

Attendance System Using Android integrated Biometric Fingerprint Recognition

Parul Wadhwa

Assistant Professor, Dept. of E.C.E., New Horizon College of Engineering
Bangalore, India

ABSTRACT- The register based conventional attendance system for students in institutions is time consuming and a laborious task for teachers so we have developed and deployed an intelligent system based on fingerprint scanner to replace the traditional attendance system which can acquire, and store and check the fingerprints of students and export the data in the form of their attendance record to a centralized database which is used by an Android Application developed which helps the administration and the students to view their attendance in real time and the entire system is cheap and reliable.

Keywords—component; Android; Biometric Fingerprint; Intelligent System; Authentication.

I. INTRODUCTION

Biometrics is a method of identifying a person based on physiological characteristics. Biometric data are discrete and unique like odor, fingerprints, iris, retinal, voice and face geometry [1]. Biometric templates cannot be reverse engineered or duplicated to access personal information. Today, the important biometric characteristics of human body like fingerprint or iris is one of the best and sophisticated methods to identify and verify a particular person. Fingerprint scanner is one of the finest discoveries of science and bioelectronics. In our hand, ten fingers have ten fingerprints different from each other. Because of its uniqueness fingerprints is playing a vital role in modern biometrics Technologies. A fingerprint scanner acquires an image of the prints from the fingertip and cross checks it with the image previously saved. A fingerprint is made of a series of 'ridges' and 'valleys' on the surface of the finger. It compares these patterns of 'ridges' and 'valleys'. If the two patterns matches, then access is established. The fingerprint scanners are mainly optical scanners. It is also a charge coupled device (CCD), along with a camera. The CCD takes the image of the fingerprint and generates an inverted image by reflecting the light from the ridges. The scanner compares some specific areas of fingerprints called "minutiae". The scanner stores some series of minutiae for checking and investigating. So it is virtually impossible to replicate fingerprints with these details available. Fingerprint scanners are more secure methods than any other methods in verification or identification. We have proposed an attendance system with fingerprint scanner. But the process is bit complex. We have tried to overcome complexity by making our system simpler. We have also proposed another attendance system with fingerprint scanner. But here, the data must be transferred to computer in order to update the database. But in our system, the database is automatically updated and written on memory module. We have proposed another system where the attendance system stores data on a centralized database and an Android application developed can use this source to display Attendance related queries.

II. METHODOLOGY

The Fingerprint Recognition Sensor scans the finger tips and extracts the fingerprint and it' is processed with an Advanced Digital Image a Processor. Each ID is associated with a fingerprint and stored in a database. The Arduino Mega coordinates with the sensor to perform this enrollment operation Next stage the attendance is calculated when the enrolled user places his finger on the sensor. This attendance is now updated in the database. The 16X2 LCD interfaced to the Arduino Mega display if the User's Fingerprint was Identified successfully and displays a message saying "User_ID Is Found" & "User_ID Is Present ".The dedicated Android Application now captures this data in real time from the database and uploads it to the application and helps the user track the attendance.

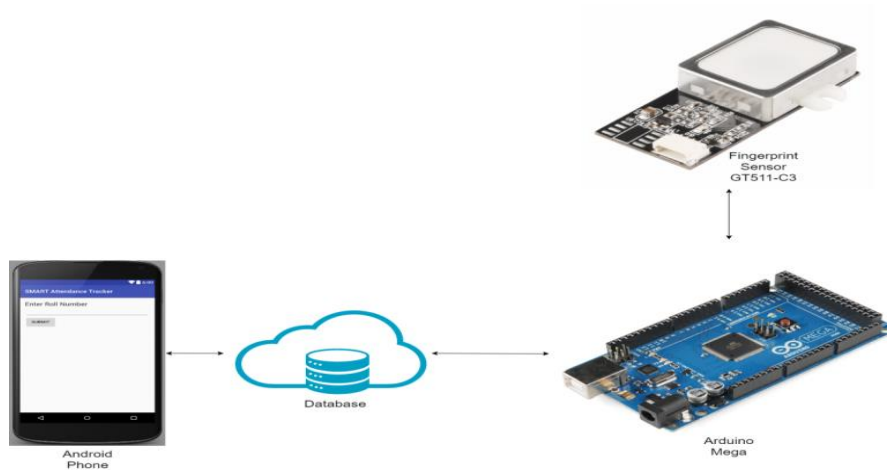


Fig.1 The Integrated System

III. PROPOSED SYSTEM

We have proposed a fingerprint based Attendance System. The system is designed to store user’s fingerprints, User ID and their Attendance data during student enrolment to the institution. The student can now use his/her finger on the Fingerprint scanner to mark himself “Present” in the class and immediately his attendance will be stored in the Database. If the Subject wishes to check the status or any information about his Attendance, he/she can use the Dedicated “Android Application” developed for the Fingerprint Based Attendance system and see his Attendance status in Real-time. The Fingerprint Recognition Sensor scans the finger tips and extracts the fingerprint and it is processed with an Advanced Digital Image Processor. Each ID is associated with a fingerprint and stored in a database. The Arduino Mega coordinates with the sensor to perform this enrolment operation. In the next stage the attendance is calculated when the enrolled user places his finger on the sensor. This attendance is now updated in the database. The 16X2 LCD interfaced to the Arduino Mega displays if the User’s Fingerprint was Identified successfully and displays a message saying "User_ID Is Found" & "User_ID Is Present ". The dedicated Android Application now captures this data in real time from the database and uploads it to the application and helps the user track the attendance.

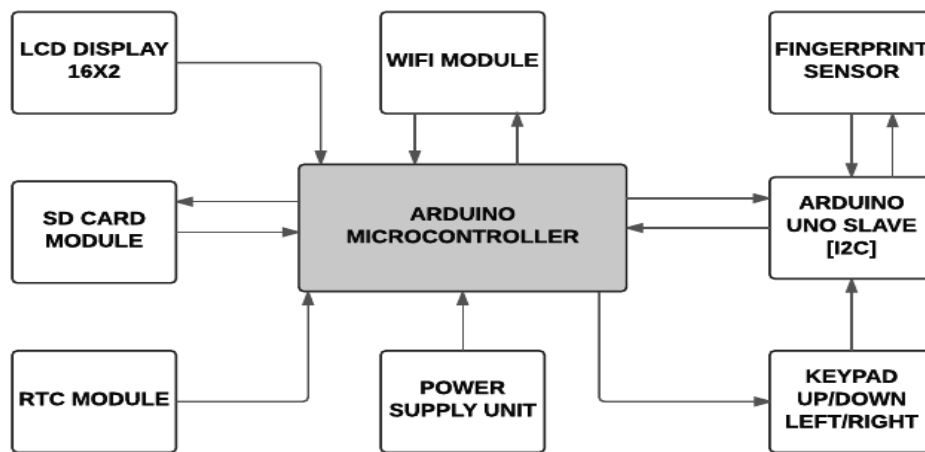


Fig.2 Block diagram of the arduino interfaces

IV. ANDROID INTEGRATION

In the smartphone industry, Android is one of the leaders. Hence to make the database accessible to smartphone users, we decided to design our application for Android. The Android application lets anyone access the attendance data when they enter the roll number of the student. This not only simplifies it for the students but also for the parents/guardians who want to keep an eye on their child’s attendance. The Android application is connected to the Arduino on one side and to the database on the other. When valid fingerprint is entered, the Arduino increments the attendance of the student in the online database. The Android application has permissions to only read the data in the database. This prevents students from modifying the database.

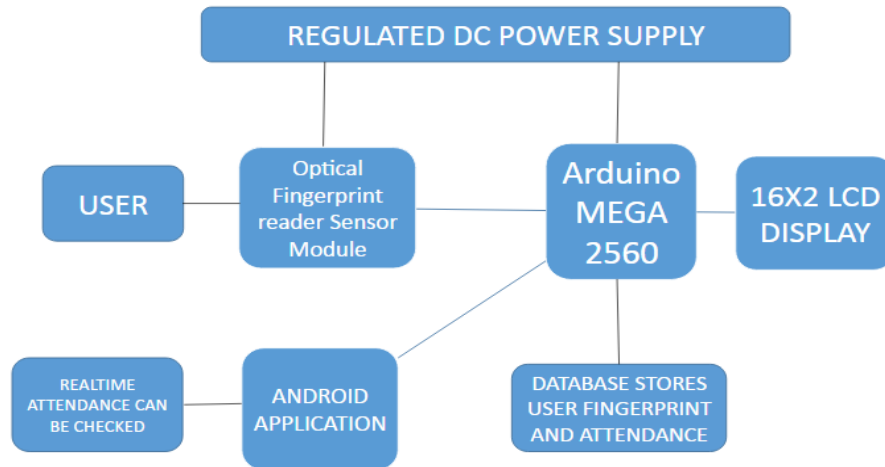


Fig. 3 Integration of arduino with android

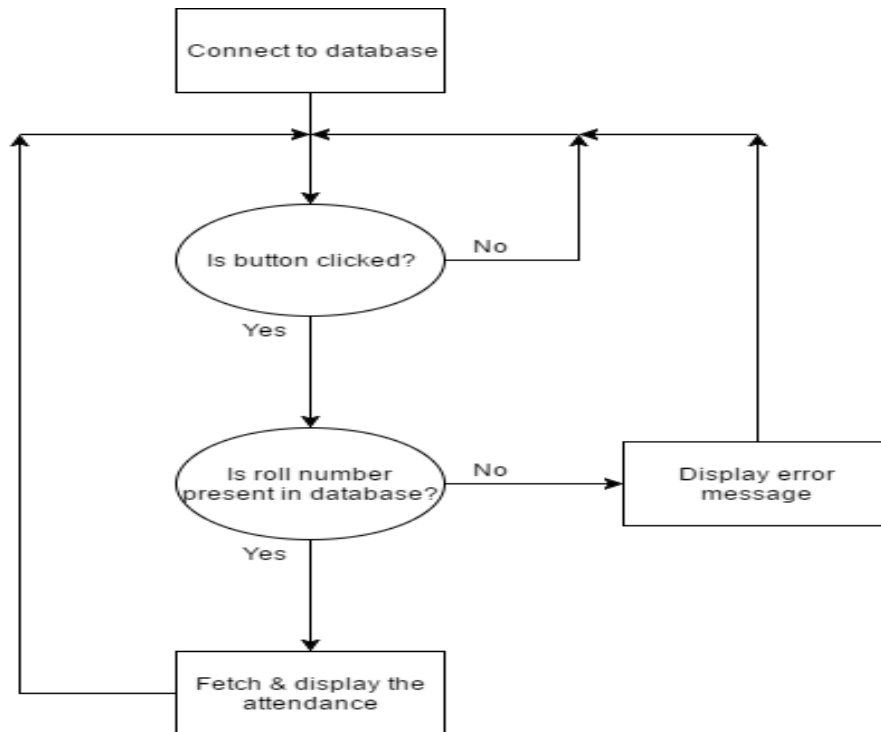


Fig. 4 Flowchart of the android operation

V. RESULT AND ANALYSIS

The system that has been designed, implemented and has been tested on 5 students and 1 Teacher. The students and teachers were properly identified and their attendance has been updated successfully. This module is Accurate and Reliable, Matching of fingerprints is about 100% but Errors have been detected regarding Enrolling Fingerprints. #1 Fingerprints could not be enrolled due to some accident by placing finger at wrong places. #2, Secondly, fingerprint failed to capture due to Bad skin or rough skin. This is about 3% error during testing of 5 students. During Enrollment there was about 5% error while capturing the fingerprints.

VI. FUTURE WORK

Current model focuses its efforts on wirelessly transmitting the attendance database for checking via Android app. In future we could add multiple subjects and also change the students for each class. We can also add multimodal biometric detection by including Iris Recognition.

VII. CONCLUSION

Biometrics has been used at workplaces and many other areas for over a decade for attendance management. Despite its widespread adoption in these areas, there it hasn't been adopted in various areas due to several misconceptions on security. These concerns no longer persist once the historical proof of biometrics is noticed. Biometrics enables us to quickly authenticate our identity without the need of having to remember passwords or carry any form of identity proof. This is thanks to the unique fingerprint each human possesses. We can audit the attendance of students in real time using our proposed system. Through years of iterations it was noticed that when properly deployed, Biometrics are an effective tool to track attendance in a secure and quick manner. This system offers a cheap yet reliable and efficient solution to the conventional attendance tracking systems.

REFERENCES

BOOKS:

- [1] Mr. Sanjay Kumar, Dr. Ekta Walia, "Analysis of various Biometric Techniques," International Journal of Computer Science and Information Technologies, vol. 2(4), 2011.
- [2] Henry C. Lee, Robert Ramotowski, R. E. Gaensslen, *Advances in Fingerprint Technology*, 2nd ed., CRC Press, 2001, pp.286-287.
- [3] Norshidah Katiran, Helmy Abdul Wahab, and Jamal Rasyid Abdul Rahman, "Development of Attendance System using Biometric Fingerprint Identification," 3rd Engineering Conference on Advancement in Mechanical and Manufacturing for Sustainable Environment, April 14-16, 2010.
- [4] Gunjan Talaviya, Rahul Ramteke, A.K.Shete, "Wireless Fingerprint Based College Attendance System Using Zigbee Technology," International Journal of Engineering and Advanced Technology, Volume-2, Issue-3, February 2013.
- [5] Michael H. Indico, Luisa M. Lanciso, Ana L. Vargas, "Mobile Monitoring and Inquiry System Using Fingerprint Biometrics and SMS Technology," International Journal of Scientific and Research Publications, Volume 4, Issue 1, January 2014.
- [6] ADH Technology Co. Ltd "3D TouchPrint® Optical Fingerprint Recognition EMBEDDED Module GT-511C3," V1.1, 2013
- [7] Dogan Ibrahim, *SD Card Projects Using the PIC Microcontroller*, Elsevier Ltd, 2010, pp 114-135.
- [8] ATMEL, "ATmega640/V-1280/V-1281/V-2560/V-2561/V [DATASHEET]" 2014, pp3-9.
- [9] Muhammad Ali Mazidi, Sarmad Naimi, Sepehr Naimi, *The AVR Microcontroller and Embedded system using Assembly and C*, 2nd ed., Pearson Education, 2011, pp 419-428, 429-451, 609-612.
- [10] Martin Drahansky, Michal Dolezel, Jaroslav Urbanek, Eva Brezinova, and Tai-hoon Kim, "Influence of Skin Diseases on Fingerprint Recognition" *Journal of Biomedicine and Biotechnology*, May 10, 2012
- [11] Leon Adams, "Choosing the Right Architecture for Real-Time Signal Processing Designs", White Paper, SPRA879 - November 2002.

- [12] Chang Ning, "The Implementation of Fingerprint Identification Preprocessing Algorithm on DSP", International Conference on Intelligent Computation Technology and Automation, 2010.
- [13] Tsai-Yang Jea, "Minutiae-Based Partial Fingerprint Recognition, Ph.D. thesis", 2005, State University of New York at Buffalo.
- [14] Lin Hong, "Automatic Personal Identification Using Fingerprints", Ph.D. Thesis, 1998, Department of Computer Science, Michigan State University.
- [15] Salil Prabhakar, "Fingerprint Classification and Matching Using a Filter bank", Ph.D.thesis, (2001), Department of Computer Science and Engineering, Michigan State University.
- [16] Salil Prabhakar, "Fingerprint Classification and Matching Using a Filter bank", Ph.D.thesis, (2001), Department of Computer Science and Engineering, Michigan State University.
- [17] Yongqiang Zhang and Ji Liu, "Wireless Fingerprint Attendance Management System", Proceedings of the 2007 WSEAS International Conference on Computer Engineering and Applications, Gold Coast, Australia, January 17- 19,2007.