

IoT BASED SMART VOTING SYSTEM

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Abstract - The process of efficient voting is a vital component in the proper functioning of our increasingly modernized society. Hence there is a need for a system that would build upon that concept as well as being more compact, elegant and cost-effective, while at the same time capable of catering to a broader range of populace, all at the same time maintaining fairness and impartiality throughput. On proposing IoT based Smart Voting System, using mobile application, unique ID and fingerprint details for authentication will simplify the voting process by considerably reducing the steps for voting and increasing overall throughput, keeping interaction between voters and the system easy understandable, as well as eliminating unnecessary and costly hardware that have no overall impact on the final outcome, thus providing for a smarter and more feasible solution.

1. INTRODUCTION

India possesses a biggest democracy in the world. Democracy is defined as "Government by the people, for the people and of the people". Biometrics is the science and technology of measuring and analysing biological data. Biometrics refers to technologies that measure and analyse human body characteristics, such as DNA, fingerprints, eye retinas and irises, voice patterns, facial patterns and measurements, for authentication purposes. The field of biometrics was formed and has seems expanded on too many types of physical identification. Among the several human fingerprints remain a very common identifier and the biometric method of choice among law enforcement. The basic point of these devices is also to examine the finger print data of an individual and compare it to a database of other finger print. In this project fingerprint are used for the purpose of voter identification or authentication. As the thumb impression of every individual is unique, it helps in minimizing the error. A database is created containing the fingerprint images of all the voters as required. Illegal votes and repetition of votes is checked for in this system with accurate coding.

1.1 INTERNET OF THINGS

IoT is the network of physical devices, vehicles, home appliances, and other items embedded with electronics, software, sensors, actuators, and connectivity which enables these Things to connect and exchange data, creating opportunities for more direct integration of the physical world in to computer-based systems, resulting in efficiency improvements, economic benefits, and reduced human exertions. IoT involves extending internet

connectivity beyond standard devices, such as desktops, laptops, smart phones and tablets, to any range of traditionally dumb or non-internet-enabled physical devices and everyday objects. Embedded with technology, these devices can communicate and interact over the internet, and they can be remotely monitored and controlled [2].

1.2 WIRELESS FIDELITY

Wi-Fi is a technology that uses radio waves to provide network connectivity. A Wi-Fi connection is established using a wireless adapter to create hotspots - areas in the vicinity of a wireless router that are connected to the network and allow users to access internet services. Once configured, Wi-Fi provides wireless connectivity to your devices by emitting frequencies between 2.4GHz - 5GHz, based on the amount of data on the network [1]. Wi-Fi can be used on several types of devices like personal computers, video game console, smart phones, digital camera, tablet computers etc. You can use Wi-Fi to create a hotspot within the range of 20 meters (66 feet). It is less secure than wired connection because the intruder does not need the physical connection to use the Wi-Fi.

1.3 SMART VOTING SYSTEM

Smart Voting System is implemented with the Adriano technology. In this System a voter can poll his vote easily. In the database server all voters information is stored, the voter should enter password. This information will be checked by the database server. Because all the information about the voter already stored in data base, if wrong login information is entered, the system will not allow the voter to poll his or her vote. This system is helpful to reduce time required for voting process. It provides secured voting process with the use of finger prints. Fingerprint uniquely identifies the individual user. Fingerprint Voting System is user-friendly. It has simple architecture, responses very quickly manner, it reduce the polling time, Reduce the staff of voting centre, it provide easy and accurate counting without any troubles [3].

2. METHODOLOGY

The project is based upon fingerprint based android application voting system. The first unit consists of Fingerprint scanner to enrol (register) and scan the fingerprint using software SDK tool. The fingerprint data is fed to Arduino Uno which is programmed to accept the fingerprint as digital information. Using android application registered voter needs to log into the system.

ESP WROOM 32Wi-Fi module is used as transition agent between the voter the server. After login process voter needs to verify the finger prints with fingerprint scanner. After successful recognition/authentication voter will get to candidates list according to their respective region. After all these process voter will get SMS as acknowledgement of voting via Global System for Mobile communication (GSM).

2.1 BLOCK DIAGRAM

By using the UART, the finger print information of the voters is stored in the database. Next by using the Android application the voter needs to login to the voting process by entering the correct password provided by the server. After the proper login the phone number is verified, after the verification the server will send the verify message to the voter's mobile. The finger print of the voter is scanned using the finger print scanner, if authenticated fingerprints are detected then the mobile application will directs to the location based candidates list from the ESP Wi-Fi module. After the vote has been casted then the voter will get the acknowledgement through SMS via GSM interfacing with Arduino UNO. Finally after entire voting process is completed the vote counts are stored.

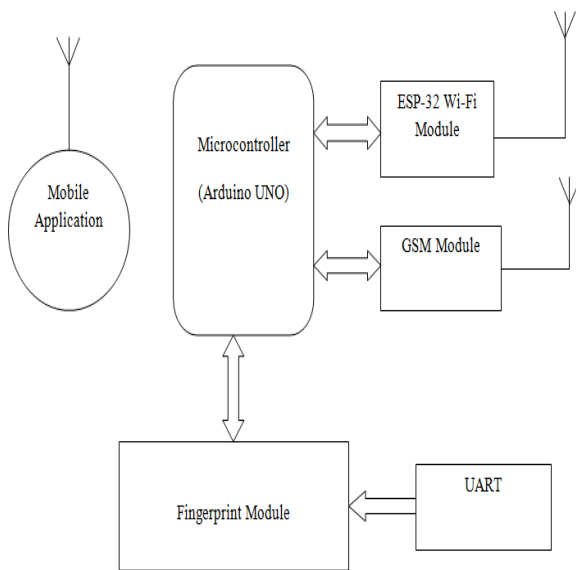


Fig-1: Complete Architecture

2.2 HARDWARE REQUIREMENTS

- **Arduino UNO** - The Arduino UNO is an open source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.
- **ESP 32 Wi-Fi Module** - ESP32 is a series of low-cost, low-power system on chip microcontroller's with integrated Wi-Fi and dual-mode Bluetooth
- **GSM Unit** - GSM is a mobile communication modem, it stands for Global System for Mobile Communication.

- **UART** - A Universal Asynchronous Receiver-Transmitter is a computer hardware device for asynchronous serial communication in which the data format and transmission speed are configurable.
- **GT-511C3 Finger Print scanner** - GT-511C3 FPS (fingerprint scanner) is a small embedded module that consists of an optical sensor mounted on a small circuit board.

2.3 IMPLEMENTATION

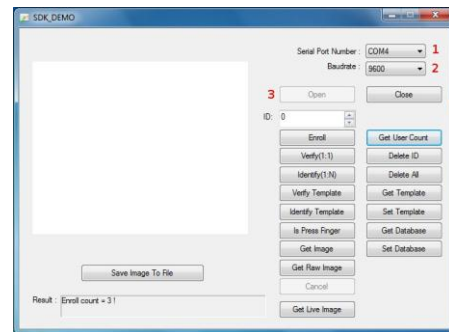


Fig-2: SDK demo software

2.3 SMARTPHONE APPLICATION

Implement android based application for communication between hardware equipment's and smart phone through Wi-Fi and made a series of security pages for OTP authentication and also for finger print authentication and that works on both hardware and software application like we did on following pictures that took as screenshot.

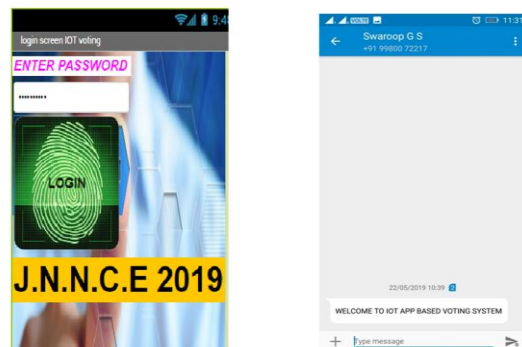


Fig-3: login page and welcoming

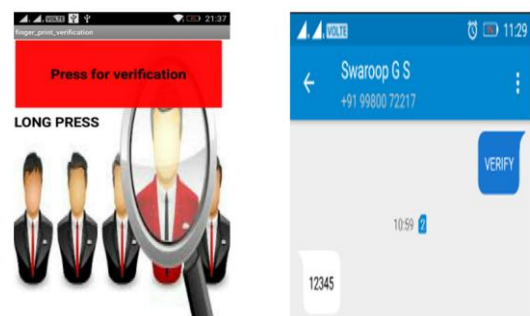


Fig-4: Verification page through OTP

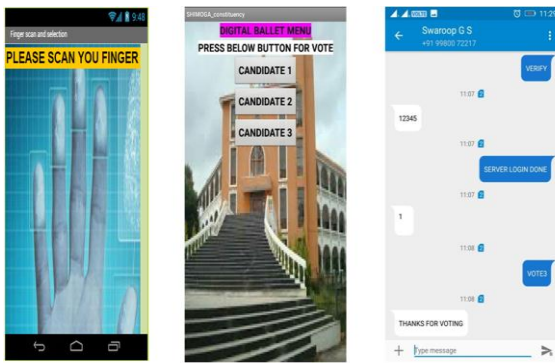


Fig-5: Region wise voting list (Shivamogga)

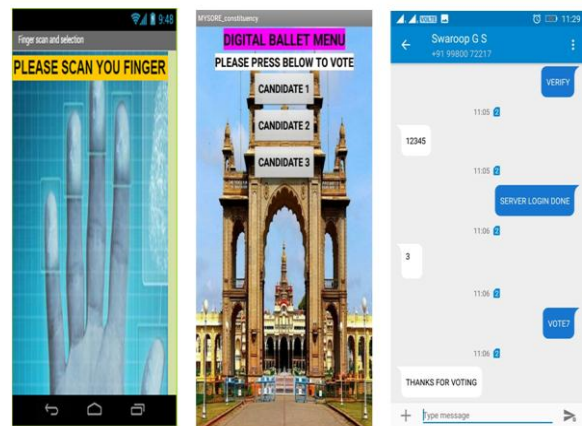


Fig-7: Region wise voting list (Mysore)

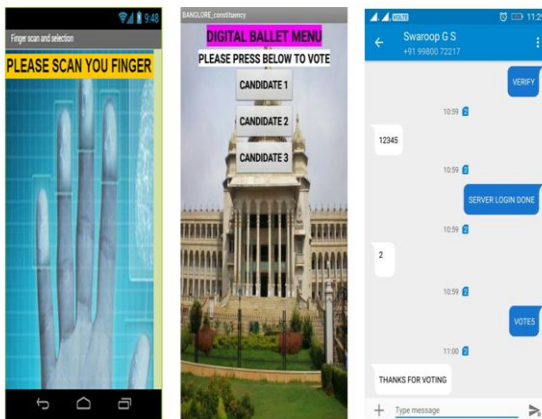


Fig-6: Region wise voting list (Bengaluru)

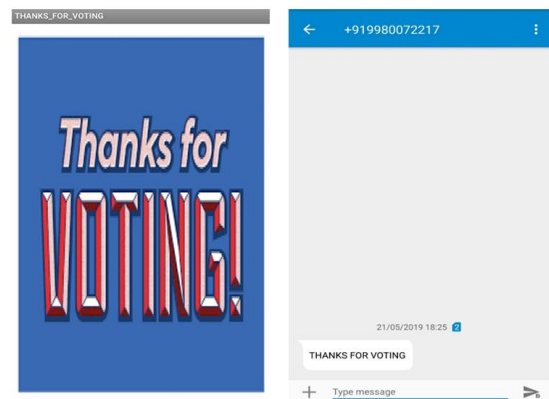


Fig-8: voting acknowledgment to the user

3. CONCLUSIONS

The IoT based Smart Voting System is designed.

In which the election data is recorded and stored as digital information and also provides secured voting by providing acknowledgement to the user. This project enable's a voter to give his/her vote and avoid proxy vote or double voting and provide high security, quick to access and easy to maintain all information of voting, highly efficient and reliable duet use of fingerprint scanner it reduce or remove unwanted human error. In addition this voting system is capable to handle multiple modules in various centres and provide better scalability for large election.

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