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# Design and Implementation of Micro Controler Based Fingerprint Management Attendance System

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## *Abstract*

Institutions, companies and organizations where security and net productivity is vital, access to certain areas must be controlled and monitored through an automated system of attendance. Managing people is a difficult task for most of the organizations and maintaining the attendance record is an important factor in people management. Therefore, the aim of this paper is to design and implementation of a microcontroller based finger print attendance system that can record and analysis student's attendance and then generate the percentage of student's attendance. Biometric is use because it is the part of our body and it is most secure identification. For this project research work, fingerprint will be chosen as identification.

**Key word**. Microcontroller, Biometric, Fingerprint

## *Introduction*

Biometrics refers to the automatic identification of a person based on his or her physiological or behavioral characteristics. It includes fingerprint, iris, facial and retinal. Biometrics technologies are becoming the

foundation of an extensive array of highly secure identification and personal verification solutions. Today, biometric is being spotlighted as the authentication method because of the need for reliable security.

(Cappelli et al., 2007). Fingerprint authentication is one of the most well-known and publicized biometrics technologies 'Because of their uniqueness and consistency over time, fingerprints have been in use for identification for over a century, more recently becoming automated due to advancements in computed capabilities. Fingerprint reconstruction is popular because of the inherent ease of acquisition, the numerous sources (e.g. ten fingers) available for collection, and their established use and collections by law enforcement and immigration (Jianjiang, 2007). According to Oloyede, Adedoyin and Adewole (2013), many industries are experiencing technological advancement and changes in the mode in which they carry out their business processes. With the rise of globalization, it is becoming essential to find an easier and more effective system to help an organization or company improve their employee's productivity. In spite of this matter, there are still business establishments that use the old-fashioned method of manual process of recording employee's attendance (Yuihotakaishi, 2011).

Attendance system is a system that records the attendance of their employee's time entered and left the office or factories. Employer have a huge burden on how to keeping track on their employee. This system ensures the company to know what does the employee do and how disciplines are they. This times and attendance system let the employer know the amount of wages for their employee in the same time it make it difficult to cheat on giving wages due to the employee also know their working hour. This system also can motivate to the employee to come to work early and indirectly increase company productivity.

Furthermore, this attendance system can help employer planning on the future outcome of their company.

For an organization like school, teachers need to track student attendance by calling name one by one or counting person by person every day in every starting school day. Than the teachers need to calculate the percentage of every student attendance at the end of the month. Again, the records need to rewrite in every student record book to show to their parent about their children activities in school.

School activities such as curriculum and co curriculum are compulsory. Student must come to the school on the weekend to actively join club and sport. The students have to bring along student activities book to record the attendance which is sign by the supervisor teacher of the organization. This student activities book will be gathering up and then need to calculate the percentage of student attendance at the end of the year. This percentage will differentiate the mark of the student.

However, most of the attendance systems that are being used in school still are in traditional method. There is no standardization from the government in this system. Taking attendance by roll calling is a failure. It gives a huge burden to the teacher and a lot of time waste over responses of student. Then, the recording needs to analyze and report to admin. Waste of paper happen in this process.

These propose a research on developing and design a system that can automatically record student's attendance then somehow calculate the percentage of student's attendance and their mark and with a software development to easily view and access the data.

**Aim and Objectives of the Design**

The aim of this project is to design and implement a finger print based attendance system that will be used for many purposes. An attendance system is important in monitoring student activities. It is also important to show the recording and analysis to the student's parent. Therefore the research has the following objectives:

i. To replace the current existing student attendance system process to fully- computerized and automated student attendance system.
ii. To develop a desktop-based application that obtains the student fingerprint every time they attend the classes for attendance marking purpose.
iii. To develop a web-based student attendance system in displaying every student attendance results effectively.
iv. To generate reports regarding to the student attendance in order to assist the lecturer/staff in analyse and tracking the student attendance.

v. To eliminate the chances for student to ask their buddy sign attendance for them through the implementation of fingerprint attendance system.

## METHODOLGY

This discussion on research methodology covers about the selected device and the process involved which includes circuit designs and software development. These steps were planned out carefully to ensure that the whole project progress smoothly with minimal setbacks.

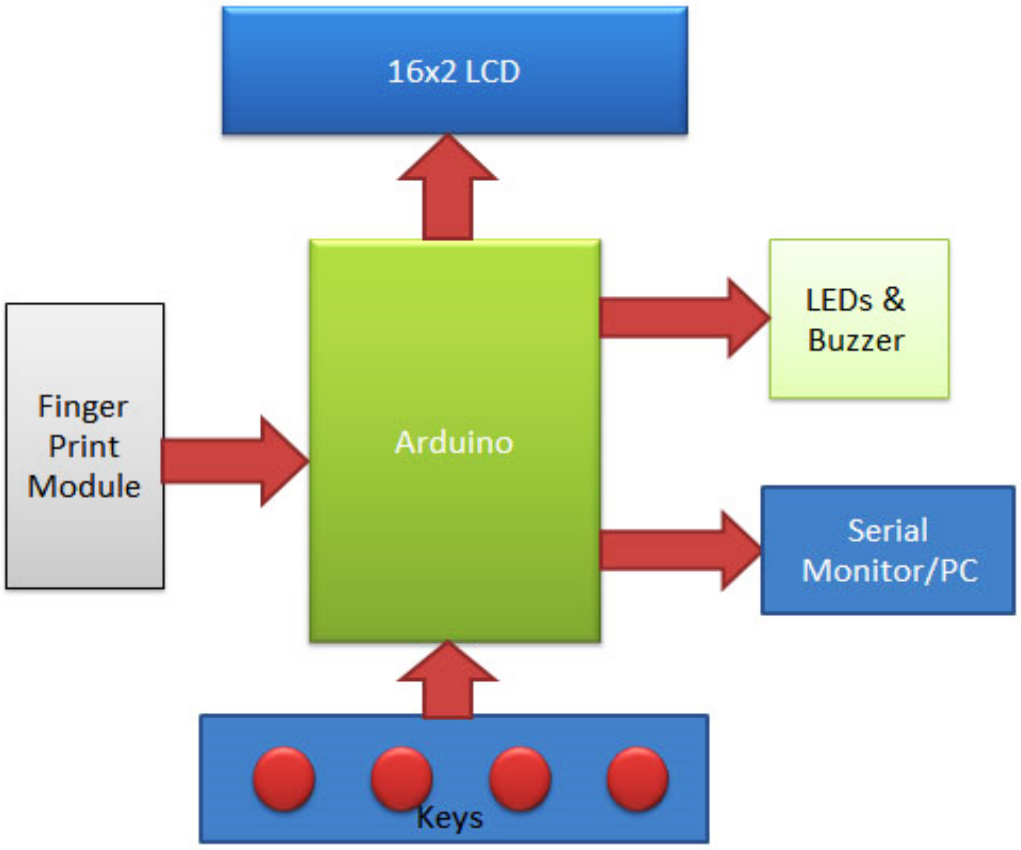



Fig 1. Block Diagram of the Fingerprint Based Management Attendance System

## WORKING PRINCIPLE OF THE BLOCK

### 1 power supply unit

Most electronic devices require dc voltage to operate. The more readily available source of power is the 240AC, 50Hz outlet. Where a de voltage is required, a dc

power supply circuit is employed to convert the ac voltage to a de voltage during the process the sinusoidal ac waveform is converted to a semicircle dc waveform by the rectifier with ripples filtered by the capacitor.
In this project the power used in the circuit is 5volts for the microcontroller with other components, and 12volts for operating the motor and the relays. Hence, the power supply unit consist of a 220/240V, 50Hz, 500mA, DC: 12 x 2 step down transformer, rectifier and regulators.

**R307 Fingerprint Sensor**

R307 is an optical fingerprint scanner which is an upgraded version of R305. R307 has its own database which can store 1000 templates. Security level for R307 is from 1-5. This module has less false error rate, fast searching process, high speed processor, uses minutiae based algorithm to work with scanned fingerprints.
R307 Fingerprint Module consists of optical fingerprint sensor, high-speed DSP processor, high- performance fingerprint alignment algorithm, high-capacity FLASH chips and other hardware and software composition, stable performance, simple structure, with fingerprint entry, image processing, fingerprint matching, search and template storage and other functions

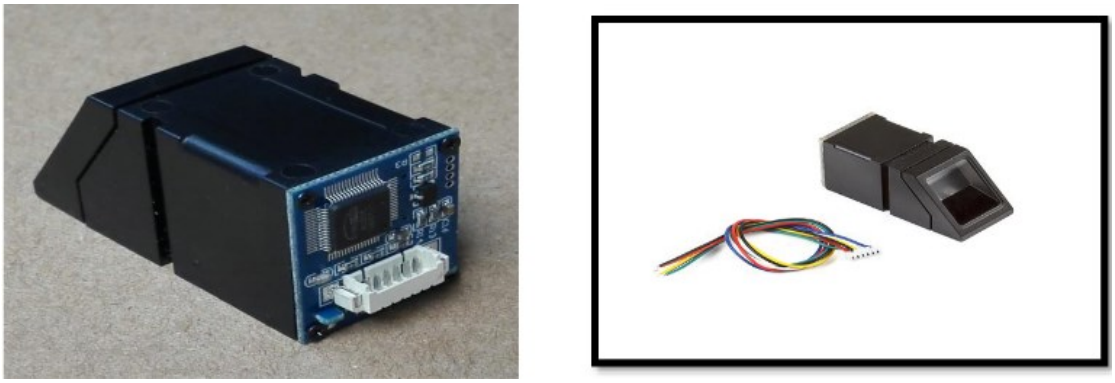


Fig 2. Fingerprint Sensor

**LCD Display**

LCD Display is used here to provide messages to the user to have a better interaction with the device. LCD Display has green light in background with characters displayed on them in black. Characters are displayed in 7X5 matrix.

LCD modules are very commonly used in most embedded projects, the reason being its cheap price, availability and programmer friendly. Most of us would have come across these displays in our day to day life, either at PCO's or calculators. The appearance and the pin outs have already been visualized above now let us get a bit technical.

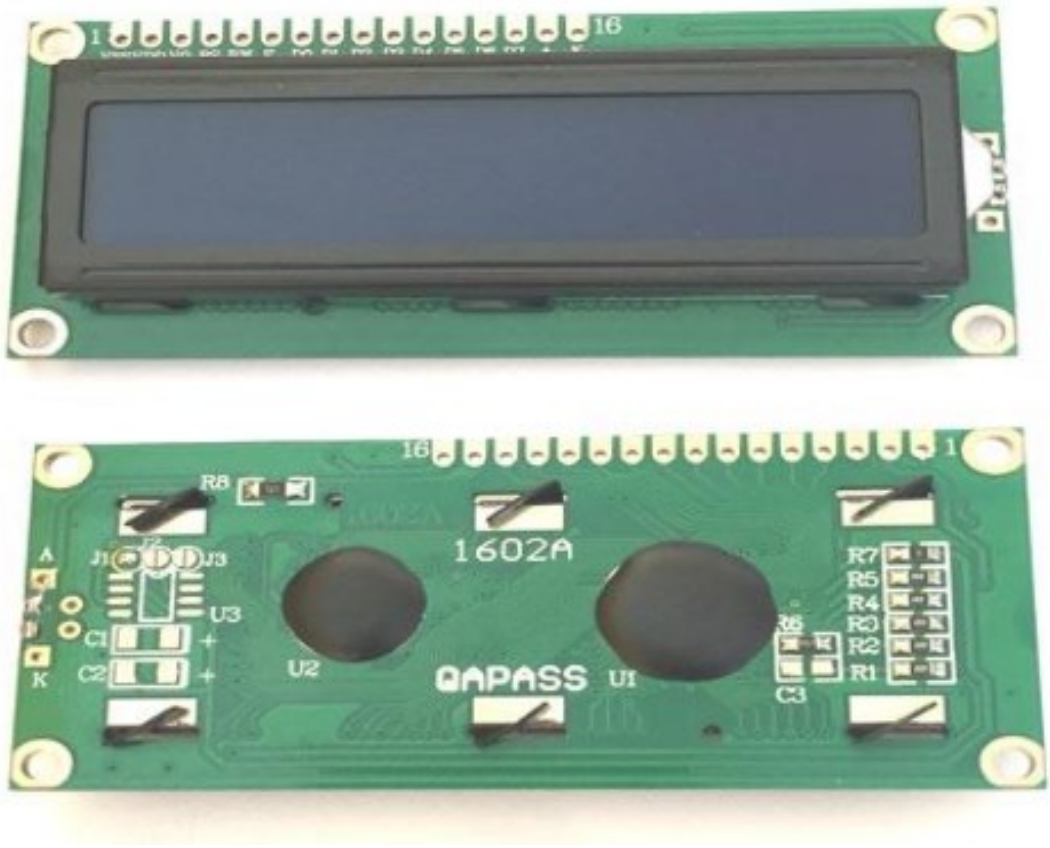



Fig 3. LCD Layout

**Arduino Uno**

Arduino Uno is a microcontroller board based on the ATmega328P datasheet. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your Uno without worrying too much about doing something wrong, worstcase scenario you can replace the chip for a few dollars and start over again.

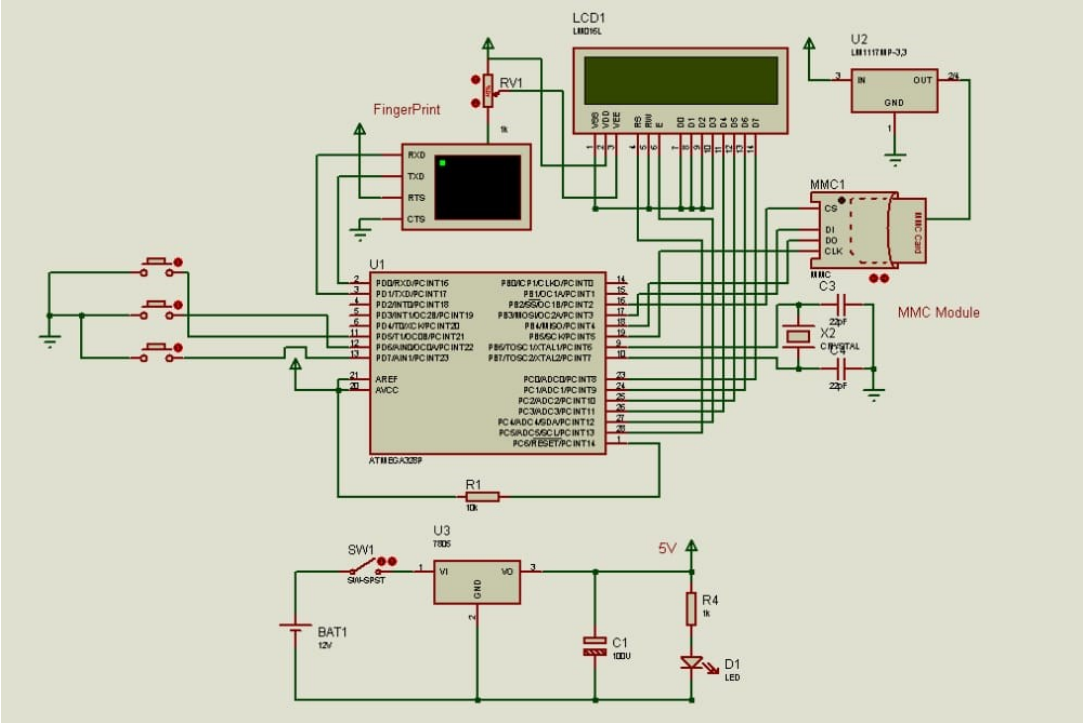


Fig 3.3: Arduino Layout

Table 1. List of Components/Material required

| S/N | List of Components | Quantity |
|---|---|---|
| 1. | Arduino | 2 |
| 2. | Fingerprint Module | 1 |
| 3. | Switch | 1 |
| 4. | LEDs | 1 |
| 5. | Resistor | 3 |
| 6. | Keyboard | 1 |
| 7. | Power Supply | 1 |
| 8. | Connecting Wires | 4 |
| 9. | Box | 1 |
| 10 | Memory Card | 1 |
| 11. | 16*2 LCD | 1 |
| 12. | Bread Board | 1 |

## WORKING OF SIMULATION CIRCUIT




## PRINCIPLES OPERATION OF THE SYSTEM

This research work is based on the design and implementation of students finger print attendance system using fingerprint authentication. The proposed system can be used to monitor, identify and check the Sign-In and Sign-Out timings of students in tertiary institution. The system requires that all students to enrol his/her fingerprint for the device to identify and verify if he is a valid student and also to record daily resumption and closure timings for the students for a whole month. The primary idea behind this is to avoid a situation where students records fake timings in the manual register and yet receiving full privilege. This greatly affects output to input ratio of students and in earnest the institution as a whole.

## TESTS, RESULTS AND DISCUSSION

This will involve on test and the result of the experiment. The discussion covers about the procedures on conducting the test, the result of the experiment and the discussion of the experiment. This experiment was carried out carefully to ensure the system is in high performance and a quality system.

**Test Scheduled**

**Table 1 Test Schedule**

| S/N | TEST | PROCEDURE | EXPECTED OUTCOME |
|---|---|---|---|
| 1. | Component Test | Using Millimeter | The components were tested and are performing accurately |
| 2. | Continuity Test | Using Millimeter | The circuits were tested and it is working perfectly |
| 3. | Project Test | By registering individual through their fingerprint and given them ID | The system capture and stored individual tomb print and ID and recall during signing in and out. |

## RESULT

From this research, hardware that will automatically calculate student's attendance mark had been successfully developed and the hardware had been assembled. This project was developed accordingly based on the test and survey obtained in experiment discussed. A setup file has been successfully developed for installation to make it easier for the end user i

## DISCUSSION OF RESULT

The proposed finger print attendance system is a system that takes attendance electronically. This system was implemented using Microsoft Visual Basic, Net programming language. It involves the interaction with the central database which contains all records of students of the faculty or institution as well as records of monthly attendance taken. In implementing this system, certain criteria are considered. These criteria includes: Only eligible students of the faculty can enroll and take attendance. Similarly, no one can take attendance for another. The records of each attendance taken can be retrieved as well as the monthly summary attendance for all students can be viewed. Furthermore, there is a period of grace within which IN and OUT timings can be taken. The design requirements are met through the use of a fingerprint reader which captures the fingerprint of users and desirable results are achieved, some of which are discussed in this section.

## CONCLUSION

In conclusion, the overall project research in develop an attendance system for students curriculum has successfully developed. Although it has limitation, hope this research give an idea in continuing developing the system in this area for its benefit. Traditionally, attendance is taken using the manual method, which involves pen, and paper registers. The implementation of an electronic biometric-based method of fingerprint attendance system will greatly assist institutions or any organization and thereby prevents time-consuming processes. Finger print attendance system provides the administrator with easy access to student's attendance information as well as easy monitoring of monthly attendance summary. This will improve the net productivity of institutions or any organization. The proposed system is reliable, secure, efficient, and capable of replacing the traditional manual and unreliable method of attendance management. This system ensures security of student's records; eradicate fake attendance record, saves time as well as reducing the amount of work done by the administrator in gathering student's attendance records. The proposed system can be improved through the integration of multimodal biometric technologies to provide more security for the student's finger prints attendance system.

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