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Finger Print Based Voting Machine using Arduino

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ABSTRACT: Tampering with the election process is not uncommon, even in some of the countries with strong rule of law. Ballot stuffing, voter suppression, multiple voting and destruction of legitimately cast ballot still covers the headlines of newspapers. Since every person has the unique fingerprint in this world, their fingerprint can be used to cast their vote with electronic fingerprint voting system. The proposed system is offline version. The finger-print voting system requires to register their fingerprint at the polling booth. The person can now vote on the Election Day just by verifying their identity using their fingerprint. The system uses Arduino ,Keil , Proteus, C language and fingerprint technology. The system integrates different hardware components like microcontroller, fingerprint module, LEDs, switches that facilitates a flawless voting system.

KEYWORDS : Arduino, Finger Print , Microcontroller , Keil (Software) , Proteus , C language.

I. INTRODUCTION

Election is a feature of democratic government in which people govern themselves and are able to express their choices regarding various issues, such as constitutional amendments, piece of legislation or choosing the right person as their leader. An electoral system is present to layout the rules of the election. Political election is the most common form of election but there are many different fields where election is vital part of their organizational functions. Election is vital for business, informal organizations and non profit organizations.

In a democratic country, like India voting is an important way where the citizen can cast their vote. Usually voting is done by casting their vote in polling booth. As the technology increases, nowadays electronic voting machine is used for casting vote. The Election Commission of India developed the country's EVMs in partnership with two government-owned companies, the Electronics Corporation of India (ECIL) and Bharat Electronics Limited (BEL). Though these companies are owned by the Indian government, they are not under the administrative control of the Election Commission. They are profit-seeking vendors that are attempting to market EVMs globally. To overcome the problem of tampering with the EVMs and Ballot boxes that are still in use in the election process we've tried to make a Finger Print Based EVM.

This project mainly focuses on developing a prototype of embedded system that deals with fingerprint voting system which can help in progression of election in robust and secure manner. The system integrates different hardware components like microcontroller, fingerprint module, LEDs, switches that facilitates a flawless voting system. For the implementation of this system, DY50 fingerprint sensor is used to take user finger print image and store in internal memory, these images are further processed and analyzed using Arduino. The user interface is implemented using LCD screen, which is mainly used to print user instructions during the execution of the voting process and the result.

II. THEORY

Since every person has the unique fingerprint in this world, their fingerprint can be used to cast their vote with electronic fingerprint voting system. The proposed system is offline version. The finger-print voting system requires to register their fingerprint at the polling booth. The person can now vote on the Election Day just by verifying their identity using their fingerprint. The system uses Arduino and fingerprint technology.

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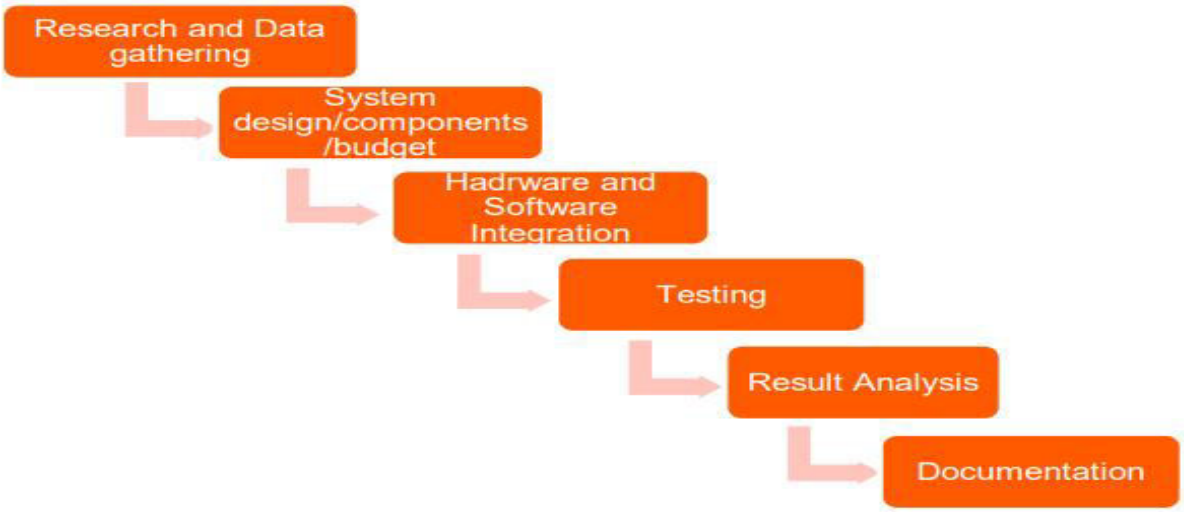

Fig. 1 Methodology

The functional block of the IoT based voting machine with fingerprint verification consist of controller, fingerprint module, Wi-Fi module, keypad, power supply and a cloud. The controller used in this system is arduino Uno. Power is given to the system from the laptop. Keypad is used to poll the vote. Message regarding the system instructions and any malpractice will be displayed on the serial monitor. Fingerprint module is used to place the finger; it is used to store the database of the voter's fingerprint. Fingerprint module identifies the fingerprint of each user with the fingerprint in the database and displays a message if it belongs to an authenticated person. It will give the result of matching on the serial monitor. The ballot paper of the voting is stored on the cloud. The final count of each candidate is stored in different field in the cloud. Here, thingspeak is used to store the final count obtained by the candidate. ESP8266 is used to provide Wi-Fi to the controller. Buzzer is used as an alert when a person votes for the second time. Here they are divided into two units' finger-print unit and voting unit.

Software Specification and Components

1) Microcontroller-AT89C52
2) Fingerprint module-R305
3) EEPROM(24C08A)
4) LCD display.
5) Keypad
6) MAX 232
7) Resistors
8) Capacitors
9) Crystal oscillator
10) Keil µ vision 3
11) Proteus
12) C Language

Fingerprint Module: Fingerprint identification is also known as dactyloscopy. Fingerprint identification is the process of comparing two examples of friction ridge skin impression from human fingers, palm or toes . Today fingerprints are considered being one of the oldest and popular among other biometric technologies.

- The fingerprint scanner used here is NITGEN company based which is the leading manufacturer of FIM(Finger identification Module)
- The methodology involves of storing the fingerprint images as database and during voting the input image is matched using the database

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Fig. 2 Finger Print Scanner (R305)

MatchingAlgorithm: This algorithm detects similarities between two templates extracted by characteristic point extraction algorithm. It is done by comparing the position of each structure and characteristics point as shown in figure.

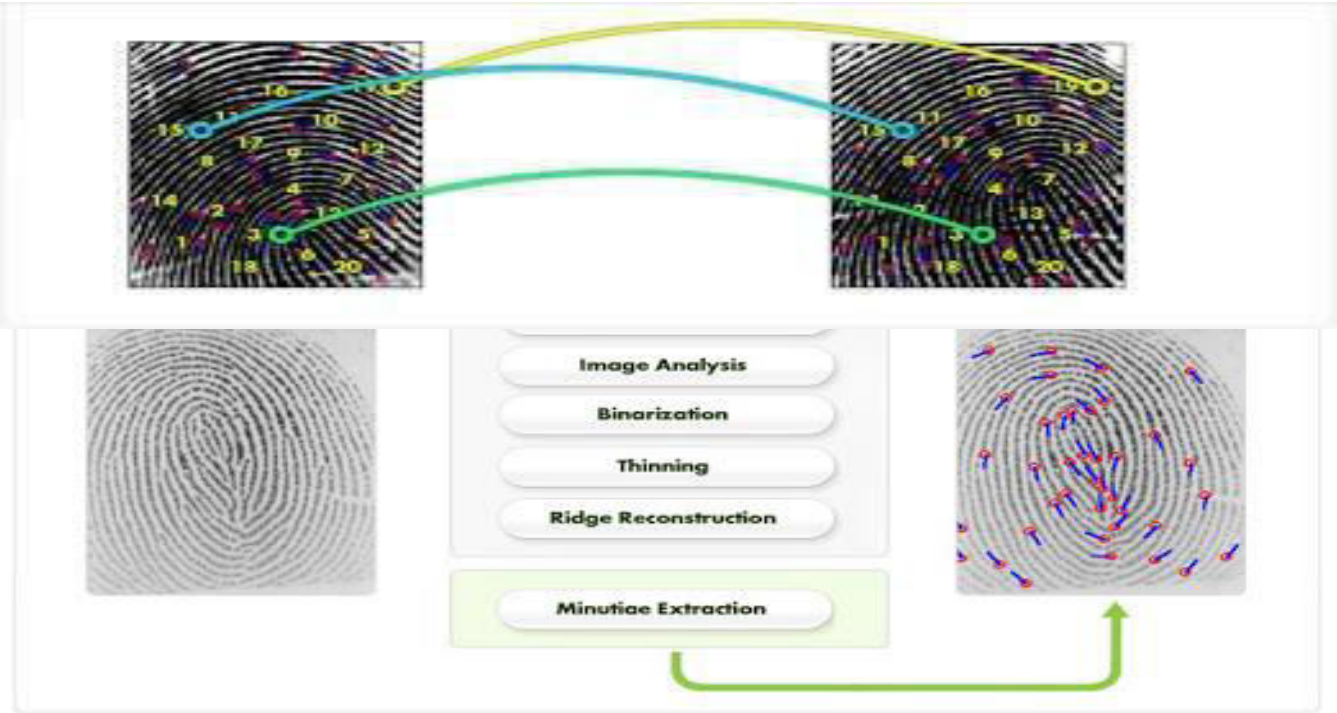

Fig. 4 Finger Print Image Extraction

Microcontroller: Microcontroller is the brain and heart of todays technologically advanced world. Almost every application that is in use today uses microcontroller as its central processing unit. It is heart and brain of the system.

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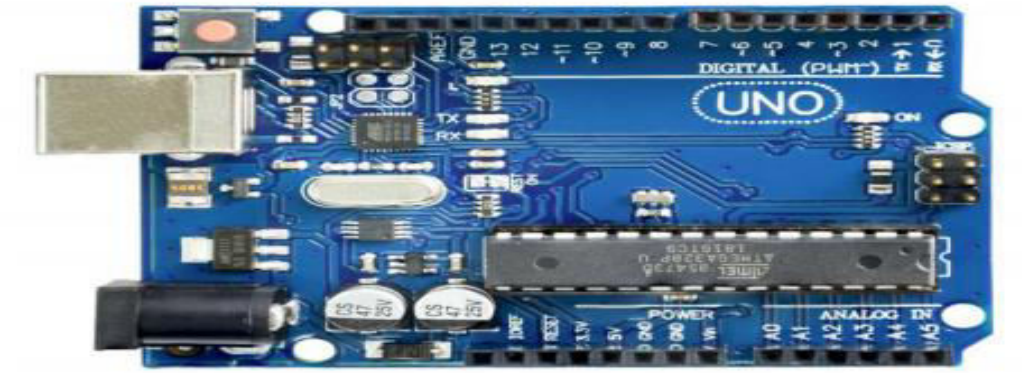

Fig. 5 Microcontroller Chipset

Keil µ vision 3: The µvision3 is a windows based software development platform that combines a robust editor, project manager and makes facility. µvision3 integrates all tools including the C compiler, macro assembler, linker/locator and HEX file generator. The vision3 user interface consists of menus, toolbar buttons, keyboard shortcuts, dialog boxes and windows for managing various aspects of our project.

Proteus: Proteus is a software for microprocessor simulation, schematic capture, and printed circuit board(PCB) design. Proteus PCB design combines the ISIS schematic captures and ARES PCB layout programs to provide a powerful, integrated and easy to use suite of tools for professional PCB design.

III. WORKING

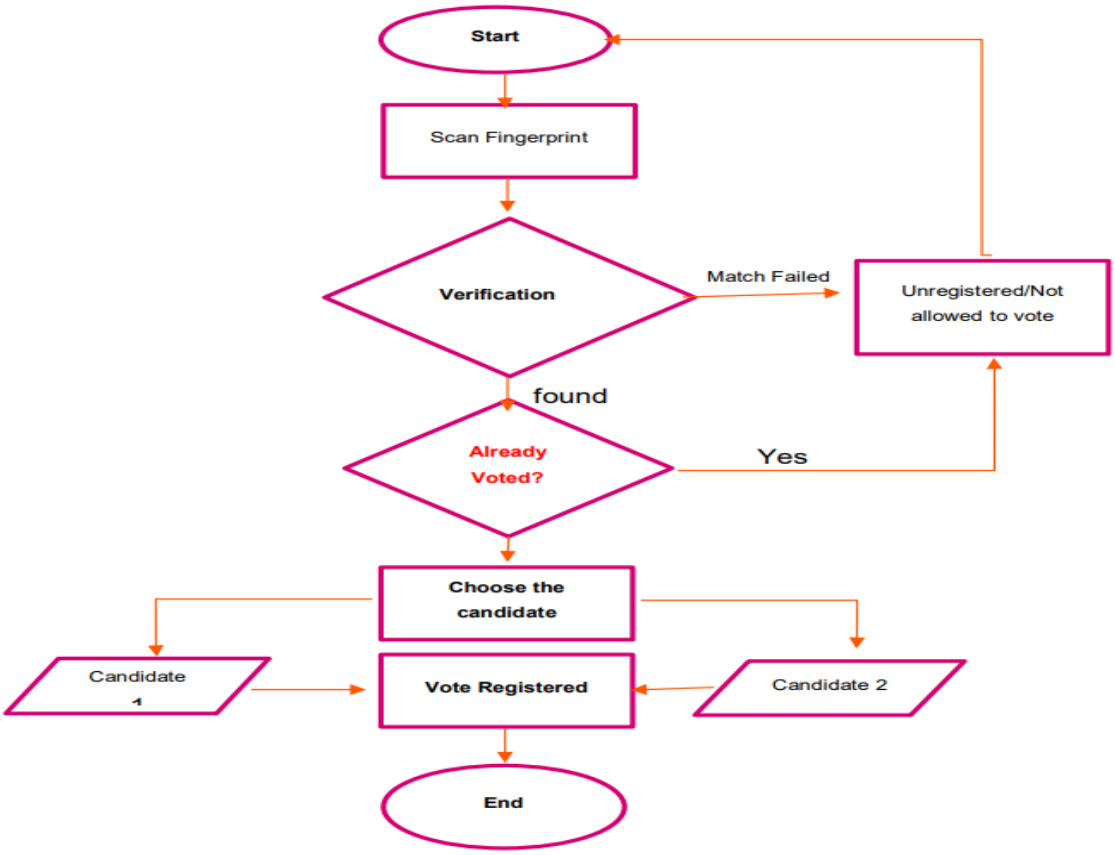

Fig. 6 Block Diagram

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The circuit of this Fingerprint Based Voting Machine Project is very simple which contains Arduino for controlling whole the process of the project, push button for enrolling, deleting, selecting IDs and voting purpose, a buzzer for alert, LEDs for indication and 16x2 LCD for instruct Voter and showing the result as well. Yellow LED indicates that fingerprint module is ready to take an image of the finger and Green LED indicates that system is ready to take a vote or see results. The push button is directly connected to pin A0(ENROL), A1(DEL), A2(UP), A3(DOWN) and A4(Match), D5(Can1), D4(Can2), D3(Can3), D2(Result) of Arduino with respect to ground. Yellow LED is connected at Digital pin D7 of Arduino with respect to ground through a 1k resistor and Green LED is connected to D6 of Arduino with the same method. Fingerprint module's Rx and Tx directly connected at Serial pin Tx and Rx of Arduino. 5v supply is used for powering finger print module taken from Arduino board. A buzzer is also connected at A5. A 16x2 LCD is configured in 4-bit mode and its RS, EN, D4, D5, D6, and D7 are directly connected at Digital pin D13, D12, D11, D10, D9, and D8 of Arduino.

IV. VOTING PROCESS

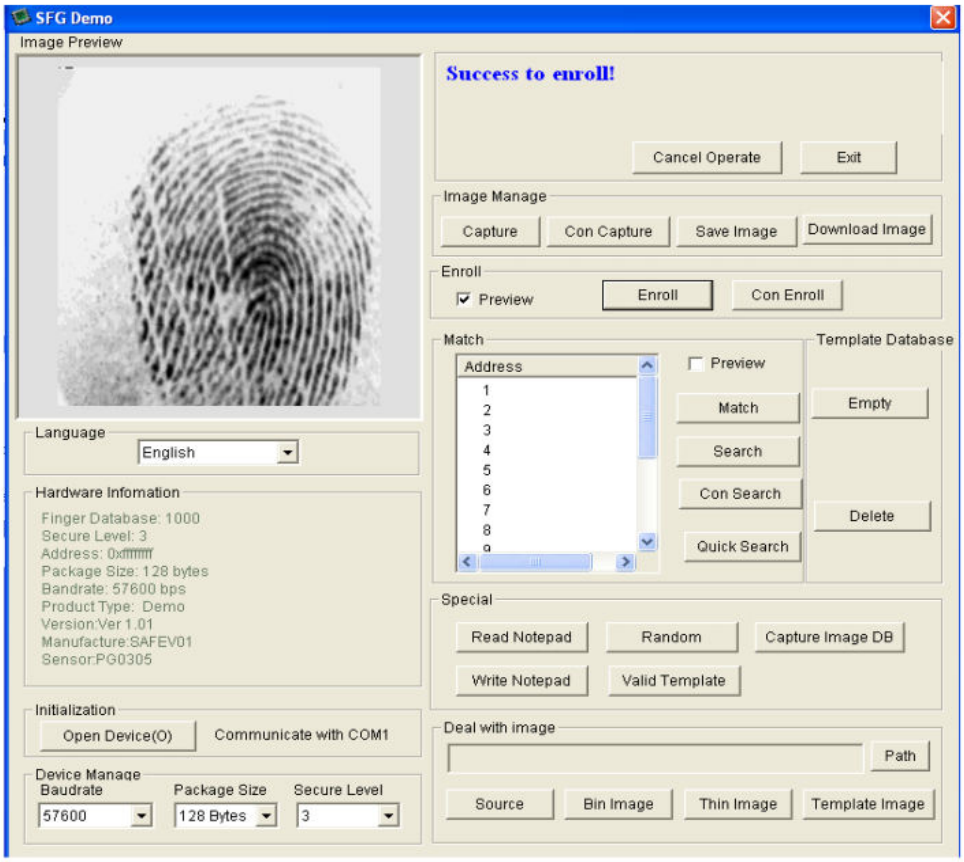

Fig. 7 Voter Enrollment and Checking

Voting Enrollment and Checking Procedure of the Voter using the software , where the finger print which was earlier registered on the software is being matched and then later the result is b being shown on the LED

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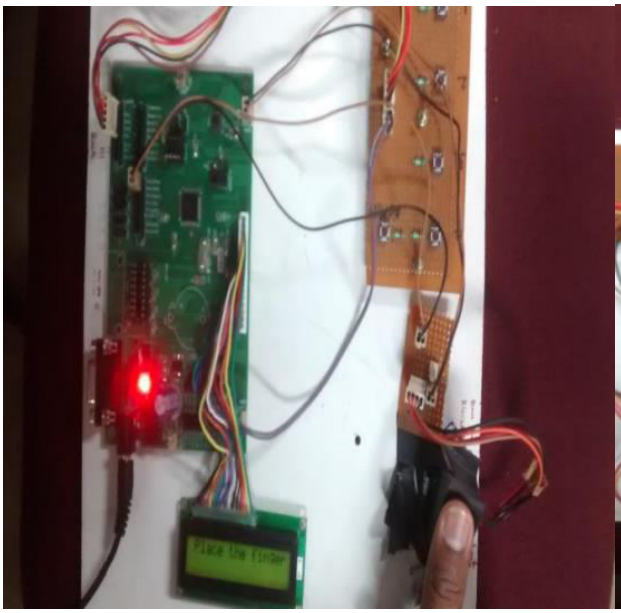

Fig. 8 Placing Finger for Identification

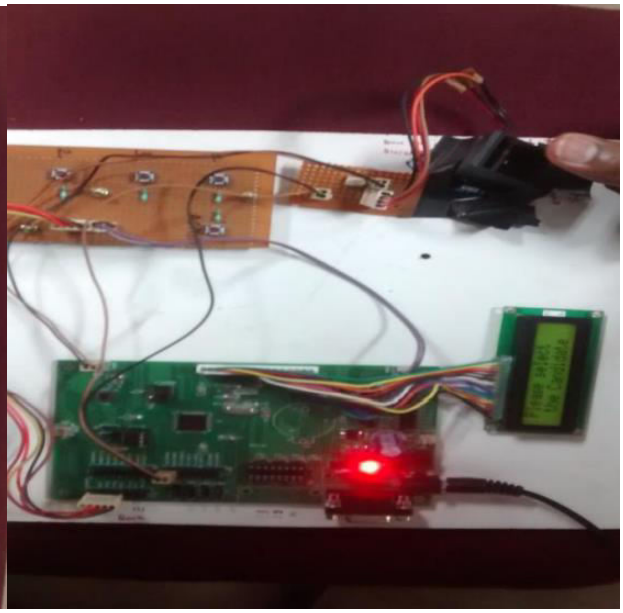

Fig. 9 Casting of Vote

Fig. 10 Display After the Vote Casting

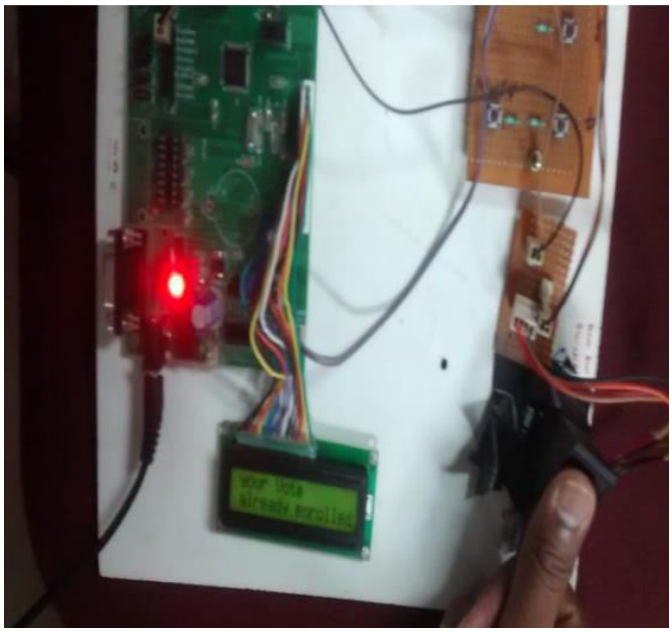

Fig. 11 On the attempt of re-voting by the same person

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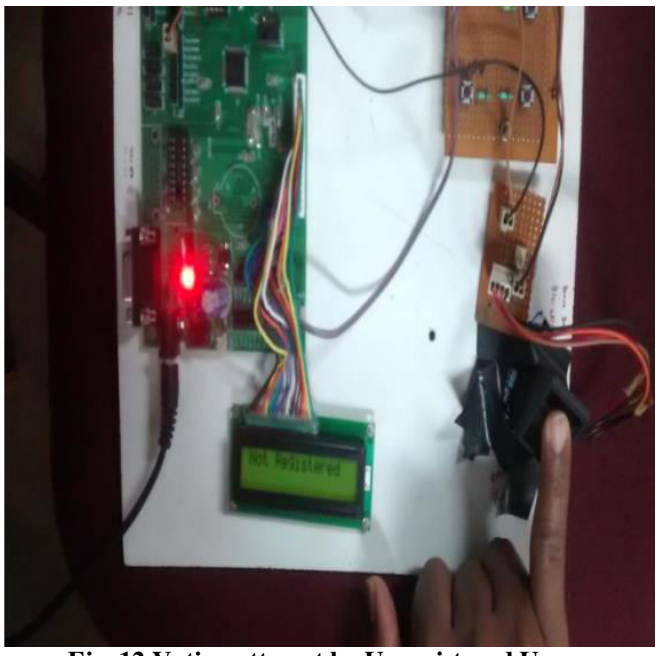

Fig. 12 Voting attempt by Unregistered Users

V. CONCLUSION

The project "Fingerprint Based Voting Machine" was mainly intended to develop a fingerprint based advanced Electronic Voting Machine (EVM) which helps in free and fair way of conducting elections which are basis for democratic country like India. The final system is the result of various successful hardware and software integration. The process includes review and analysis, designing the system and algorithm, hardwiring, hardware and software integration, test and troubleshooting and result analysis. To summarize, the prototype device was successfully able to enroll the fingerprint of the voters in fingerprint module flash memory, verify the status of voters (registration and multiple voting), matching the new fingerprint input with saved fingerprint template, authorize the voter to cast the vote and was able to generate result. To conclude, the device is great alternative to other lengthy election processes especially ballot paper voting system. Further improvement of the prototype device could be done at the later development stage. For instance, an addition of WIFI module could help send result wirelessly to host computer and adding external memory space could help store any amount of fingerprint data

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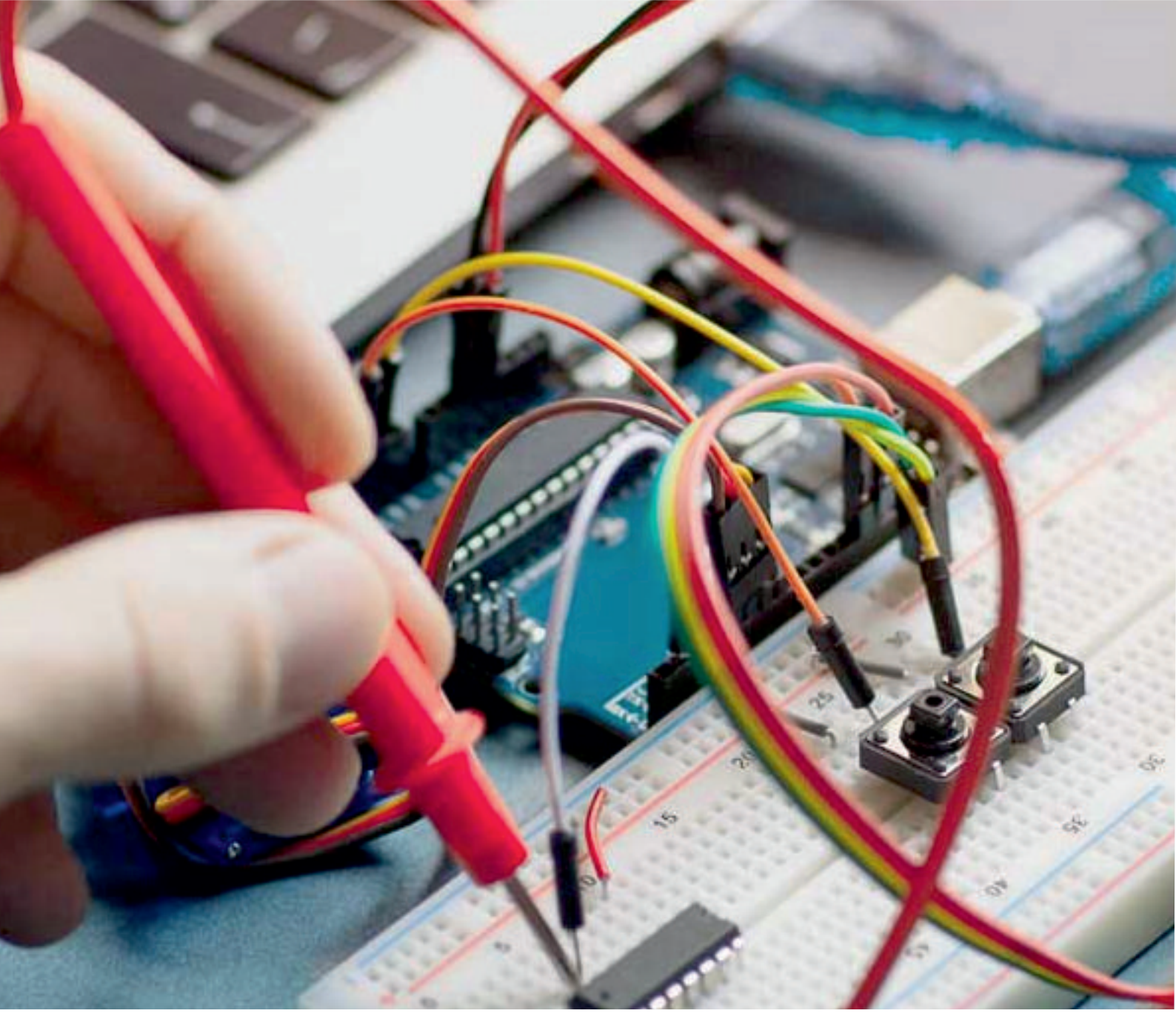

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