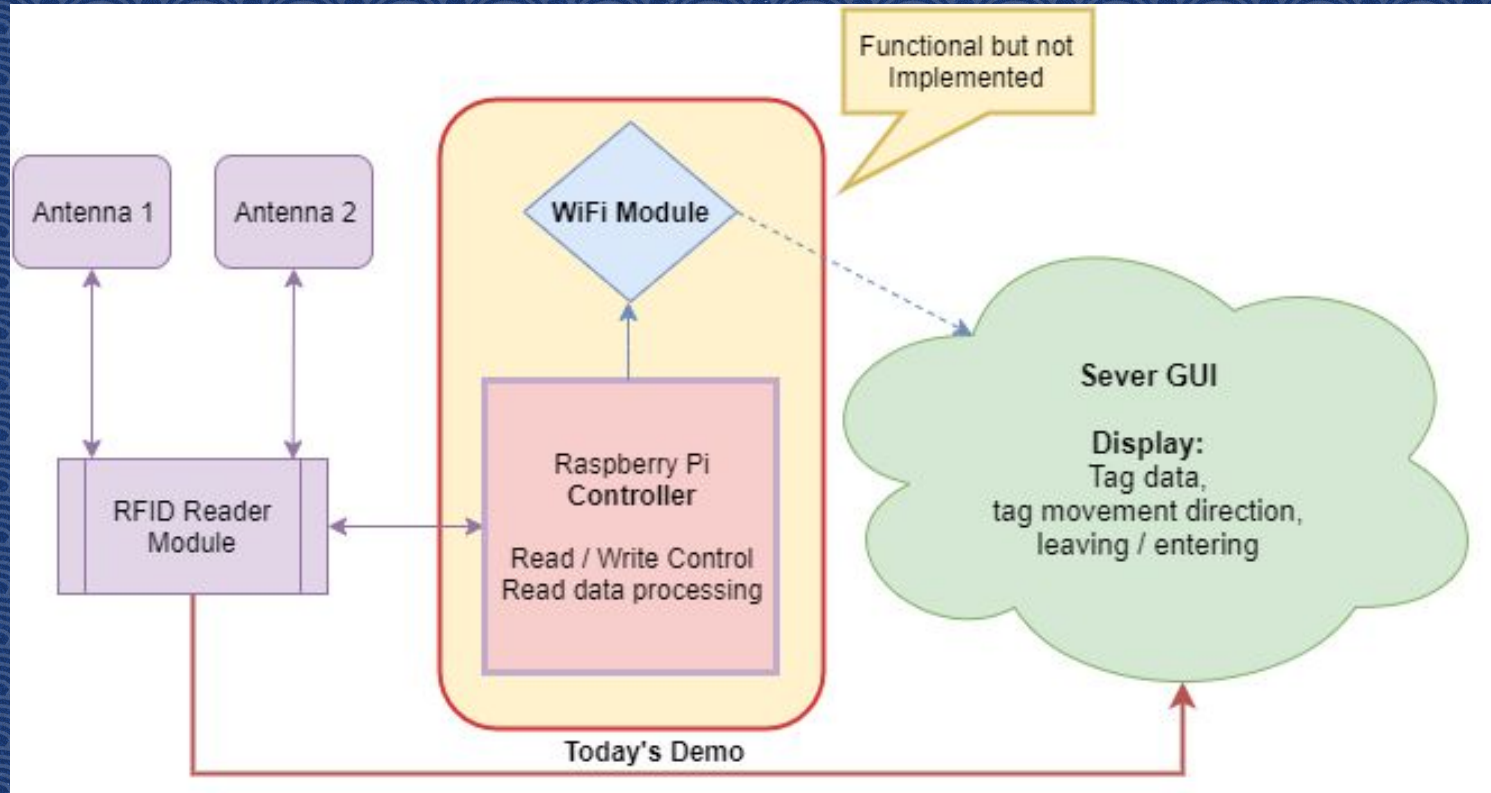


System Design

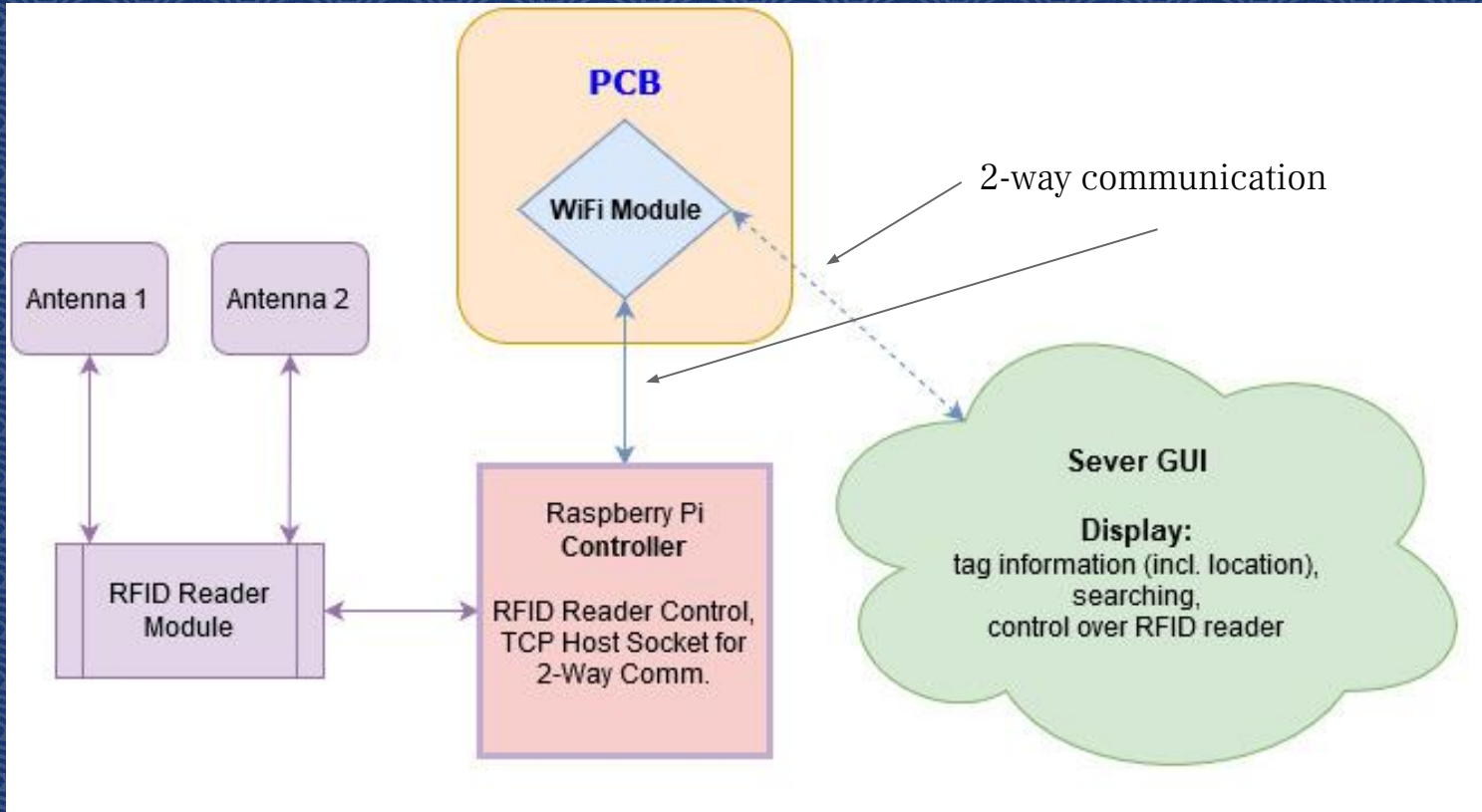
CDR Prototype, Block Diagram

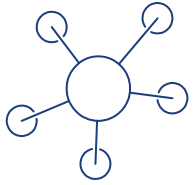


Previous: MDR Functional Diagram



Now: CDR Functional Diagram





CDR Deliverables:

Promised and Delivered

CDR Prototype: Promised & Delivered

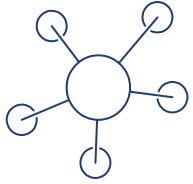


Promised & Delivered:

- WiFi module transmits data from RPi to server
- PCB designed, tested, and integrated
- Updated GUI
- Very high accuracy for determining location

In Progress:

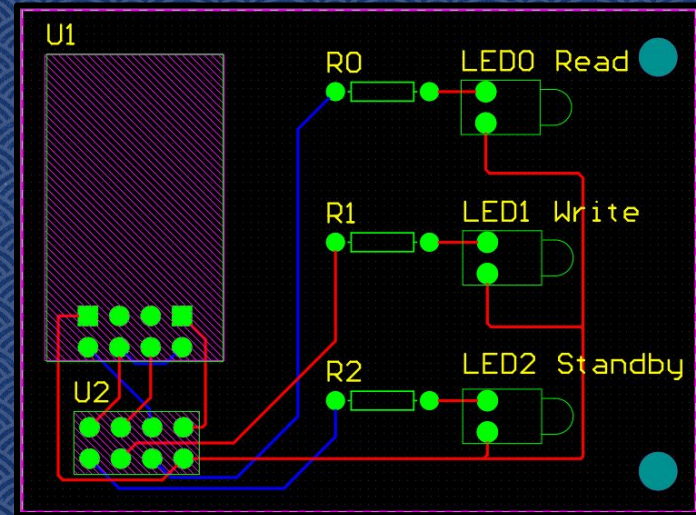
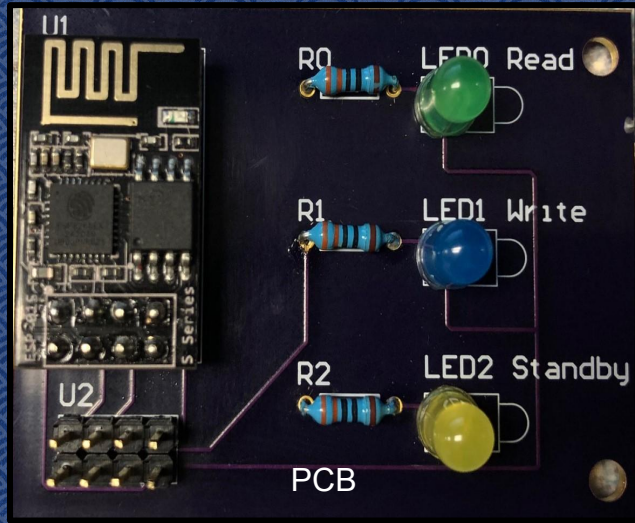
- More features on GUI
 - Searching
 - History / Logging (e.g. know where a tag was for how long and when)
- Finalized Mount
- Finalize hardware housing unit



Hardware

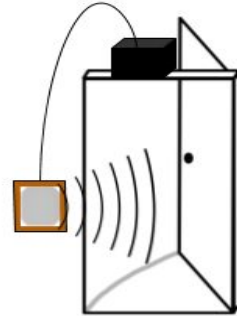
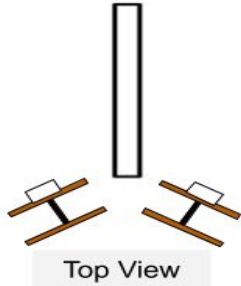
PCB, Mounting, & Enclosures

PCB

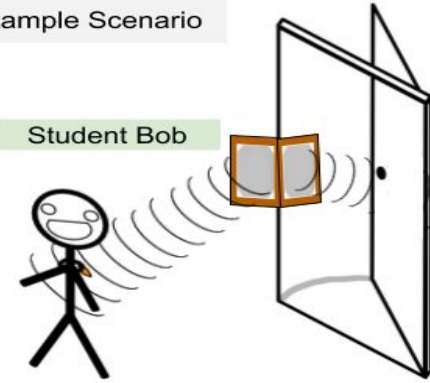


Product Sketch

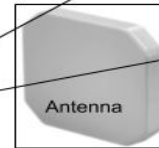
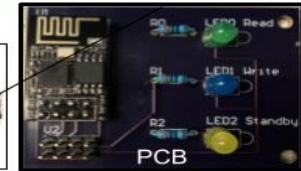
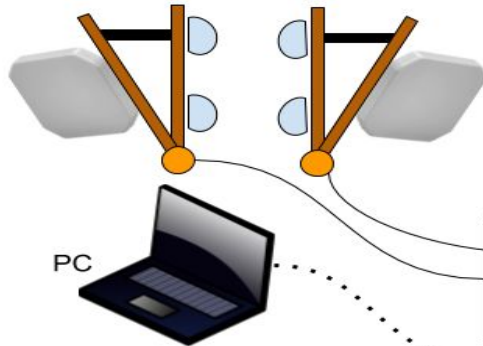
Attendance Plus+



Example Scenario



Antenna Mounting Frame



Hardware

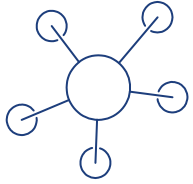


Materials & Design

- Makerspace Collaboration
 - M5 & All Campus Makerspace
 - Design insight from staff
- Materials
 - Hardware (hinges, pipe fitting strip metal)
 - Wood/woodshop tools
 - Suction
- Coming: Housing Unit

Design: Adapting to New Problems

- **Original:**
 - Antennas hang above either side of doorway
 - Tension rods to adjust angle
- **Today:**
 - Placement on side of door
 - Recommended angle pre-installed



Software

GUI, Software on Raspberry Pi, TCP

Software Breakdown - Current Implementation as of CDR

GUI

- Qt C++ implementation
- Distributable executable
- Secure
- User friendly
- Current features: Home (general), logging

RPi Software

- Bridge between reader and hosts (gui.exe)
- TCP server implementation
- Python wrapper functions to interface with reader (e.g. reader_start(), reader_stop())

TCP Connection

- Socket connection between GUI & RPi
- 2-way connection
- 3 controls: start reader, stop reader, disconnect
- Sends ACK back to GUI

[Home](#)[Search](#)[Logging](#)[Settings](#)[History](#)

Tag Registration:

To register your tag, enter your name and unique tag ID, then click "Register".

Name:

If your tag is already registered to another name, then you will not be able to register that tag.

Tag ID:

Click "See Registry" to see all registered tags and their holder.

Connection Status:

Connection to Raspberry Pi: **Connecting...**RFID Reader Status: **Inactive**

Local Area Scan: -Inactive-

Current Location: Guinness Student Center / Guinness Conference Room

Total Unique Tags Found: **0**

<u>ID:</u>	<u>Name</u>	<u>Current Location</u>	<u>Latest Timestamp</u>

Scan Settings:

RESET Local Area Scan Table:

Set read mode to read strictly registered or registered & unregistered tags:

Registered Registered and Unregistered



Testing

Testing Mount

- Height Difficulties
 - Doorways too tall (8+ ft)
 - Dramatically shorter range
 - Interference causing lower strength
 - Antenna Orientation
 - Passive tags not strong enough
- Change to Side Orientation
 - More accurate results
 - Easier installation

Experimental Data

Antenna Height: 3.7 feet

Angles: 30 degrees and 45 degrees

Trial Number:	1	2	3	4	5	6	7	8	9	10	Success Rate:
Control: Chest Height	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	100%
Hanging from Wrist at Chest Height	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	100%
Wristband: Waist Level	X	X	X	X	X	X	X	X	X	X	0%
Necklace: Chest Level	✓	✓	X	✓	X	X	✓	✓	X	X	50%



Looking Ahead

FPR and More...

FPR Deliverables



- GUI Functionality & Aesthetics Complete
- Real Time Updates Per Location
- Final Mount & Housing Unit Designs
- Actual Necklaces

Remote Learning Plan

- Remote Testing/Demo Plan
 - Remote in (video call) to physical location
- Designated Lead
 - Jonah (Team Lead) will take device
- GUI Set-Up Instructions
 - Compile server/GUI download & setup
 - Run Virtual Machine image
- Majority of team will remain local for testing



Thank You!

Any Questions?



Demo!