Design and Implementation of IoT based Electronic Voting Machine

Prof. S. S. Kamate
Electronics and Communication Engineering
Hirasugar Institute of Technology, Nidasoshi.
Belagavi, Karnataka, India
sskamate.ece@hsit.ac.in

Prof. S. S. Malaj
Electronics and Communication Engineering
Hirasugar Institute of Technology, Nidasoshi
Belagavi, Karnataka, India
ssmalaj.ece@hsit.ac.in

ABSTRACT

This project proposes policy regarding the electronic approaches and developments towards electronic data storage and transmission. The finger print devices for voting machine and different existing identity documents are mentioned and enforced. The voting system is managed in a easier manner since all the users should login by Face recognization and click on his/her interested candidates to cast the vote. This system has high security in which voter high security password is confirmed before the vote is accepted in the main database of Election Commission of India (ECI). The proposed EVM consisting of finger print module, Camera module, raspberry pi board, touch based LCD panel and also it having voter information storage device (Thumb impression) and management system. The software with Raspberry pi platform is developed for automated electronic voting machine system.

Keywords—Automated Electronic Voting machine, Raspberry pi, IoT, finger pint sensor, pi camera

I. INTRODUCTION

Since the population has been increased in India, the voters have also increased; the maintenance of transparency of voting system by government is somewhat difficult especially in conventional method of voting. In this project high transparency voting system is developed to avoid illegal voters and thereby to protect our democracy. Illegal voter are like same voter can try to use the vote of others who do not participate in the voting system by removing the ink from his/her finger. This type of illegal system can be avoided only by using biometric authenticating voting system that is by high secure Electronic Voting Machine (EVM) with high transparency.

VNC server based Raspberry Pi 3 electronic voting machine [1], has password security using aadhar and finger print authentication to avoid illegal voting. In [2], Raspberry Pi is used as the host, a camera to take frontal image of the voter. If the citizen is valid and didn't vote then allowed to vote with finger print authentication. Here in this paper also we have two authentication processes and updates the result on the google sheet.

There are two types of authentication processes which are introduced in this project, one is finger print authentication and second one is face authentication. At first the voter has to enroll by putting the thumb on the finger print scanner and provide the permanent address with face and latest photograph. All the information of the voters is stored in a data base of the Raspberry Pi processor. All this process is done under the Election Commission of India before the election. When the voter comes to EVM, he/she has to give thumb impression, on the finger print scanner, and face will be recognized by Pi-camera. The raspberry Pi System checks the voter data with the data base whether the candidate is already enrolled or not. If the thumb print and face is matched with data base, which already exists then "voter verified" message is shown on to the VNC server (client). The whole information of the voter is displayed and the system is allowed to proceed for voting. All the process is repeated for each and every voter. When the voter comes to EVM to vote again, the Raspberry Pi 3 EVM system has data already stored in EVM system when he/she voted does not allow him to vote. After finishing the voting process all voters reports are stored in the data base with high security and will be sent to the server by using wireless communication or IOT. This paper covers Block diagram in section II followed by major devices, section III and IV give circuit diagram and working details respectively.

II. BLOCK DIAGRAM

The proposed approach is to avoid illegal voters and thereby to protect our democracy. Illegal voter are like same voter can try to use the vote of others who do not participate in the voting system by removing the ink from his/her hand. These types of illegal system can be avoided only by using biometric authenticating voting system that is by high secure EVM with high transparency.

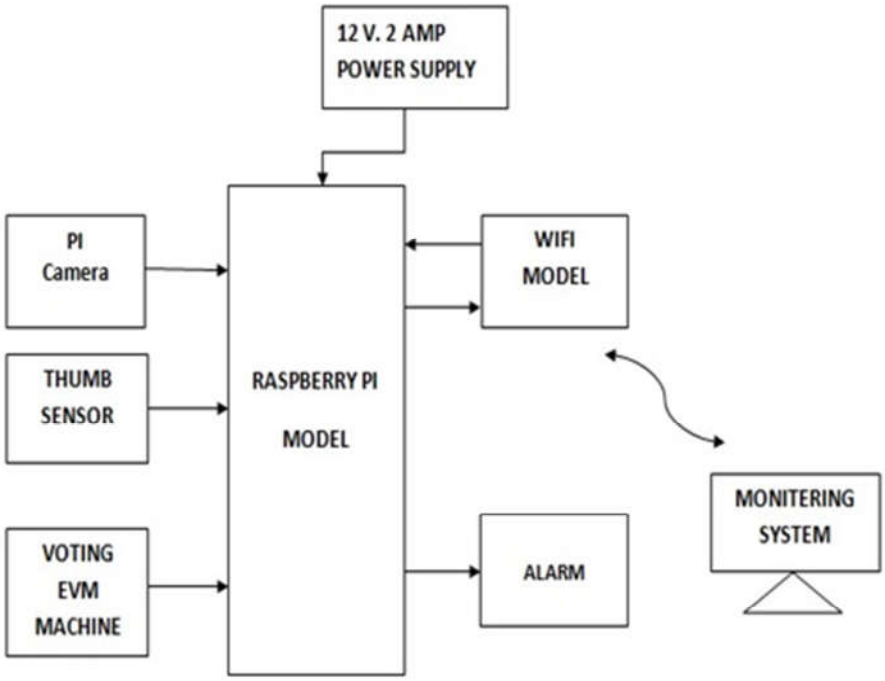

Fig. 1: IOT based smart voting machine

At first the voter has to enroll by putting the thumb on the finger print scanner and provide the permanent address with ID number and latest photograph. All the information of the voters is stored in a data base of the Raspberry Pi processor. All this process is done under the ECI before the election.

When the voter comes to EVM, his/her thumb on the finger print scanner, the raspberry Pi System checks the voter data with the data base weather the candidate is already enrolled or not. If the thumb print is matched with data base, which is already existed "finger is found" message is shown on to the VNC server.

A. RASPBERRY PI 3 MODEL B+ MODEL

The Raspberry Pi 3 Model B+ is the latest product in the Raspberry Pi 3 range, Broadcasting a 64-bit quad core processor running at 1.4GHz, dual-band 2.4GHz And 5GHz wireless LAN, Bluetooth 4.2/BLE, faster Ethernet, and PoE capability via a separate PoE HAT.

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Fig. 2: Raspberry pi B+ model

The dual-band wireless LAN comes with modular compliance certification, allowing the board to be designed into end products with significantly reduced Wireless LAN compliance testing, improving both cost and time to market. The Raspberry Pi 3 Model B+ maintains the same mechanical footprint as both the Raspberry Pi 2 Model B and the Raspberry Pi 3 Model B.

B. FINGER PRINT SENSOR

A fingerprint sensor is a sensing electronic device which is used to capture a digital image of the fingerprint pattern. The finger print sensor module with TTL UART interfaces directly to raspberry pi UART or PC by means of MAX232/USB serial adapter. The voters can able to store the information of their finger print in the module and can configure it in 1:1 r 1: N mode for identifying the person. The Finger Print module is directly interfaced raspberry pi.

Fig. 3: Finger Print Sensor R(305)

Table-1: Specification of finger print sensor R (305)

Power	DC 3.6V- 6.0V	Interface	UART (TTL Logical level) / USB 1.1
Working current	Typical: 100mA Peak: 150mA	Matching Mode	1:1 and 1:N
Baud rate	(9600*N)bps, N=1～12 (default N=6）	Character file size	256 bytes
Image acquiring time	<0.5s	Template size	512 bytes
Storage capacity	256	Security level	5 (1, 2, 3, 4, 5(highest))
FAR	<0.001%	FRR	<0.1%
Average searching time	< 1s (1:1000)	Window dimension	18mm*22mm
Working environment	Temp: -10℃- +40℃	Storage environment	Temp: -40℃- +85℃
	RH: 40%-85%		RH: <85%
Outline Dimension	Split type	Module: 32*23*7mm Sensor:56*20*21.5mm	
	Integral type	54.5*20.6*23.8mm	

C. PI CAMERA

The Raspberry Pi camera module can be used to take high-definition video, as well as stills photographs. The module has a five megapixel fixed-focus camera that supports 1080p30, 720p60 and VGA90 video modes,

as well as stills capture. It attaches via a 15cm ribbon cable to the CSI port on the Raspberry Pi. It can be accessed through the MMAL and V4L APIs, and there are numerous third-party libraries built for it, including the Pi camera Python library. The camera module is very popular in home security applications, and in wildlife camera traps. You can also use it to take snapshots.

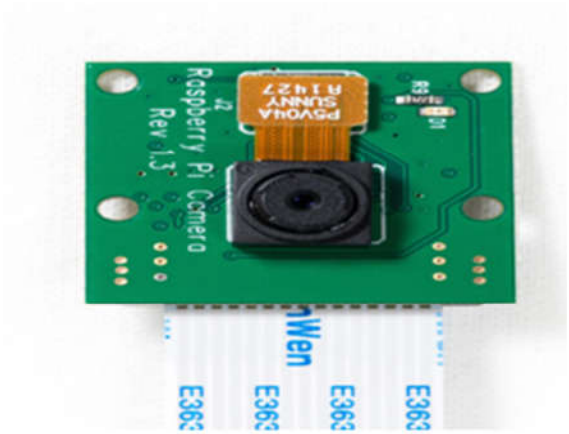

Fig. 4: PI camera

III. CIRCUIT DIAGRAM

The circuit diagram of the Electronic Voting machine is given below fig. The hardware setup is done, wherein camera and Raspberry pi are connected; the camera interface to CSI Connector Using 15Pin FPC flex cable to connect the camera interface on the Rasp CAM board and the CSI connector on the Raspberry Pi B+ board. Connect the Rasp CAM and Raspberry Pi B+ board. Connect the 40pin connector on the Rasp CAM board to the pin header on the Raspberry Pi B+ board. Using the plastic standoff spacer between two boards, then fasten the screws.

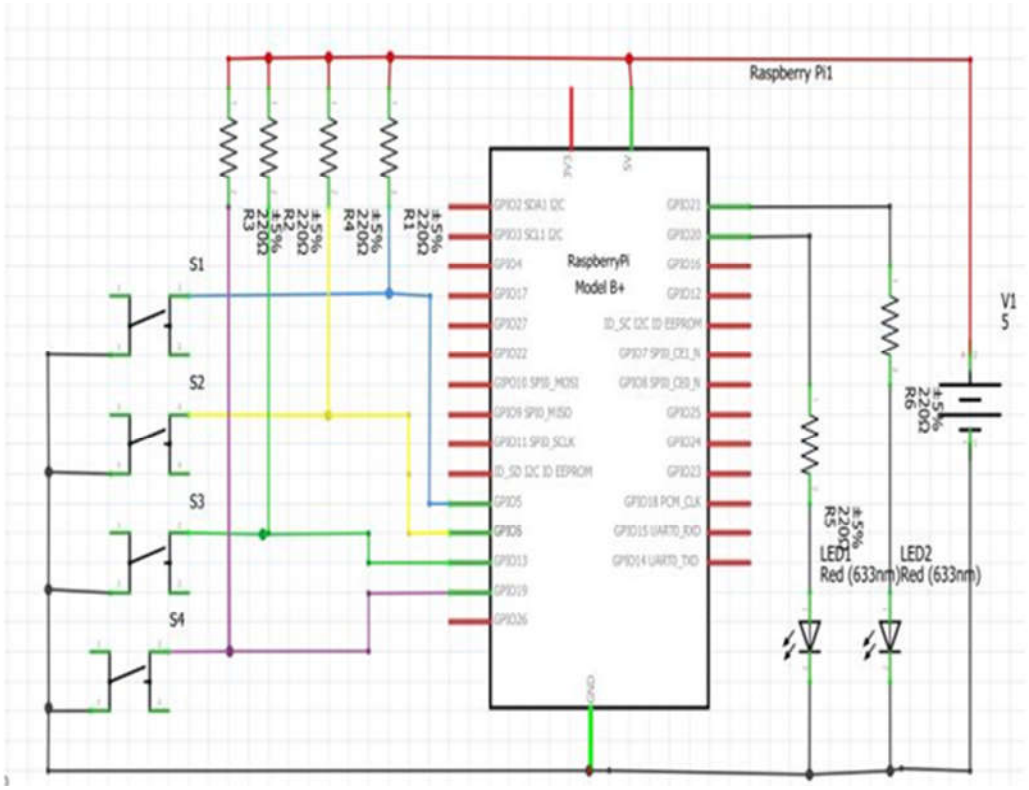

Fig. 5: Circuit Diagram of IOT Based Smart Voting Machine

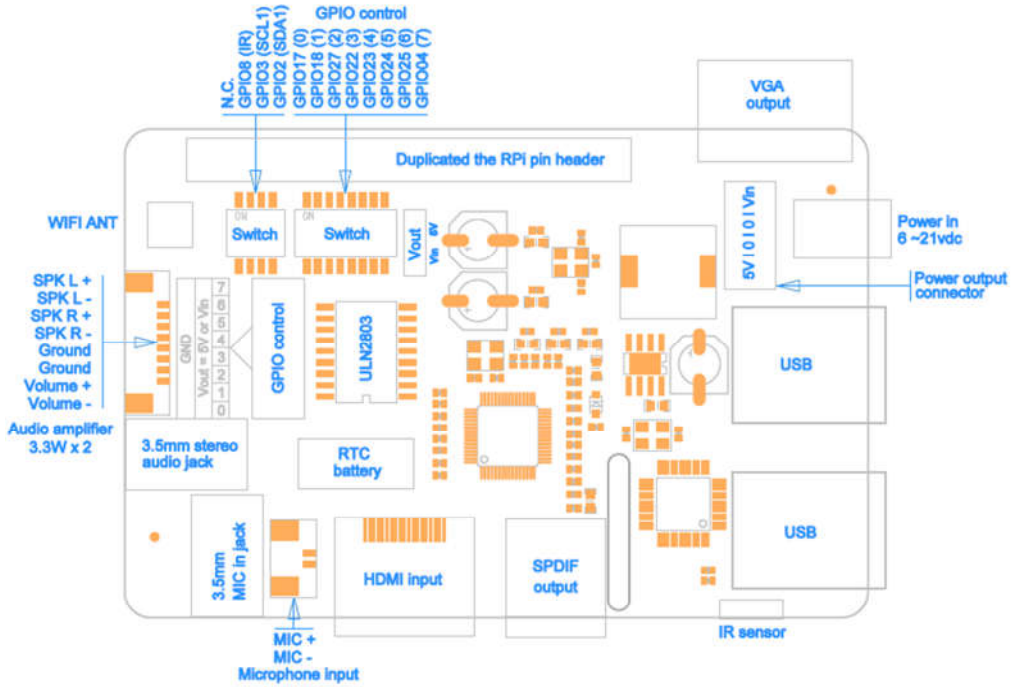

Fig. 6: PCB DESIGN

IV. WORKING

When the voter comes to EVM, he/she has to give thumb impression, on the finger print scanner, and face will be recognized by Pi-camera. The raspberry Pi System checks the voter data with the data base whether the candidate is already enrolled or not. If the thumb print and face is matched with data base, which already exists then "voter verified" message is shown on to the VNC server (client). The whole information of the voter is displayed and the system is allowed to proceed for voting. All the process is repeated for each and every voter.

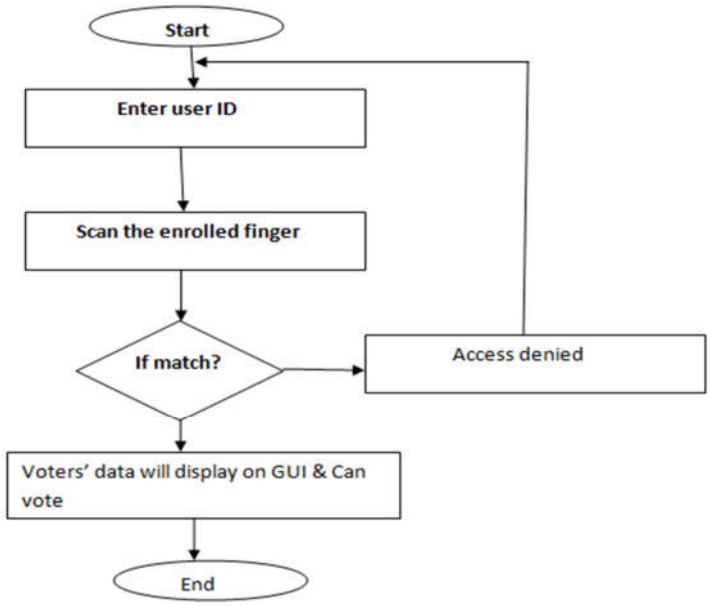

Fig. 7: Flow Chart of IOT based Smart Voting Machine

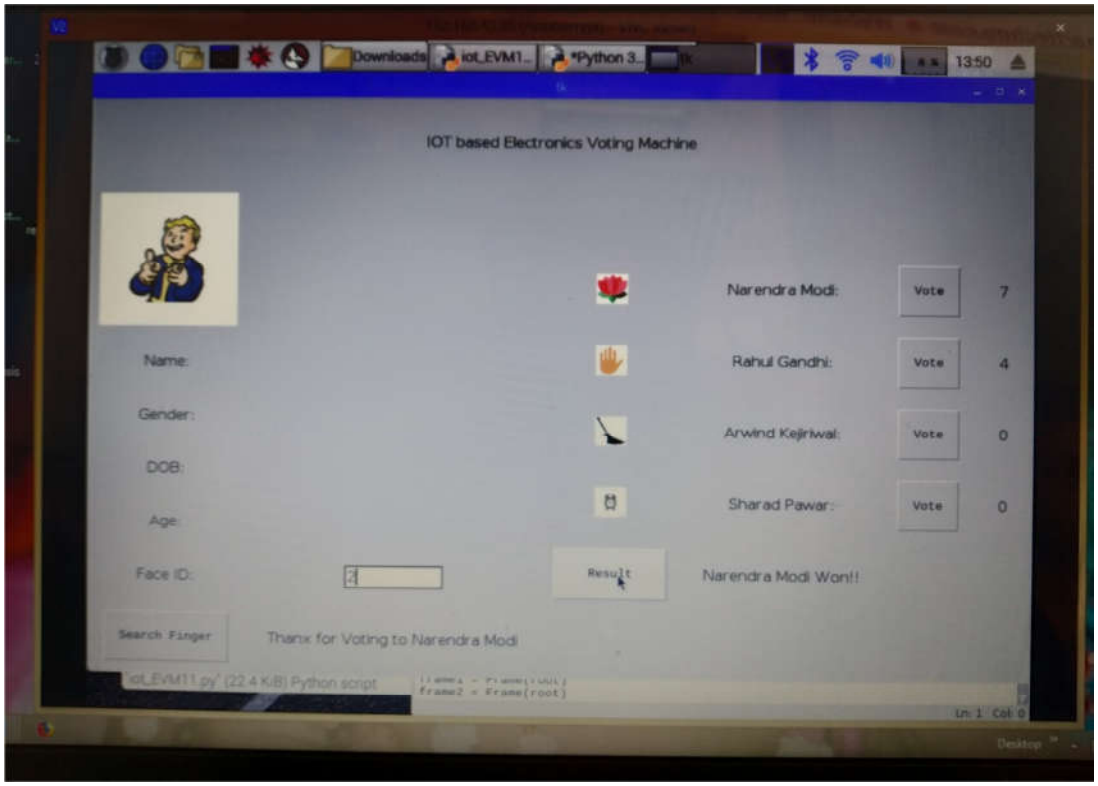

Fig. 8: Sample result of project

IV. CONCLUSION

Present work is focused on the design and development of electronic voting machine. It is having more benefits like high security, and transparency. The system is user friendly; easy to understand. By using this EVM we can avoid the fake voting and the results can be quickly declared. The proposed system uses Pi camera and the Fingerprint sensor and that's why the system's accuracy will increase rather than the old ballot paper system. Because of this the manpower will be reduced. And further this system will give correct voting information and quick results, this information will be on sever, will be seen anytime.

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