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Portable Attendance System

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Abstract: ***Portable attendance system is the dynamic system of taking and storing attendance. Attendance of students in college will be done only by their physical presence, thus removing the loop hole of proxy attendance. Database of attendance, subject wise will be accessible to students and professors at any instant of time. Setting minimum Criteria of attendance, students can foreknow the margin they are having. Using affordable hardware and efficient methodology easy to use and efficient attendance system has been made by us.***

Keywords: Embedded, Attendance, Automation, Classroom

1. Introduction

In present scenario, Attendance in college is taken in the most orthodox manner. This creates redundancy in data managing. Also, sometime default attendance is also calculated, thus creating loopholes in conventional attendance system. We have devised an efficient attendance system to remove the loopholes in the system. Using portable hardware, connected in common network with that of the institution. Attendance can be taken in the suavest way. A common database will be accessed by students and teachers, which will be updated on daily basis.

2. Objective

- The first objective of our system is to improvise the methodology of taking attendance in classrooms by digitalizing it.
- The second objective is to reduce proxy attendance in classrooms by including security parameters in portable attendance system.
- The third objective is to reduce the workload of teachers in maintaining attendance data by making the system all online.

3. System Detailing

3.1 Hardware requirements

3.1.1 Microcontroller

A microcontroller is a small controller having size as much as of a small PCB. It is a miniature version of any dedicated computer. It is programmed to do specific work as per our needs and requirements. Any microcontroller includes a input/ output peripherals processor, memory, and a processor on a single chip. Advanced Microcontroller also have on chip modules for wireless connectivity with different appliances. The peripherals that can be mounted on the microcontroller depends on necessity and working of the project. Microcontroller is important because of its in-built memory and consumption of less power.

3.1.2 Liquid Crystal Display

Liquid Crystal Display (LCD) is used for displaying the required text on any connected microcontroller. LCD display is much thinner than the conventional in use Cathode Ray Technology (CRT) display. LCD consume less power and hence are likely used for connecting it with microcontrollers. LCD is made of either active or passive matrix. Active matrix LCD is generally used because in it frequent switching is possible, thus smooth transition can be observed.

3.1.3 RFID Sensor

Radio Frequency Identification (RFID) Sensor captures data from a tag or smart card and transfers it to a database for taking further action. As the name suggests Radio Frequency Identification, system works on radio waves. There are three components in the system; Smart Card (RFID tag), RFID reader, and Antenna. RFID tags are of passive and active types. Passive RFID tags are most generally used because they are smaller in size and cheap.

3.1.4 Biometric Sensor

Biometric Sensor is an identification device. Various process is carried out after recognizing features of a human being. Mainly fingerprint, retina or facial recognition is used in Biometric Sensor. Such sensor works as a transducer, changing biometric trait of a person into an electrical signal. Fingerprint Sensor is a widely used device because it is cheap and accurate. Fingerprint sensor is a small device which is used mainly for security purpose. It reads fingerprints and gives data to the microcontroller. The sensor is widely used because of the enhanced security in the system and fast processing.

3.1.5 Pi Camera

Pi Camera is a miniature camera which can be connected directly to Raspberry Pi. It can be used for video recording or detecting facial features and sending it to database in real time. Resolution of picture captured can be upto 2592 X 1944 pixels. 1080p HD video can be recorded by the 5 MP camera module. Pi camera captures at 30 frames per second (30fps).

3.2 Hardware Functioning

3.2.1 Microcontroller (Raspberry Pi)

Figure 1: Raspberry Pi

Raspberry Pi is the brain of the system. It is connected with all the sensors. It will be taking input from RFID sensor when the smart card will be detected. For marking the attendance either of the two parameters are required i.e. fingerprint or facial recognition. Input will be taken from this sensors and attendance will be marked absent or present in the database, by the system. Relevant output will be sent to LCD as an output.

3.2.2 RFID Sensor

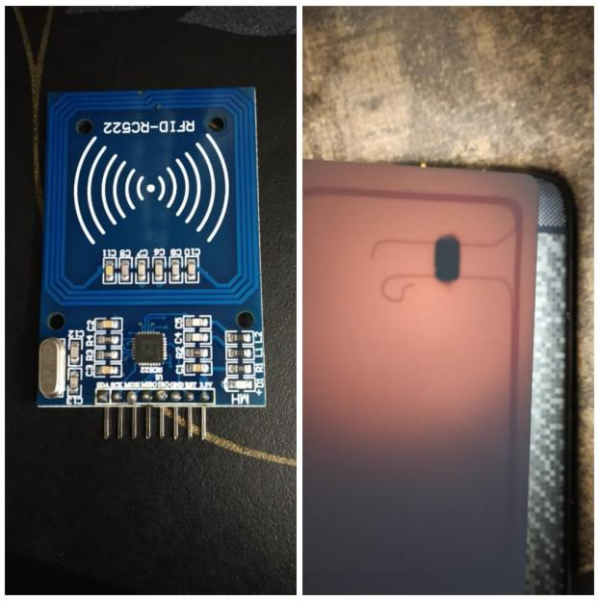

Figure 2: RFID sensor

RFID tag will be included in the identification card of the student. When he will swap his identification card in front of the sensor, then the system will be activated. Every student will have a unique code related to its card. Once the system is activated because of the smart card, then only the student can proceed for fingerprint or facial recognition for attendance.

3.2.3 Biometric Sensor

Figure 3: Fingerprint sensor

It detects the fingerprint of the student. As per the data stored of the student in the database if, fingerprint matches that of the student relevant "ACCEPTED" message will be displayed on the display or else "TRY AGAIN" message will be displayed.

3.2.4 Pi Camera

Figure 4: Pi Camera

Pi Camera will take live recording of the students. After the portal is activated, student can decide to mark attendance by either fingerprint or by facial features. Pi camera will take the picture of student in front of the Pi camera. Raspberry Pi will process the image and will give relevant output if the facial features matches that in the database of the particular student.

3.2.5 Liquid Crystal Display

Figure 5: Liquid Crystal Display

It is the output peripheral of the system. As per data matching, relevant text will be displayed. If data of

fingerprint or of facial features matches the database, then the displayed text will be, “ACCEPTED” and if it does not match, then the displayed text will be, “TRY AGAIN”. As per the programming of the microcontroller, if data is not matched three times consecutively the text displayed will be, “REGISTER YOUR SELF”.

4. Working

The whole system will be combined in a single portable device, which is named as the input pad. The input pad will have Raspberry Pi and a power bank to power it, and the visible peripherals will be LCD, biometric sensor and Pi Camera. Initially the students will have to register themselves in the system. Their identification card (id-card) will have a smart tag which will have a unique code in the database. The unique code will be linked with the fingerprint and facial recognition data in the database.
In the first step the student will have to swap his id-card in front of the RFID sensor. Once the card is swapped then only the student can give his attendance by his facial features or by fingerprint. After the system is activated, student can give his attendance. If the fingerprint or facial features matches the data in database, LCD will display, “ACCEPTED” or else “TRY AGAIN”. In case of repeated failures in accepting the attendance, the display will showcase, “REGISTER YOUR SELF”.

Reason behind adding two biometric parameters for attendance, is, if a student has injured his finger by which he gives his attendance or because of environment if he has moist fingers. He can give his attendance by his facial features. Similarly, is a student has been injured or because of some intolerable reasons, he can showcase his face for attendance, he can give his attendance by his fingers.

After sensing id-card, the system will give output on OR logic of biometric sensor and Pi camera.

Table 1: Logics for Attendance

Sr. No	*Fingerprint sensor*	*Pi Camera*	*Attendance*
1.	0	0	Absent
2.	0	1	Present
3.	1	0	Present
4.	1	1	Present

5. System Flow

- Taking fingerprint data from fingerprint sensor and facial features data from Pi camera and storing it in relevant id-card.
- For attendance, swap of id-card for proceeding to next step.
- Giving attendance by fingerprint.
- If it fails or is not possible then trying by facial features.
- After attendance is marked, for next student again swap of id-card is necessary to let the system know it is a new entry.

Figure 6: System Flow

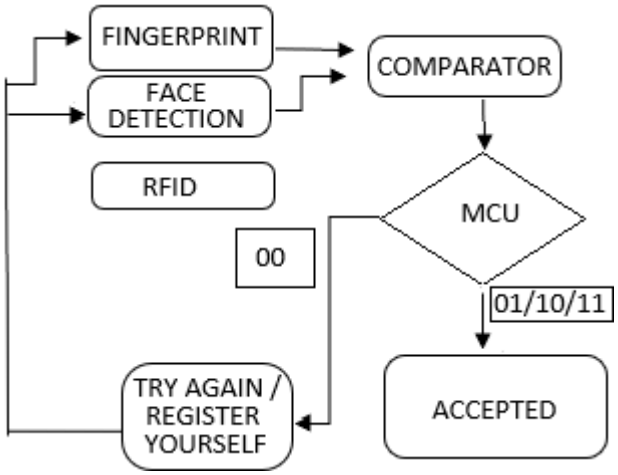

Figure 7: Flow Diagram

6. Conclusion

After applying the system we can analyze the work load of a teacher will be highly reduced. In addition to it the system will be highly efficient and will be deterrent from proxy attendance.

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