Attendance Application

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I. Introduction

This project's primary goal is to allow students to submit their attendance using their student ID cards and an RFID reader. It will save professors a lot of time at the beginning of their classes and eliminate the possibility of the professor mismarking the students' attendance. The project also includes a web application to track each student's attendance. The web application will make it easier for professors to access their student's attendance. It will also allow students to search their classes to check their attendance grades. Alternative to using a paper sign-in sheet and running the risk of losing it or students forgetting to sign it, professors can use this project to track their student's attendance more effectively.

This project uses an RFID-based system to record student attendance automatically. Students will scan their student ID cards on an RFID reader. This approach is more reliable than manually tracking attendance. We will create a database for the website, then an RFID circuit to scan student ID cards and upload the attendance on the website.

II. Glossary

1. **RFID** - Stands for Radio Frequency Identification. It is a form of wireless communication that incorporates electromagnetic or electrostatic coupling in the radio frequency portion of the electromagnetic spectrum to identify an object, animal, or person uniquely.

2. **Database** - A database is an organized collection of structured information, or data, typically stored electronically in a computer system. A database is usually controlled by a database management system (DBMS).

3. **ESP32** - ESP32 is a series of low-cost and low-power microcontrollers with integrated Wi-Fi and dual-mode Bluetooth connectivity.

4. **User Interface** - how the user and a computer system interact, particularly input devices and software, also known as a webpage/website.

III. Functional Requirements

Student:

- Students can scan their ID cards on the RFID reader, and the system will mark them as present.
- The student will be able to login into the website using their school email and password
- The student should be able to view a list of the courses they are enrolled in and be able to select the course that they want to view their attendance for
- Students should be able to search for a specific class using the search bar, then select the course

Teacher:

- The teacher should be able to login into the website with their login information
- The teacher should be able to view a list of the courses that they are teaching and be able to select the course that they want to view
- When a teacher selects a course, the teacher should be able to choose the date of the class session they wish to view, and from there, they should be able to view the list of students and whether they were present, late, or absent.
- The teacher should be able to select a specific student and view the attendance of that student for each class session
- The teacher should be able to adjust the time frame (for each course) that a student will be able to check in to class before they are considered late
- They should be able to search for a specific student or course in the search bar and select the course/student from there

System:

- In response to the student scanning their ID card, the RFID reader should generate a green light if the student has been successfully marked in the database
- The system should retrieve the data from the RFID reader and place that data into the database
- The system should mark the student as present or late in the database, keeping track of the time the student checked in to class.
- The system should generate a summary of each student's attendance for each course over the whole semester for the teacher to view. Students should also be able to do the same. The system should summarize the student's attendance for that course over the whole semester.

- The system should generate a list of the students in the selected class session (for teachers) and indicate whether they were present, late, or absent via the colors green, yellow, and red, respectively.
- The system should NOT apply one course's changes to all other courses
- The system should ONLY let the user in when the login credentials match the login credentials that the database system has for that user
- When the student is absent, the system should notify the student of their remaining absences
- When users hover their mouse over the late symbol, the time that the student checked in should show up

IV. Introduction to User Manual

Directions for students

Upon arrival to each class period:

Bring your RFID card to every class and wave your card next to the scanner (at least 4 inches from the scanner) until you see the green light turn on. Once the green light turns on, you are marked as present for that class period. If the light turns yellow, you have been marked as late for the given class period.

To view your previous attendance history:

Log into the user interface with provided credentials. Once you are logged in, you will see a list of courses you are enrolled in (if you have trouble finding a course, use the search bar and search for your courses there). Click on a course to view your previous attendance for that course. Here you will see a list of class sessions and your corresponding attendance mark for each session. By default, this list will be sorted to show class sessions where you were absent. Use the drop-down sort button at the top of the list to change how the list is sorted. Sorting options include chronological order, absent to present (the default option), and present to absent. A green mark next to a session indicates you were marked as present and on time for that session. A yellow mark next to a session indicates you were marked as late for that session (you may hover over the yellow symbol to see what time you checked in to class). A red mark next to a session indicates you were marked as absent for that session. Additionally, on the right side of the list, there will be a summary showing your attendance for the given class. This summary will show how often you were absent, present, and late for the current semester.

Directions for Professors

To view your student's attendance history:

Log into the user interface with provided credentials. Once you are logged in, you will see a list of your courses. You may either use the search bar to search for specific classes or students, or you can select the course from the list that appears on the screen. Select a course, and there you will see a list of class sessions for the given course. Next, you may select a particular class session for a specific date. There will be a list of the students with either a green, red, or yellow symbol next to their names. If the symbol is green, they were marked as present and on time. If the symbol is red, that means that they were marked as absent. The student was marked late for the given class session if the symbol is yellow. If you hover your mouse over the yellow symbol, it will show what time the student checked in to class. By default, the list will be sorted to show absent students at the top, followed by late, then present students in ascending order. Additionally, you may sort the list of students using the sort dropdown button, which can be found at the top of the list. The sorting options are to sort absent to present (in ascending order), present to absent, and alphabetically by the last name.

Click on a student’s name from the class list to view their overall attendance for the class. This screen will show a list of class sessions and the student's attendance for each session. On the right side of the page, there will be a summary of how often the student was marked present/late/absent for the entire semester.

You may also adjust the time window of what is considered late instead of on time via the settings symbol at the top right of the screen. For example, if the “late time window” setting is set to 5 minutes, then students will have 5 minutes after the time that the class starts to be marked as present and on time. If a student arrives and checks in any later than that 5 minutes, they will be marked as late. Note that the settings for each class are different, and settings applied to one course will not apply to all other courses.

V. Special Requirements

We don't know what services we will use for this project. We must decide what services to implement a database (MySQL?) and server (Gthub pages?). An obstacle is figuring out how to configure the esp32 to communicate with our database and how our database will communicate with our server. Once this is figured out, most of the work

will be developing the user interface, organizing the database, and programming the esp32 to read RFID chips.

What we foresee as a possible problem is how we would input the attendance results into Canvas. As far as we know, there is no API that canvas provides to the end user to access their software data remotely / change data remotely. This would leave us with our only option to fulfill this possible feature: a web bot the user would run, and it will interact with the site on the user's behalf.

A second issue we foresee as a possible issue is how we use the data and where. Since our program uses two parts (A web-based portion and the scanner), we need to decide where to process what data and how much to do in each area. Ultimately it will come down to how he chooses to determine, but as it stands now, there is no obvious best path forward.

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VII. Bibliography

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