

Wireless Student Attendance System using Fingerprint Sensor

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ABSTRACT

Nowadays accurate personal identification is becoming more and more important. Usual means (smart cards, passwords...) have shown their limits. Currently fingerprint recognition is the most widely used technique for personal identification. The development of an attendance management system using biometrics is proposed. As the manual method of attendance system produced errors and taking lot of time during lecture period, an efficient and organized biometrics system for students' attendance is purposed. The electronic system not only used to take attendance for the students, but a database is also mentioned to store all the information which can be manipulated further in future. Optical fingerprint sensor will make adding fingerprint detection and verification super simple. This type of verification is widely used in various aspects of life for different purposes, like in security, police identification, etc. Node MCU is used which provides the wireless communication. It also send the attendance report to PC. In this system, there are two parts, one is transmitter and another is receiver. In transmitter module, there is a Liquid Crystal Display (LCD), Arduino UNO, transmitter. In receiver module, Node MCU is mainly used. The resultant message will show on LCD.

KEYWORDS: Arduino UNO, Node MCU, Fingerprint Sensor, LCD

I. INTRODUCTION

Biometric technology uniquely identifies an individual based on certain characteristics which can be physiological or behavioural. These techniques use data that is unique to the individual and remains so throughout one's lifetime. Fingerprints are emerging as the most popular biometrics technology due to its uniqueness, stability, permanence and ease of acquisition. Presently in most of the educational institutes, the attendance of students is taken by conventional method in which teacher calls the name of student and marks his attendance in a register. There are various disadvantages to this approach such as paper based attendance registers are not uploaded to any centralized system therefore the data is not available for analysis, effective lecture time gets affected due to the time taken for data collection and the system can also be cheated by students (buddy students might sign on behalf of absent students).

Biometrics technology can solve these problems and proposed fingerprint based attendance system would be ideal for implementation in universities for identification and also by organizations for attendance monitoring of their employees. Proposed system is designed using Arduino UNO and optical fingerprint acquisition module. Finger prints are unique in nature, it gives attendance for only those who are gave fingerprint while attendance time. Wi-Fi module is used for immediate data transfer to the backend server. A data, which is the student ID is sent to the microcontroller will be decoded using Wi-Fi Module to the access point. The

attendance data in the database is used to create many types of reports like specific day attendance, current day attendance, monthly attendance, weekly attendance, complete attendance and real time.

II. LITERATURE REVIEW

With the help of previously implemented systems, we came across various methods of attendance management system. some of the methods are mentioned in the below literature survey.

Student Attendance by, Nadar Prince, Abhishek Sengupta, Ms. Keerthi Unni [3] presented Implementation of IoT Based Attendance System on a Dedicated Web-Server. In this paper the concept of Internet of Things (IoT) is applied to the basic attendance system in a class room. The student verification is done using R-305 Finger Print module. The student data is fed already in the finger print module. Once successful recognition of finger print pattern is done, the student's attendance is ready to be pushed to the web-server. This data is sent through the serial interface to the Arduino .A combination of the student ID, teacher ID and device ID is sent to the web-server using Wi-Fi Module esp8266-01. And the MySQL database is updated.

Ms. Manjiri Pathak, Divya Prajapati, Vidya Prajapati, Bipin Nair, Swapnil Deo, 2017[4] proposed Wireless Fingerprint Attendance Management System . In this paper the basic concept of attendance using biometric authentication is

used. This paper uses the methodology of wireless transmission of data using ZigBee model and ARM7 LPC2148 which is the major component part of the project. The transmission of the data to the end server using ZigBee module from all the other techniques is efficient because it has low power consumption. Considering the network topology of the ZigBee network it uses wireless local area network which is a cluster tree network. To resolve the problem of time delay when the image is transmitted by ZigBee technology, the traditional transmission mode is improved.

Attendance technique by Riya Lodha,, Suruchi Gupta, Harshil Jain, Harish Narula 'Bluetooth Smart Based Attendance Management System [5]. In this paper we come across the concept of Bluetooth smart chip which is controlling most of the android application. The RFID scanner is used to scan the electronic tags provided to the students. A Bluetooth Smart chip is programmed and configured such that it works in connection with the Android application via Bluetooth. Every student is given a specific tag, which can then be detected by the application via Bluetooth Low Energy. When he/she attends the lecture, a serial number (related to each student's SAP number) of the tag is associated with the student database entry. Therefore, every time a student carries his/her card and is attending the lecture the entries will be entered into the database with the time stamp as the lecturer moves around the class and the application detects the tags. Also, the application is configured to detect tags only within a particular range in order to avoid detection of tags that are outside the class. Since the Bluetooth spectrum range works in (the 2.400 GHz-2.4835 GHz ISM band).

Biometric attendance system technique was proposed by Dhiman kumar sarkar, Nafize Ishtiaque Hussain, insane Arafat Jamil, [6] which is Design and Implementation of Smart Attendance Management System using multistep Authentication System. This research papers implements the attendance system using Arduino Mega 2560, RFID and biometrics that is finger print scanner. This system makes use of all the system including RFID and also biometrics. This research paper looks over all the possibilities if any one of the system fails. Here the implementation takes place using arduino Mega 2560 which is interfaced with the fingerprint scanner and the RFID. For display of the authentication process 16*16 LCD screen is used which is interfaced with the keypad for the output.

III. OVERVIEW OF PROPOSED SYSTEM

System block diagram is shown in Fig.1

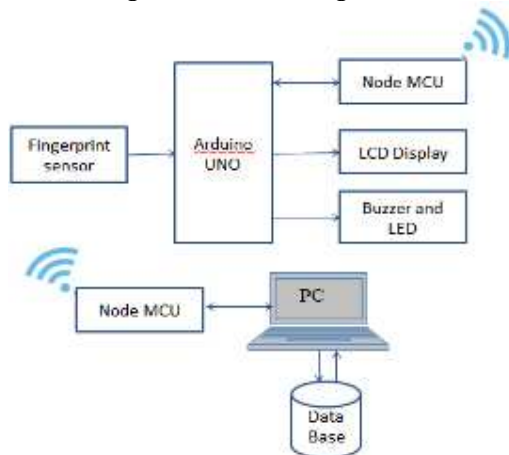


Figure 1. Block diagram of the System

This system is designed to an automated marking and updating of an attendance in the database of computer. Student's fingerprints are stored in the fingerprint module. Node MCU is used for serial communication to the main computer. The stored data can be viewed easily for future usage. This system more secured than traditional attendance system.

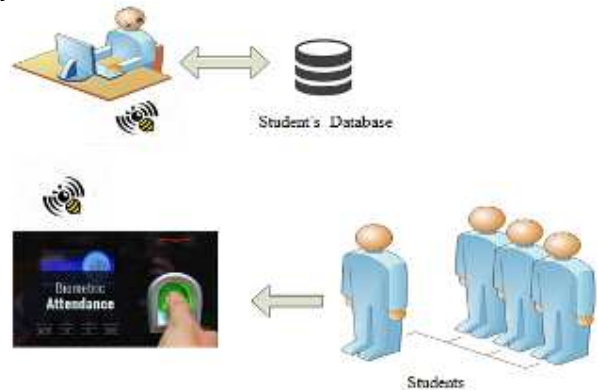


Figure2. Architecture of Proposed System

Fig.2 represented student press their thumb on fingerprint sensor in the entry of their class. When they pressed, their ids are sent to school office and record their attendance. Admin can check easily student's roll-call percentage.

IV. HARDWARE AND SOFTWARE DESCRIPTION

A. Fingerprint Sensor (AS608)

Optical fingerprint sensor will make adding fingerprint detection and verification super simple. These modules are typically used in safes - there's a high powered DSP chip that does the image rendering, calculation, feature-finding and searching. Connect to any microcontroller or system with TTL serial, and send packets of data to take photos, detect prints, hash and search. You can also enroll new fingers directly- up to 162 finger prints can be stored in the onboard FLASH memory. There's a red LED in the lens that lights up during a photo so you know its working. We like this particular sensor because not only is it easy to use, it also comes with fairly straight-forward Windows software that makes testing the module simple - you can even enroll using the software and see an image of the fingerprint on your computer screen.

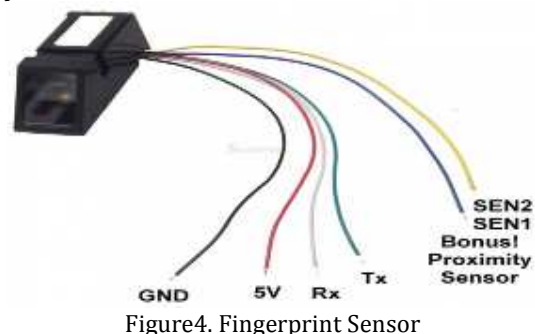


Figure4. Fingerprint Sensor

B. Arduino UNO

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino. cc . The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be

powered by a USB cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform. The ATmega328 on the Arduino Uno comes preprogrammed with a bootloader that allows uploading new code to it without the use of an external hardware programmer.



Figure 5.Arduino UNO

C. Node MCU

ESP8266 is a low-cost, WiFi Module chip that can be configured to connect to the Internet for Internet of Things (IoT) and similar Technology Projects. Basically, your normal Electrical and Mechanical equipments cannot connect to the Internet on their own. They don't have the in-built setup to do so. You can setup ESP8266 with these equipments and do amazing stuff. Controlling, Monitoring, Analysis and much more. Node MCU is a Firmware on ESP8266. Its basically an SoC (System on Chip)A System on a Chip or System on Chip (SoC) is an integrated circuit that integrates all components of a computer or other electronic systems.



Figure6. Node MCU

D. LCD

Lcd stands for liquid crystal display. Character and graphical lcd's are most common among hobbyist and diy electronic circuit/project makers. Since their interface serial/parallel pins are defined so its easy to interface them with many microcontrollers. Many products we see in our daily life have lcd's with them. They are used to show status of the product or provide interface for inputting or selecting some process. Washing machine, microwave, air conditioners and mat cleaners are few examples of products that have character or graphical lcd's installed in them.

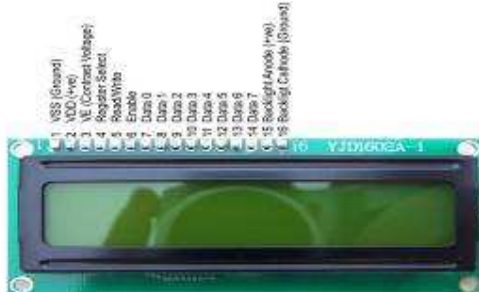


Figure7. Liquid Crystal Display (LCD)

E. Buzzer

A buzzer is a device which makes a buzzing or beeping noise. There are several kinds; the most basic is a piezoelectric buzzer, which is just a flat piece of piezoelectric material with two electrodes. This type of buzzer requires some kind of oscillator (or something more complicated like a microcontroller) to drive it—if you apply a DC voltage you will just get a click. They are used in places where you need something that emits an audible tone, but don't care about high-fidelity sound reproduction, like microwave ovens, smoke alarms, and electronic toys. They are cheap and can be very loud without using very much power. They are also very thin, so they can be used in flat objects like “singing” greeting cards.



Figure7. Buzzer

F. Software Description

In this system, Arduino IDE, Microsoft Access Database and Visual Basic are used. Microsoft Access is a database management system (DBMS). Microsoft Access stores data in its own format based on the Access Jet Database Engine. Microsoft Visual Basic is a free development tool that can help in designing and programming simple or complex applications. It has a nice, good interface to be desired and is optimized to work quickly. Codes easily added either by directly writing or by using a GUI.

V. TESTS AND RESULT

This design combines the arduino UNO with the fingerprint module, display, and communication interfaces. Students are required to place their fingerprint. After the enrollment stage, the data will be saved in the fingerprint scanner and the verification system takes place by comparing the captured fingerprint characteristic with the previously enrolled data. LCD displays the status and details of each student during the enrollment and attendance marking process.

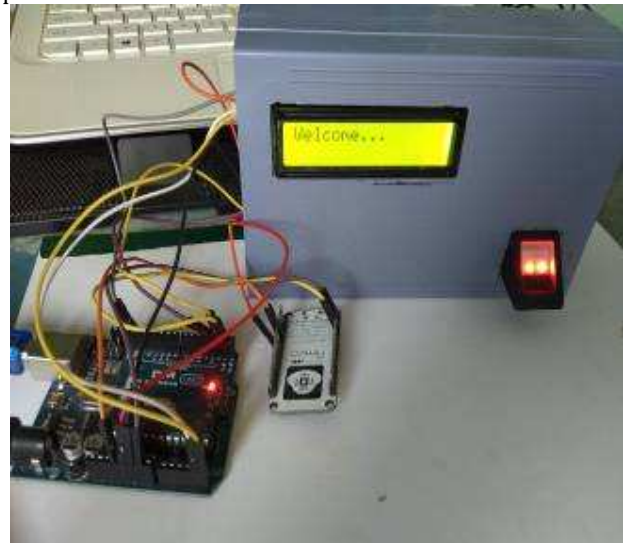


Figure8. Testing of Fingerprint Sensor, LCD and Node MCU

Fig.9, two Li-ion batteries having typical voltage of 3.7V is connected in series, so that together they produce more than 7.4V. A 5V back converter is used to convert this voltage to 5V. The supply is controlled by a power ON switch and the power status would be notified by a LED. LEDs is used to monitor battery voltage. This circuit conserves the power by turning ON it only when required. Then the battery voltage is fed to the Arduino UNO through a internal ADC and is processed to monitor battery critical functions. The device is using two 1.4Ah Li-ion batteries for power. This converter will read the charge from battery whenever it is necessary thus saves the charge being drained out.[2]

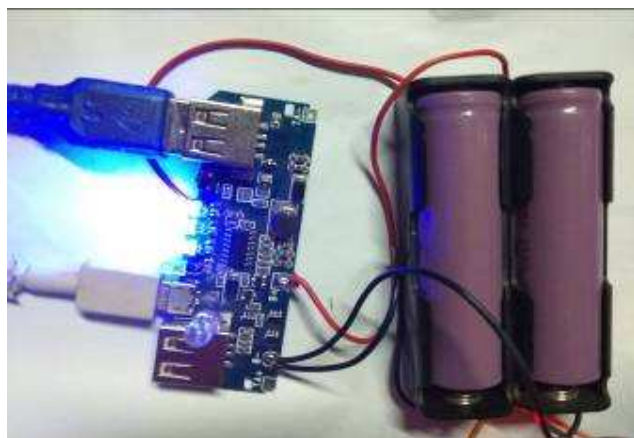


Figure9. Battery Charge For Power Supply

Fig.10 represented the admin can control the student registration. The stored data can be viewed easily for future usage.



Figure.10. Admin Screen

Microsoft Access is a database management system (DBMS) from Microsoft that combines the relation with a graphical user interface and software-development tools. Fig.10 represented the student's data can be registered into the database file via the GUI. It can also import or link directly to data stored in other applications and databases. Visual objects used in forms and reports expose their methods and properties in the VBA programming environment, and VBA code modules may declare and call Windows operating system operations.

Roll-No	Name	City	Phone-No	DOB	Click to Add
1	Phyu Mar Kyu	Mandalay	9971253674	2/2/1992	
2	Htet Htet Shin	Chaung Oo	9398450834	5/25/1994	
3	Yu Maw Win	Monywa	9976536237	3/22/1995	
4	mmm	Monywa	9795103212	3/30/1995	
5	Phyo Ko Ko Oo	Kyaukse	9400074760	2/11/1995	
6	Nay Yi	Yangon	9975072192	1/22/1995	
7	Zin Mi Mi Ko	Sagaing	9691638673	12/11/1995	
8	Yamin Nyein	Pyin Oo Lwin	9978231003	3/22/1995	
9	Nilar Soe	Mandalay	9694006664	5/18/1995	
10	Kywat Kay Thw	Mandalay	9691638673	2/25/1995	
*	0		0		

Figure 11.Student's Data Record

Fig.12 shows the testing Node MCU for serial communication needed to transfer the student's ID from fingerprint sensor to the main computer.



Figure12. Testing for serial communication

Fig.13 shows the table of the student's roll call marked. It can be used to import a list of students to the application and this data can be transferred to the device through USB. Visual Basic uses Microsoft's Excel interface class to interface with Microsoft Excel. It can read Excel file and can create new workbook without opening Microsoft Excel application. Using Visual Basic, the software can read cell by cell details and write new data into it.

Figure 13.Table of the Student Attendance Record

VI. CONCLUSION

In this work, a secure, fast, reliable and an efficient fingerprint sensor and Android based attendance system have been developed by replacing a manual and unreliable system. The fingerprint sensor captured new fingerprint images to be stored in the database and compared them with those stored already in the database successfully. After comparison, if the record already exists present in the database, then a confirmation message displayed on the LCD. Finally, a database has been maintained and individual record can be checked by using GUI. The stored data can be viewed easily for future usage. This system more secured than traditional attendance system.

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REFERENCES

- [1] D.Narendharsingh¹, Anusha Reddy² and Dr.Sharma Sudhir Kumar, "IOT Based Wireless Attendance Management System Using Finger Print Recognition", presented by International Journal of Latest Trends in Engineering and Technology <http://dx.doi.org/10.21172/1.73.554> e-ISSN:2278-621X
- [2] "Fingerprint Attendance System for Classroom Needs", Mohamed Basheer K P Dept. of Electronics and
- [3] Nadar Prince, Abhishek Sengupta, Ms.Keerthi Unni, "Implementation of IoT Based Attendance System on a Dedicated Web-Server", International Journal of Scientific & Engineering Research, Volume 7, Issue 6, June-2016.
- [4] "Wireless Fingerprint Attendance Management System" presented by Ms. Manjiri Pathak¹, Divya Prajapati², Vidya Prajapati³, Bipin Nair⁴, Swapnil Deo⁵ 1Guide, 2,3,4,5 Author's, Computer Engineering, 1,2,3,4,5 Padmabhushan Vasantdada Patil Pratishthan's College of Engineering, Mumbai, India
- [5] Riya Lodhaa, Suruchi Guptaa, Harshil Jaina, Harish Narulaa *ad. J.*, "Bluetooth Smart based Attendance Management System" presented from Sanghvi College of Engineering, Mumbai-400014, India
- [6] "Design and Implementation of Smart Attendance Management System Using Multiple Step Authentications", See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/312154410>
- [7] Kaliprasanna Swain*, M.V.S.V Prasad, Anwasha Dash, "Android Based Fingerprint Sensor Attendance System" presented from *123 Electronics and Communication Engineering, GITA, Bhubaneswar, India

