Project Design Document

Digital Sign-In System for MAMS

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Statement of Goals

The current sign-in system at Mass Academy is paper-based, creating inconveniences for administrators and students. The front desk admin has to manually copy data from the sign-in and sign-out sheets, which include the name, sign-in time, and sign-out time, for each of the 100 students at the academy. This process is time-consuming and sometimes inaccurate. Furthermore, the sign-in and sign-out times written by students are not verifiable by electronic systems, which leaves a potential for the times to be falsified.

Our goal is to create an electronic sign-in and sign-out system that (a) speeds up the time students spend signing in and signing out and (b) streamlines the process for admins to transfer sign-in and sign-out data to the academy's attendance system (c) provides administrators a user interface to query attendance data.

Functional Description (MVP)

Our program will identify the user based on a unique identifier, either through scanning the student ID's barcode, facial recognition, or fingerprint recognition. Then, the system will either mark them as signed in or signed out depending on the time of day and timestamp their sign-in or sign-out time. The data and website will be hosted on Firebase.

The 3 core features of the product are:

1. Allow the student to sign in and sign out using an easily accessible personal identifier for each student.
2. Collect the sign-in/out data into a database that tracks sign-in and sign-out times, attendance by each date, and the student's unique personal identifier.
3. Provide a user interface web page or application that allows administrators to access daily reports and query attendance data.

Technical and Data Feasibility

In order to track sign-ins and sign-outs, our program requires basic identifying information for each student, including:

- A unique identifier
    - Depending on the input, this includes a barcode on the student's ID, an RFID, their face, or their fingerprint.
- Student names

- Student grade levels

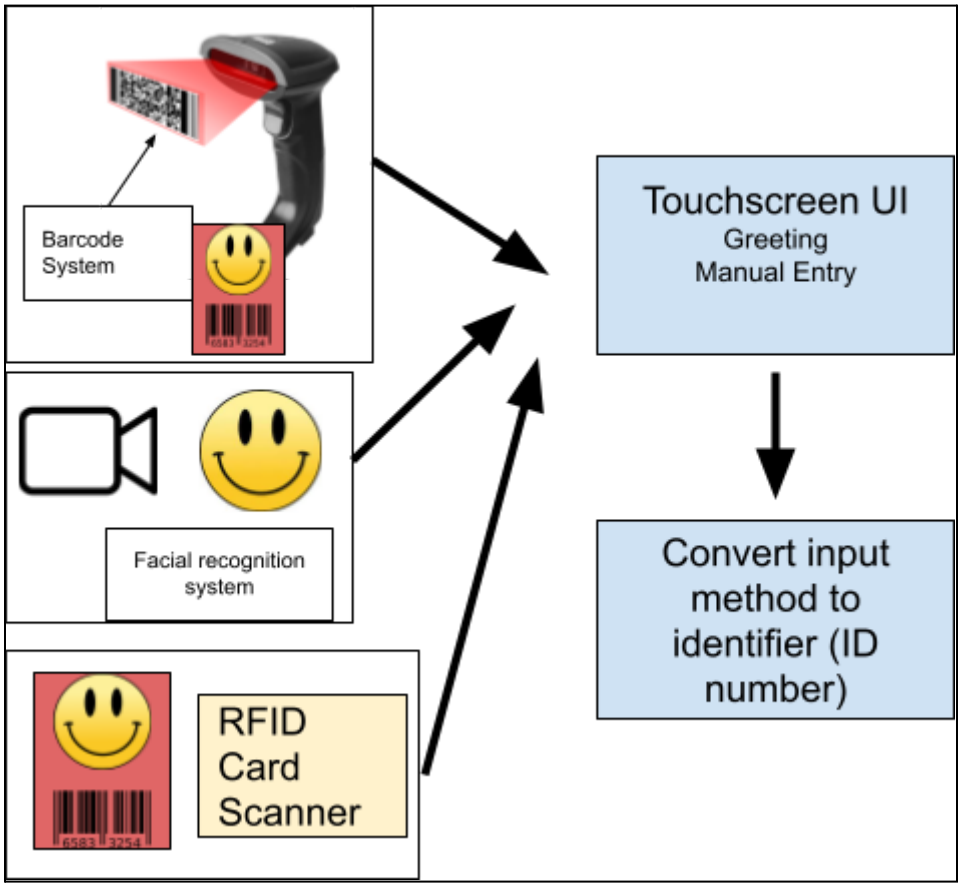
In order to format the input data correctly, our program requires the spreadsheet format used by the academy's attendance system. Furthermore, the data would be transferred into a cloud database using MongoDB and can be queried through the web page.

In the case of a system failure or a student forgetting their unique identifier, like their ID, we will create paper back-up slips for the student to fill out.

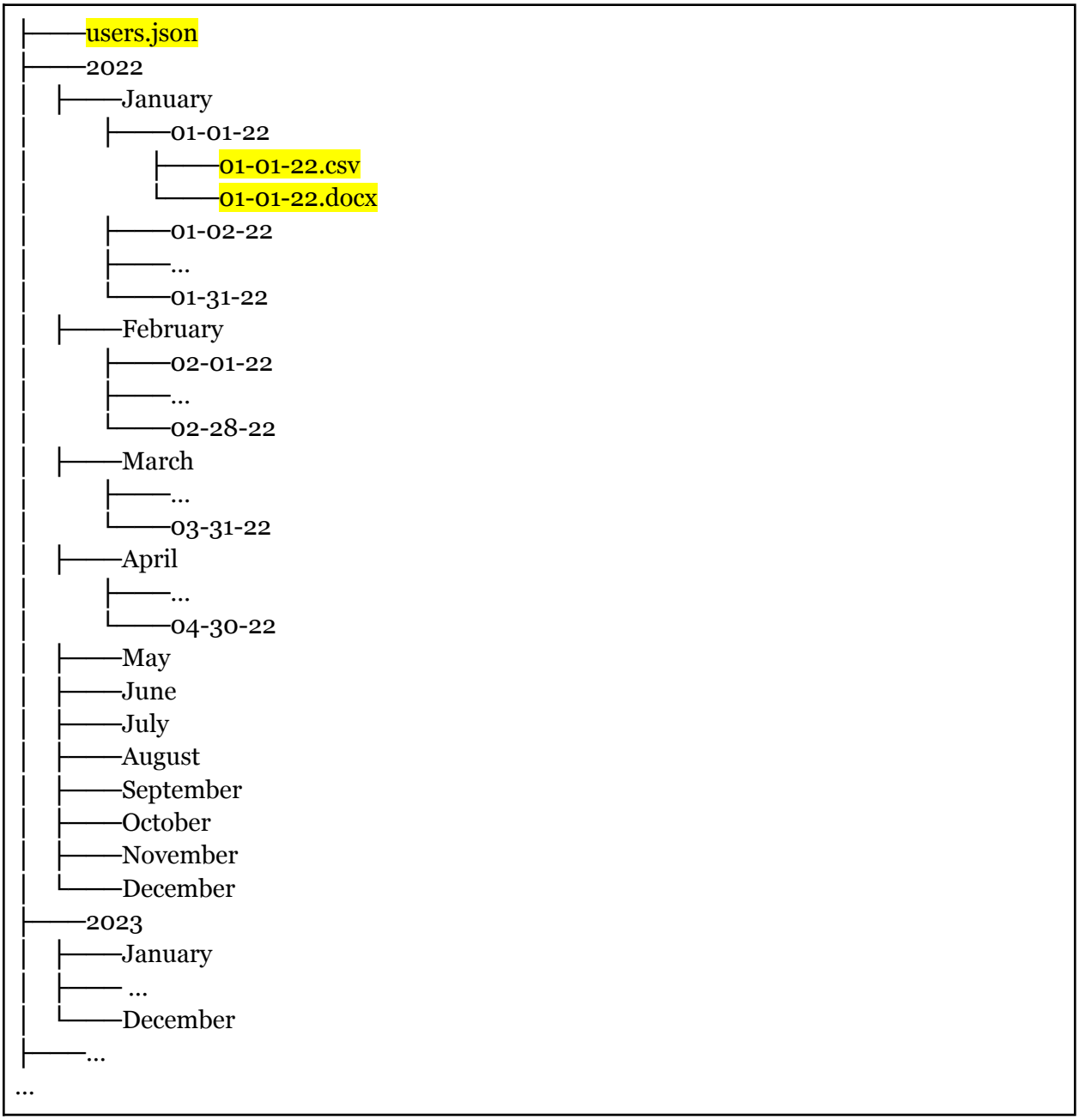
Existing technologies/APIs

- Barcode scanner API (C++)
- CSV library for Python
- Uploading files to Google Drive API – PyDrive · PyPI
- FaceNet facial recognition deep learning framework
- RFID technology – smart card scanner

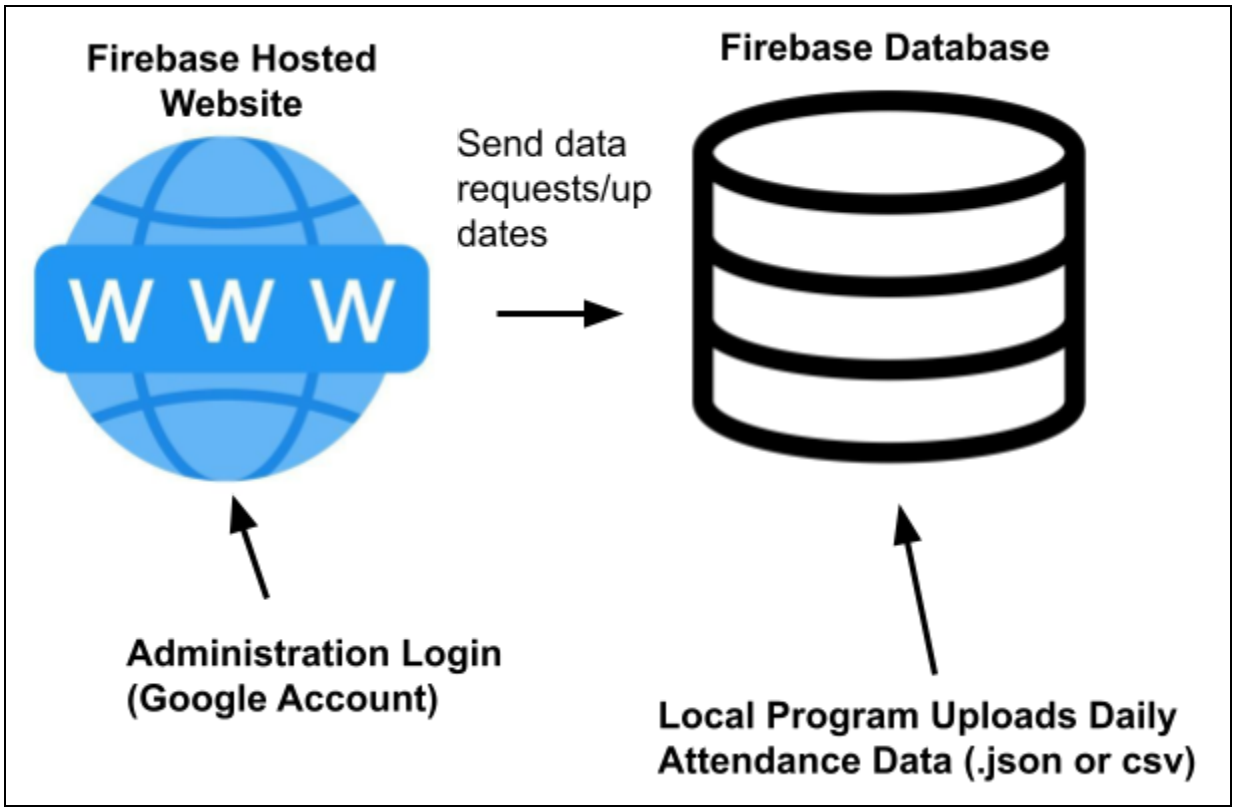
User Interface



This user interface allows students to input a unique identifier. The input method would be matched with a unique person identifier for each student, and the timestamp of the sign-in/sign-out would be recorded. An audible alert and a screen would indicate that a student has successfully signed in or signed out.

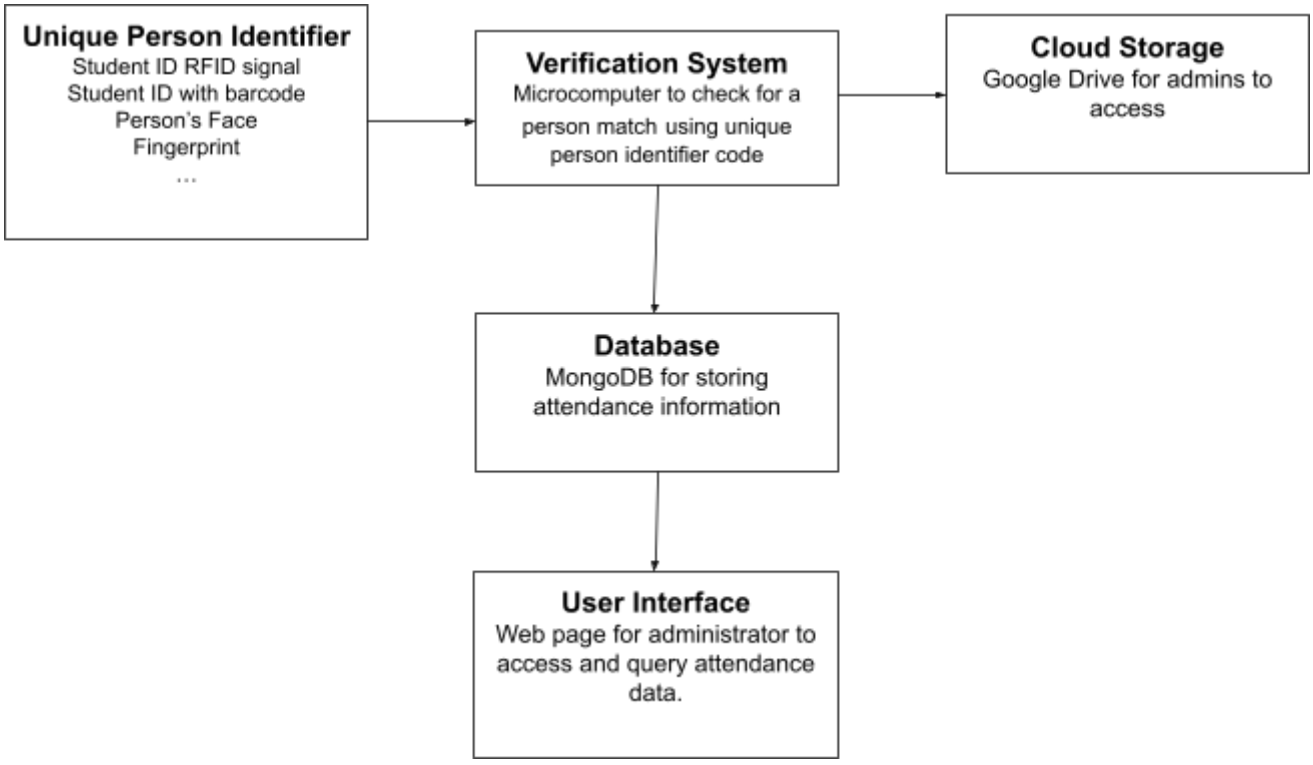


This user interface would allow administrators to access daily reports and attendance data easily by organizing it in a user-friendly way. Each day's attendance would be sorted into the respective directory locally and in cloud storage. Each person's unique identifier code would be stored in a JSON file for easy references, such as their RFID signal, barcode number, or face detection encoding.



This diagram shows the overview of the cloud-hosted database and the website. This diagram also outlines the technologies that will be used to develop the database.

Flow Chart / Systems Diagram



Persistent Storage

Our software will store attendance information in a spreadsheet CSV format and in a MongoDB database. Each spreadsheet would be named corresponding to the current date. This data will be stored locally and pushed to an online storage location for the admin to access.