# A Fingerprint based Attendance Management System using GSM

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***Abstract*---In today's world regularity of student attendance is concerned in the administration of Educational Institutions. Overall academic performance is affected by the student's attendance because poor attendance leads students in detention list. Student's attendances are taken manually by using attendance sheet given by the faculty members in the classroom, which is a time consuming event. Furthermore, it is very difficult to verify one by one student in a large classroom whether the authenticated students are responding or not[1].The proposed system describes a method for Student's Attendance System which will integrate with the fingerprint technology. This paper proposes the system in that various fingerprints of students will be getted through the fingerprint module. The fingerprints will be mapped against the data set for authentication of student attendance. The student whose fingerprint matches the most with the data set is marked present for the particular lecture. As well as this paper demonstrates how fingerprint recognisation can be used for an efficient attendance system to automatically record the presence of an enrolled individual within the respective venue. Also it maintains a log file to keep records of the entry of every individual with respect to subjects and also generate a report of attendance. This paper also provides the design method of fingerprint based student attendance with help of GSM. This system ignores the requirement for stationary materials and personnel for keeping of records.**

***Keywords*---Fingerprint detection, Fingerprint recognition,GSM.**

## 1. INTRODUCTION

Fingerprint identification is one of the most crucial building blocks for smart interactions. Amongst the identification methods, fingerprint recognition is identified to be the most natural ones, that uses to identify people in day by day lives. Although other methods, such as magnetic cards , can provide enhanced performance, those are not appropriate for natural smart interactions due to their intrusive nature. In comparison, fingerprint recognition provides passive identification that is the person to be identified does not need to cooperate or take any specific action .Attendance record plays a important role in the academic achievement of institute students.

Attendances of every students are being maintained by every school, college and university. Attendance Management Falls into two categories Namely: Conventional and Automated Methods.The manual attendance record system is not efficient and requires more time to arrange record and to calculate the average attendance of each student. Hence there is a requisite of a system that will solve the problem of student record arrangement and student average attendance calculation. Faculty has to maintain proper record for the attendance. The major problems faced by organizations are time consuming in manual. Basically this do research is aimed for implementing a system that is capable of identifying the employees in an organization, students in institute marking their attendance. As a result fingerprint recognition is used to mark the attendance of the employees as well as student. This system provides flexibility optimizing the attendance of the students and the employees at the same time separately, rather than identifying one by one and the absentees details are sent as SMS to the higher authorities using GSM modem. The proposed system will store the absent and present student's attendance details in electronic format so that management of attendance becomes effortless.

The Fingerprint authentication has many advantages such as very high accuracy, the most economical biometric PC user authentication technique [2]. It is one of the safest biometric authentication methods widely used. It is very easy to use. Small storage space required for the biometric template, reducing the size of the database memory required and it is standardized.

## 2. PREVIOUS TECHNOLOGIES

### *2.1 Facial recognition*

A facial recognition system is a computer application for automatically identifying or verifying a person from a digital image or a video frame from a video source. One of the ways to do this is by comparing selectedfacial features from the image and a facial database.face recognition are from biometric authentication; surveillance to video database indexing and searching.component-based face recognition.systems using Support Vector Machines (SVM).[3]

***Advantages***

a. Non intrusive
b. Cheap technology.

***Disadvantages***

a.2D recognition is affected by changes in lighting, the person's hair, the age, and if the person wear glasses.
b. Requires camera equipment for user identification; thus, it is not likely to become popular until most PCs include cameras as standard equipment.

### *2.2 Speech recognition*

Speech recognition is the inter-disciplinary sub-field of computational linguistics which incorporates knowledge and research in the linguistics, computer science, and electrical engineering fields to develop methodologies and technologies that enables the recognition and translation of spoken language into text.Speech recognition systems is usually evaluated in terms of accuracy and speed Speech recognition machine is a very complex problem analyzes the person's specific voice and uses it to fine-tune the recognition of that person's speech, resulting in increased accuracy [4].

***Advantages***

a. Non intrusive. High social acceptability.
b. Verification time is about five seconds.

***Disadvantages***

a.A person's voice can be easily recorded and used for unauthorised PC or network.
b.Low accuracy.
c.An illness such as a cold can change a person's voice, making absolute identification difficult or impossible.

### *2.3 Signature recognition*

Signature is one of the most popular biometrics used for authentication. There are different techniques through which one can classify the signature as true or forged .The human signatures can be handled as an image and recognized using computervision and neural network techniques.signatures are verified based on parameters extracted fromthe signature using various image processing techniques[5].

***Advantages***

a. Non intrusive.
b. Little time of verification .

***Disadvantages***

a. Signature verification is designed to verify subjects based on the traits of their unique signature. As a result, individuals who do not sign their names in a consistent manner may have difficulty enrolling and verifying in signature verification.

### *2.4 Iris recognition*

Iris recognition, a relatively new biometric technology Iris recognition is proving to be one of the most reliable biometric traits for personal identification. In fact, iris patterns have stable, invariant and distinctive features for personal identification. Application of such system includes computer system security, secure electronic banking, authentications.mobile phones and credit card Iris based security applications thrive on infraredcameras and video cameras for logins and transaction authentications[6].

***Advantages***

a. Very high accuracy.
b. Verification time is generally less than 5 seconds.
c. The eye from a dead person would deteriorate too fast to be useful, so no extra precautions have to been taken with retinal scans to be sure the user is a living human being.

***Disadvantages***

a. Intrusive.
b. A lot of memory for the data to be stored.
c. Very expensive

### *2.5 Fingerprint recognisation*

Fingerprint authentication refers to the automated method of verifying a match between two human fingerprints. Fingerprints are one of many forms of biometrics used to identify individuals and verify their identity[1],[7].

***Advantages***

a. Very high accuracy.
b. Is the most economical biometric PC user authentication technique.
c. it is one of the most developed biometrics
d. Easy to use.
e. Small storage space required for the biometric template, reducing the size of the database memory required

***Disadvantages***

a. For some people it is very intrusive, because is still related to criminal identification.
b. It can make mistakes with the dryness or dirty of the finger's skin, as well as with the age (is not appropriate with children, because the size of their fingerprint changes quickly).

## 3. COMPUTERIZED ATTENDANCE SYSTEM

This system is going to enhance productivity, compact payroll error and also compact payroll inflation, compact overtime, retirement of legacy systems, Eradication of paper costs, and which can offer all the reports which is demanded. In this system, teacher staff has to take attendance manually, only these records have to be entered into the computerized system. In this also, the problem of data entry inaccuracy may occur.
The attendance registration is done by click a check box next to the name of the students that are present, and then a mark their presence. But in this also, human contribution for attendance tracking is needed.

## 4. BIOMETRIC BASED ATTENDANCE SYSTEM

Managing student attendance during lecture periods has become a difficult challenge. The capability to compute the attendance percentage becomes a major task as manual computation produces wrong results, and also wastes a lot of time. For the stated reason, an attendance management system using biometrics is designed. This system takes attendance automatically with the help of a finger print device and the attendance of the particular student is marked in a database. Attendance of student is marked after student identification. For attendance, the student places his/ her finger over the fingerprint device that makes them ideal for personal identification. A fingerprint is made of a series of ridges and furrows on the surface of the finger. The uniqueness of a fingerprint is de- termined by the pattern of ridges and furrows as well as the minutiae points. Minutiae points are local ridge characteris- tics that occur when a ridge splits apart or a ridge ends. The student's matriculation number is sent to the database as having attended that particular lecture. At the last part of the semester, reports are generate to specify the students that are eligible for exams and percentage of times the student attended lecture. A simple architecture is shown below Fig 1

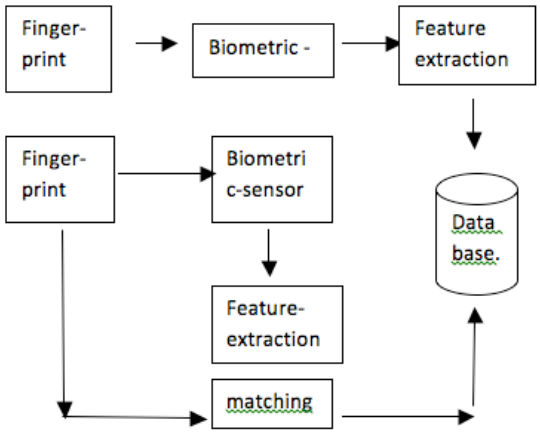


FIG.1 Architecture of Biometric (Fingerprint) Based Attendance system

## 5. GENERAL BLOCK DIAGRAM

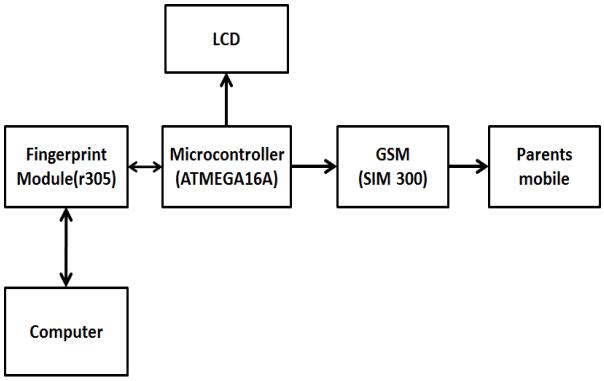


Fig 2 General block diagram

## 6. BLOCK DIAGRAM EXPLANATION

The finger prints from the various users are acquittedusing the fingerprint module. For example we are taking the samples of three or four fingerprints and they are enhanced using several enhancement techniques [8]. After that we detect the edges along the image using the edge detection function. Here we use the prewitt operator for the detecting the edges. We use minutiae matching algorithm for matching the finger print images. Instead of doing all these image processing works, we had used Fingerprint Module (R305) in t his paper. The circuit is made to be switched ON and all the initialization processes are done.The "Initialization done" message has to be displayed in the screen.Up to that user should not keep any fingerprints for scanning.After that "Show the Finger" will be displayed on the screen. The fingerprint that has to be compared is already stored in the memory of fingerprint module.The fingerprint module is capable of storing about 100 images in the inbuilt memory.Now the fingerprints are kept for scanning with in a stipulated time period.Fingerprint module started to compare the results and it gives the hex codes to the microcontroller for further operations.The microcontroller starts to send the control to GSM based on the results from the finger print module. But the microcontroller has only one transmitter pin in it.We have to communicate both of the GSM and fingerprint module but not at a time.For that we are using Relay for switching between the GSM and fingerprint module.There are also commands for holding the fingerprints and for comparing it.The person whose fingerprint is matched and there will not be any SMS send to those persons.The persons whose fingerprints were not kept were takenand SMS will be sent only to those numbers.If the fingerprint of an unknown person is kept for scanning then the scanning will not take place.If unknown persons fingerprint is kept then the message " Not Identified" will be displayed.With the help of this the parents can be known about their arrival of the Students to the college

or school.The fingerprints are one of the greatest authentication system where students cannot forge very easily.This can be practically implemented by extending the time period and student's attendance can be managed.

## 7. PROPOSED SYSTEM

This system will overcome the problem occurred in conventional method of attendance system and most important it describe the automated attendance system which maintained the record of student presence or absence in each lecture. This automated attendance system will consist of four module

1. Detection
2. Recognition
3. Dashboard
4. Synchronization.
5. SMS Alert

For getting the fingerprint it requires fingerprint module.In this system, admin first registered the student's details along with their fingerprint . Fingerprint module needs the incoming and outgoing entry of the student. Mark the attendance of the student as per their presence in particular lecture. In this system, server will maintained the record student attendance. The finger prints from the various users are acquitte dusing the fingerprint module. For example we are taking the samples of three or four fingerprints and they are enhanced using several enhancement techniques . After that we detect the edges along the image using the edge detection function. Here we use the prewitt operator for the detecting the edges. We use minutiae matching algorithm for matching the finger print images. Instead of doing all these image processing works, we had used Fingerprint Module (R305) in t his system.The circuit is made to be switched ON and all the initialization processes are done.The "Initialization done" message has to be displayed in the screen.Up to that user should not keep any fingerprints for scanning.After that "Show the Finger" will be displayed on the screen. The fingerprint that has to be compared is already stored in the memory of fingerprint module.The fingerprint module is capable of storing about 100 images in the inbuilt memory.Now the fingerprints are kept for scanning with in a stipulated time period.Fingerprint module started to compare the results and it gives the hex codes to the microcontroller for further operations.The microcontroller starts to send the control to GSM based on the results from the finger print module.

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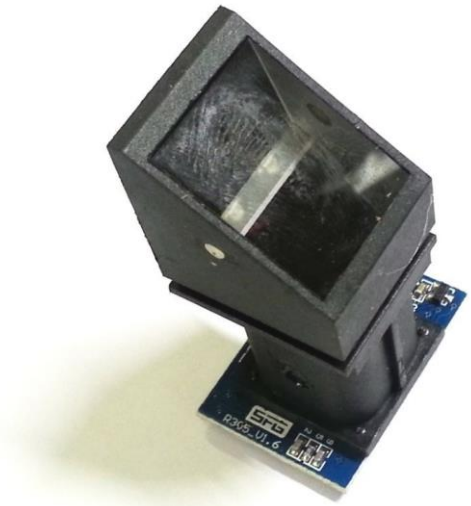
## **8** .SYSTEM DESCRIPTION

### *8.1 HARDWAR E: Fingerprint sensor:*

Fingerprint scanner will be used to give fingerprint of teach- ers/students to the computer software. LCD display will be displaying rolls and name of those whose attendance is marked. Computer Software will be interfacing fingerprint scanner and LCD and will be connected to the network. It will input fingerprint, will process it and extract features of fingerprint for matching. After matching, it will update da- tabase attendance records of the students. [9]

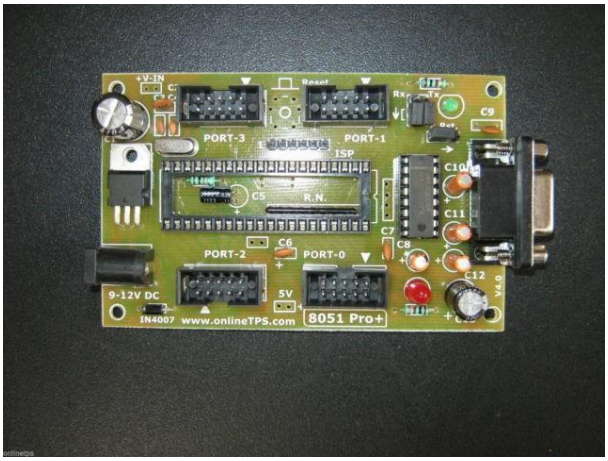


### *8.2 GSM Modem:*

**GSM** is one of the widely used mobile standards. **GSM** is **Global System for Mobile Communication.** As the name specifies, it enables the mobile users to interact all over the world at any time.[10]

### *8.3 Microcontroller*

**PIC** is a family of Harvard architecture microcontrollers made by Microchip Technology, derived from the PIC1640 originally developed by General Instrument's Microelectronics Division. The name PIC initially referred to "**Peripheral Interface Controller**". PICs are popular with developers and hobbyists alike due to their low cost, wide availability, large user base, extensive collection of application notes, availability of low cost or free development tools, and serial programming (and re-programming with flash memory) capability.




### *8.4 LCD Display*

The liquid crystal material may be one of the several components, which exhibit optical properties of a crystal though they remain in liquid form. Liquid crystal is layered between glass sheets with transparent electrodes deposited on the inside faces.When a potential is applied across the cell, charge carriers flowing through the liquid disrupt the molecular alignment and produce turbulence. When the liquid is not activated, it is transparent. When the liquid is activated the molecular turbulence causes light to be scattered in all directions and the cell appease to be bright.


## 9. SOFTWARE ARCHITECTURE:

The software architecture consists of the database and the application program. Database: The database stores the records implemented in Microsoft SQL Server database. However, this can be changed to any other relational database of choice. SQL Server is fast and easy, it can store a very large record and requires little configuration.

***Application Program***

The application program is devel- oped with Microsoft C programming language using Mp Lab compiler and it provides a user interface for the Attendance Management System .The advantages of Microsoft C# programming language are its robustness, easy to program, has an excellent database con- nectivity , runs on the two most common operating sys- tem platforms like Windows and Linux.

## 10. COMMUNICATION OF GSM WITH MICROCONTROLLER

The result from the fingerprint module is taken and it is analyzed in the microcontroller. We use "ATMEGA 16" microcontroller in the paper. The result from the GSM module is received by microcontroller. If the already stored image in the memory and input image are matched then microcontroller will sent the control to the GSM module. The GSM will send the messages to respective parent's mobile numbers [8]. If the fingerprints are mismatched then the control signal will not be sent to the GSM module. After some time interval the details of the students who were not present were taken. Those persons details were taken and message of "NOT PRESENT "is sent to their respective parent's mobile numbers. So, the parents may know

about the student's presence immediately. The Students cannot forget this system easily.

## 11. CONCLUSION

This System represents an analysis of different technologies which are used for taking attendance system. Traditionally students attendance is taken by professor and it will take too much time of lecture. More proxy attendance can be recorded in manual system. This can be replace with computerized system. In proposed system attendance will marked using Fingerprint Recognition. And it will verify the student which will eliminate the proxy attendance. This system can be implemented for better results regarding the management attendance. This system will save time, decrease the amount of work the administration has to do.

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