ONLINE VOTING SYSTEM USING FACIAL BIOMETRICS VALIDATION

By

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A PROJECT SUBMITTED IN THE DEPARTMENT OF COMPUTER SCIENCE AND MATHEMATICS, COLLEGE OF BASIC AND APPLIED SCIENCES, IN PARTIAL FULLFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE.

2021

DECLARATION

I hereby declare that this project has been written by me is a record of my own research work. It has not been presented in any previous application for a higher degree of this or any other University. All citations and sources of information are clearly acknowledged by means of reference.

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OLUWADAMILARE, SIMILOLUWA ALFRED

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Date

CERTIFICATION

This project titled, "**Online Voting System Using Facial Biometrics As Means Of Validation"**, prepared and submitted by **OLUWADAMILARE SIMILOLUWA ALFRED** in partial fulfillment of the requirements for the degree of **BACHELOR OF SCIENCE IN COMPUTER SCIENCE,** The original research work was carried out by her under by supervision and is hereby accepted.

_____ (Signature and Date)

Dr Chinwe P. Igiri

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DEDICATION

This Project is dedicated to God Almighty and my parents.

ACKNOWLEDGEMENTS

I owe my profound gratitude to God Almighty who gave the strength, wisdom and courage, divine help and provision to me from the beginning to the completion of this work. I express gratitude to my supervisor, Dr Chinwe P. Igiri for her teachings, guidance, counsel and Motherly support in ensuring the successful completion of this research. God bless you ma. My heart-felt gratitude goes to the Ag. Dean, College of Basic and Applied Sciences – Dr Ofudje and all other members of the department of Computer Science.

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ABSTRACT

An Online Voting System is a web-based system that facilitates the running of elections online. Most organizations conduct elections regularly in order to elect a leader at various positions. The elections conducted are mainly manual hence they are marred with irregularities which have negative impact on outcome. In this era of advanced technology where online systems boosts work speed, reduces mistakes and promote the generation of accuracy, having a manual system like the paper-based version becomes a mishap. Voters are expected to undergo a matching verification of their facial biometrics samples against that which is stored in the database, which is identified through the use of a unique voter identification number assigned during registration.

The project is made able to achieve a high success rate in the use for conducting elections as it is able to stamp multiple registrations by voters through the combined use of both the unique voter identification number and their unique facial biometrics. This effectively solved a lot of questions that may arise on eligibility of voters.

React native was used to develop the front-end part of the Online voting system. Node was used to design the backend and Mongo db was the database that was utilized. The performance of the system when compared to the current system in use was found to be satisfactory.

Keywords*: Facial Biometric, Verification.*

CHAPTER 1

1.1 INTRODUCTION

One fundamental feature of all-encompassing democracy is the act of election. Democracy promotes individual freedom in accordance with the rule of law, so that individuals can behave and speak as they desire. This allows people not just to choose their leaders but also to express their opinions openly about the challenges. The online voting system is described as a mechanism for voting that allows voters to vote via the Internet and transmit the vote safely to the electoral authority or the officer concerned. Online voting is supposed to serve the electorate so that voters can cast their votes more conveniently. You can vote from anywhere in the world on any Internet-connected computer. The installation of this web voting system requires several technical solutions to ensure effective authentication of the voter. Elections allow the population to choose its representatives to decide how they are governed. (Khater, 2011) Khater: The "ONLINE VOTING SYSTEM" allows a voter to use his right to vote online without difficulty. He had first to register as an elector before he could vote. Registration should be done before the voting day to allow the database to be updated. But not just anyone can vote. To participate in the elections, the conditions must be met. As already said, the online voting project provides for fast and convenient voting procedures, only registered electors having access to the system.

1.2 BACKGROUND TO THE STUDY

Nigeria is a federal nation with 36 countries in West Africa, bordering west Benin, east Cameroon and Chad, and northern Niger. Igbo, Hausa and Yoruba are the three

primary ethnic groups. Elections are held every four years in Nigeria, during which a leader, president and representatives of the National Assembly are elected by the people. Despite technological developments, INEC continues to employ paper-based voting techniques in the highest electoral body, typified by the manual form filling for leadership selection.

As a result, a large number of mistakes have been included in the final vote. The main benefit of a paper system is that voting sheets are easily audited by people; however, the negatives overweight the positives, such as the slow, expensive and inflexibility of creating ballot papers. (COMPANY, 2017)

Some election observers have in recent years encouraged electronic voting to be carried out at the state and the federal level, all the way down to SUG level. The electronic voting system using online voting technology should be less expensive than the present paper-based system of the independent national electoral commission.

1.3 STATEMENT OF THE PROBLEM

Elections are still weak and underdeveloped in the country as a fundamental component of the democracy of any society, with the most important problems being a transparent vote system, among other things. With recent happenings in the search of a more effective voting system, Nigerian officials must propose adopting e-voting as an alternative to lack of transparency, a loss of faith and confidence in the election process and other concerns affecting Nigeria's voting system. Countries all across the world are increasingly examining and contemplating electronic voting as a potential substitute to the frail and easily manipulated conventional ballot paper voting mechanism. More focus needs to be made on biometric technology to capture the real identification of the voter and improve the safety standards of non-repudiation.

1.4 AIM AND OBJECTIVE OF THE STUDY

The goal is to create a biometric-based electoral system that is secure.

The following are the goals:

1. To develop a secure online voting platform that uses biometrics as a means of verification

2. The system must deliver reliable data to the voters.

3. To develop a system whereby voters can be able to cast their vote anywhere in the world

1.5 SCOPE AND LIMITATIONS OF THE STUDY

The scope of this project revolves around the developing of an online voting system that employs facial registration and verification for each voter per election, which will allow voters to participate in the elections regardless of their physical location.

The limitations of the system to be designed would be:

- Tendency for the system to be bypassed if the examinee is an identical twin.

1.6 SIGNIFICANCE OF THE STUDY

This study would help increase the level of trust in the entire staff electioneering process as well as ease the different difficulties previously clogging the system such as long queues, general time wasting and lack of credibility. It also ensures

early availability of results and reduction of the overall cost of conducting an election. This would enhance the willingness of voters to participate in the elections and ultimately lead to the conduct of a credible election.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

An election is recognised as a formal decision-making process through which a population or society chooses a person to hold political office. Both public and private organisations such as the government and private groups hold elections to pick, for example, members for the Board of Directors, professional club leadership and even volunteer associations. In the majority of democratic political systems, there are many different types or categories of elections that coincide with the many levels of public government or geographical jurisdiction. There are a number of elections in our particular sector, namely the political sphere in universities, based on a number of variables that contribute to the categorization of the university staff into groupings such as academic or non-academic staff, senior staff and cooperative unions. Online voting and electronics are the tools most democracies and universities are using in the 21st century (D.Kavitha, 2020)

2.2 RELATED CONCEPTS

Election is a procedure that allows citizens the chance to select candidates in a democratic manner. Election addresses democracy and citizens' free will. This is why voting is considered to be a very critical and delicate procedure, and consequently the conduct of elections must serve several conditions in order for a credible election to take place. (Makungu, 2018)

2.3 VOTING SYSTEMS

- Paper-based voting: The elector receives a blank vote and uses a pen or a marker to show himself to vote for whatever candidate. Hand-counted ballots are time- and labor-consuming, but paper ballots can be easily produced and the votes maintained for verification, this is still the most popular method of voting.
- Lever voting machine: The Lever machine is a strange device and a corresponding candidate is assigned each lever. The voter pulls his favoured candidate's lever to poll. This type of voting equipment can automatically count the votes. As its interface is not user-friendly enough, voters need additional training.
- Direct recording electronic voting machine: This type, abbreviated as DRE, fits in with a keyboard; touch screen or voting buttons. Some of them are recorded in voting and the counting of votes is quite rapid. However, the other DRE is questioned as to its accuracy without keeping voting records.
- Punch card: The voter uses metal hole-punch to hit the blank ballot with a hole. It can automatically count votes, however if the voting perforation is incomplete, the outcome is usually wrongly determined. To hit the blank ballot, the voter utilises the metal hole-punch. It can count votes automatically, however if the drilling is incomplete, the result typically is mistakenly determined.
- Optical voting machine: Once each voter fills out a circle corresponding to his or her favourite candidate, the system chooses the darkest mark on each ballot to calculate the final result. This type of machine quickly counts votes. However, if the voter fills the circle, it will lead to an optical scan error.

2.3.1 ELECTRONIC VOTING SYSTEMS

Improving the electoral system of a country is a fundamental demand. As the technology develops rapidly in the computer and telecommunications industry, solutions based on the e-voting system are now being used to ease many of the difficulties connected with prior manual election systems. (Kripp, 2012). The use of e-Voting technology will make our election processes and social lives easier, more efficient and less expensive. Voters can now use this technique to vote from anywhere in the world. The electronic voting system must all meet confidentiality, integrity, fairness, forgery attacks, verifiability and other security standards. The ultimate objective of e-voting is to offer voters a good setting where they can vote on the Internet at least cost and effort.

2.3.2 ADVANTAGES OF ELECTRONIC VOTING SYSTEM

a) Ballots cast electronically

   In electronic voting systems, electronic ballots can be used to store votes cast in computer memory. If electronic voting is used, the provision of votes is never depleted. In addition, the need to print paper votes is eliminated, which saves considerable money.

b) Cost-cutting

   Electronic voting systems have a significant advantage over paper-based voting systems in that they save money by lowering human expenses, management overheads, and total costs. It should be mentioned, however, that while the initial cost of constructing an electronic voting system is

considerable, it is less expensive in the long run because it is only created once.

c) Accessibility and Convenience

With a well-designed and user-centered Electronic Voting System, voters may be certain that they will be able to cast their votes with easily and with no technical knowledge. It's also feasible to create a range of ballot question formats to accommodate the various types of voters who may utilize the system.

d) Efficient Data Collection

The results of an election can be counted and shown instantly using an electronic voting system. It's especially handy when there are a huge number of votes to count, which can be laborious, error-prone, and time-consuming if done by hand.

2.4 ELECTORAL SYSTEM REQUIREMENTS

The success of any democratic system in the world is often decided by the faith of the voters in the system. Every technique or technology of voting should therefore take into consideration and conform with election legislation. Legislative or administrative bodies in this respect shall be accountable for setting the requirements of an electoral process. They have to guarantee that scientific criteria are not inequitable and that (Okediran Oladotun Olusola, 2012). It is crucial to maintain the core characteristics. If a suitable set of basic system demands is agreed, the disturbing weaknesses of

traditional election systems will become clear. Electoral requirements are designed to reduce existing and future risks. The following are the requirements:

a) Accessibility: This aims to cater to all eligible voters by ensuring that they have access to a user-friendly system.

b) Fairness: In the final tally, all eligible voters should be counted.

   Timeliness and accuracy: Timeliness refers to the ability to ensure that information is captured and available results are disseminated as soon as feasible, whilst accuracy refers to the ability to ensure that each individual's vote is registered and counted.

c) Privacy and secrecy: All participants must be able to vote anonymously. Both vote-buying and coercion must be discouraged. The privacy of voters must also be preserved in such a way that only a court order can reveal how they voted. Furthermore, this will prevent electoral officials from selling people' votes.

d) Security: Computer machines are typically operated by humans. As a result, they may find it simple to influence and tamper with the entire system. It protects against manipulation and interference by the use of the following mechanisms: personal identification number (PIN) or password, encryption, digital signature, and biometric identifiers.

e) Authentication and verification: When it come to authentication, it's important to make sure that people can't be impersonated while voting. The importance of verification emphasizes the importance of an e-voting system's ability to independently verify that all voters have been correctly counted in a system.

2.4.1 E-VOTING SYSTEM SECURITY

The e-voting process is based on safety. As a result, creating a safe electronic voting system is crucial. Security and privacy processes for elections are generally time consuming, expensive and unpleasant for election administrators. The safety of e-voting is measured on a scale of one to ten. Serious steps must thus be taken to keep it out of the public eye. Security must also be employed to keep votes from the public's sight. Since the amount of acceptable security varies according on the type of information, no standard exists. A good level of security is always a tradeoff between usability and the power of the security mechanism. The safety elements of voting authentication and polling data for e-voting systems are described here. It stops unauthorized persons from disturbing the voting process.

The basic aim of secure electronic voting is to safeguard the privacy of voters while ensuring that their votes are correct. The following are the requirements for a secure e-voting system:

a) Eligibility: Only legitimate voters' votes will be considered.
b) Non-reusability: each voter is only allowed to vote once.
c) Anonymity: votes are kept anonymous.
d) Accuracy: once a ballot is cast, it cannot be changed. As a result, once the election is closed, it must not be possible to delete or add ballots.
e) Objectivity: partial tabulation is not possible.
f) Vote and leave: once a voter has cast their ballot, there is no need for them to do anything else until the election is over.
g) Public verifiability: anyone should be able to easily check the voting process's validity.

2.5 BIOMETRICS

The name 'biometrics' comes from two Greek words: bios and metrikos meaning 'life' or 'measuring,' and (Giesing, 2003). Biometrics is the science and technology that allows biological data to be collected and interpreted from the human body and a feature set extracted from the data and compared to a template set for the database. A biometric is a measurable physical or behavioural attribute or characteristic. It is often used for identifying an individual, giving certain privileges and validating the identity of the individual. Some writers also characterise biometrics as the safest and most convenient authentication technology, based on an automated identification or verification of a person (Alese, 2010). It cannot be borrowed, stolen or forgotten and it is virtually difficult to forge one. Biometrics evaluate individuals' unique physical characteristics or behavioural characteristics (non-inherited but learnt) for recognition or authentication of their identification. They relate to the inherited qualities that originate in the early embryonic stages of human development).

Biometric systems can be divided into two categories.

2.5.1 UNIMODAL BIOMETRIC SYSTEM

Unimodal biometric system uses only a single biometric characteristic. This system is usually more cost-efficient than a multimodal biometric system.

Examples are: face recognition, fingerprint matching, Hand Geometry, Palm Prints.

2.5.2 MULTIMODAL BIOMETRIC SYSTEM

Multimodal Biometric system incorporates a variety of biometric sources. This can be done by merging several features of an individual, or by extracting multiple features and matching algorithms with the same biometric. These multimodal solutions can increase the accuracy of a biometric system while reducing spoofing and population coverage. (Adewole, 2010).

2.5.3 BIOMETRIC FEATURES

Biometric traits are properties that are universal to all human beings and can be used for the authentication and validation.

Biometric characteristics are widely grouped into;

a) Physiological (e.g. Face, Fingerprint, Iris, Retina, Hand Geometry, Ear etc.) (e.g. Face, Fingerprint, Iris, Retina, Hand Geometry, Ear etc.)
b) Behavioral (e.g. Voice, Dynamic Signature) (e.g. Voice, Dynamic Signature)

2.6 FACE RECOGNITION AND DETECTION

In this project we will utilise a Face Detection and Recognition system in online voting to achieve the Supreme Electoral Council rules as follows: The vote is secret and each vote (properly cast) counts, to meet the purposes of online voting as follows: increase participation, lower the expenses of the elections, and raise the accuracy of outcomes.

In general, an FDR system starts with an image source to capture face images, Automatic detection or manual selection of the human face may be found in the scene, a database of faces can be manipulated (created, added, deleted) and a process started by comparing the faces previously detected with the faces in the database. (S, 2016)

Web-based voting enables voters to vote wherever in state or out of state. The image of the voter is taken and transferred to an algorithm for face detection (Eigenface or Gabor filter) that is used to recognise the image from his face and save it as its first match. A National Voter Card Number is utilised to retrieve and return your saved photo from the Supreme Council election database (SCE) which is provided under the

same technique to detect the face of the SCE (Eigenface or Gabor Filter) and save it as a second matching point. The two matching points are utilised to examine that they are identical or not with the matching algorithm. If the results of the matching algorithm match two points, this person has the right to vote or not to check wither. If he has the right to vote, he receives a voting form.

2.7 RELATED WORKS

The purpose of this section is to highlight other similar projects that are related to the proposed voting system. This includes research that is based on and work that displays other proposed solutions to the same problem. This section covers the topics that are most closely relevant to the proposed system. Here I will better illustrate the present constraints and the need for new methods by explicitly describing earlier work and also the expertise of the field and other researchers to connect this current study to other scientific fields.

In the Research work carried out by (Asiamah, Adjei, prince, & Singh, 2019) it was explained that an election system that uses the internet to ensure access to a domain or website and allows qualified voters to cast their secure and secret ballot electronically is referred to as online voting. It is done by using computerized technology to cast a ballot over the internet. During elections, an attempt was made to develop an electronic voting system with token generation for verifying voters. The voter has the opportunity to vote for their favorite candidate after completing out the form. Multiple votes with the same generated token are not permitted by the system. This work discusses the design and development of a fingerprint-based web-based voting system to provide high performance and security to the voting system. This

study also employed web technologies to make the voting system more practical. The new design proposes a university election to determine the president of the university. In the research carried out by (WANG, 2014) he stated that Since voting is a simple and classic way of reflecting ideas from a group of people, this researcher's report explored social voting behaviors on mobile platforms. The researcher intended to learn how to improve the user experience of social voting by undertaking this research study the focus is on how a change in voting interface affects people's voting behavior. This report gives two interfaces: one that ranks negative to positive measures, and another that ranks all positive measures.

Introduced in the work done by (Njideka , Umeh , & Chukwunonso, 2021) the study offered the notion of designing and implementing an online voting platform (OVP) for the Independent National Electoral Commission to combat fraud, malpractice, and blatant lack of transparency (INEC). This application, which was developed using Python, a strong online programming language, provides a fair, electronic, and readily manageable method of holding gubernatorial elections in Nigeria (in one of the states).). In a research technical report proposed by (Augoye, 2013) The security needs of an electronic voting mechanism will be discussed. This report then talks about the Fujioka, Okamoto, and Ohta (FOO) system and the GSM voting method, and compares their security to the security requirements of an e-voting scheme to illustrate their flaws.

In a research work carried by (Okpara, 2018) When it comes to voting, the majority of Nigeria's tertiary institutions have issues. This Android voting app aims to address these issues. Vote rigging during elections, overcrowded voting centers, inaccessible and unsecured polling arenas, inexperienced personnel, and other issues have been identified because voting in these institutions has been limited to methods

such as ballot paper, on-the-spot counting, electronic voting, and others not specified. With this software up and running, university/college of education/polytechnic student users could have more time during voting sessions. They will also receive instruction on how to vote using the app before the election, albeit this will be minimal given the app is user-friendly.

In a research work carried by (Adel, Yasmin, Dima, & Dalya, 2013) they introduced the M-Vote system, which is capable of completing activities that can reduce the risk inherent in the voting process, such as the addition, deletion, and adjustment of votes, to facilitate and ensure the integrity of elections.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 ANALYSIS OF THE EXISTING ELECTION SYSTEM

The existing system used to conduct university elections today is still manually handled. Staff who vote must congregate in a certain place and get their qualification certified by checking first of all the election officials' eligibility and then queue up to exercise their franchise. At the end of the day's voting activity, the votes cast will be calculated by counting the ballots and the results revealed.

The manual system examination was carried out and the following advantages and demerits were determined.

3.1.1 BENEFITS OF THE EXISTING SYSTEM

The benefits of the existing system are:

a) Voters must be physically present.

b) Results are available immediately following the voting procedure.

c) Familiarity of faces enhances voter identification.

d) Physical usage of Staff records

3.1.2 LIMITATIONS OF THE EXISTING SYSTEM

The current electoral process, though with the promises of transparency and trustworthiness of the system, is not without its problems. Following are the observations which urge for alteration in the manner this whole procedure carries itself:

a) Low percentage of voting
b) Long distance between polling booth and the voter.

3.2 ANALYSIS OF THE PROPOSED SYSTEM

The new system takes use of a biometric component (Facial Recognition) to authenticate users of the system. Facial Recognition API is integrated with the system thus has to solve the problem of the existing system.

The new system operates in an identifying mode and accomplishes the following:

a) Captures facials, extracts the features and records it in the database.
b) Verifies the identity of the voter at login time by comparing the facial recognition that has been pre-saved in the database with the facials being supplied at login.
c) Provides an interface for the user to cast votes if a match is detected.
d) Provides an interface for seeing the results of the election.

3.2.1 DESIGN GOALS FOR THE PROPOSED SYSTEM

Some of the design objectives of the new online voting system are outlined below:

a) Voting secrecy: Nobody should know the voting
b) Authentication of the voting: voters should be who they claim to be

c) Voting verification: internal voting monitoring, ensuring all votes are registered with the voters.

d) Safe transfers of user votes to the server

e) Voting security: Proper security and registration of users can assure voting security.

f) Casting uniqueness - a person can cast only one vote.

3.2.2 USER REQUIREMENTS

This section explains the system's end-user needs. Voters and an administrator are the users of this system. The system's Use Case Diagrams (informal graphical representations of requirements) reflect the user requirements as well as more precise system requirements (particular functions to be performed by the system). The user requirement specifies the services that the Sauce vote system is expected to provide to system users, as well as the restrictions that it must follow. The following are the user requirements for the Sauce vote system.

A. Voter

i. Register profile with your face ID.

ii. Login to the system.

iii. View desired election.

iv. Cast vote using your face ID.

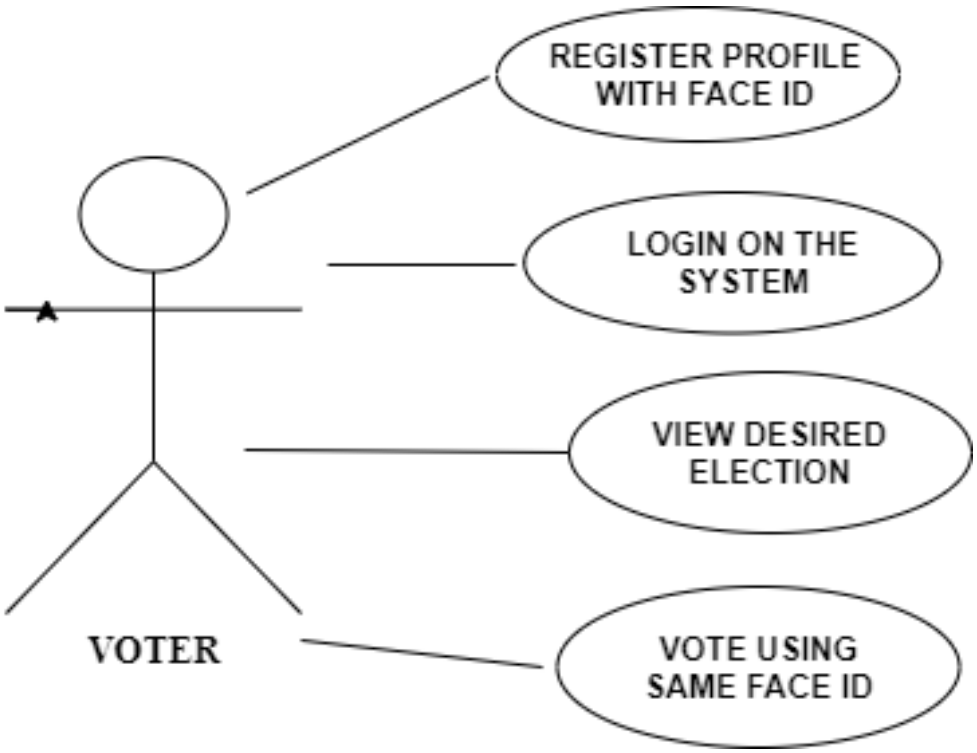

Fig 3.1 Use case diagram for the user (Voter) in the system.

B. Administrator

i. Upload elections to the system.

ii. Generate Voters ID on registration.

iii. Stores facials in the database.

iv. Compares facials before validation.

v. Accepts votes and increases count.

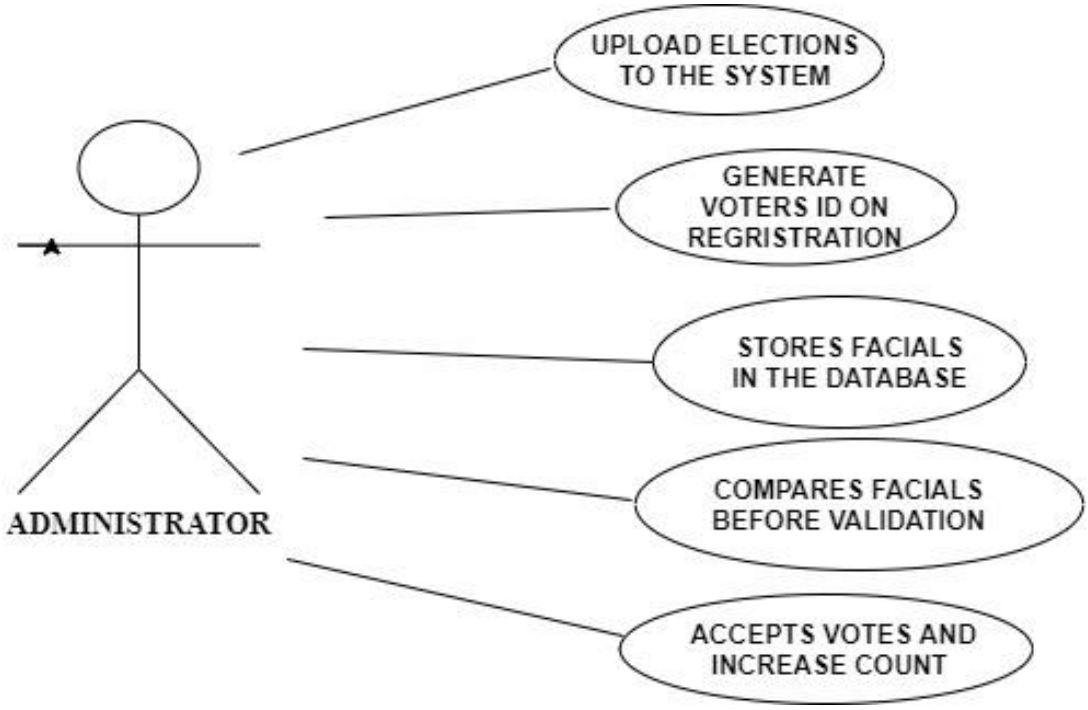

Fig 3.2 Use case diagram for the user (Administrator) in the system.

3.2.3 SYSTEM REQUIREMENT SPECIFICATIONS

In this section of the project, the system's needs would be broken down into a more complete description, which would include the system's operations, services, and operational limits. The following are the system requirements for the Sauce vote System:

3.2.3.1 PROPOSED SYSTEM FUNCTIONAL REQUIREMENT

Functional requirements are system capabilities and domain specific capabilities.

The functioning of the online voting system is as follows:

a) The system shall present the electorate with reliable information

b) The system shall provide standard decision-making reports

c) Trails of auditors making modifications to the database must be kept

d) Voting administrators should be able to edit the Voter Information Database

e) Standard error checking must be provided by the system

f) In order to ensure that data is consistent and updated, the system must conduct data integrity checks.

g) Documents should be provided by the system to inform users of system functionality and any system changes.

h) Facilities of GUI accessible through the web browser must be established

3.2.3.2 PROPOSED SYSTEM NON-FUNCTIONAL REQUIREMENTS

Non- functional requirements are functional limitations or quality requirements.

The system's non-functional requirements include:

a) The system must work at a maximum efficiency of 100% during the voting process.

b) All votes shall be taken in one day

c) Voting is conducted on multiple Internet computers

d) Capabilities for backup data restoration should be granted

e) The system must comply with the university authorities' standards

3.2.3.3 HARDWARE REQUIREMENTS

Certain hardware requirements must be met in order for project efficiency to be dependable and productive:

i. 250 GB hard drive

ii. 2 GB ram size

iii. A working webcam

3.3.4 SYSTEM DESIGN

The system was designed based on the requirements specification. The Sequence diagrams, Data flow diagrams and architectural design are presented below.

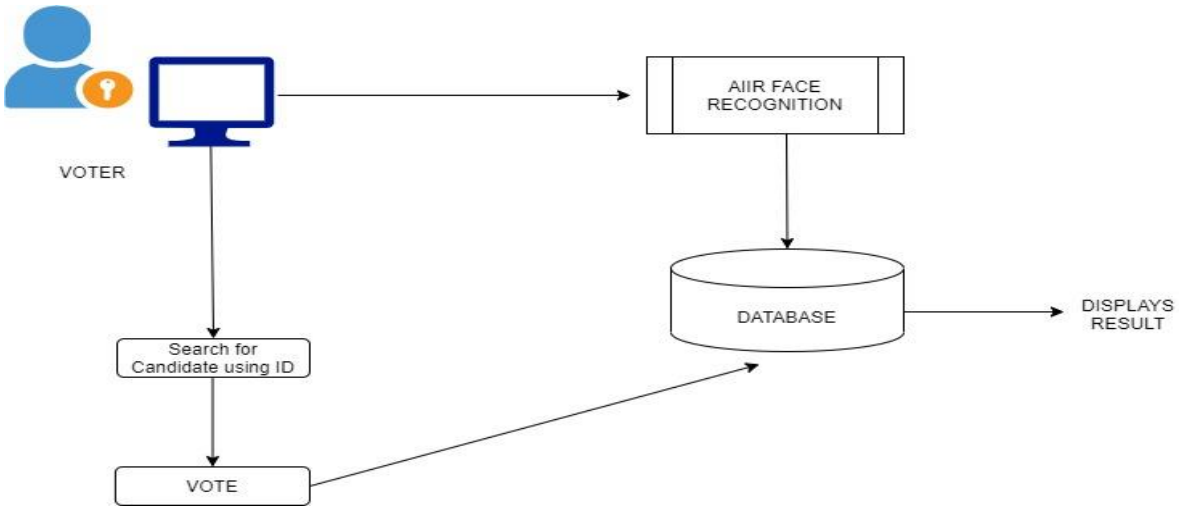

Fig 3.3 System architectural design.

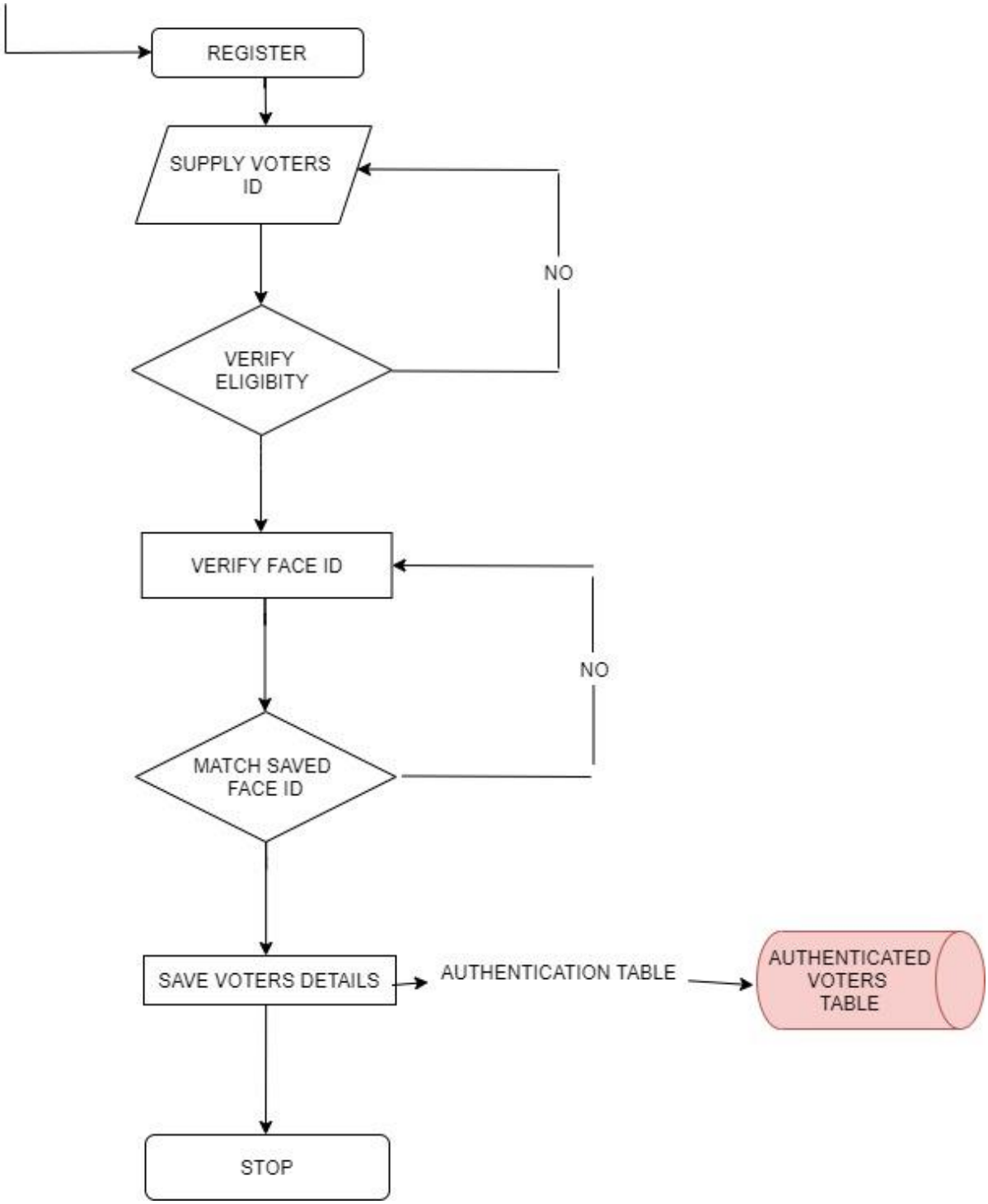

Fig 3.4 Flowchart for the voter's verification and authentication process.

3.3.5 SOFTWARE DESIGN

The software consists of all the software platforms needed for the system functioning and their interactions.

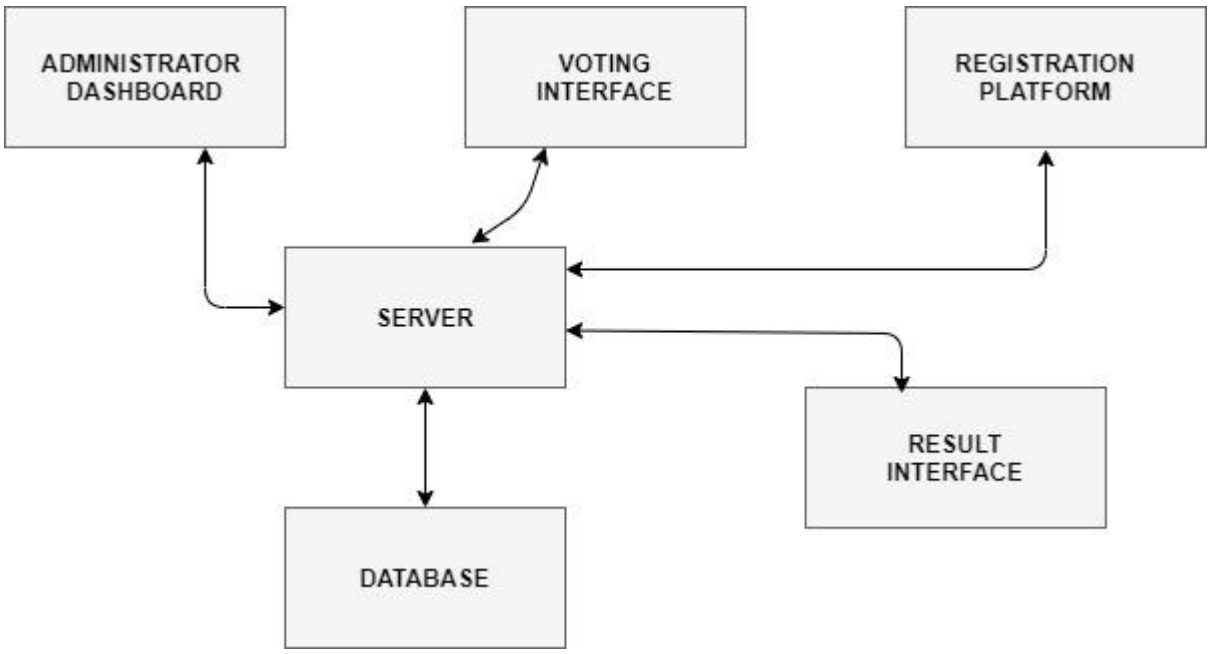

Fig 3.5 Software design block diagram

3.4 FACIAL VERIFICATION

Face verification API, also known as a face comparison API, helps to check the likelihood that two faces belong to the same person. The API will return a confidence score about how likely it is that the two faces belong to one person. We use very strict threshold 99% to make sure that the person is the same in a photo.

3.4.1 VERIFICATION WORKFLOW PROCEDURE

a) 1.Obtain the Voter Identification Number of the person to be verified.

b) 2.Capture a facial sample using the facial biometric API.

c) 3.Extract a facial Biometric feature set for the purpose of verification from the facial sample.

d) 4.Retrieve the facial biometric template associated with the Subject Identifier from your repository.

e) 5.Perform a one-to-one comparison between the facial biometric feature set and the facial biometric, and make a decision of match or non-match.

f) 6.Act on the decision accordingly.

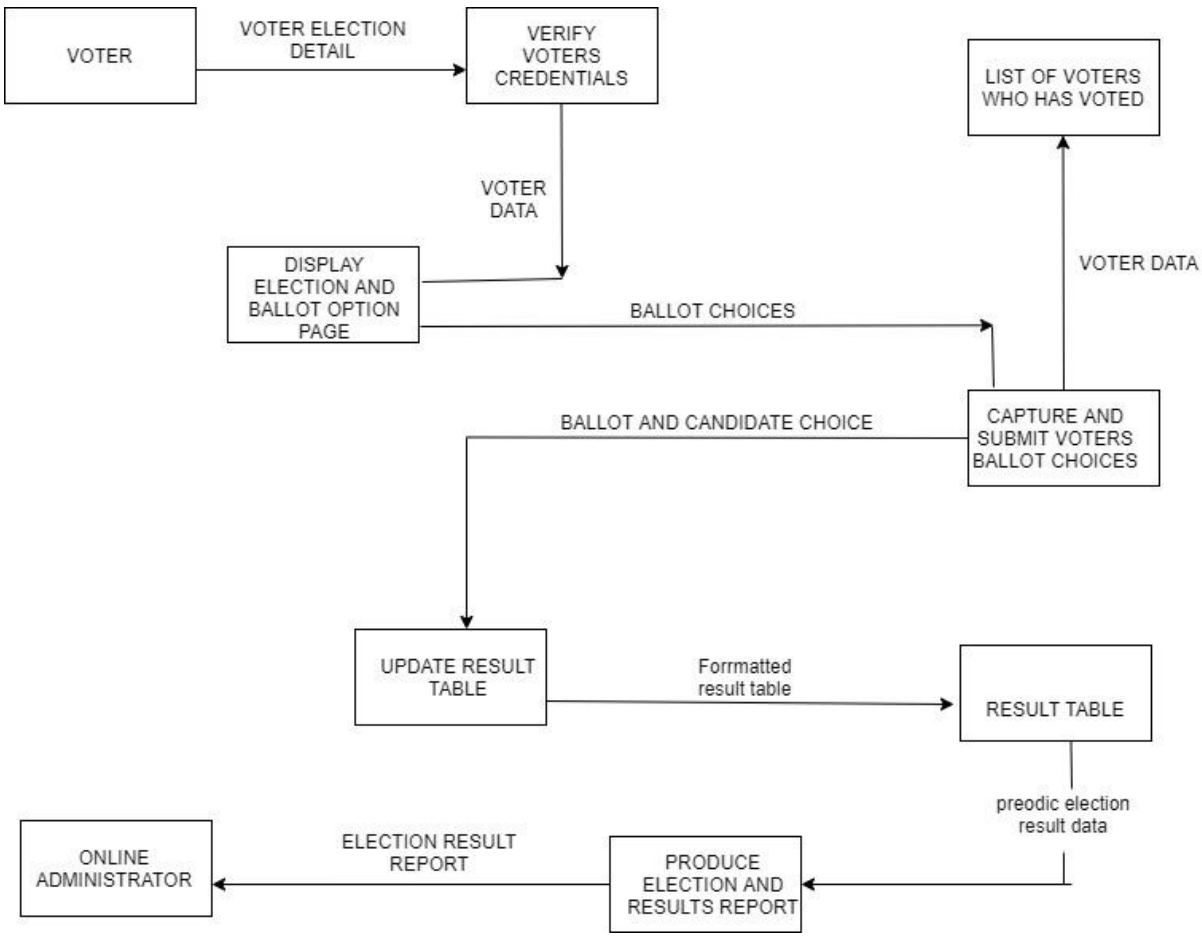

Fig 3.6 Breakdown of the online voting procedure

3.4.2 API FOR THE FACIAL RECOGNITION AND BIOMETRIC ENROLMENT

a) AIIR

‘AIIR’ stands for ‘Artificial Intelligence Image Recognition’ and is a SaaS-based integrated solution brand using the image recognition AI technology of Alchera.

Access Control AIIR can accurately identify people who enter and exit through facial recognition AI.

b) SCALABLE

Scalable with the number of users and operation range via web service API.

c) FLEXIBLE

Provide customizable architecture configuration, operation optimization and easy setup.

3.4.3 JWT WEB TOKEN

Token-based security is commonly used in today’s security architecture. There are several token-based security techniques. JWT is one of the more popular techniques. JWT token is used to identify authorized users. This was integrated in my frontend so as to validate when a user logs in and allocates a voter ID to it.

How Does JWT Work?

Step 1 Client logs in with his/her credentials.

Step 2 Server generates a Jwt token at server side.

Step 3 After token generation, the server returns a token in response.

Step 4 Now, the client sends a copy of the token to validate the token.

Step 5 The server checks JWT token to see if it's valid or not.

Step 6 After the token is validated, the server sends a status message to the client.

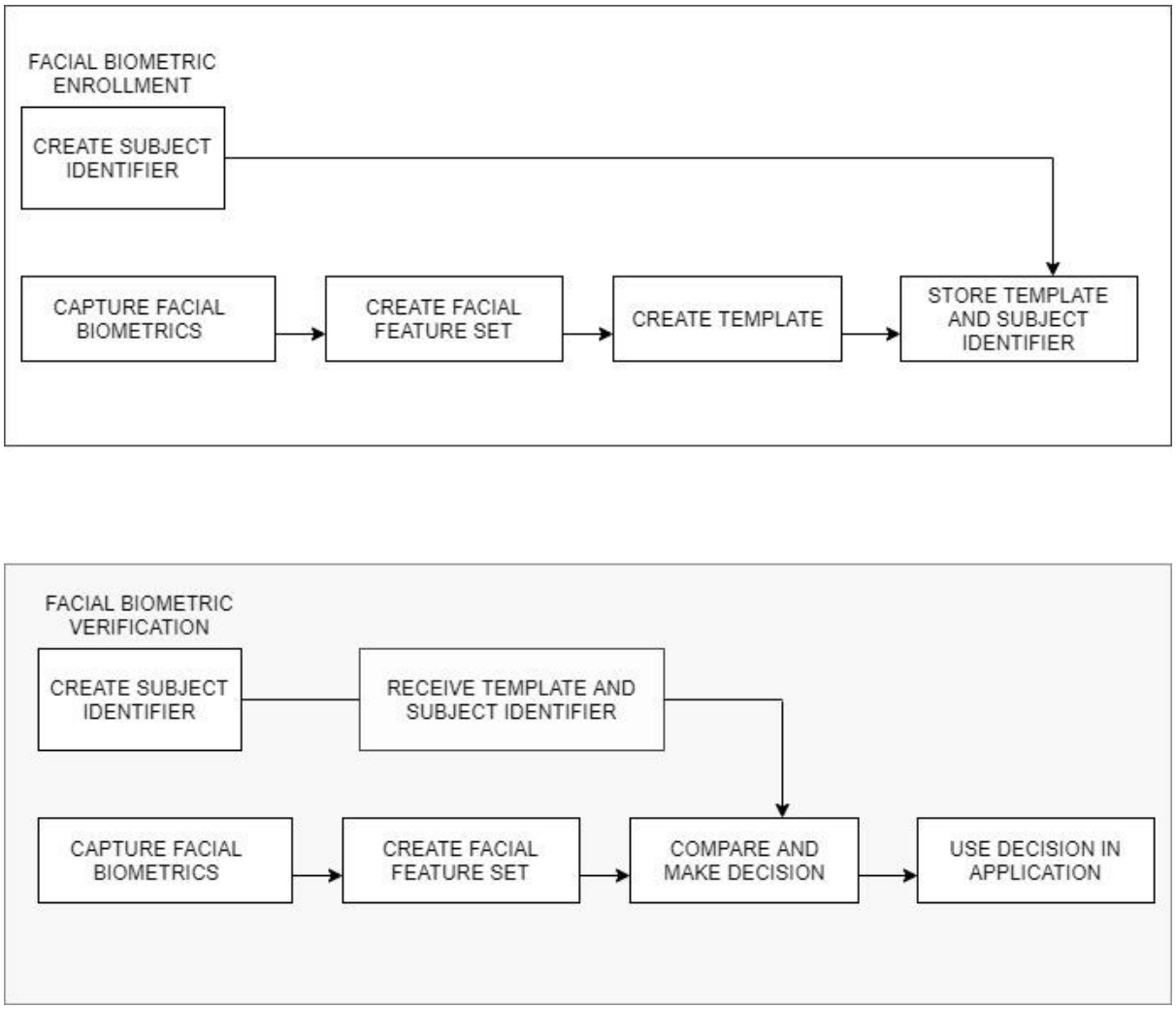

Fig 3.7 Work Flow Chart for Voter Facial biometrics Enrollment and Verification

3.4.5 MONGO DBMS

MongoDB is not only a general-purpose database which can perform only insert, update and delete data it was the database I used while developing this system within it. Besides these, there are several important features which make the MongoDB one of the most popular and enriched databases in the world.

3.5 DEVELOPMENT TOOLS

The Sauce vote system was developed using React Native, PHP ,Cascading Style Sheet (CSS), JWT Token, Alchera Api, NODE JS and MongoDB.

CHAPTER 4

IMPLEMENTATION OF DESIGNED SYSTEM

4.1 Introduction

This chapter shows the implementation of the crime reporting application using geographic information system. The tools used in system design and development of the system's primary idea and functionality to accomplish its defined mission.

4.2 Systems module

The system comprises of the following modules

a) The welcome page: This is the first Page that appears when the system is launched from the web browser. It provides navigation to the other modules of the system such as the login interface and the register interface.

b) The login page: This is the interface the user sees after the welcome page it has a form where the user should login if he is already a user, if the user tries to log in using a wrong email and password that is not registered on the database, the system will not grant access and report back with a warning alert. Hence the user will log in with his or her valid credentials hence the user will have to register and own a new profile.

c) The registration page: This is where the user can register if he or she doesn't have an existing account, there is a form whereby the user will fill appropriately his or her credentials like (name, email, phone number, date of birth)

d) The facial registration page: This page is a vital page for the aim of this project, this is where the user/voter gets to register his face and gets it saved to the backend as that particular user having generated his ID. Its being powered

by the alcehra Api. Once the voter registers his or her face he or she can now proceed to the voting page

e) The voting page: This is the page where the voter gets to view which ever election he or she wants to vote for, this page consists of a lot of elections already added in by the administrator, e.g. an election for the post of the local government in a particular area etc. as soon as the voter identifies the election he or she is in for, he can proceed to vote.

f) Authentication page: Once the voter sees the participant he or she wants to vote for he has to authenticate the face he has registered, this will be verified from the backend and once its correct he can proceed to vote for his or desired participant. And the status is returned on the screen if vote is successful or not.

g) Development page: This project was built and tested on an emulator, where I checked for errors in my codes ill display what it looks like below also the database I made use of, MONGO DB.

Fig 4.1: The welcome page

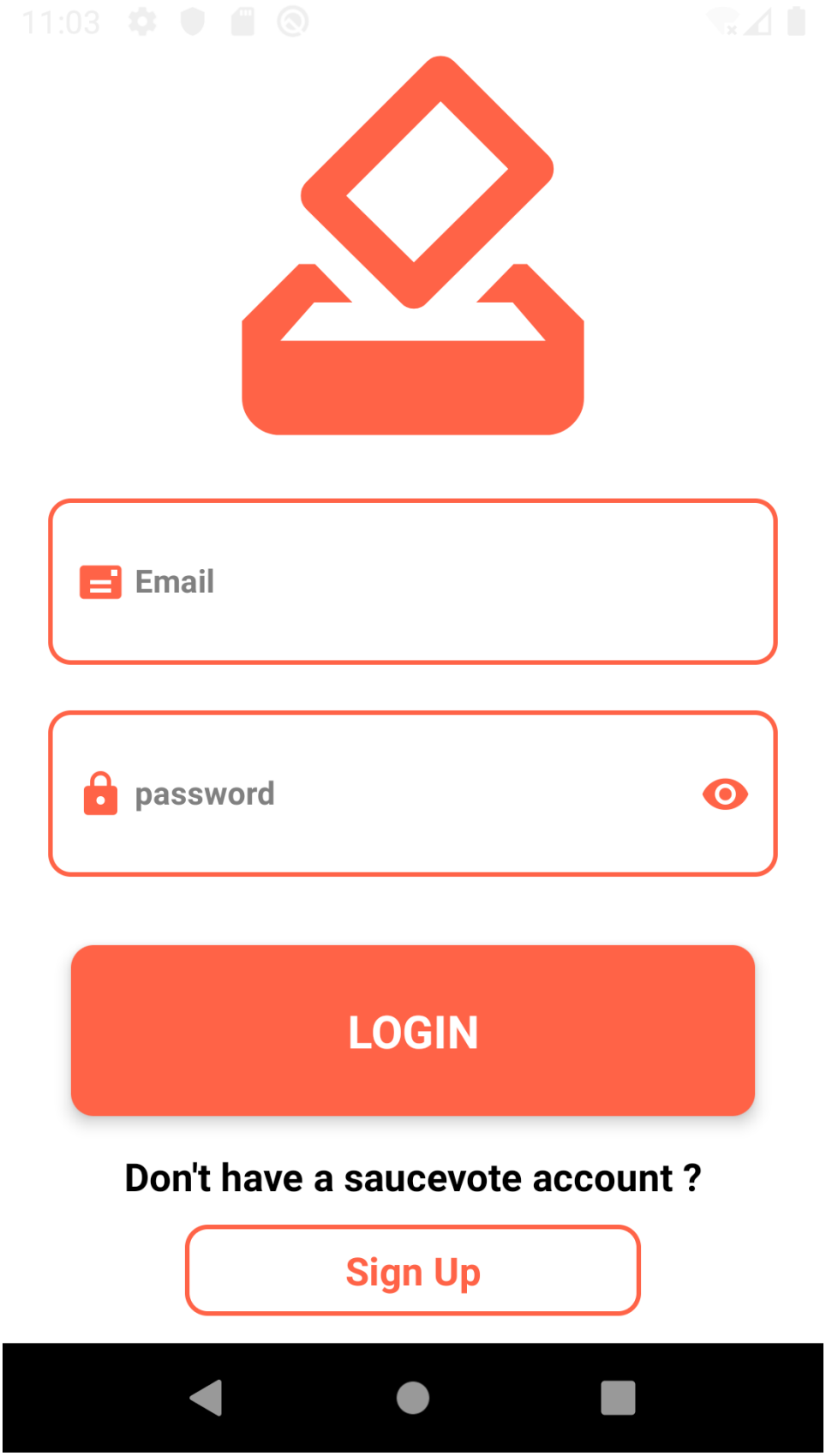

Fig 4.2: The login page

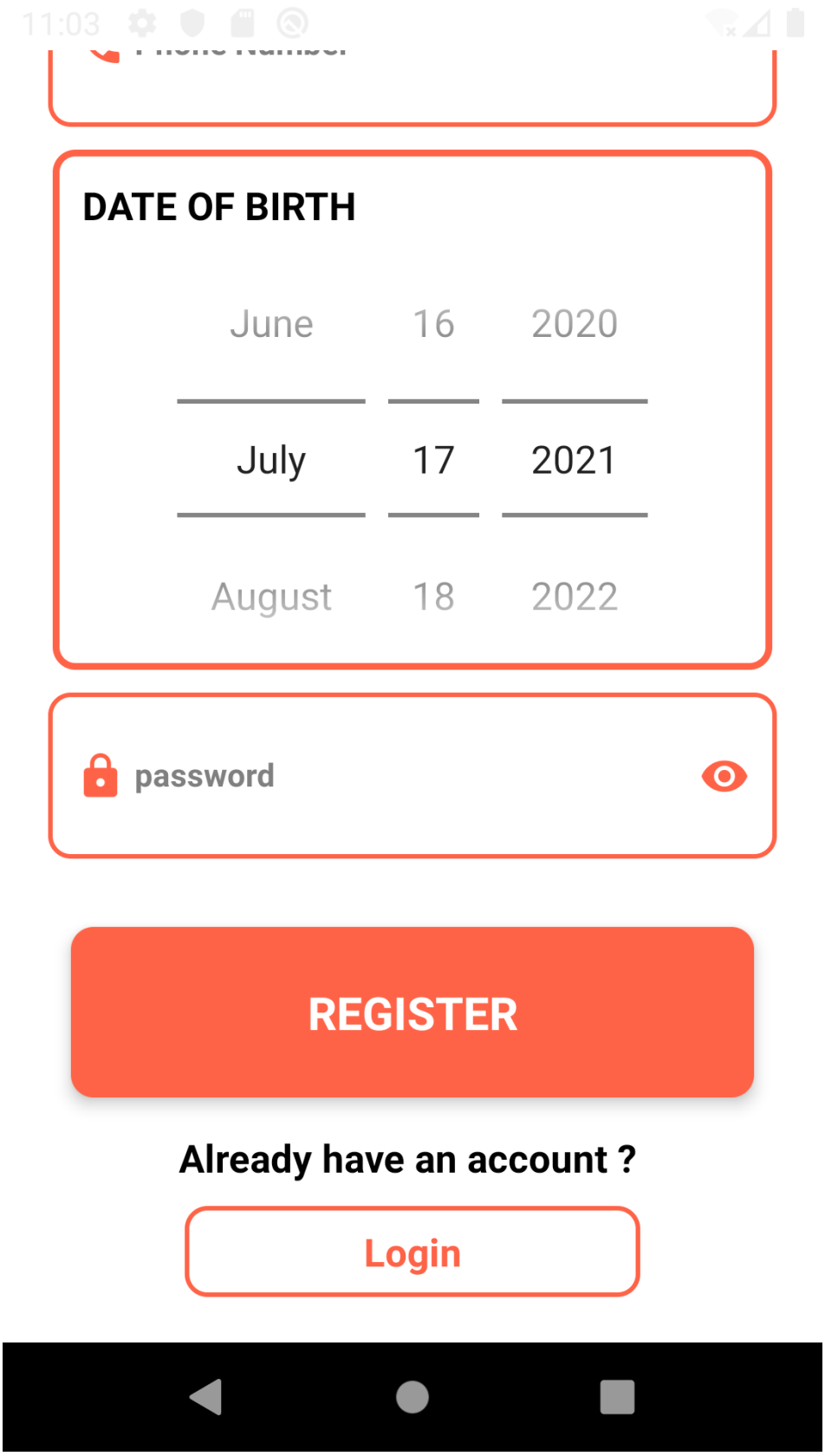

Fig 4.3: The registration page

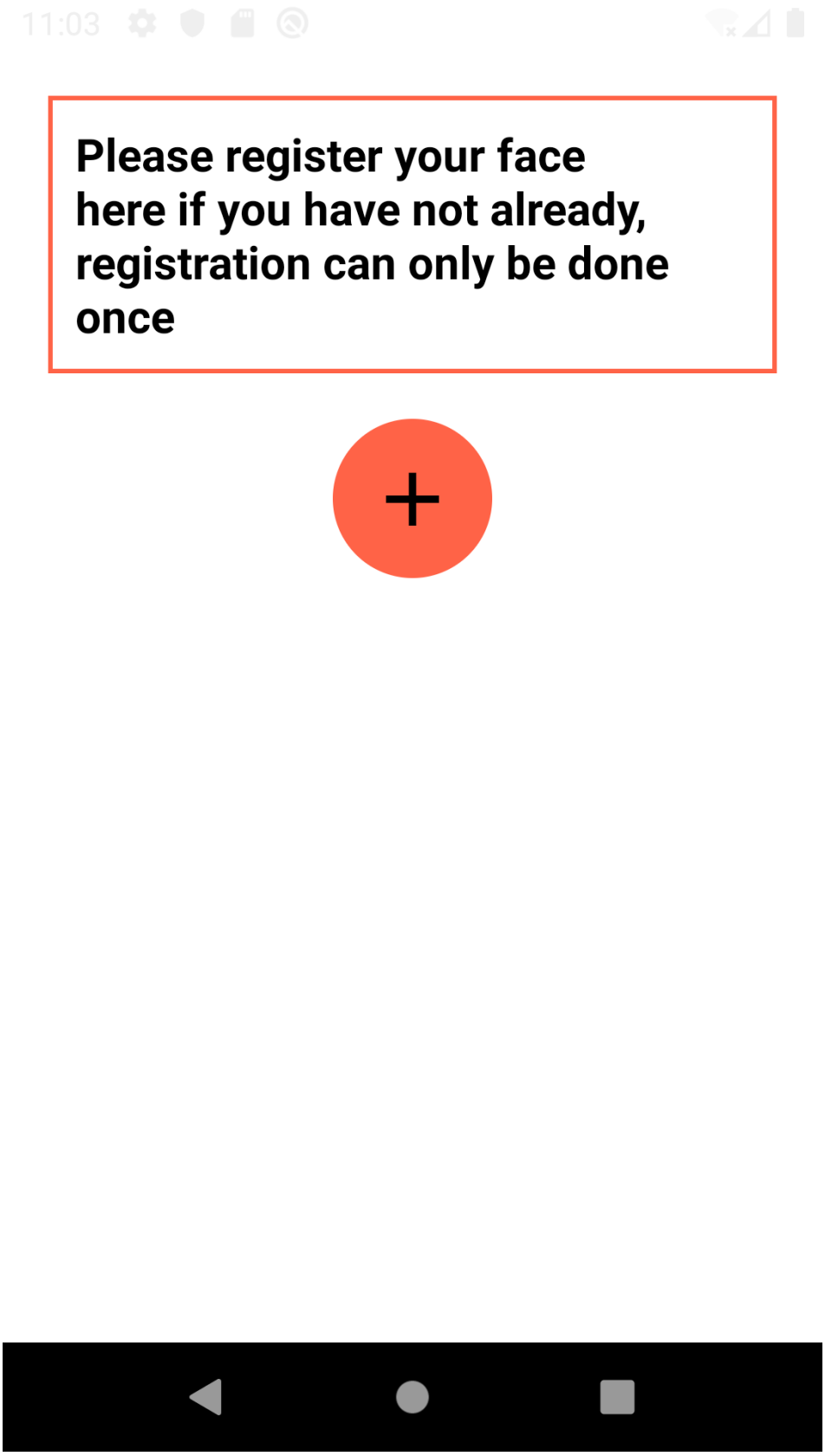

Fig 4.4: The facial recognition page

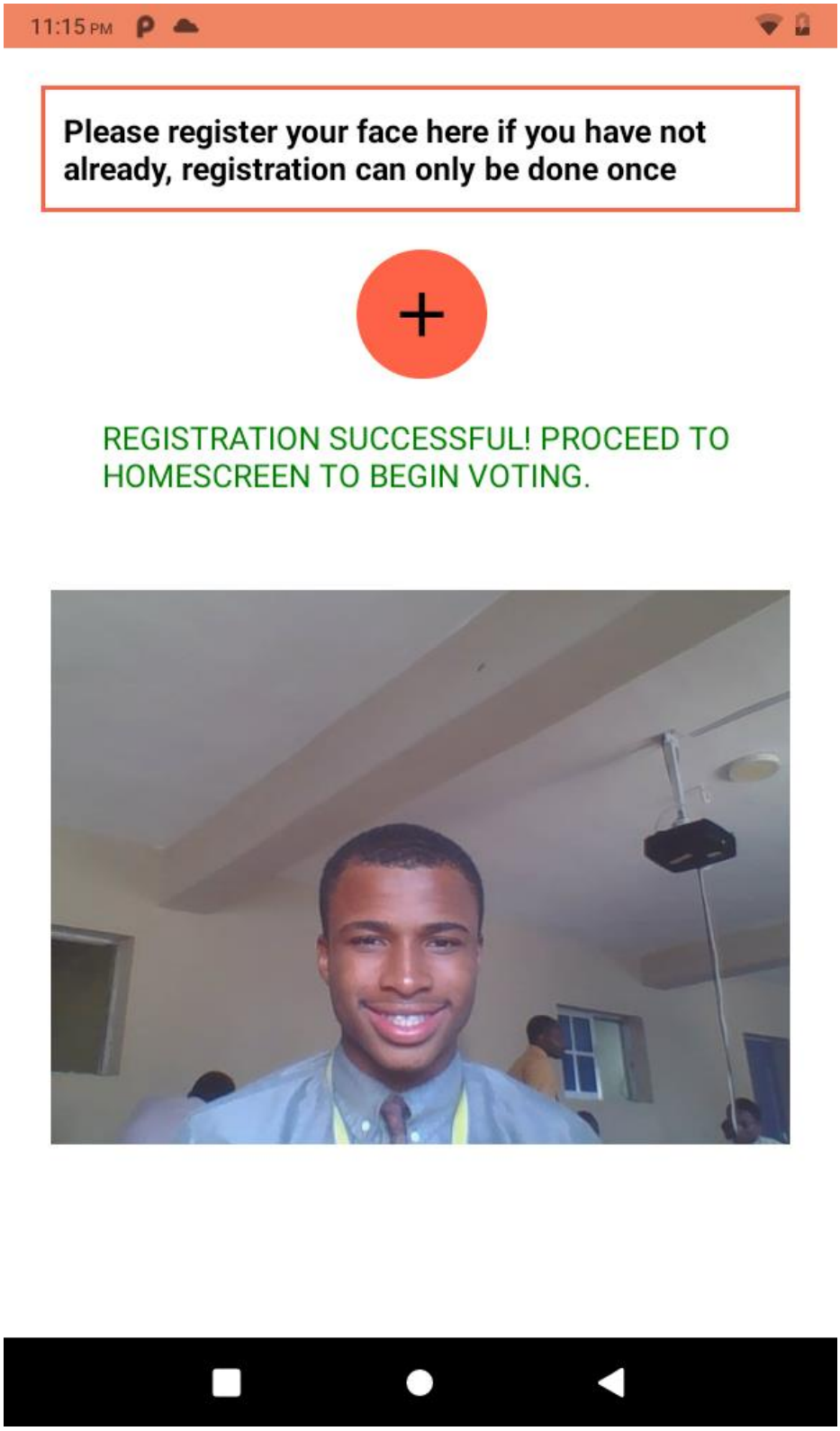

Fig 4.5: Facial recognition page

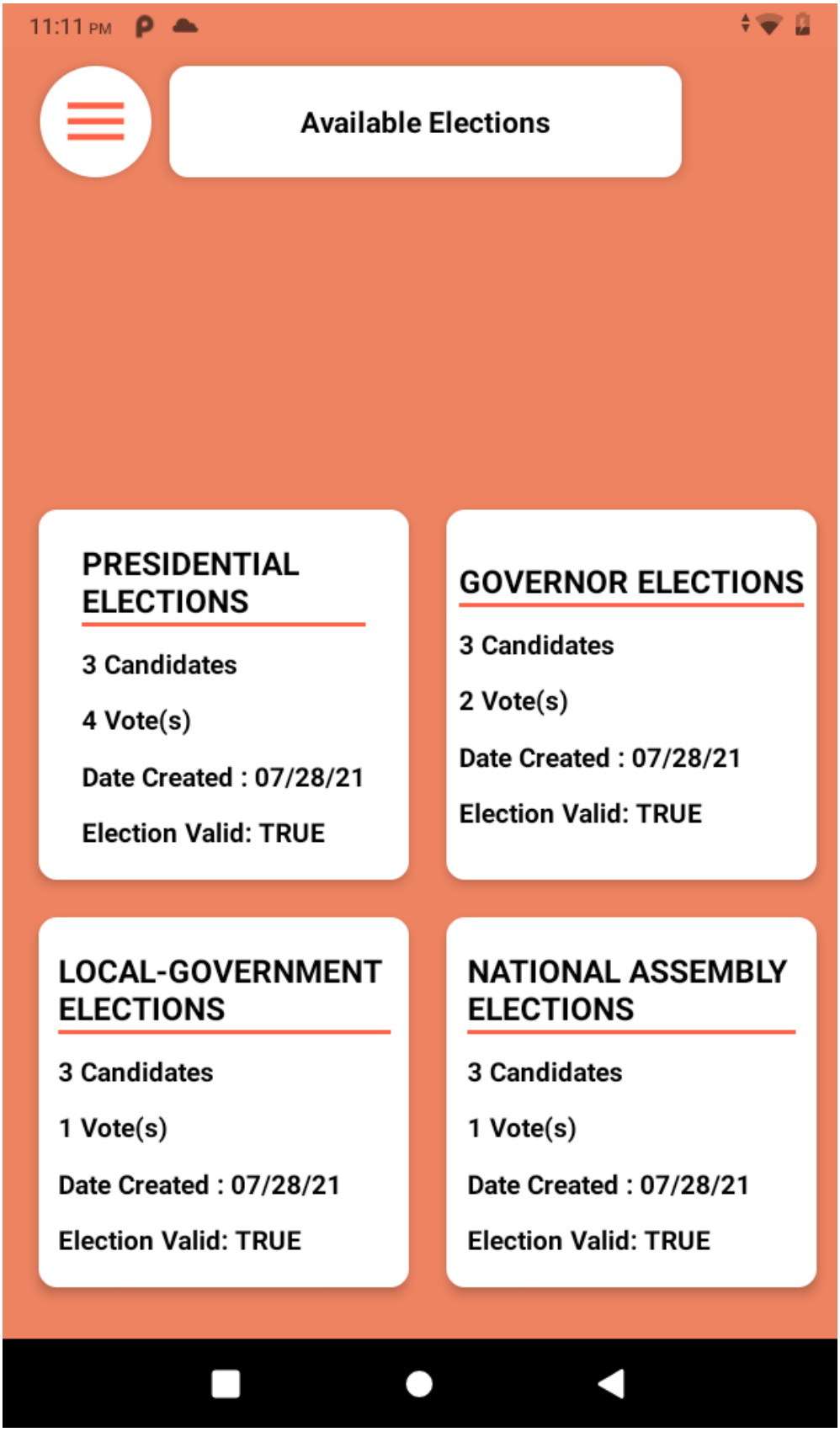

Fig 4.6: The Available Election page.

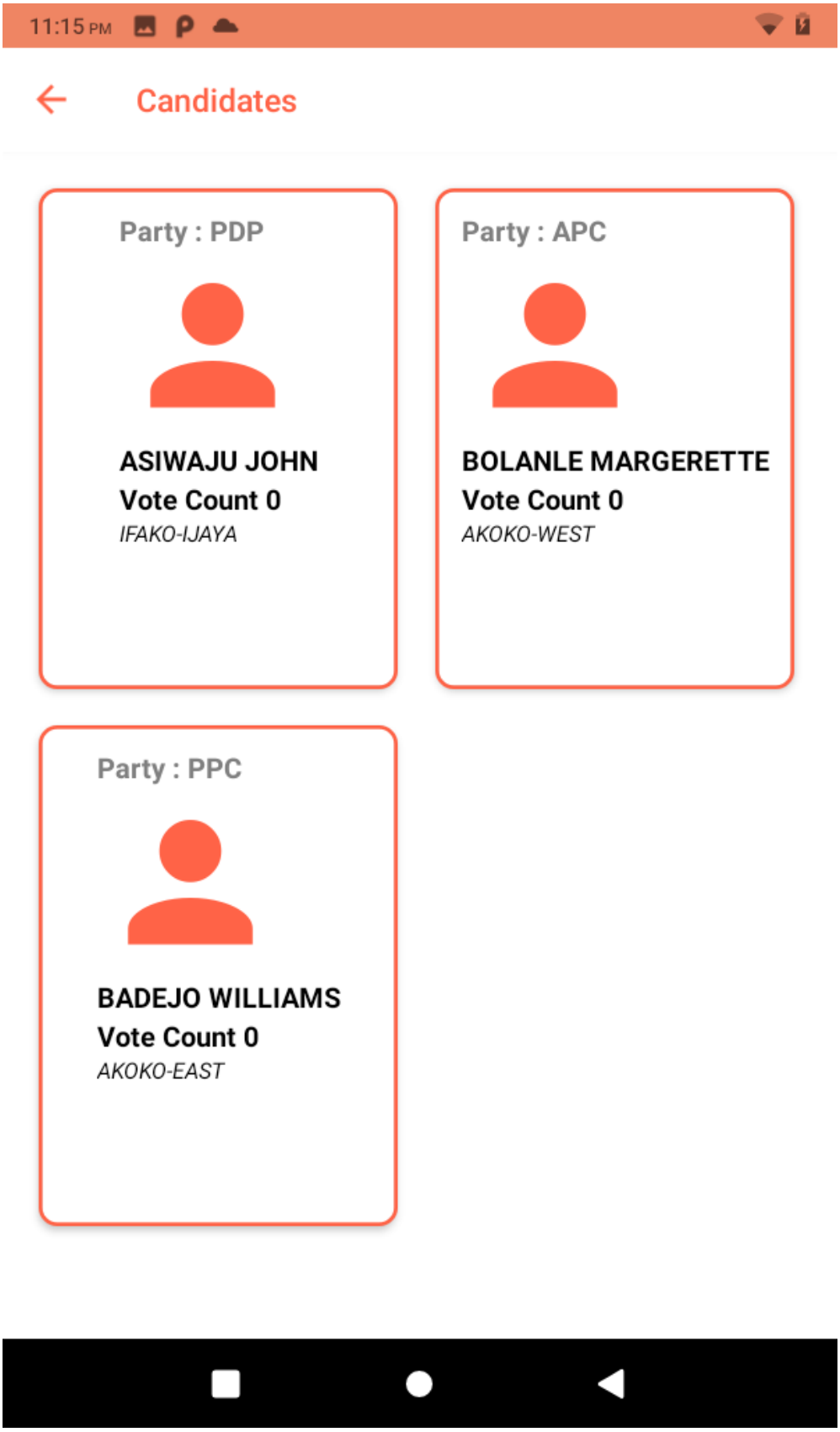

Fig 4.7: Candidate page.

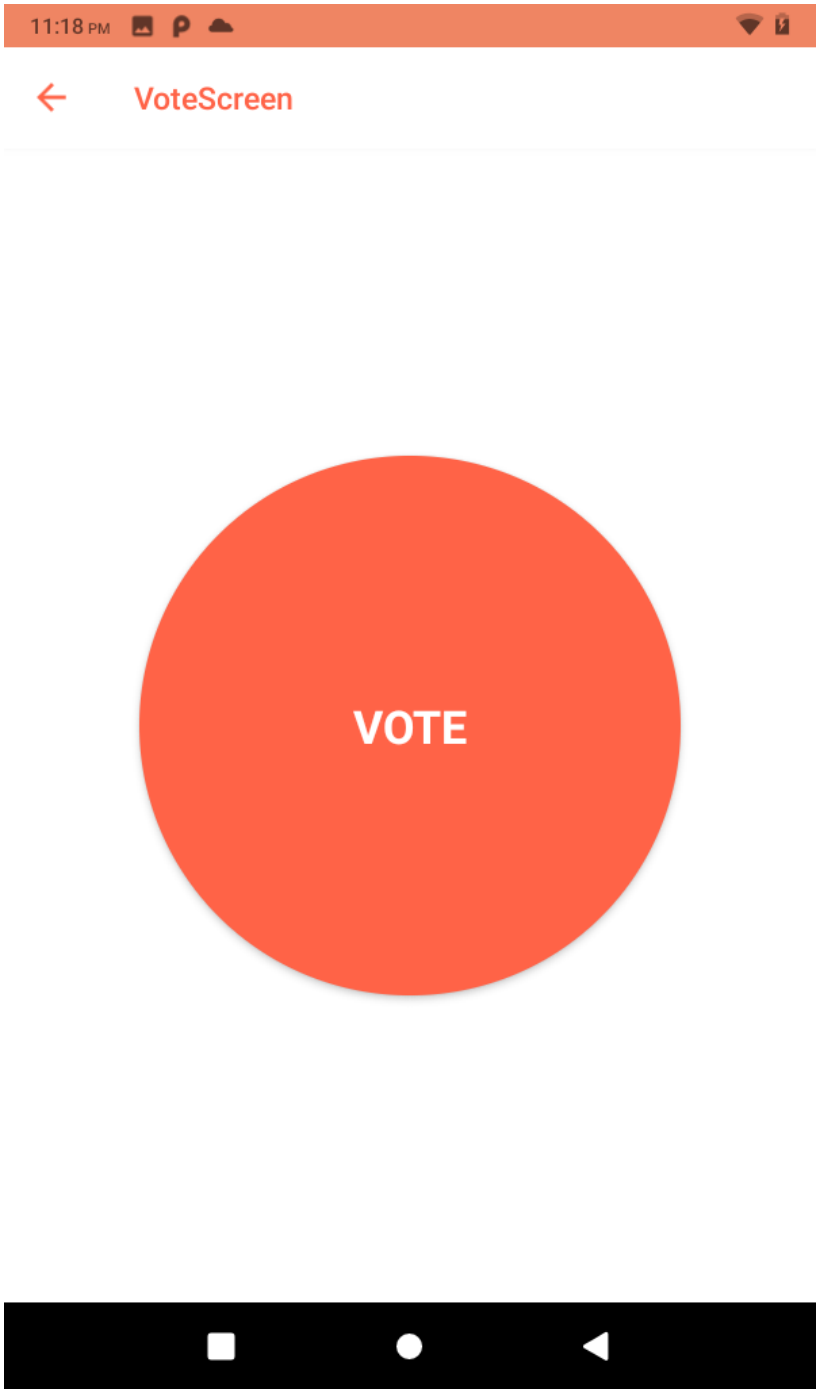

Fig 4.8: The vote screen.

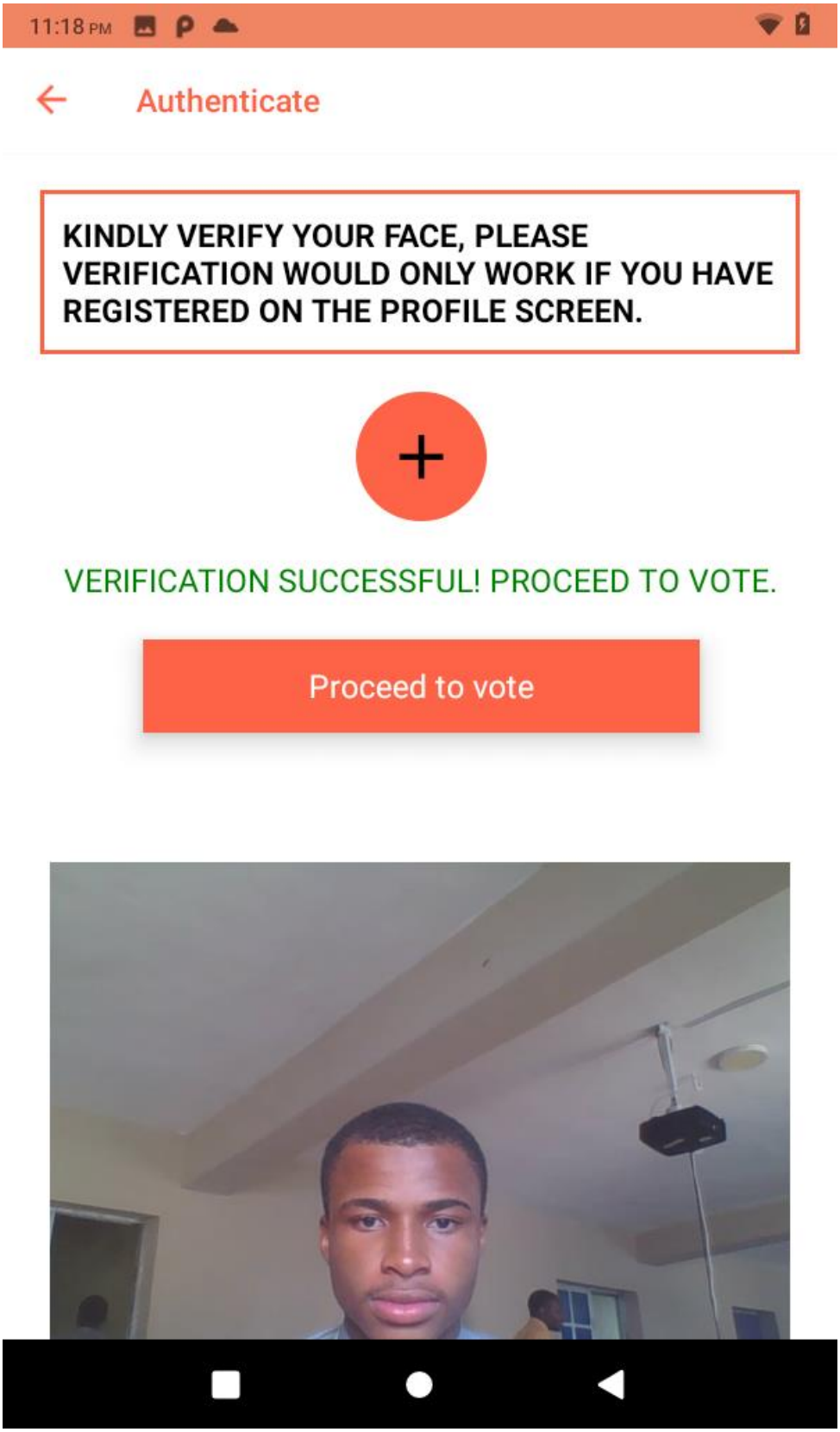

Fig 4.9: The verification screen.

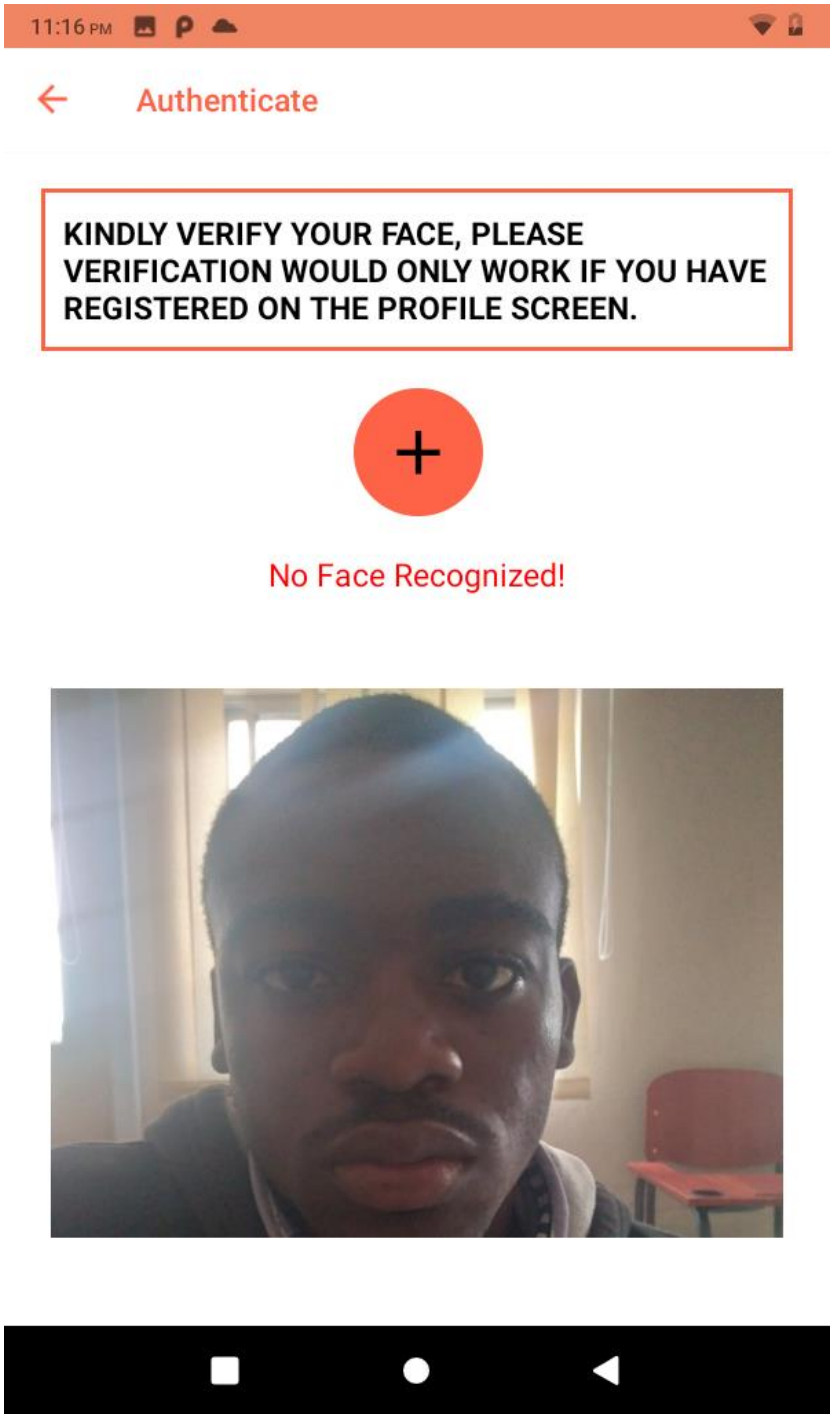

Fig 4.10: Error handling page

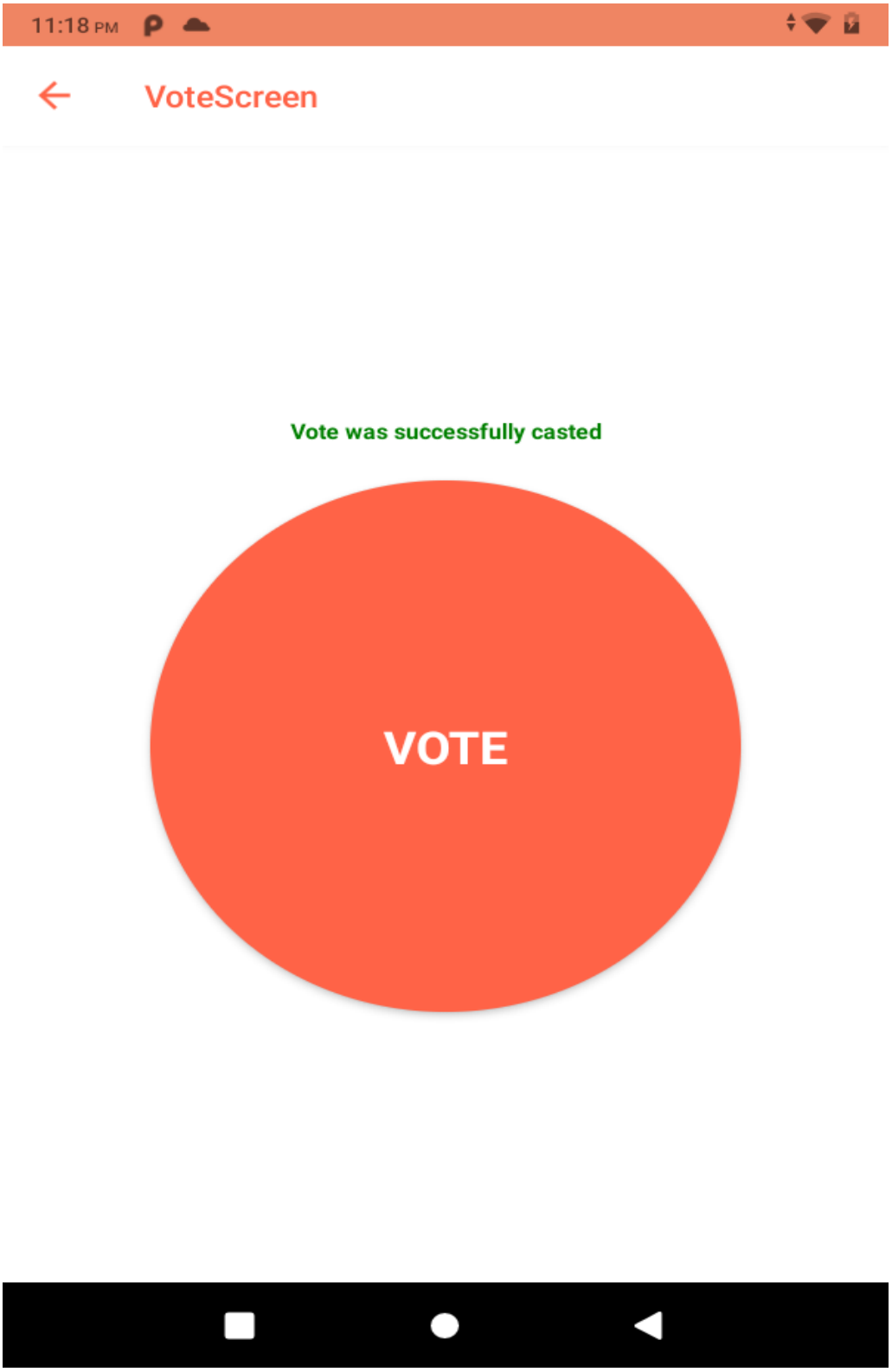

Fig 4.11: Vote casting screen

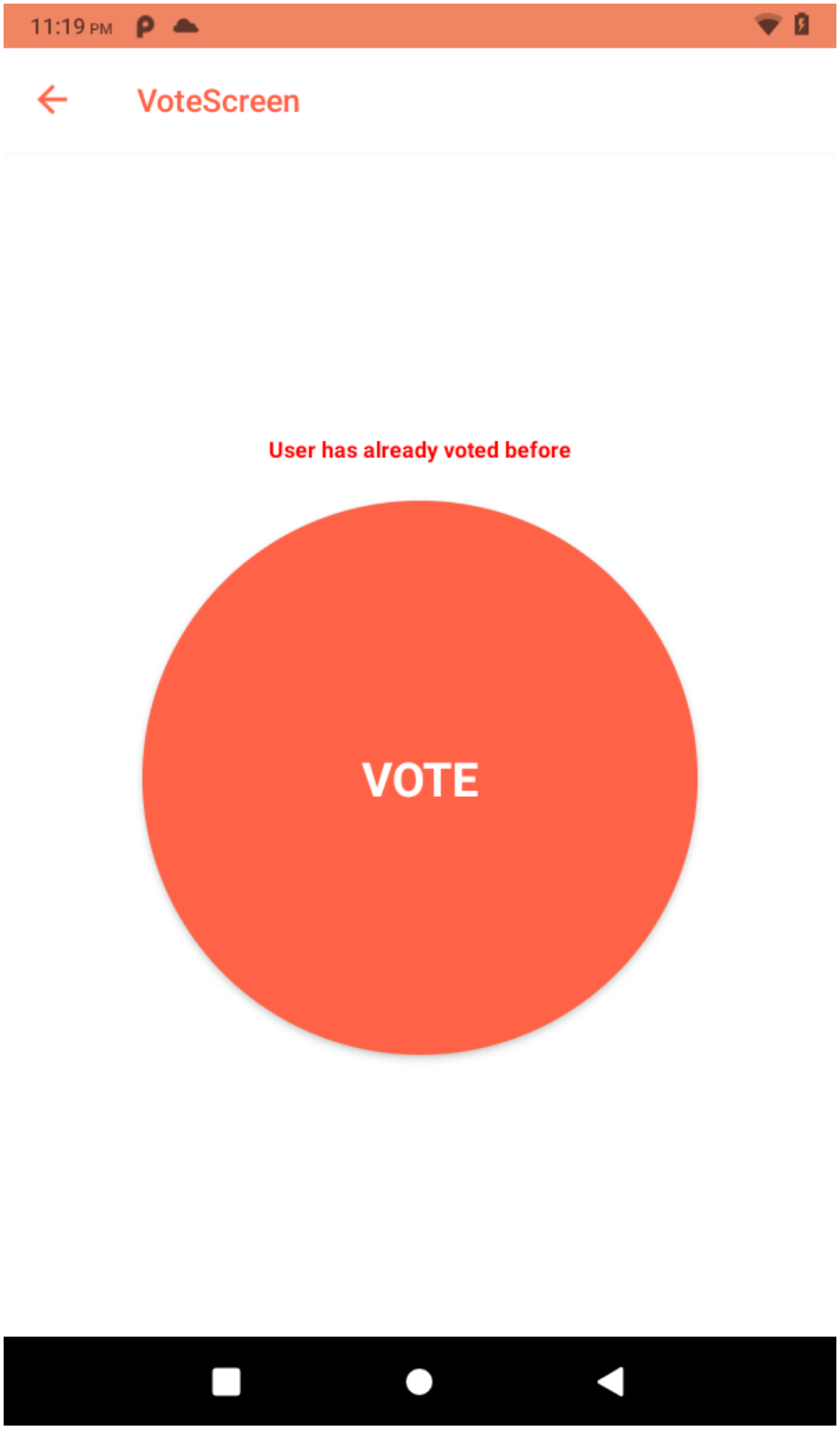

Fig 4.12: Error handling page “when a voter tries to vote more than once”

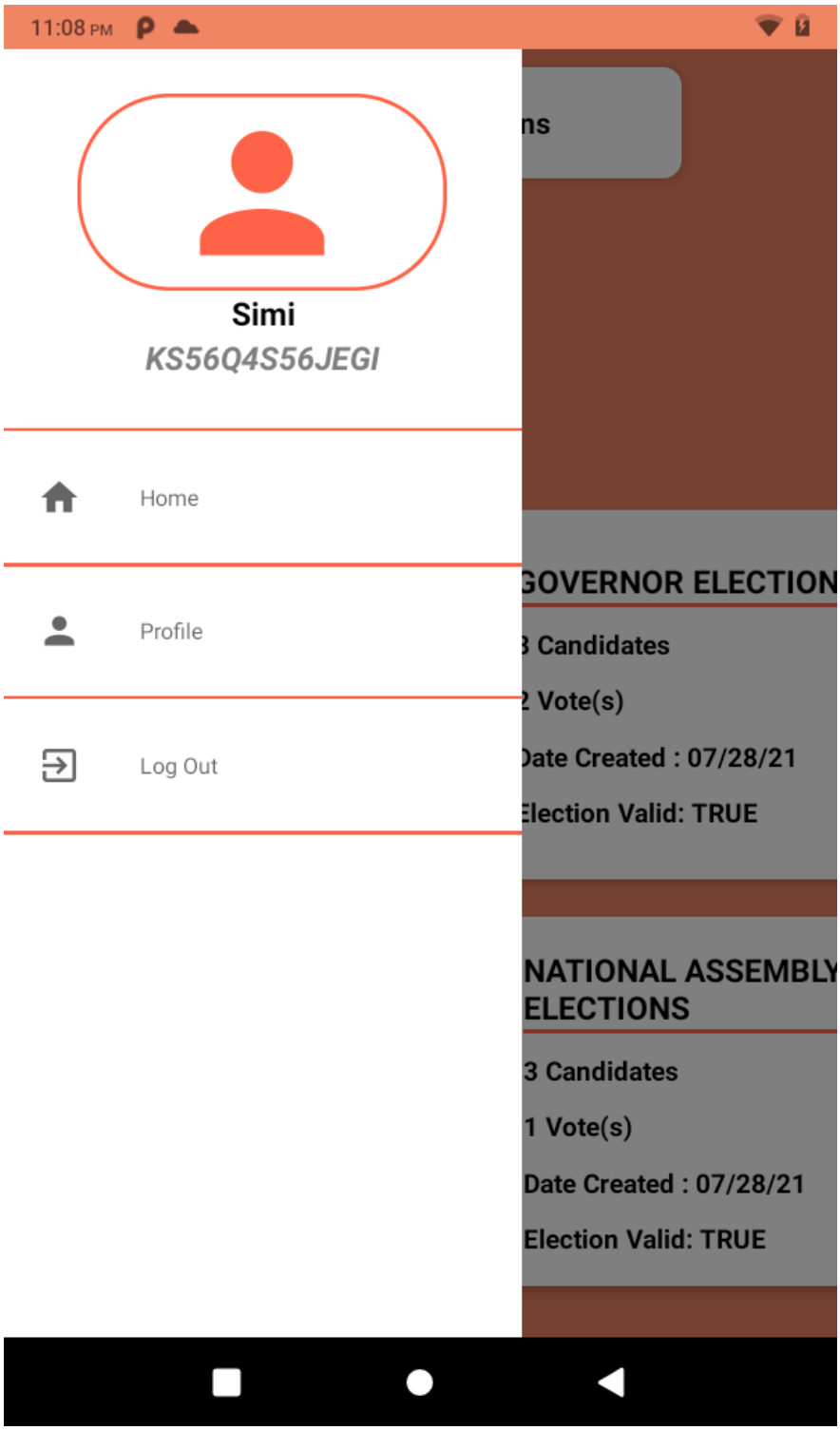

Fig 4.13: Dashboard. once the voter has voted successfully, he or she can log out.

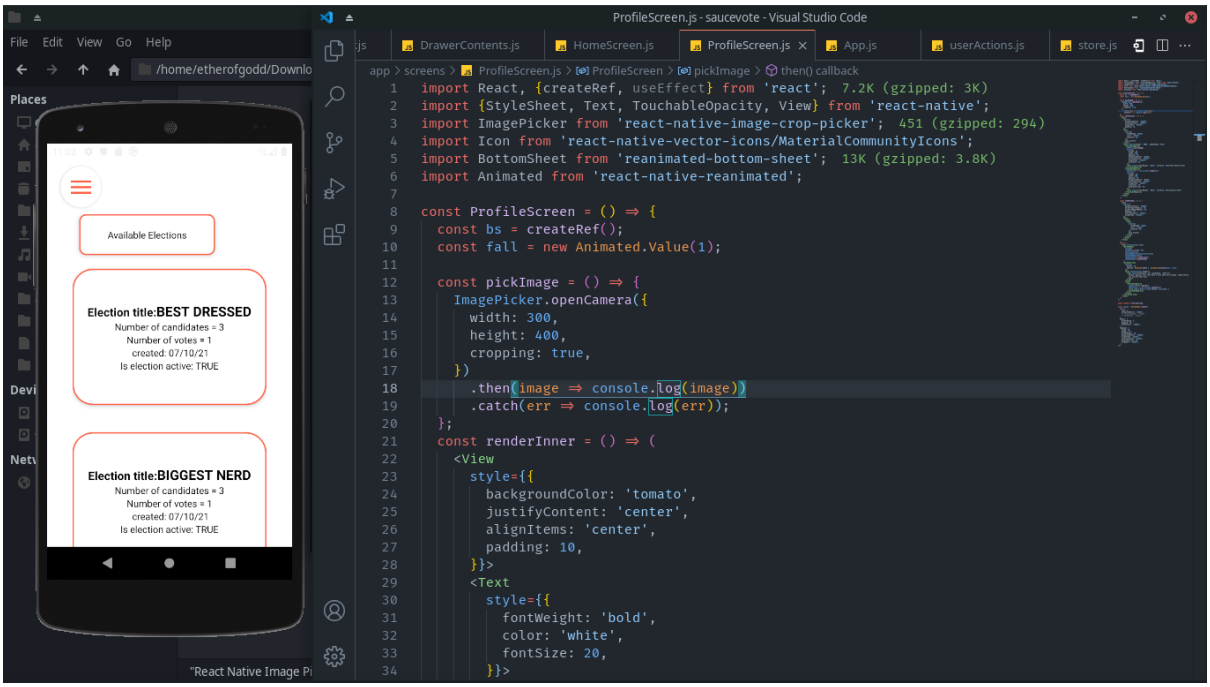

Fig 4.14: text editor used. Visual code, and my emulator.

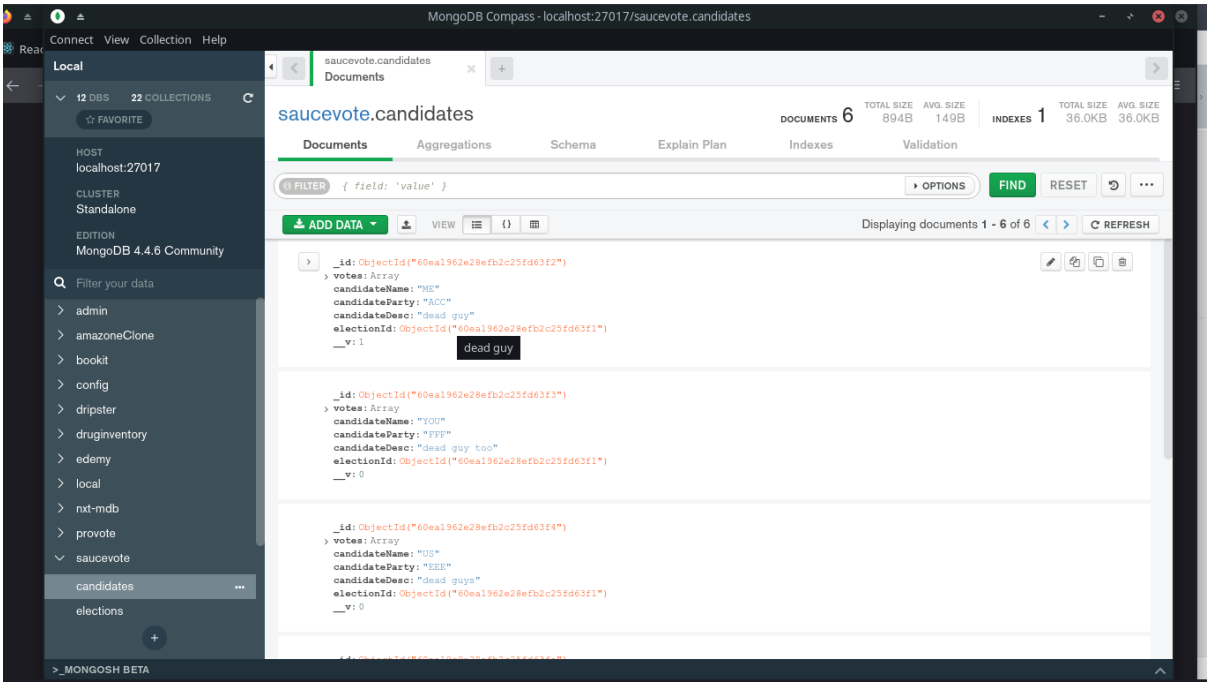

Fig 4.15: Backend used MongoDB.

CHAPTER 5

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY

Given the current electoral system in the country, we must not ignore that the uncertainty, dishonesty and indiscipline of the electorate and of the voting process as a whole play a major role in selecting our leaders, in order not to forget the voters who even sell out their votes, which are entitled to very little money, this project was aimed at stopping all this. Bringing facial biometrics into the internet voting system would drastically lower all kinds of anomalous votes and risks to the life of the voter as it will still be done anywhere at the convenience of everyone in the elections.

5.2 LIMITATIONS

a) Testing was a limitation.

b) Financial constraint was a hindrance in this project.

5.3 CONTRIBUTION TO KNOWLEDGE

A lot has been done to improve the electoral process by increasing the voters' interest in participating in the elections, notably in Nigeria. This system will provide a great deal of openness and enable citizens to vote voluntarily.

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