

Fingerprint Based Attendance System Using Arduino

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Abstract- Attendance system is required in many different places such as offices, companies, schools, organizations and institutions, etc. There are many attendance systems to take attendance. But, every place need to have a good system. This paper describes one of the attendance systems. The main objective of this paper is to study and construct the attendance system using fingerprint module. In this system, Arduino UNO controller and PLX DAQ tool are the main components to display the record on Excel.

Index Terms- Arduino, PLX-DAQ, attendance, fingerprint module

I. INTRODUCTION

In an educational system, the teachers call out the name of each and every student and mark the attendance. This causes time wastage during lecture time. This becomes more and more important where number of students in a class is very large. Managing the attendance data is also very difficult such a large group. The other way is that the teacher must pass the attendance sheet around the class for the students to sign. These methods have a major drawback because the students tend to answer or sign for their friends. In educational institutions, attendance and academic success are directly related. Therefore, to have a proper attendance management system is important. In developing countries, most of the educational institutions and government organizations still use paper-based attendance method to keep and save the attendance. Most employers value work attendance for their ethics.

Biometrics is the emerging technology used for automatic identification of a person based on biological characters such as fingerprint, iris, facial recognition, etc. The fingerprint verification system is commonly used biometric technique. Fingerprint based technique use computer to store and verify fingerprints.

II. PRESENT ATTENDANCE SYSTEM

In this system, the reference roll number and name for every student is provided by the institute with sheets. The teachers call out the roll number and mark 'present' or 'absent' on the sheet. For a particular class or each lecture, the call out process is also replaced by passing the sheet and signing. Many institute or university still use this type of paper-based attendance system. The disadvantages of this system are that roll calling and signing process is waste time and cannot take actual attendance.

III. OPERATION

This paper represents a fingerprint based biometric attendance system. Fingerprint module and arduino UNO are used to take and keep the attendance. Overall block diagram is shown in Figure (1).

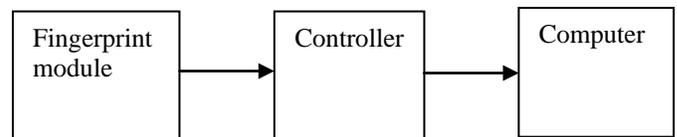


Figure (1). Overall Block Diagram

In this system, there are three main parts: enrolling, searching and displaying the attendance. This simple device starts with the connection of Arduino and fingerprint sensor to the computer for enrolling. In searching phase, as soon as the user presses the fingerprint sensor, it reads the user's fingerprint and related user's information are display on the computer depending on the instruction written in. For this system, scanning time, date, user name and ID number are displayed on the computer. Microsoft Excel is used in this system to show the information. PLX-DAQ is a useful tool to connect the Arduino with Excel. Circuit diagram is shown in Figure (2).

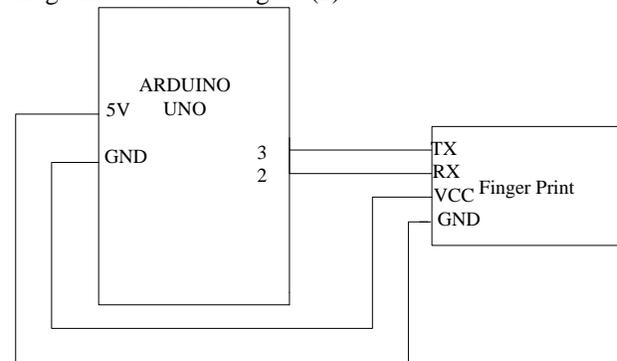


Figure (2). Connection Diagram

IV. SYSTEM REQUIREMENTS

- (i) Arduino UNO microcontroller
- (ii) Fingerprint Module
- (iii) PLX-DAQ tool
- (iv) Microsoft Excel

4.1. Arduino UNO Microcontroller

The main purpose of the microcontroller is to enroll and search the fingerprint. In enrolling, this controller read the template from the fingerprint sensor and enroll the ID number. This display the ID number on serial monitor. And then, this controller check the fingerprint with the stored template in the searching process. If the fingerprint is correct, the display valued are shown in excel. Otherwise, the controller don't give any output. [1][6]



Figure (3). Arduino Microcontroller

4.2. Fingerprint Module

There are many kinds of fingerprint module. They are optical, capacitive, piezoresistive, ultrasonic, piezoelectric, RF, thermal, etc. An optical fingerprint sensor is used in this system. This sensor read the fingerprint pattern. The scan image is converted as template and saved in memory.



Figure (4). Fingerprint Module

4.3. PLX-DAQ Tool

In this system, PLX-DAQ application software called parallax microcontroller data acquisition add-on tool is used to display the output of controller in Excel sheet. When PLX-DAQ software is opened, Excel sheet is automatically opened. After that, it is needed to connect PLX-DAQ with Arduino with the suitable baud rate of 9600bps and com port. Any of microcontrollers connected to any sensor can now send data directly into Excel using the serial port of a PC with PLX-DAQ. [3]

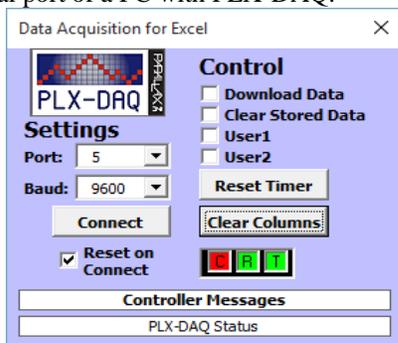


Figure (5). PLX-DAQ Tool

Data collection, analysing of sensors values and real-time equipment monitoring are easily provided with PLX-DAQ. Plot or graph data can be constructed as it arrives in real-time using Microsoft Excel.

V. EXPERIMENT SETUP

5.1 Enrolling

Firstly, fingerprint module is connected with controller. ID number is enrolled using the serial monitor. If this step is ok, the fingerprint is scanned with sensor. And then, the fingerprint is converted as templates and stored in EEPROM. Figure (7) and (8) shows this process. After that, another fingerprint is taken and saved as another ID number. Figure (5) shows the flow chart of enrolling.

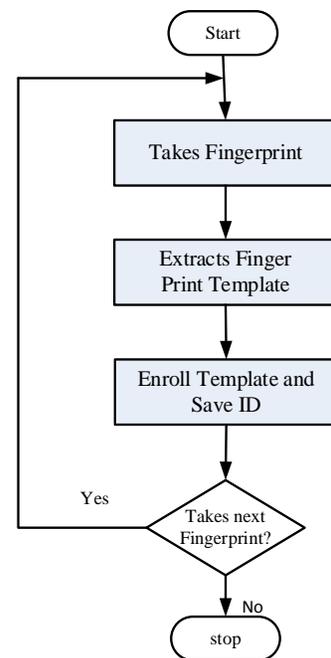


Figure (6). Flow Chart of Enrolling

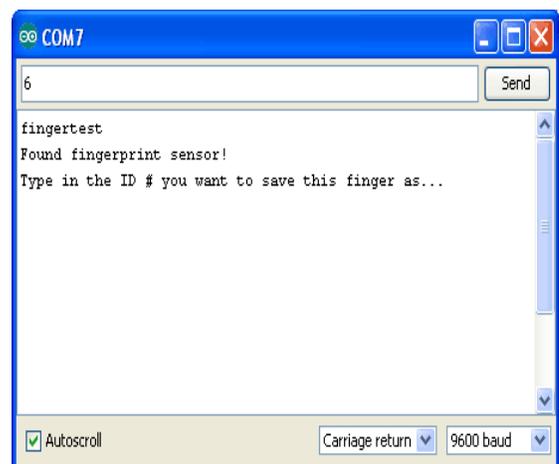


Figure (7). Enrolling ID Number

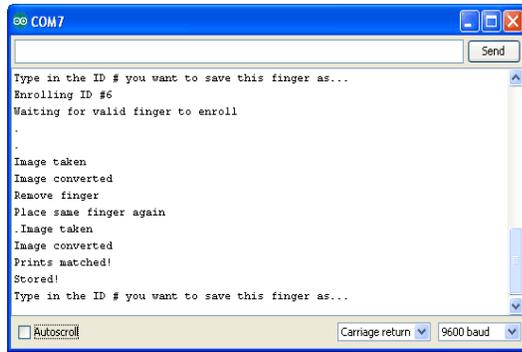


Figure (8). Saving Fingerprint

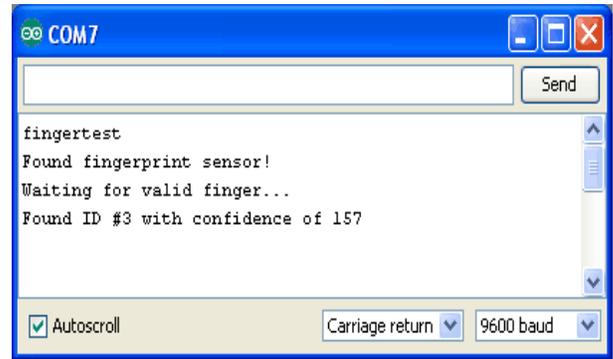


Figure (10). Waiting Valid Finger

5.2. Searching and Displaying Fingerprint

Firstly, the controller checks whether the fingerprint is present or not. When the fingerprint is detected and compared this template with the stored value in EEPROM. If this is matched, ID number and name is displayed into Excel including the scanning time and date.

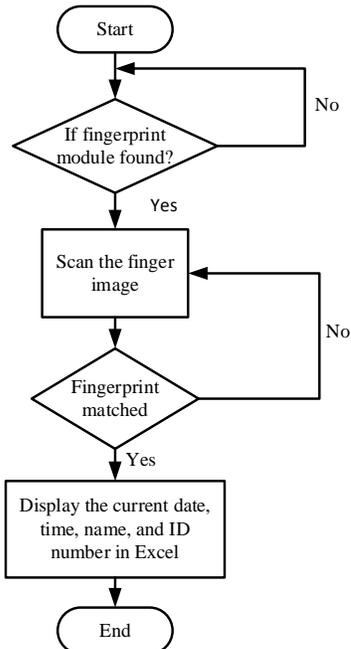


Figure (9) Flow Chart of Scanning and Displaying Attendance

The flow chart of searching and displaying attendance is shown in Figure (9). In testing, the result will be seen by pressing the finger on the sensor.

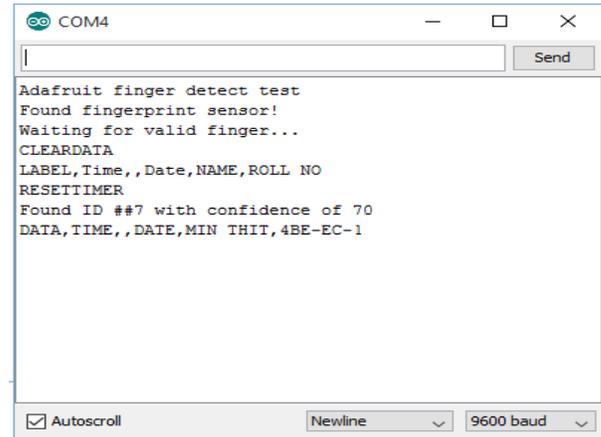


Figure (11). Arduino Serial Monitor

Test and result for fingerprint attendance system are shown in Figure (12) to Figure (15).

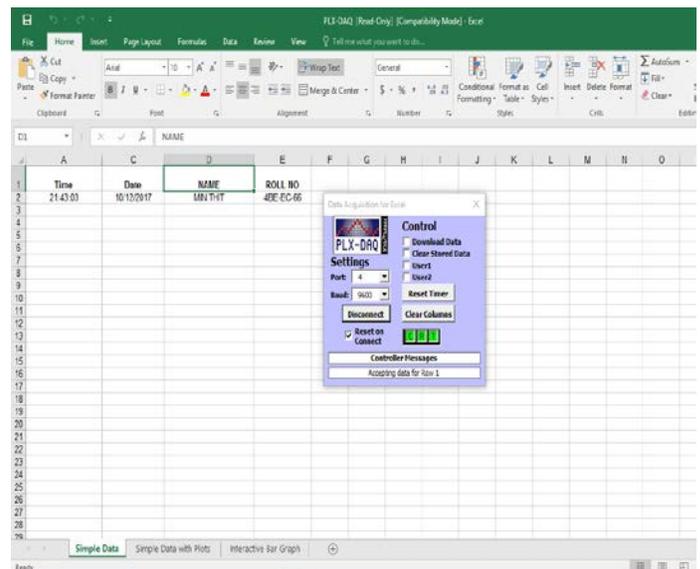


Figure (12). Test and Result of Fingerprint Attendance System

Analogue and Digital Communication			
Time	Date	NAME	ROLL NO
10:12:25	25-06-18	min thit	4BE-EC-1
10:12:31	25-06-18	khant zin aung	4BE-EC-2
10:12:38	25-06-18	moe hein kyaw	4BE-EC-3
10:12:44	25-06-18	min paing soe	4BE-EC-4
10:12:50	25-06-18	ye win hlaing	4BE-EC-5

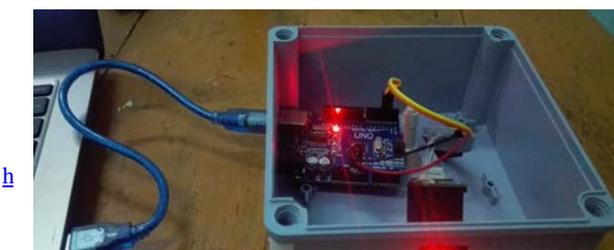
Figure (13). Test and Result of Fingerprint Attendance System

Analogue and Digital Communication			
Time	Date	NAME	ROLL NO
11:19:45	27-06-18	min thit	4BE-EC-1
11:19:51	27-06-18	khant zin aung	4BE-EC-2
11:19:57	27-06-18	moe hein kyaw	4BE-EC-3
11:20:04	27-06-18	min paing soe	4BE-EC-4
11:20:10	27-06-18	ye win hlaing	4BE-EC-5

Figure (14). Test and Result of Fingerprint Attendance System

Analogue and Digital Communication			
Time	Date	NAME	ROLL NO
1:22:26	29-06-18	moe hein kyaw	4BE-EC-3
1:22:32	29-06-18	min paing soe	4BE-EC-4
1:22:38	29-06-18	ye win hlaing	4BE-EC-5
1:22:44	29-06-18	min thit	4BE-EC-1
1:22:50	29-06-18	khant zin aung	4BE-EC-2

Figure (15). Test and Result of Fingerprint Attendance System



VI. CONCLUSION

Now a days, Information systems and Communication Technologies (ICT) are becoming more and more improved. Biometric technology is also an effective tool to identify and detect fraudulent issues. A fingerprint-based attendance system is presented in this paper. This system will enhance the ability to detect the presence of the students in class or employees in an organization. In terms of efficiency and performance, fingerprint-based attendance system is used in many places. This system is user-friendly and reliable because this system displays name, the ID numbers, date and time on excel sheet. This excel sheet can also be saved and attendance can be calculated with Microsoft Excel technique. Otherwise, this attendance system can be implemented to check which person reached the work in time or on time or late time. So, this developed system is very also useful in saving valuable time of students and lectures, paper, generating report at required time.

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Figure (16). Photo of Fingerprint Attendance System