Makerspace Sign-In Project

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Team

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Content

Problem Presented

- The Makerspace currently has an **inefficient sign-in process** for students
  - Current Google Form **asks students to select stations** that they intend to use during their visit
  - Students **must sign a safety waiver** every time they enter
  - Students **must sign in** even if they **just want to speak to a mentor**
  - Students will often **ignore the sign-process and go straight to the machine**

Goals:

- We want to create a solution that allows visitors to **efficiently sign in**
- Also want to give the Makerspace mentors **more information** about the **amount of time that students spend in the space and what machines are used**

Our Solution

Our Sign-In Process

1. Students will scan in using their student ID card

2. Must sign a safety agreement if it's their first time at the Makerspace

3. Students must scan out when they leave and select the stations that they used

4. Makerspace mentors will acquire data to keep track of who visits the Makerspace

The Steps

Hardware

Raspberry Pi 4 Model B

A **small single-board computer** that can **connect to the internet and interact with hardware** through its GPIO pins
Software: Runs Python to detect RFID scans
Hardware: The Pi talks to RFID modules
Logic: Compares scanned ID with known list, then takes action

Micro SD Card

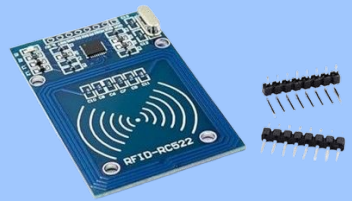
Acts as the **Raspberry Pi's main storage** (similar to a hard drive)
Boots up the Pi with the OS
Runs our Python code that listens to the RFID reader
Stores scanned RFID tag data and holds libraries

RFID Reader

RFID card/tag contains a unique ID stored on a chip
RFID reader emits a signal and reads the card ID
Raspberry Pi receives data through a communication interface like a micro USB
A program on the Pi **handles the ID log in, database information, and grants access for the Makerspace**

Raspberry Pi 4 Model B

Micro SD Card



RFID Reader

- **Frontend:**
  - **Designed web pages (using HTML/CSS frameworks)**
    - Landing Page
    - New Student Sign-In
    - Returning Student Sign-In

- **Backend:**
  - **Created a database that stores students' information**
    - Student name, ID, email, and RFID
    - Signed safety agreement
    - Machines used, date & time in/out
  - **Data is collected through scan events**
    - RFID is used to query the database and display the correct webpage
    - Form submissions entered into database
  - **Export Data**
    - A function queries the database to write data to a CSV file

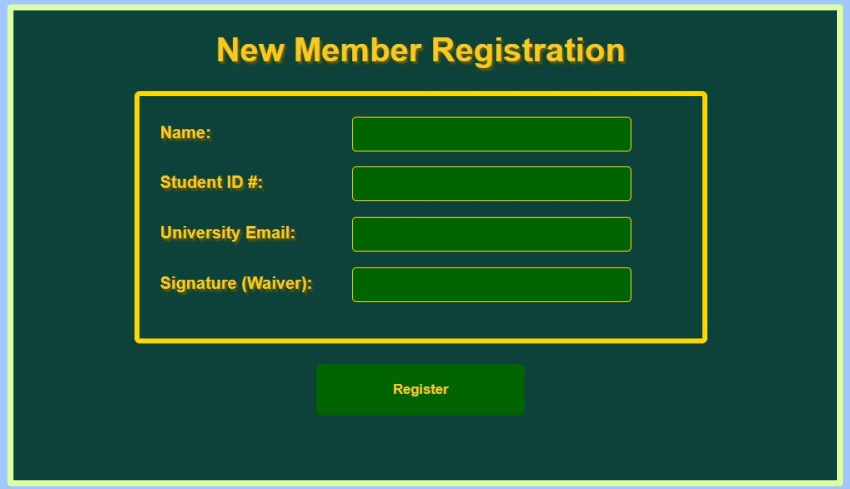
- **Analytic & Admin Dashboard:**
  - **Visual insights**
    - Secure admin access to view statistics
    - Allow admins to generate reports and monitor real-time activity

This stored information allows us to see **who has visited the Makerspace and how much time they were there for in a given day.**

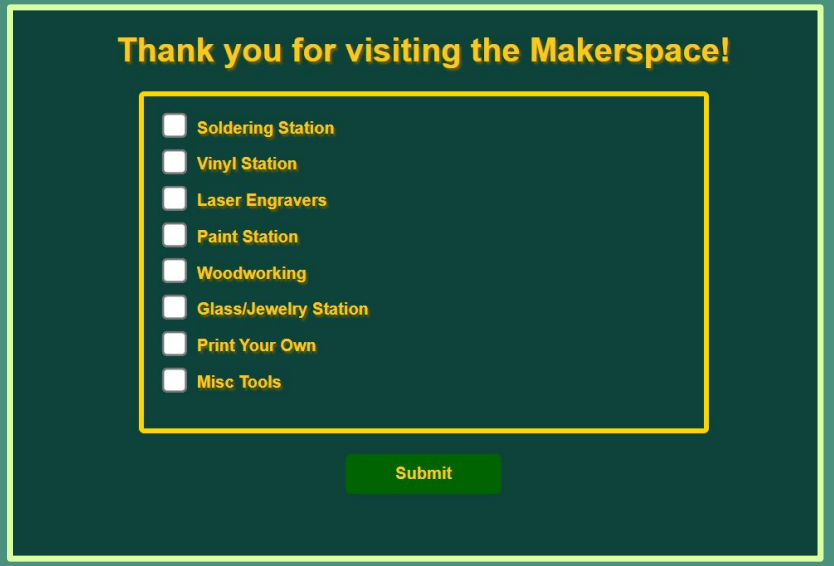
Safety agreements are stored digitally, making them easier to monitor and manage.

Results

New Student Screen



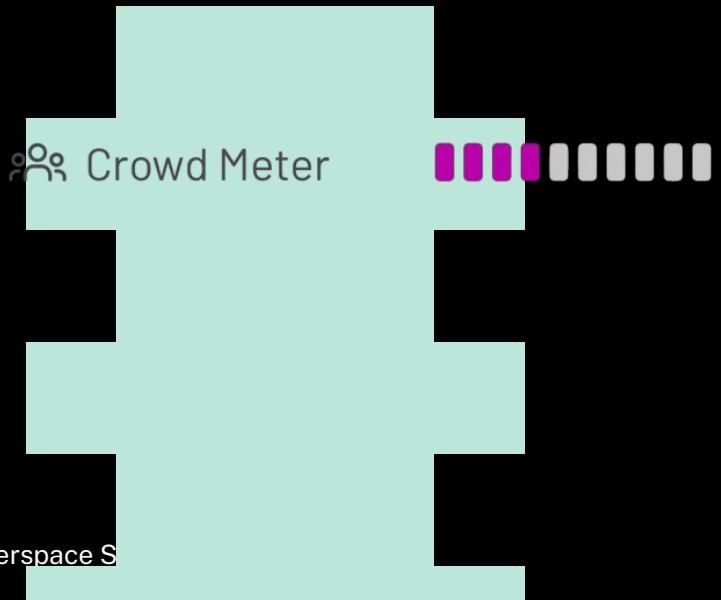
Sign Out Screen



Future Plans

After we complete this project, we have an idea about how to continue improving areas around campus...

Crowd Meter/Activity Scale!



The Makerspace:

- Can use our **database that contains information about the amount of students in the Makerspace at a given time** to create a crowd meter
- A crowd meter **will allow students to see how busy the Makerspace is** throughout each day

Gyms:

- Both the Deneka and Cheel gyms **already keep track of the amount of students who use their facilities at a given time**
- Using this information, we can create a crowd meter so that **students can see how busy the gyms are**

Dining Halls:

- Could be a little trickier, but **still possible to make a crowd meter for dining halls!**

Thank You!