

# IOT Based Biometric Attendance System

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## ABSTRACT

In many institutions, and academic organizations, attendance is a very important criteria which issued for various purposes. These purposes include record keeping, assessment of students, and promotion of optimal and consistent attendance in class. In this paper, a Biometric Access control system based on IoT is designed and implemented. These systems can be used for security of an environment so that only the authorized persons are allowed to pass or also for attendance measuring purposes. Biometric authentication is the best among security systems because it's unique and personal. These systems are comprised of biometrics such as fingerprint, iris, etc. Fingerprint based biometric system is a good combination of low cost and high accuracy. Evaluation of person's authentication is done by updating time, attendance and all related information to a Web server.

## Keywords

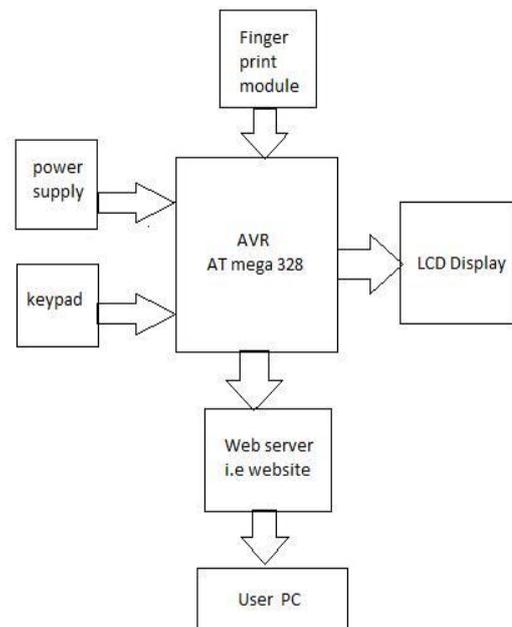
*IOT,Atmega328P,Fingerprint module,web server.*

## 1. INTRODUCTION

Our project presents a simple and portable approach to student attendance in the form of an Internet of Things (IOT) based system that records the attendance using fingerprint based biometric scanner and stores them securely over cloud. This system aims to automate the cumbersome process of manually taking and storing student attendance records. It will also prevent proxy attendance, thus increasing the reliability of attendance records. The records are securely stored and can be reliably retrieved whenever required by the teacher. The idea of this project was taken to overcome all the issues in all previous technologies and make data in digitized way. In the recent decades we have seen many types of Data logging systems. The recent technological developments in cloud computing and cloud storage have given new possibility in logging and viewing data for analysis and diagnostics System. An attendance management system is a software developed for daily student attendance in schools and institutions. It facilitates access to the attendance of a particular student in a particular class. This system will also help in generating reports and evaluating the attendance eligibility of a student. Rather than signing an attendance sheet, individuals will pass their thumb over the fingerprint scanner, the finger print is compared against a list of pre-registered users, and once match is made, the individual will be registered as having

attended that lecture. Our embedded system can connect to internet and could link to online storage space services like Google Drive, Drop box, etc. to log data which could further be easier to represented and analyzed globally.

## 2. BLOCK DIAGRAM & DESCRIPTION



**Fig.1: System Overview**

In this project we are using Atmega 328P controller for attendance system .the finger print sensor will give finger print enrollment and finger print matching. The power supply is given to the controller of 12V.LCD will show if the controller is busy or finger print is matched or not. When controller identifies the fingerprint its attendance is being recorded into the website. The higher authority is able to access the system and make thereby changes as like deletion of old fingerprint and also to enroll new fingerprint.

### 3. HARDWARE DESCRIPTION

#### 3.1. AT mega 328P Microcontroller

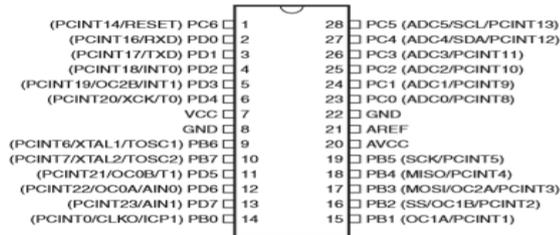


Fig.2: AT mega 328P Microcontroller

It is low power 8 bit controller .It has high performance. The AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers. Circuit (I<sup>2</sup>C™) bus and Addressable Universal Asynchronous Receiver Transmitter (AUSART). All of these features make it ideal for manufacturing equipment, instrumentation and monitoring, data acquisition, power conditioning, environmental monitoring, telecom and consumer audio/video applications. The ATmega48PA/88PA/168PA/328P provides the following features: 4/8/16/32K bytes of In System Programmable Flash with Read-While-Write capabilities, 256/512/512/1K bytes

#### 3.2. LCD Display

Here, we used 16\*2 LCD display for displaying parameters like body temperature and heartbeats

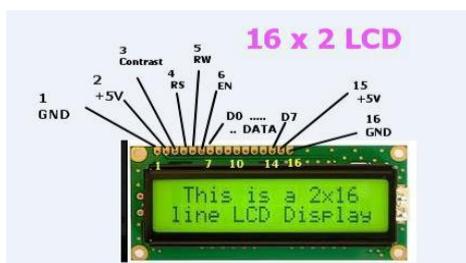


Fig.3. 16\*2 LCD Display

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be

displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

#### 3.3. Fingerprint scanner

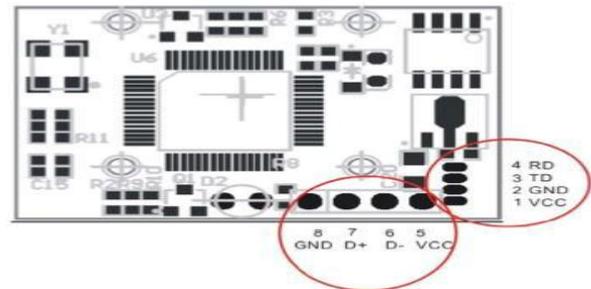


Fig .4 Fingerprint scanner

Everyone in this world has marks on their fingers. These marks have a pattern and this pattern is called the fingerprint. Since, they are unique and cannot be removed or changed, they have become ideal means of biometric identification. An image of the user’s fingerprint is captured by fingerprint scanner. This captured image is called as live scan. The live scan is processed digitally to create a biometric template which is stored and used for matching. Identification of fingerprints of individuals is done on the basis of both hardware and software techniques.

A fingerprint verification system is to take a fingerprint image as input and processes part or all of the following steps.

- Image Acquisition - a fingerprint image is requested from a fingerprint reader, e.g., Digital Persona, FPS110 by veridical
- Region of Interest (RoI) detection.
- Image enhancement - get rid of noise and attenuate the contrast.
- Pixel classification - ridge, valley, or background.
- Skeletonization - find all of the ridge curves or valley curves.
- Type line finding - find pair(s) of special ridge curves called type lines, or valley curves.
- Singular point localization - locate cores or deltas.
- Minutiae search - computing the endings and/or bifurcations and their corresponding orientations tangential to the ridge curves.

Matching - compare the feature of the input fingerprint image with those presorted in the database to find the possible candidate for several best matches.

#### 3.4.Keypad

A keypad is set of buttons arranged in blocks or “pad “which

bear digits, symbols or alphabetical letters. Pads mostly containing numbers are called a numeric keypad. Numeric keypads are found on alphanumeric keyboards and on other devices which require mainly numeric input such as calculator, push button, telephones, vending machines, ATM, point, telephones, vending machines, ATM, point.



Fig 5 .Keypad

Matrix keypads use a combination of four rows and four columns to provide button states to the host device, typically a microcontroller. Underneath each key is a pushbutton, with one end connected to one row, and the other end connected to one column. These connections are shown in our proposed module design we have used 4x4 keypad. Keypad matrix is nothing but the combination of switches in row and column wise. We have used 16 switches, each switch indicate a particular row & column due to which each pressed key can be easily recognized by microcontroller.

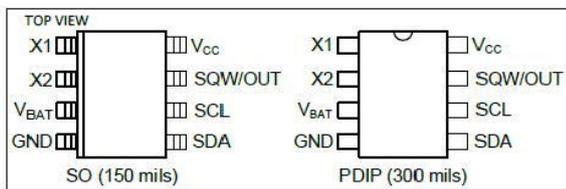


Fig 6 .RTC DS 1307

The DS1307 Serial Real-Time Clock is a low-power; full binary-coded decimal (BCD) clock/calendar plus 56 bytes of NV SRAM. Address and data are transferred serially via a 2-wire, bi-directional bus. The clock/calendar provides seconds, minutes, hours, day, date, month, and year information. The end of the month date is automatically adjusted for months with fewer than 31 days, including corrections for leap year. The clock operates in either the 24-hour or 12-hour format with AM/PM indicator. The DS1307 has a built-in power sense circuit that detects power failures and automatically switches to the battery supply. The DS1307 serial real-time clock (RTC) is a low-power, full binary-coded decimal (BCD) clock/calendar plus 56 bytes of NV SRAM. Address and data are transferred serially through an I2C, bidirectional bus. The clock/calendar provides seconds, minutes, hours, day, date, month, and year information. The end of the month date is automatically adjusted for months with fewer than 31 days, including corrections for leap year. The clock operates in either the 24-hour or 12-hour format with AM/PM indicator. The DS1307 has a built-in power- sense circuit that

detects power failures and automatically switches to the backup supply.

## 5. PROPOSED SYSTEM

In this section, the proposed fingerprint recognition system as described below.

### 5.1. Fingerprint enrollment

On selecting the enroll button the fingerprint scanner R305A acquires a scanned finger image as an input. The image is of 8-bit BMP format. The image generated is 256\*288 pixels. This image acquired is forwarded to the subsequent blocks for further processing.

### 5.2. Template generation

The image generated then undergoes the linearization, thinning and image enhancement process. The system generates a template of the finger image based on processing results. The template size is 512 bytes. The template generated can be transferred to the microcontroller Atmega328P via a USB interface.

### 5.3. Real Time System

The system is made real time as we use a RTC (DS1307).The RTC is used to provide a real time security to the entries of the fingerprint. The RTC gives accounts of leap years also of up to 2100

### 5.4. Fingerprint Matching

For matching user enters the finger through the optical sensor and system will generate a template of the finger and compare it with the templates of the finger library. For 1:1 matching, system will compare the live figure with specific template designed in the module [3]. For 1: N matching or searching, system will search the whole finger library for the matching figure.

### 5.5. Decision of Match

The decision for the match or failure is displayed by the Microcontroller on the Led provided. If match is found then a certain task is given permission or else it is denied.

### 5.6. Retrieving the data



fraudulent issues in the presence of the students in class or employees in an organization. In terms of efficiency and performance, the present work has provided a comparison with the traditional methods attendance system. By using the flash memory, the data is well structured. This system is user-friendly and very reliable. Therefore, it can be implemented either in organizations or educational institutions. The attendance management system can be improved by adding the features that indicate if the employee or student is late. Some of the future enhancements for this are to extend the current flash memory to store the complete details of the student. The system can be enhanced to track the arrival and exit time of the student or employee for additional monitoring

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