**Engineering Requirements:**

- **Battery Powered:** The system shall be battery operated when no wall power is available.
- **Cost-efficiency:** The budget for manufacturing the electronic components of the lockbox must be under the specified budget of $18 for 10,000 units.
- **Electronically Secure:** If a user is unable to access a lockbox without a valid key, or other means (to be determined) then the system is secure.
- **Energy Efficient:** The system shall be continuously powered for at least 1 day.
- **Independent function:** Each lockbox subsystem may be connected or disconnected and the system will function without reprogramming.
- **Multiple Systems:** Two independent hardware systems shall be constructed for testing purposes. (You have authorized reusing the wall power and battery power blocks for both systems, but all other hardware components will be duplicated for the second system)
- **Physically Reconfigurable:** The system shall be able to physically connect and disconnect with electrical connection from other lockboxes using a single enclosure design, but vertically and horizontally.
- **Server Functionality:** The system must be unlock/lock and reprogrammed with the server connection.
- **Software Reconfigurable:** Each box should be reprogrammable to allow for resetting of passwords or keys.
- **User Friendly:** 9 out of 10 users shall be able to unlock the lockbox within 1 to 2 minutes.
- **Wall Power:** The system shall be powered by 120VAC 60Hz wall power.
- **Wireless Communication:** The system shall be locked/unlocked and reprogrammed wireless so that the system will be able to do these things wireless within 2 minutes.

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**Reconfigurable IoT Lockbox**

*Custom PCB for ESP32 microcontroller:*

- The ESP32 gave us the option to use integrated Wifi to interface with the server and web application.
- When the signal is received and the user code matches the code saved to on-board memory, the solenoid is engaged and the door can be opened.
- Automatic switching between standard AC wall power and battery power when wall power is unavailable.

**Project Overview**

This project will focus on creating a simple IoT lockbox with an emphasis on security and privacy for users. This security and privacy should extend both the person opening the lockbox and the company filling the lock box. Lock boxes need to be extremely low power or even “no power” with a possible serverless design to allow for a box to be opened only by an authorized user 10’s or 100’s of years in the future. Lock boxes need to be reconfigurable in that multiple boxes can be quickly connected and disconnect from banks of other boxes if so desired.

**Website for Lockbox:**

- Main page: Students enter the student’s ID and passcode which they get from the email to pick up the package.
- Home page: Allow admin send the package and logout.
- Send page: Admin enter the box number, student’s ID and email to send the package.
Once admin send the package, student will receive email for the package information.

**Security for the Website:**

- Only admin can login in: Using CAS to login; if admin log in, the website will turn to Home page to send the package, else back to the main page and send an error.
- Only student can see their passcode: The passcode will create randomly by 6 numbers and send directly to the student’s email.
- Passcode will be destroyed once picked up the package: After student entering the passcode to pick up the package, the passcode will be destroyed.

**Website for Lockbox**

- Send page: Admin enter the box number, student’s ID and email to send the package.
- Home page: Allow admin send the package and logout.
- Send page: Admin enter the box number, student’s ID and email to send the package.

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**Team Members:**

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