**PROPOSAL ON THE DESIGN AND CONSTRUCTION OF AN ELECTRONIC VOTING SYSTEM USING ARDUINO**

# Objective

The objective of this project is to design and construct a fingerprint based electronic voting system using arduino to reduce rigging of elections and make collation of results faster.

The aims include:

* Development of a portal for registration and generation of identification number with React JS.
* Construction of the electronic voting system with arduino.
* Development and setting up of the API/server that interacts with the database
* Development of a mobile application where live results can be viewed (future work).

# Introduction

Election is an important aspect of democratic process to choose the leader of a state or country. There are various types of voting systems used in different countries. Paper ballots are used in Nigeria and votes are collated manually. There are also other electronic voting systems in world elections such as Optical Scanning, Direct Recording and Vote over Internet. Somalia recently used Iris biometric voting system in the concluding election.

The fingerprint voting machine is an electronic voting machine using the human biometric system. This can be used to eradicate the use of ballot papers during elections. In the recent concluding elections in Nigeria, various forms of electoral malpractices and misconducts were noticed such as voting by fictitious people and multiple voting by a single person. A vote is considered invalid if the mark is in between two parties’ symbols or is not in a box near any party. According to INEC (Independent National Electoral Commission), there were over one million rejected votes just in the concluding presidential election. All these misconducts and malpractices is partly due to the use of manual ballot papers. These issues could be resolved or minimized in a system whereby a person is authorized with his unique fingerprint. Electronic using fingerprint is a more secure and efficient way of voting.

# Methodology

A registration portal for registration and generation of identification number for eligible voters would be built using React JS.

The main components needed for the electronic voting system include an arduino Uno, fingerprint sensor module, 16 X 4 LCD display, push buttons and a 4.2V battery.

At the backend, the arduino would be connected to a MySQL database and an API server. The API would be built using PHP and XAMP. A mobile application could also be built for viewing live results of the election.

The process basically would consist 3 stages

* Generation of unique identification number (ID) for eligible voters through registration on the portal.
* Registration of eligible voters through fingerprint enrolment by matching the fingerprint with the generated ID.
* Casting of votes by eligible voters.

Voters that are eligible would register on the online portal where their first name, last name, address and other necessary pieces of information would be needed. After completing the registration, a unique ID is being generated for each person. This unique ID alongside the other information submitted would be saved in the database. The schema of how the row for a user in the database might look after registration is shown below:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ID | First Name | Last Name | Party | Voted? | Fingerprint |
| 564664 | Babatunde | Olagunju |  |  |  |

For enrollment, the user has to input the unique ID being given after registration to the voting system. Using the Wi-Fi module, the arduino would be connected to the server. A request is then being sent to the server to ensure the ID is valid. If valid, the desired finger is then placed on the fingerprint sensor module and the fingerprint of the user is scanned. The fingerprint is saved in the fingerprint scanner flash memory. Base 64 would be used to convert the fingerprint image to a unique string or text. An HTTP POST request is sent to the API to save the unique string in the row of the registered user on the table. The table would like this after enrolment.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ID | First Name | Last Name | Party | Voted? | Fingerprint |
| 564664 | Babatunde | Olagunju |  |  | xgxhhggdgdg |

To vote, the user has to input his given ID. A request is being sent to the server to check if the ID is valid and the user has enrolled. If this condition is satisfied, the user would be allowed to vote by pressing the button of the desired party. A POST request which contains the ID, fingerprint and the party is sent to the API. The fingerprint is being compared to the one on the row of the unique ID to check if they match. If they don’t match the user would not be allowed to vote. If they match and the “Voted column” is 1, the user wouldn’t be able to vote as well because “1” signifies the user has voted before. When confirmed the user is eligible, the party voted for and voted columns are now being updated. After voting, the table would like what is shown below

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ID | First Name | Last Name | Party | Voted? | Fingerprint |
| 564664 | Babatunde | Olagunju | APC | 1 | xgxhhggdgdg |

# References

[1]Vishal Vilas Natu, 2014. Smart-Voting using Biometric “International Journal of Emerging Technology and Advanced Engineering, 4(6).  
[2]. Khasawneh, M., M. Malkawi and O. Al-Jarrah, 2008.A Biometric-Secure e-Voting System for Election Process, Proceeding of the 5th International Symposium on Mechatronics and its Applications(ISMA08), Amman, Jordan.  
[3]. Virendra Kumar Yadav, SaumyaBatham, Mradul Jain, Shivani Sharma, 2014. An Approach to ElectronicVoting System using UIDAI, International Conference on Electronics and Communication Systems.  
[4]. Chaum, D.L., 1981. Untraceable Electronic Mail, Return Addresses and Digital Pseudonyms, Communications of the ACM, 24(2): 84-88.  
[5]. Virendra Kumar Yadav, SaumyaBatham, Mradul Jain, Shivani Sharma, 2014. An Approach to Electronic Voting System using UIDAI, 2014 International Conference on Electronics and Communication Systems.  
[6]. Ashok, Kumar D. and T. Ummal Begum, 2011. A Novel design of Electronic Voting System Using Fingerprint.  
[7]. Jefferson, D., A. Rubin, B. Simons and D. Wagner, 2009. A Security Analysis of the Secure Electronic Registration and Voting Experiment (SERVE), Technical Report, available at: http://www.servesecurityreport.org, last visited 2009.