# E-Components Monitoring System Using Fingerprint Scanner

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***Abstract-*** *Bio-metric based technologies are very efficient. It is believed to be unique to each person. Among all these technologies, fingerprint recognition is universally applied. It is a tedious task to monitor the number of components present in the lab. The distribution of the components to the students and collecting the components from the students is a challenging task. Our goal is to monitor all the components data in the lab by assigning the components to the students by scanning their finger using the fingerprint scanner. Initially, the data (fingerprint) of the students are collected and each component in the lab is assigned with a specified number (in serial order) these data is stored in the controller. Whenever a student willing to take a component then the individual has to scan his fingerprint and he has to select the required components with the help of keypad provided. All this data is stored in the server (like the name of the student, Components assigned, date of assign, phone number) and the lab in-charge can access the list whenever he requires. If the date of submission is over, then an alert message will be sent to the student about the component submission using recorded time stamp in software at the time of issuing. The table also represents all types of components present in the lab and whenever a component is issued, the count of that component data in the software will be decreased.*

***Keywords***- Microcontroller, Fingerprint scanner, Keypad module, Display module, Bio-metric.

## I. INTRODUCTION

There are many colleges in our country and each college contains many streams such as electronics, computer sciences, electrical, mechanical etc. and each and every stream consists of many laboratories. In every lab, there might be components which students take and work on it. The major problem is to monitor the components in the particular lab. To handle this process many colleges are using manual process by registering in the registers. This may lead to loss of data if the register gets misplaced. Another disadvantage of the present system is the students can take the components by using another student's ID. To secure the data of components taken can be secured by taking the students fingerprint at the time of issuing of components using keypad module can be implemented such that the data can be stored systematically and the python program will run simultaneously and the results will be stored in files.

## II. SYSTEM OVERVIEW

The proposed system uses the fingerprint scanner for the purpose of monitoring the components in the lab. It has three processes namely Enrollment, Issuing of components (verifying the fingerprints) and submission of components. While enrolling, the lab in-charge enters the details of the students such as student name, enroll ID, mobile number and year of study by taking their fingerprints. During issuing of components, the individual has to scan his fingerprint if the fingerprint matches with the fingerprints which enrolled previously then the person is allowed to select the components. By checking the availability of the components in the lab the person has to select the components. While submission of components, the person again has to verify his finger when it matches with the data in the server then he has to select the submission button and has to select the components which he is going to submit by using keypad then automatically the component count in the list will be updated. The instructions for the students for the whole process can be given using LCD Display. The total data can be seen in the text file generated by the python program in the tabular format. The components used in the proposed system are as follows:

**Fingerprint sensor (R305):**

Fingerprint sensor module R305 (connected across CON2) has UART interface with direct connections to the MCU or to the PC through the max232/USB serial adaptor. The user can store fingerprint scanner data in the module and configure it in 1:1 or 1: N mode for identification. Pins TX and RX of R305 sensor are connected to Arduino digital pins which are used for serial communication.

Fig.1: Fingerprint scanner (R305).

**Arduino UNO ATmega328:**

Arduino has a software for which the source code is freely available. Arduino can able to read inputs in any different form and it can turn into an output. Arduino has 14 input and output pins of which 6 provide PWM outputs. It has 6 analog input pins. Arduino clock speed is 16MHz. Based on Arduino IDE software we can program Arduino in such a way that it will do whatever we say. Maximum power supply limit for Arduino is 7-20V.

The microcontroller is used to make all the computations in the project. The microcontroller has about 20 pins for connecting to the eternal world and also the cost of the Arduino is less. The Arduino is used to analyze the fingerprint scanner and analyses with the previous fingerprint data present in the microcontroller. It can be able to communicate with the server with the help of the python code using the serial communication this helps to upload the data to the server in a text format as a log file.

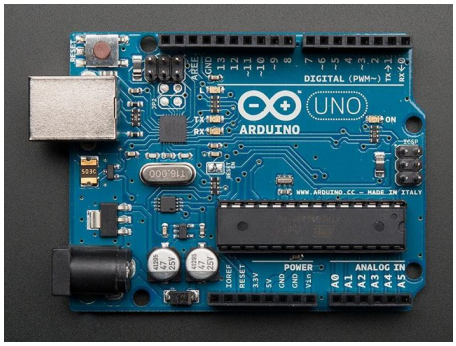


Fig2: Arduino UNO

## III. PROPOSED SYSTEM

**Block Diagram:**

The block diagram is shown below:

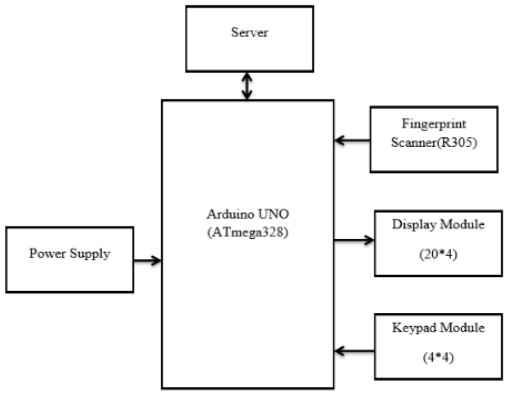


Fig.3: Block Diagram.

Adafruit R305 (Fingerprint scanner): The fingerprint scanner R305 is a high-quality fingerprint scanner which helps in giving the fast analysis. The fingerprint scanner is connected to the Arduino Uno board with the help of the GPIO pins which are present on the microcontroller the once the fingerprint is scanned by the scanner then it converts into a binary format and sends the data to the Arduino for the result of the verification process usually takes 1 second.

LCD display (20*4): The LCD display is used to display all the user interface of the project this is used to interact with the user it displays the number of components present in the lab etc. These are connected to the Arduino board analog pins from A0-A5. At the time of issue, the students should select the required components which are displayed on the LCD Display using the keypad.

The communication between Arduino and server is developed using serial communication.

**Keypad**: The keypad is used for the user interaction with the product this is used to select the number of components and type of components.

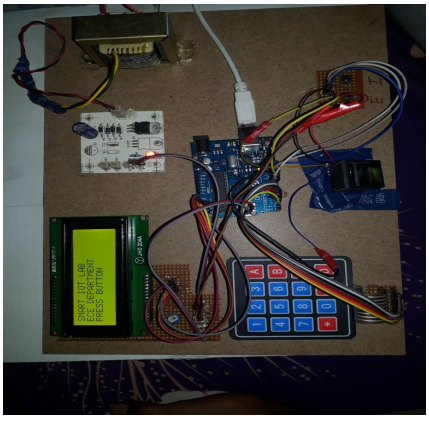

Fig.4: Implementation.

The student has to select the option either issuing of component or returning of component. While enrolling the system will automatically generate ID. With the help of ID, students will take and return the components.

While issuing the components, the time stamp of date of issue is stored. If the components are not returned till the date of submission then the message will be sent to particular student using way2sms automatically. If the component is returned before the date of submission then the system will ignore.

At the time of issue, the students should select the required components which are displayed on the LCD Display using keypad.

The communication between Arduino and server is developed using serial communication. The data will be transmitted at 9600 baud rate to the server in which python program runs in turn generates the files of all the data regarding student's information and components details and these files can be accessed whenever the data requires.

The Flowchart for the whole process is shown in the fig5., below. It includes enrolling, Issuing of components and Submission of components.

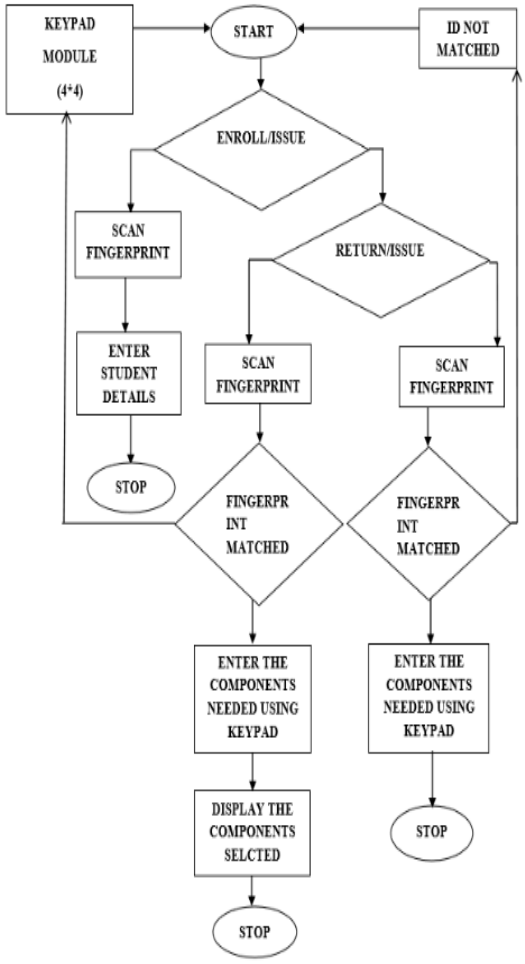


Fig.5: Flowchart of components monitoring system.

## IV. RESULTS

The components monitoring system is used to store the information of components list and issue list and the return log files. These are stored in the server and can be sent as an email file to others.

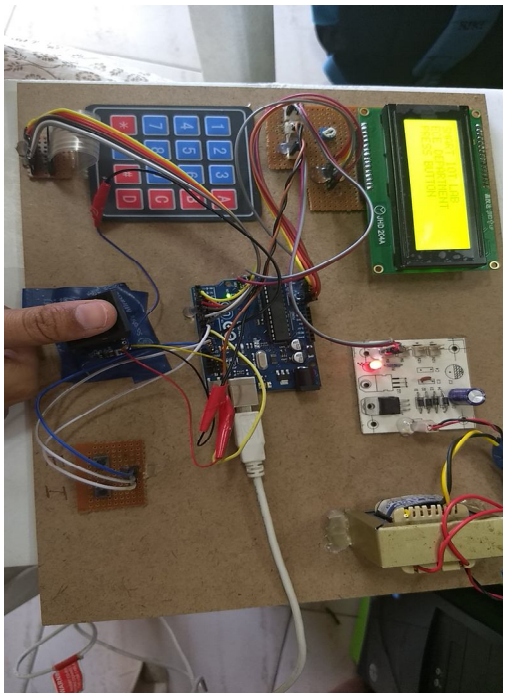

Fig.6: Hardware or the project.

**Software results:** The server acts as a log file which can be used to store all the data and the file information regarding the issue of the components list and their time of issue with the help of the time stamp and creates 3 files

1. Issue file
2. Return file
3. Number of components file

```
IOT LAB MONITORING STUDENT COMPONENTS ISSUE DETAILS


STUDENT ID: 09JK1A0451,SELECTED COMPONENTS TIME:Sat Mar 10 16:10:27 2018
ARDUINO  - 1
IR  - 1
MQ2  - 1
MQ3  - 1
LDR  - 1


STUDENT ID: 09JK1A0451,SELECTED COMPONENTS TIME:Sat Mar 10 16:18:02 2018
ARDUINO  - 1
IR  - 1
MQ2  - 1
MQ3  - 1
LDR  - 1

STUDENT ID: 09JK1A0451,SELECTED COMPONENTS TIME:Sat Mar 10 17:18:03 2018
```

Fig.7: Log File

## V. CONCLUSION

Thus our work not only helps the staff of the labs but also helps wherever we need monitoring. In labs it helps to monitor the components present in the lab and the demand for the components can be analyzed. The loss of the components can also be found easily. The data of students who have taken the components and the components taken by him is correctly maintained time to time.

## REFERENCES

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