

BIOMETRIC ATTENDANCE SYSTEM USING IOT

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Abstract: The human body has the privilege of having features that are unique and exclusive to each individual. This exclusivity* and unique characteristic has led to the field of biometrics and its application in ensuring security in various fields with various embedded controllers and embedded computers. Biometrics have gained popularity and has proved itself to be a reliable mode of ensuring privacy, maintaining security and identifying individuals. Biometrics is the study of identifying a person by their physical traits that are inherent and unique to only the person concerned. Biometric identification includes fingerprint verification, palm geometry, face recognition, iris recognition, etc. Accuracy and reliability are the two most important parameters when it comes to biometric applications and that too with advanced embedded computers. Fingerprint verification is one of the oldest known biometric techniques known but still is the most widely used because of its simplicity and good levels of accuracy.

Thus, this project aims to reduce the hectic manual work by making an automated Attendance management system in which the live transfer of data will take place through the internet
- INTERNET OF THINGS.

Keywords: Biometric, Attendance, Fingerprint.

1. INTRODUCTION

Biometric recognition refers to the use of distinctive anatomical (e.g. fingerprint, face) behavioral (e.g. Speech) characteristics, called biometric identifiers or traits for automatically recognizing individuals.

Conventional attendance system followed in an educational system where the teacher calls out the name of each and every student and mark the attendance causes time wastage during lecture time. This become more and more severe especially in the current scenario where the number of students in the class is very large. Managing the attendance data of such a large group is also very difficult. Another disadvantage of present system is the chance for student to mark fake attendance. Fingerprint based device are being used in corporate environment. These devices are use computer to store and verify fingerprints. It can be ported to academic environment with modifications.

2. BIOMETRICS



Figure 2.1: Biometric

2.1: Biometric Functionality:

Many different aspects of human physiology, chemistry or behavior can be used for biometric authentication. The selection of a particular biometric for use in a specific application involves a weighting of several factors. Jain et al (1998).

Identified seven such factors to be used when assessing the suitability of any trait for use in biometric authentication.

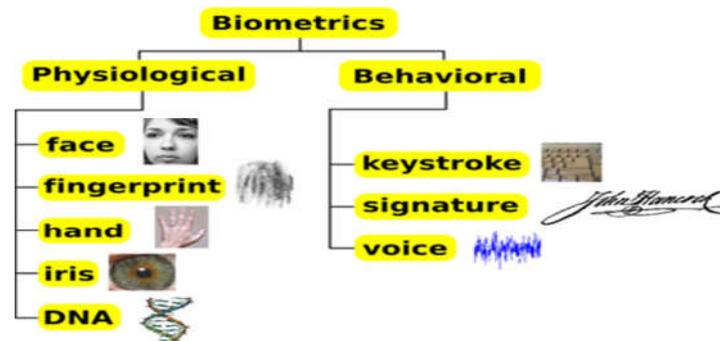


Figure 2.2: Biometric Functionality

2.2. Fingerprint Identification Method:

Fingerprint records normally contain impressions from the pad on the last joint of fingers and thumbs, although fingerprint cards also typically record portions of lower joint areas of the fingers. Human fingerprints are detailed, nearly unique, difficult to alter, and durable over the life of an individual, making them suitable as long-term markers of human identity. Fingerprint analysis, in use since the early 20th century, has led to many crimes being solved. This means that many criminals consider gloves essential. In 2015, the identification of sex by use of a fingerprint test has been reported. The analysis of fingerprints for matching purposes generally requires the comparison of several features of the print pattern. These include patterns, which are aggregate characteristics of ridges, and minutia points, which are unique features found within the patterns. It is also necessary to know the structure and properties of human skin in order to successfully employ some of the imaging technologies.

2.3: Fingerprint Processing:



Figure 2.3: Fingerprint Processing

Fingerprint processing has three primary functions: enrollment, searching and verification. Among these functions, enrollment which captures fingerprint image from the sensor plays an important role. A reason is

that the way people put their fingerprints on a mirror to scan can affect to the result in the searching and verifying process. Regarding to verification function, there are several techniques to match fingerprints such as correlation-based matching, minutiae-based matching, ridge feature-based matching and minutiae-based algorithm. However, the most popular algorithm was minutiae based matching algorithm due to its efficiency and accuracy.

2.4. Minutiae features:

The major minutia features of fingerprint ridges are ridge ending, bifurcation, and short ridge (or dot). The ridge ending is the point at which a ridge terminates. Bifurcations are points at which a single ridge splits into two ridges. Short ridges (or dots) are ridges which are significantly shorter than the average ridge length on the fingerprint. Minutiae and patterns are very important in the analysis of fingerprints since no two fingers have been shown to be identical.

3. PROPOSED SYSTEM

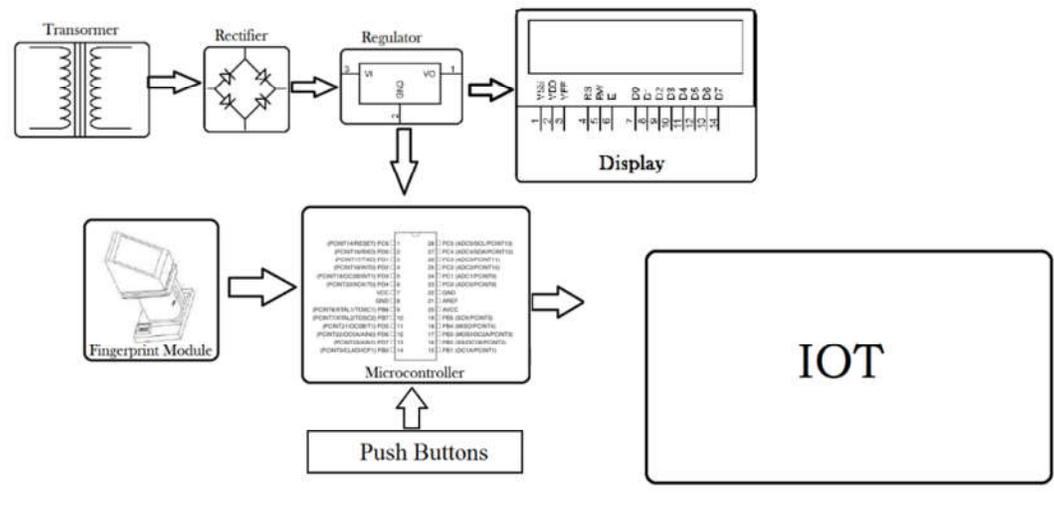


Figure 3.1: Proposed System

3.1. Rectifier:

A rectifier is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), current that flows in only one direction, a process known as rectification. Rectifiers have many uses including as components of power supplies and as detectors of radio signals. Rectifiers may be made of solid states diodes, vacuum tube diodes, mercury arc valves, and other components. The output from the transformer is fed to the rectifier. It converts A.C. into pulsating D.C.

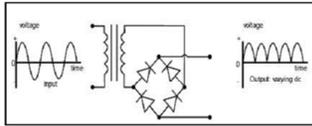


Figure 3.2: Rectifier

3.2. LED'S:

A light-emitting diode (LED) is semiconductor light source. LEDs are used as indicator lamps in many devices, and are increasingly used for lighting. When a light-emitting diode is forward biased (switched on), electrons are able to recombine with holes within the device, releasing energy in the form of photons. An LED is often small in area (less than 1 mm^2), and integrated optical components may be used to shape its radiation pattern. LEDs present many advantages over incandescent light sources including lower energy consumption longer lifetime, improved robustness, smaller size, faster switching, and greater durability and reliability.

Types of LED'S

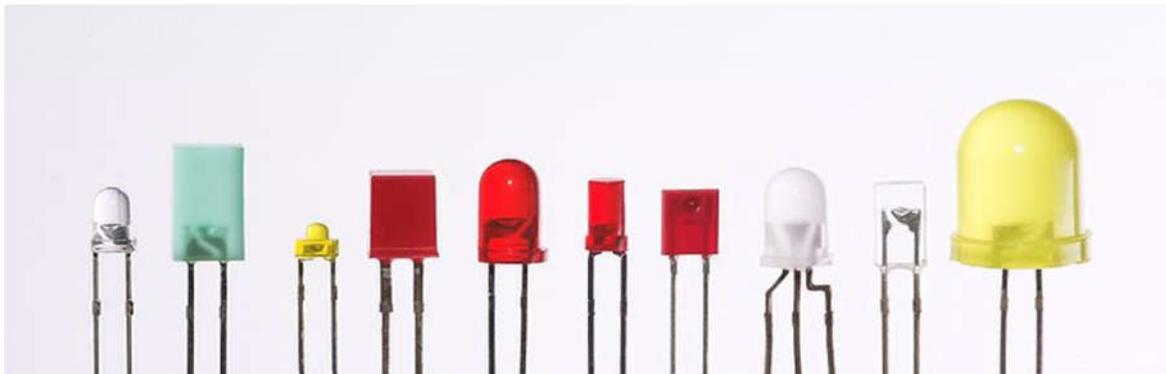


Figure 3.3: Types of LED'S

Electronic Symbol:



3.3. Fingerprint Module:

This is a fingerprint sensor module with TTL UART interface for direct connections to microcontroller UART or to PC through MAX232 / USB-Serial adapter. The user can store the finger print data in the module and can configure it in 1:1 or 1: N mode for identifying the person. The FP module can directly interface with 3v3 or 5v Microcontroller. A level converter (like MAX232) is required for interfacing with PC serial port.

Optical biometric fingerprint reader with great features and can be embedded into a variety of end products, such as: access control, attendance, safety deposit box, car door locks.

Features

- Integrated image collecting and algorithm chip together, All-in-one

- Fingerprint reader can conduct secondary development, can be embedded into a variety of end products
- Low power consumption, low cost, small size, excellent performance
- Professional optical technology, precise module manufacturing techniques



Figure 3.4: Fingerprint Module

3.4. Arduino:

Arduino is an open-source prototyping platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

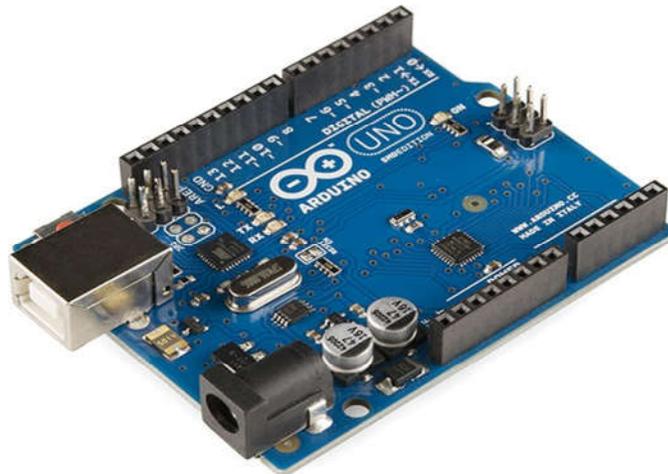


Figure 3.5: Arduino

3.5. Interfacing of Fingerprint sensor with Arduino:

This optical fingerprint reader devices uses high powered DSP chip AS601 form Syno chip that does the image rendering, calculation, feature finding and searching. It provides TTL serial out hence we can

connect to any microcontroller or system. The DSP processor has on board FLASH memory which can store 120 finger prints. Thanks to the Adafruit here we have Fingerprint library so that connect this sensor to Arduino as well.

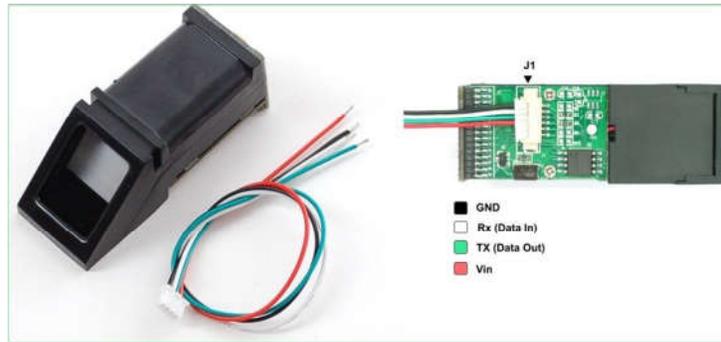


Figure 3.6: Interfacing of Fingerprint sensor with Arduino

Fingerprint Sensor Arduino Hookup

The fingerprint identification process has two steps that is

1. Enrolling Fingerprint.
2. Matching Fingerprint.

4. CONCLUSION

In this project, we proposed a system that automates the whole process of taking attendance and maintaining its record in an academic institute. Managing people is a difficult task for most of the organizations, and maintaining the attendance record is an important factor. By our automated system, we managed to achieve the desired objectives stated earlier.

Thus, the conclusion is that Fingerprint based Attendance Management System will not only enhance our knowledge but this automated system could be adopted by every college to compute the attendance rate & to evaluate the effectiveness of our education system.

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