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IOT based Biometric Finger Print Electronic Voting System for Rigging Free Governance

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Abstract: *Biometric Fingerprint systems are used in the Voting machine for voter confirmation. fingerprint voting machine is designed where there is no need for the user to carry his ID which contains his essential details, so that the controller fetches the data from the fingerprint module and then compares it with already registered fingerprints of the voters. If this data matches then the person is allowed to cast his vote if not then the person is barred from polling his vote. By using push buttons voting will be done, the message regarding polling booth location and serial number information send to mobile numbers before a day of voting by using GSM module. MIT application is used for outside voters this is easier application to build electronic projects. Results are displayed in LCD as well as in thingspeak IOT platform as a graph according to the applications thingspeak is open source IOT platform Is used to save and store data. To connect this server esp2866 Wi-Fi module is used.*

Keywords: *Fingerprint module, Gsm Module, MIT application, IOT platform.*

I. INTRODUCTION

In democratic cultures, voting is a significant means to collect and react people thinking. project offers and implements a modest and protected technique of voting by using biometric. The fingerprint data is previously stored in the database. Hence this project delivers a best result to avoid the false voting [1].

Biometric Fingerprint systems are used in the Voting machine for voter confirmation. Voting machine is designed in such a way that user need not to take any ID card while going to cast vote, every details of person will be verified by his fingerprints so when person enters in to the polling booth just need to place finger on fingerprint-module and if present fingerprint matches with stored fingerprint then person allowed to cast his vote if it not matches then person is not allowed to cast his vote. Voting will be done by using switches. the message regarding polling booth location and serial number information send to mobile numbers before a day of voting by using GSM module. MIT application is used for outside voters this is easier application to build electronic projects. Results are displayed in LCD as well as in thingspeak IOT platform as a graph, according to the applications “thingspeak” is open source IOT platform to connect this server esp2866 Wi-Fi module is used [1].

II. FUNCTIONAL BLOCK DIAGRAM AND DECRPTION

The Functional Block diagram of the entire system is as shown in the Figure 1. The project consists of arduino microcontroller. Once the system is rigged up, the primary step is, should enroll the fingerprint, to do so press registration key then press Id key and place a finger on the fingerprint module, now the fingerprint of first person will be stored. Now if another person finger is to be enrolled, we should just increase the Id number. If the person tries to register more than one it will display already registered and even buzzer will sound, once all fingerprints are stored the next step is voting. message regarding polling booth location and serial number will be send to respected mobile number before a day of voting using GSM module. While voting start the match button so that voting period is stared. The module will ask to place finger on fingerprint module, and if a person is authorized, it will display “welcome to polling booth user allowed for voting” he is allowed to vote, else no. on LCD display and now can vote by pressing a switch among different parties. After he makes a vote, he will get to know whether voting is successful or not and even the candidate to whom he voted on LCD display. If unauthorized person tries to vote then buzzer will sound and also displays as “Unauthorized Person contact polling officers for registration” on LCD or if voted person tries to vote once again, it will not be considered and displays “ALREADY VOTED” and also buzzer will sound. The person who is not there in native place can also vote through MIT app, this application only runs during voting period, even if person tries to vote more then once it shows already voted in app. User is having Unique ID as well as password to cast his vote. All the time when voting is successful, message will be sent to the respected person using GSM module. Once voting completes turn off the match button and result can be immediately displayed on the LCD display even results can be seen in thingspeak IOT platform as a graph for this nodeMCU is used.

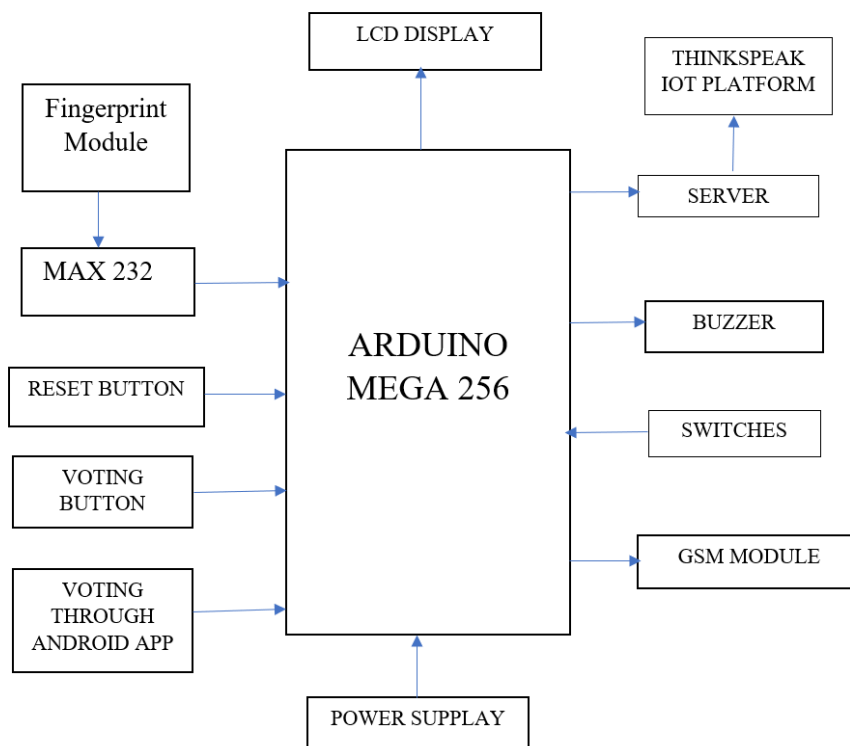


Fig 1: Functional block diagram

A. Arduino Microcontroller

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 general purpose digital pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (serial ports), a 16 MHz crystal oscillator, a USB Type-B connector, a power jack, an ICSP header, and a reset button. It contains everything expected to help the microcontroller; basically interface it to a PC with a USB connection or power it with an AC-to-DC converter or battery to start. The Mega 2560 board is great with most shields expected for the Uno and the past boards Duemilanove or Diecimila.

B. Fingerprint module

It is accepted with solid confirmations that each unique mark is interesting. All persons have their individual fingerprints with the changeless uniqueness. Along these lines, fingerprints have been utilized for recognizable proof and criminological examination for quite a while. Matchless finger consciousness acknowledgment can be obvious among the mainly solid recognizable proof procedures. Unique mark innovation is the most generally utilized for security purposes. The technology is in effect oftentimes utilized in criminal examination reason.

C. Node MCU ESP8266

The ESP8266 is the name of a scaled-down controller arranged by Espressif Systems. The ESP8266 itself is an autonomous WiFi sorting out plan offering as a framework from existing little-scale controller to WiFi and is in like manner fit for running free applications. This module goes with an inborn USB connector and a rich gathering of stick-outs. With a little-scale USB connect, you can interface NodeMCU dev pack to your PC and burst it with no burden, much equivalent to Arduino. It is furthermore rapidly breadboard heartfelt.

D. GSM 800L Module

A GSM module or a GP-RS module is a chip or circuit that will be used to set up correspondence between a wireless or an enrolling machine and a G-SM or GP-RS system. GS-M speaks to Global System for Mobile Communication. SIM800L is a little-scale module which considers GPRS transmission, sending and getting SMS and making and tolerating voice calls. Simplicity and little impression and quad band repeat support make this module perfect response for any endeavor that requires long range organize. In the wake of interfacing power module boots up, examines for cell organize and login normally.

E. MIT Android Application

It uses a graphical interface on a very basic level equivalent to Scratch and the Star Logo TNG UI, which empowers customers to migrate visual things to make an application that can continue running on Android contraptions. In making App Inventor, Google drew upon critical before research in informative handling, similarly as work done inside Google on online improvement conditions.

F. Thing-Speak (server IOT Platform)

As shown by its fashioners, "Thing-Speak is an open-source Internet of Things application and API to store and recoup data from things using the HT-TP show over the Internet or by methods for a Local Area Network. Securing data in the cloud gives straightforward access to data. Using orderly instruments can examine and picture data. In fact, even we can find out new date and envision in plots, outlines and graphs.

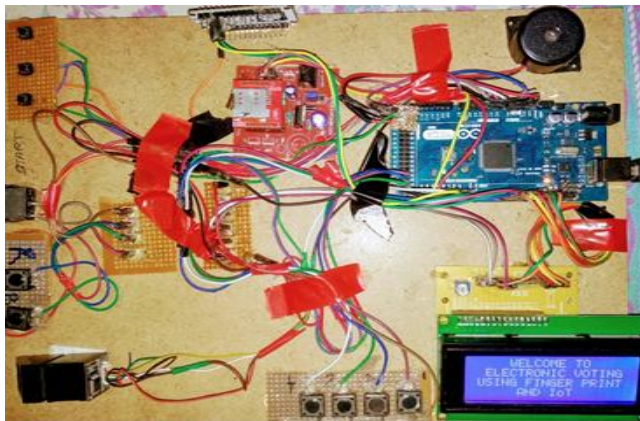


Fig 2: Hardware implementation of Biometric finger print based electronic voting system for rigging free governance using IOT.

III.SOFTWARE IMPLEMENTATION

Arduino is an open-source stage used for structure equipment adventures. Arduino involves both a physical programmable circuit board. The Arduino stage has ended up being well known with people basically starting with contraptions, and in light of current conditions. Not in the slightest degree like most past programmable circuit sheets, the Arduino does not require an alternate piece of hardware to stack new code onto the board – you can basically use a USB interface. Proteus 8 is best replication programming for some structures with microcontroller. It is chiefly pervasive as a result of convenience of practically every microcontrollers inside it. In the wake of recreating your circuit in Proteus 8 Software you can legitimately make PCB structure with it so it could be an across the board bundle for understudies and specialists. Sketch the schematic is exceptionally simple utilizing Proteus. You can tap the "Pick gadgets" catch and choose the ideal segment. You can draw wires by tapping on the terminal of the segment or Vcc, Ground, and so forth.

```

main_code | Arduino 1.6.7
File Edit Sketch Tools Help
main_code
#include<EEPROM.h>
#include<LiquidCrystal.h>
LiquidCrystal lcd(13,12,11,10,9,8);
#include <Adafruit_Fingerprint.h>
String str="";

uint8_t id;
Adafruit_Fingerprint finger = Adafruit_Fingerprint(&Serial);
#define match 22
#define enroll 24
#define del 26
#define up 28
#define down 30

#define indVote 6

#define swl 5

Done Saving.
Arduino/Genuino Mega or Mega 2560, ATmega2560 (Mega 2560) on COM8

```

Fig 3: Example program in Arduino IDE

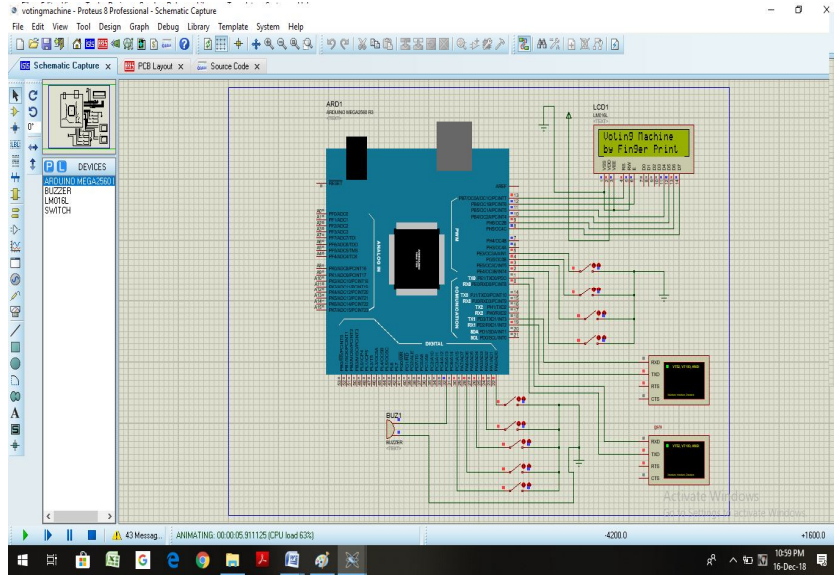


Fig 4: Schematic simulation of biometric fingerprint voting machine using proteus 8 tool.

IV.RESULTS

The design is implemented with embedded C and programmed using Arduino tool. The output results are as shown below.



Fig 5: LCD display of voting results

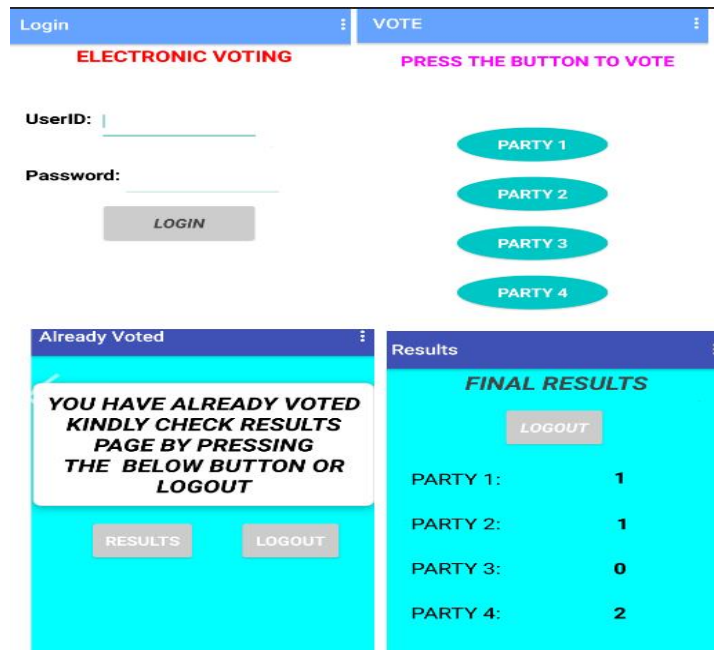


Fig 6: voting results on mobile MIT app

Figure 6 shows voting through MIT application here voter is having individual ID and password by using these two voter can cast their vote for this Wi-Fi module is used, during the voting period only this application is available.



Fig 7: voting results on thingspeak IOT server

Figure 7 shows results of election in Thingspeak According to its developers, "ThingSpeak is an open-source Internet of Things application and API to store and retrieve data from things using the HTTP protocol over the Internet or via a Local Area Network. Storing data in the cloud provides easy access to data. In the form of graph results of election can be declared. Results are declared soon after the voting period completes using nodeMCU WI-FI module.

V. COCNCCLUSION AND FUTURE WORK

Finger print based voting machine using Embedded system is implemented. Design is done to meet all the requirements and specifications. Software tools like Arduino IDE to do program and dump the source code into the microcontroller, Proteus 8 Professional for the schematic design have been used to develop the simulation results before realizing the hardware. The performance of the system is more efficient. Reading the Data and verifying the information with the already stored data and perform the specified task is the main job of the microcontroller. The mechanism is controlled by the microcontroller. The performance has been verified both in software and hardware design. The design implemented in the present work provide portability, flexibility and the data transmission are also done with low power consumption. Once the result is on the server it could be relayed on the network to various offices of the election conducting authority. Thus, project makes the result available any corner of the world in a matter of seconds IOT module is used to check the result in website online.

Future enhancement lists out some missing things in the current system. It also indicates adding more features to the existing system. Following are the future enhancements which could be implemented.

- 1) Number of candidates are increased and also interfaced with the personal computer and result could be stored in the central server and its backup could be taken on the other backend servers.
- 2) Fingerprint scanners can also be fixed in online voting for those who are voting from the App.

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