Deploying 2F Authentication Algorithm for Electronic Vovers' Registration in Nigeria

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ABSTRACT

Voter registration is the requirement in some democracies for citizens and residents to check in with some central registry specifically for the purpose of being allowed to vote in elections. An effort to get people to register is known as a voter registration drive. The fundamental purpose of a voter-registration system is to restrict access to the voting booth — to ensure that only those people entitled to vote in a given jurisdiction can do so and that they each vote only once. Voter registration is open to citizens 18 years or older, and has an address. The purpose of it is to ensure the voting process is legal and that people who do not fit the guidelines or related laws allowing them to vote or not vote. The principle of equal suffrage means each voter is entitled to cast one vote on Election Day. This is a basic principle of democratic elections. Voter registers and voter lists help to ensure that every voter will cast only one ballot or each voter casts an equal number of ballots to avoid fraudulent practices such as multiple voting. The system developed can now produce automatic individual data authentication for facilitation of Voter's Registration Card data capturing processes. The methodology used in the implementation was Structural System Analysis and Design (SSADM). The detailed changeover procedure used was parallel changeover. The new system is able to do immediate data validation. Human fingerprints are rich in details called minutiae, which can be used as identification marks for fingerprint verification. The objective of this paper is to develop a complete system for fingerprint verification in the Voter's Registration Card, through extracting and matching minutiae. To achieve good minutiae extraction in fingerprints with varying quality, preprocessing in form of image enhancement and binarization is first applied on fingerprints before they are evaluated. The result of this work is to show the authentication of Voter's Registration Card by showing the fingerprint of each individual on his or her Voter's Card print out. This will really help in knowing the actual owner of a particular Voter's Card care through the use of fingerprint sensor machine.

Key Words: 2F authentication, SSADM, Fingerprint, validation, voter registration

1.0   Introduction

   Automatic identification and data capture (AIDC) refers to the methods of automatically identifying objects, collecting data about them, and entering that data directly into computer systems (i.e. without human involvement). Technologies typically onsidered as part of AIDC include bar codes, Radio Frequency Identification (RFID), biometrics, magnetic stripes, Optical Character Recognition (OCR), smart cards, and voice recognition. AIDC is also commonly

referred to as "Automatic Identification," "Auto-ID," and "Automatic Data Capture."

Automatic Identification and Data Capture (AIDC) is a term used to group the various technologies employed to automatically identify items, collecting data about them and the ability to enter that data electronically into computer systems. In majority of cases, Automatic Identification and Data Capture (AIDC) systems work without any human involvement, where human involvement is required, this is normally confined to a user scanning AIDC equippement. It can also be regarded as a broad category of technologies used to collect information from an individual, object, image or sound without manual data entry. AIDC systems are used to manage inventory, delivery, assets, security and documents. Sectors that use AIDC systems include distribution, manufacturing, transportation, medicine, government and retail, among many others. AIDC applications typically fall into one of a few categories: identification and validation at the source, tracking, and interfaces to other systems. The actual technologies involve, the information obtained and the purpose of collection vary widely.

Current AIDC technologies include:

- **Barcodes**, which consist of small images of lines (bars) and spaces affixed to retail store items, ID cards and postal mail to identify a particular product number, person or location. A barcode reader uses a laser beam that is sensitive to the reflections from the line and space thickness and variation. The reader translates information from the image to digital data and sends it to a computer for storage or for another process.

- 2D Barcodes store information not only horizontally, as one-dimensional barcodes do, but vertically as well. That construction enables 2D codes to store up to 7,089 characters. The traditional, unidimensional barcode has a 20-character capacity.

- Magnetic stripes, which are typically seen on credit cards, debit cards, key cards and swipe cards. The stripe consists of iron-based magnetic particles in plastic-like tape. Each particle is a tiny bar magnet. Information is written on the stripe by magnetizing the tiny bars in either a north or South Pole direction. The writing process, called flux reversal, causeschanges in the magnetic field that can be detected by a magnetic stripe reader.

- Smart cards, which are plastic cards about the size of a credit card with an embedded microchip. A smart card can store much more data than a magnetic stripe card. It can be loaded with data, used for telephone calling, electronic cash payments, accessing services and other applications. The card can be refreshed for reuse. Some smart cards can include programming and support multiple applications.

- Optical character recognition (OCR), which is the recognition of printed or written text characters by a computer. The process includes scanning the text character-by-character, analyzing the resulting character image and translating that image into a machine-readable character code, such as ASCII. Among other things, OCR is used to digitize documents and books, sort mail, and process checks and mail-based payments by credit cards.

- Radio Frequency Identification (RFID) systems, which consist of three components: an antenna and transceiver (often combined into a single device) and a transponder (the tag). The antenna transmits a signal that activates the transponder, which then transmits data back to the antenna. The data is used to notify a programmable logic controller that some specific action should occur. Because RFID does not require direct contact or line-of-sight scanning, RFID tags are replacing barcodes in many applications.

- Various biometrics applications, which identify individuals by comparing captured biological data, such as fingerprints, voice characteristics and iris patterns, against stored data for that individual. Biometric systems consist of a reader or scanning device, software that converts the scanned biological data into a digital format and compares match points, and a database that stores the biometric data for comparison. Authentication by biometric verification is becoming increasingly common in corporate and public security systems, consumer electronics and point of sale (POS) applications. Specific biometric AIDC technologies include finger-scanning, electro-optical fingerprint recognition, finger vein ID and voice recognition.

A credible and secure Voter's Registration Card (VRC) in Nigeria cannot be achieved without putting in place a good and reliable security to checkmate fake Voter's Registration Card. The registration for Voter's Registration Card should be on a permanent basis and it should be a continuous process. This continues registration process requires an appropriate infrastructure and equipment to maintain the registration process.

In addition, Voter's Registration Card, registration should be compulsory for all Nigerian citizens of 18 years and above. INEC has the mandate to establish, own, operate, maintain and manage the Voter's Registration Card Database in Nigeria and to harmonize and integrate existing databases.

1.2 Statement of the Problem

The present methods of Voter's Registration are not reliable and dependable. There is no security to cross-check fake registration cards from foreigners. Also the system used for registration does not give room for verification of already entered data or information for the citizens. This tends to create short comings. The problems can be summarized thus:
1.　During registration, names are normally either omitted or replace with strange names.
2.　The names are not spelt correctly.
3.　There is no finger print on the hardcopy of the Voter's Registration Card. Fingerprints offer an infallible means of personal identification.
4.　The movement of citizen's data from one unit to the collation center for processing can cause loss of data or hard disk failure.
5.　Duplication of existing data for citizens.

1.3 Objectives of Study

The objective of this research is to develop a data capturing Algorithm that should be able to do the following:

1. Register individual data (Data, Pictures and Fingerprint)
2. Produce automatic individual data authentication.
3. Display a new windows for data

verification before printing the Registration Card
4. Use Histogram Equalization image enhancement.
5. Provide security numbers to cross-check duplication of data entry and fake Registration Card.
6. The Voter's Registration Card will Be printed with the fingerprint of the individual to increase the intensity of security.
7. To set and maintain identification standards, creating and managing a secure database.
8.　Provide a secure means to irrefutably confirm the identity of an individual that will promote national security and enhance socio-economic development.

9. It will ensure fast registration of the citizens.

1.4 Significance of Study

The findings of the study will ensure an effective way of conducting a free and fair registration of the citizens and subsequently a fee and fair election.

It is often observed that whenever a new system is being implemented, more emphasis is laid on the cost of implementation rather than on the benefits of the new system. Hence, the need to computerize and to place a proper security measures to avoid fake Voter's Registration Card.

This new system will also checkmate electoral corruption and malpractices which is usually caused by some politicians. This single system is comprehensive that, it will support the enrolment of the whole population which will comply with international standards for facial image and fingerprint.

The new system will provide extensive functionalities while keeping the operation simple, straightforward, consistent and fair.

1.5 Scope of Study

The scope of this research is limited to an effective Independent National Electoral Commission (INEC) real time Voter's Registration Data Base Management System that will be able to capture and store citizen's bio data in the 176 Local Government Areas (LGAs) in Nigeria.

Election is a means of choosing a leader or selection of candidate for an office by vote. It does not only find application in councils, Local Governments, States and Federal Government of Nigeria but also in different institutions and social organizations.

The origin of election in Nigeria could be traced to the colonial era when elections were conducted without any grassroots participation. There after, the introduced elective principle, which was started apply in 1923 and continued after every four years. Before the fourth year, the citizen of 18 and above will register to obtain a voter's registration card, to enable them to voter. The elections were conducted under limited franchise and there independent administrative body (INEC) to overlooked the conduct. Franchise is the right to vote and vote for in political election.

According to INEC chief, election is a process not an even and it requires input from all the stakeholders.

2.0   Background of Study

The origin of the INEC goes back to the period before Independence, when the Electoral Commission of Nigeria was established to conduct 1959 elections. The Federal Electoral Commission (FEC), established in 1960 conducted the immediate post-independence federal and regional elections of 1964 and 1965. The electoral body was dissolved after the military coup of 1966. In 1978, the Federal Electoral Commission was constituted by the regime of General Olusegun Obasanjo, organizing the elections of 1979 which ushered in the Nigerian Second Republic under the leadership of Alhaji Shehu Shagari. It also conducted the general elections of 1983.

In December 1995, the military government of General Sani Abacha established the National Electoral Commission of Nigeria which conducted another set of elections. These elected institutions were not inaugurated before the sudden death of General Abacha on June 1998 aborted the process. In 1998 General Abdulsalam Abubakar's Administration dissolved NECON and established the Independent National Electoral Commission (INEC). INEC organized the transitional elections that ushered in the Nigerian Fourth Republic on May 29, 1999.

As a permanent body, INEC comprises the workforce recruited since 1987 under the defunct National Electoral Commission (NEC). Its presence has been established in all the 36 states, the Federal Capital Territory as well as in the 774 Local Government Areas of Nigeria.

The Commission is made up of a Chairman, and 12 National Commissioners. The Commission was established in accordance with section 153(f) of the Constitution of the Federal Republic of Nigeria.

The functions of the Commission as stipulated in Part I of the Third Schedule to the 1999 Constitution are as listed below:

1.   Organize, undertake and supervise all elections to the offices of the President and Vice-president, the Governor and Deputy Governor of a state, and to the membership of the Senate, the House of Representatives and the House of Assembly of each State of the Federation.
2.   Register political parties in accordance with the provisions of this Constitution and an act of the National Assembly.
3.   Monitor the organization and operation of the political parties, including their finances.
4.   Arrange for the annual examination and auditing of the funds and accounts of political parties, and publish a report on such examination and audit for public information.
5.   Arrange and conduct the registration of persons qualified to vote as well as prepare, maintain and revise the register of voters for the purpose of any election under this Constitution.
6.   Monitors political campaigns and provide rules and regulations, which shall govern the political parties.
7.   Ensure that all Electoral Commissioners, Electoral and Returning officers take and subscribe to the oath of office prescribed by law.
8.   Delegate any of its powers to any Resident Electoral Commissioners.
9.   Carry out such other functions as may be conferred upon it by an Act of the National Assembly.

Human Fingerprint

Hong [3], Skin on human fingertips contains ridges and valleys which together forms distinctive patterns. These patterns are fully developed under pregnancy and are permanent throughout whole lifetime. Prints of those

patterns are called fingerprints. Injuries like cuts, burns and bruises can temporarily damage quality of fingerprints but when fully healed, patterns will be restored. Through various studies it has been observed that no two persons have the same fingerprints, hence they are unique for every individual.
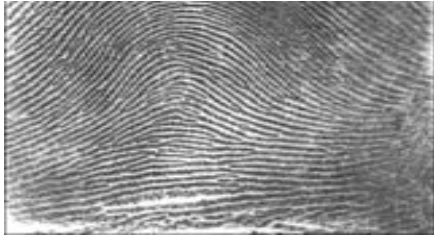

Fig. 1: A fingerprint image.

A fingerprint is the feature pattern of one finger (Figure 2.1). It is believed with strong evidences that each fingerprint is unique. Each person has his own fingerprints with the permanent uniqueness. So fingerprints have been used for identification and forensic investigation for a long time.

According to Paul Marks [4] Fingerprint in its narrow sense is an impression left by the friction ridges of a human finger.
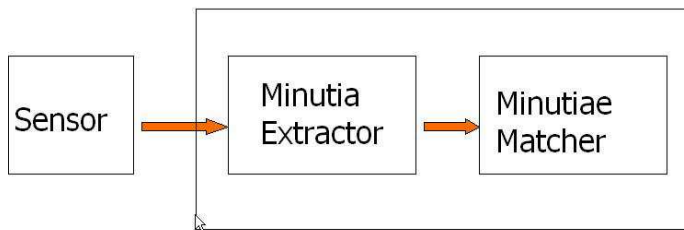

Fig. 2: Block diagram of Finger Print Modeling

Neeta Murmu and Abha Otti [2], A fingerprint is composed of many ridges and furrows. These ridges and furrows present good similarities in each small local window, like parallelism and average width. Due to the above mentioned properties, fingerprints are very popular as biometrics measurements. Especially in law enforcement where they have been used over a

hundred years to help solve crime. Unfortunately fingerprint matching is a complex pattern recognition problem. Manual fingerprint matching is not only time consuming but education and training of experts takes a long time. Therefore since 1960s there have been done a lot of effort on development of automatic fingerprint recognition systems.

Automation of the fingerprint recognition process turned out to be success in forensic applications. Achievements made in forensic area expanded the usage of the automatic fingerprint recognition into the civilian applications. Fingerprints have remarkable permanency and individuality over the time. The observations showed that the fingerprints offer more secure and reliable person identification than keys, passwords or id-cards can provide. Examples such as mobile phones and computers equipped with fingerprint sensing devices for fingerprint based password protection are being produced to replace ordinary password protection methods. Those are only a fraction of civilian applications where fingerprints can be used.

However, shown by intensive research on fingerprint recognition, fingerprints are not distinguished by their ridges and furrows, but by Minutia, which are some abnormal points on the ridges. Hong [3]

Fingerprint Recognition

A fingerprint recognition system constitutes of fingerprint acquiring device, minutia extractor and minutia matcher as shown below.

A fingerprint sensor is an electronic device used to capture a digital image of the fingerprint pattern. The captured image is called a live scan. This live scan is digitally processed to create a biometric template (a collection of extracted features) which is stored and used for matching. Some of the more commonly used fingerprint sensor technologies are Optical, Ultrasonic, Capacitance, Passive capacitance, Active capacitance

The fingerprint recognition problem can be grouped into two sub-domains: one is fingerprint verification and the other is fingerprint identification. In addition,
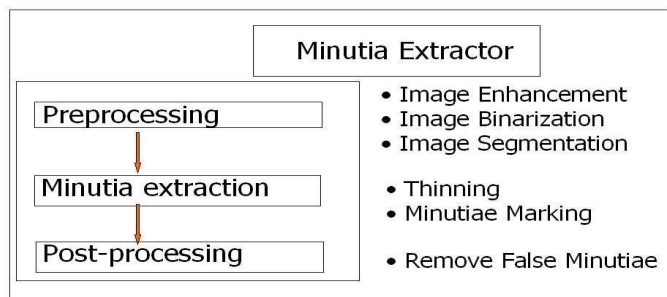
Fig.3: Algorithm For Fingerprint Image Processing   Source

Fingerprint verification is to verify the authenticity of one person by his fingerprint. The user provides his fingerprint together with his identity information like his ID number. The fingerprint verification system retrieves the fingerprint template according to the ID number and matches the template with the real-time acquired fingerprint from the user. Usually it is the underlying design principle of AFAS (Automatic Fingerprint Authentication System.

Fingerprint identification, known as dactyloscopy, or hand print identification, is the process of comparing two instances of friction ridge skin impressions from human fingers or toes, or even the palm of the hand or sole of the foot, to determine whether these impressions could have come from the same individual.

Fingerprint identification is to specify one person's identity by his fingerprint(s). Without knowledge of the person's identity, the fingerprint identification system tries to match his fingerprint(s) with those in the whole fingerprint database. It is especially useful for criminal investigation cases. And it is the design principle of AFIS (Automatic Fingerprint Identification System).

Why Fingerprint Identification?

Olsen [5] has posited that fingerprints offer an infallible means of personal identification. That is the essential explanation for fingerprints having replaced other methods of establishing the identities of criminals reluctant to admit previous arrests.

The science of fingerprint Identification stands out among all other forensic sciences for many reasons, including the following: Has served governments worldwide for over 100 years to provide accurate identification of criminals. No two fingerprints have ever been found alike in many billions of human and automated computer comparisons. Fingerprints are the very basis for criminal history foundation at every police agency on earth.

Established the first forensic professional organization, the International Association for Identification (IAI), in 1915.

Established the first professional certification program for forensic scientists, the IAI's Certified Latent Print Examiner (CLPE) program (in 1977), issuing certification to those meeting stringent criteria and revoking certification for serious errors such as erroneous identifications.

Remains the most commonly used forensic evidence worldwide - in most jurisdictions fingerprint examination cases match or outnumber all other forensic examination casework combined.

Continues to expand as the premier method for positively identifying persons, with tens of thousands of persons added to fingerprint repositories daily in America alone - far outdistancing similar databases in growth.

Worldwide, fingerprints harvested from crime "scenes lead to more suspects and generate more evidence in court than all other forensic laboratory techniques combined.

Other visible human characteristics tend to change - fingerprints do not. Barring injuries or surgery causing deep scarring, or diseases such as leprosy damaging the formative layers of friction ridge skin (injuries, scarring and diseases tend to exhibit telltale indicators of unnatural change), finger and palm print features have never been shown to move about or change their unit relationship throughout the life of a person.

However, all fingerprint recognition problems, either verification or identification, are ultimately based on a well-defined representation of a fingerprint. As long as the representation of fingerprints remains the uniqueness and keeps simple, the fingerprint matching, either for the 1-to-i verification case or 1-to-m identification case, is straightforward and easy.

Algorithm Level Design

To implement a minutia extractor, a three-stage approach is widely used by researchers. They are preprocessing, minutia extraction and post processing stage.

For the fingerprint image preprocessing stage, we use Histogram Equalization to do image enhancement. And then the fingerprint image is binarized using the locally adaptive threshold method the image segmentation task is fulfilled by a three-step approach: block direction estimation, segmentation by direction intensity and Region of Interest extraction by Morphological operations.

For minutia extraction stage, three thinning algorithms are tested and the Morphological thinning operation is finally bid out with high efficiency and pretty good thinning quality. The minutia marking is a simple task as most literatures reported but one special case is found during my implementation and an additional check mechanism is enforced to avoid such kind of oversight.

For the post processing stage, a more rigorous algorithm is developed to remove false minutia based on. Also a novel representation for bifurcations is proposed to unify terminations and bifurcations.

Fingerprint Image Enhancement:

A critical step in automatic fingerprint matching is to automatically and reliably extract minutiae from the input fingerprint images. However, the performance of a minutiae extraction algorithm relies heavily on the quality of the input fingerprint images. In order to ensure that the performance of an automatic fingerprint dentification/verification system will be robust with respect to the quality of the fingerprint images, it is essential to incorporate a fingerprint enhancement algorithm in the minutiae extraction module. Experimental results show that incorporating the enhancement algorithms improves both the goodness index and the verification accuracy.

Fingerprint Image Enhancement is also to make the image clearer for easy further operations. Since the fingerprint images acquired from sensors or other Medias are not assured with perfect quality, those enhancement methods, for increasing the contrast between ridges and furrows and for connecting the false broken points of ridges due to insufficient amount of ink, are very useful for keep a higher accuracy to fingerprint recognition.

Fingerprint Matching

The method that is selected for fingerprint matching was first discovered by Sir Francis Galton. In 1888 he observed that fingerprints are rich in details also called minutiae in form of discontinuities in ridges. He also noticed that position of those minutiae doesn't change over the time. Therefore minutiae matching are a good way to establish if two fingerprints are from the same person or not.

Among all the biometric techniques, fingerprint-based identification is the oldest method which has been successfully used in numerous applications. Everyone is known to have unique, immutable fingerprints. A fingerprint is made of a series of ridges and furrows on the surface of the finger. The uniqueness of a fingerprint can be determined by the pattern of ridges and furrows as well as the minutiae points. Minutiae points are local ridge characteristics that occur at either a ridge bifurcation or a ridge ending.

Jain, L.C. et al [1] has posited that Fingerprint matching techniques can be placed into two categories: minutae-based and correlation based. Minutiae-based techniques first find minutiae points and then map their relative placement on the finger. However, there are some difficulties when using this approach. It is difficult to extract the minutiae points accurately when the fingerprint is of low quality. Also this method does not take into account the global pattern of ridges and furrows. The correlation-based method is able to overcome some of the difficulties of the minutiae-based approach. However, it has some of its own shortcomings. Correlation-based techniques require the precise location of a registration point and are affected by image translation and rotation.

Minutia Match

Given two set of minutia of two fingerprint images, the minutia match algorithm determines whether the two minutia sets are from the same finger or not.

An alignment-based match algorithm partially derived from was used in my paper. It includes two consecutive stages: one is alignment stage and the second is match stage.

1. **Alignment Stage: -** Given two fingerprint images to be matched, choose any one minutia from each image; calculate the similarity of the two ridges associated with the two referenced minutia points. If the similarity is larger than a threshold, transform each set of minutia to a new coordination system whose origin is at the referenced point and whose x-axis is coincident with the direction of the referenced point.

2. **Match Stage:** After we get two set of transformed minutia points, we use the elastic match algorithm to count the matched minutia pairs by assuming two minutia having nearly the same position and direction are identical.

Methodology of the proposed system

Some methods usually adopted for software engineering design that are international accepted include:
   a.   The structural system analysis and design methodology
   b.   Prototyping
   c.   Expert systems methodology
   d.   Usability engineering methodology
   e.   Object oriented system analysis and design methodology

The structured system analysis and design methodology (SSADM) is a system approach to analysis and design of information system and will be used for this project.

Structured system analysis and design methodology (SSADM) was used in the design because it divides an application development project into modules stages or steps and tasks and provides a framework for describing project in a fashion suited for managing the project, for each stage, SSADM set out a series of techniques, procedures and convention for recording and communicating information.

Pertaining to these both in textual and diagrammatic form SSADM's objectives are to:

   i.   Improve project management and control
   ii.   Develop better quality systems
   iii. Make more effective use of experienced and inexperienced development staff.
   iv.   Develop better quality systems
   v.   Make project resilient to the loss of staff
   vi.   Enable project to be supported by the computer aided toll such as a

Computer aided software engineering system. Establish a framework for good communication between participants in a project.

SSADM is a very comprehensive model and a characteristic of the method is that projects may use only those elements of SSADM appropriate to the project. In details SSADM set out a cascade of waterfall view of system development, in which there are series of steps each of which lead to the next step. The following are the SSADM's steps or stages"

Method of data collection

The concept was explored, refined and the client's requirement was elicited. That is to say that the problem was carefully looked into in order determine its input (what information/data are given and which items are important in solving the problem) and the output (what information must be produce by implementing those three methods of data collected).

   a.   Interview method
   b.   Study of procedural manuals
   c.   Library research
   d.   Website research

Different locations (websites) on the World Wide Web (www) were reviewed to find information which was essential in writing the introduction, literature review. SSADM was adopted for this work, because the technique it processes are quickly and easily understood and its ability to develop a better quality system, also, it is an open standard, and is freely available. There are five steps used in SSADM which are:

   a.   Feasibility study
   b.   Requirements analysis
   c.   Requirements specification
   d.   Logical system specification

e.   Physical design

System Analysis

System analysis is the critical examination of an activity, procedure, method or technique, to determine its purpose and how the necessary operations can best be achieved. Analysis of a system involves decomposition and by decomposition we mean stepwise refinement that is breaking down large problems into smaller and specific problems in attempt to discover its basic problems. It is the procedural study of systems operation with an attempt to discover its basic problem areas. System Analysis is a process whereby a system Analyst delves into an existing system to discover or locate the problem(s) associated with the present system, which will be very useful in the development of a new system so as to eliminate those problems in the new system. The main reason for analysis or research work is to find out what type of data is maintained, what fact to find and look for, how to find them and to record them for usage.

Analysis of the present system

In the present system data is sent to the end user or clients, for systems that are on a network. One at the server can get hold of the information being sent. Data can be sent during the software processing, in which the citizen's fingerprint will be checked to know if it exists or not, and the security code employed will be considered.

Advantages

The advantages of the present system were as follows:
- Easy identification of citizen with   photograph and easy access
- It generates room for creating NewVoters' Registration cards
- It creates room for one to print
- Easy access.

Disadvantages

The following weaknesses were identified during the investigation on the Voters' Registration cards.
1.   Manual data collection: the present ystem which involves data collection at various stages is insufficient and inefficient.

2.   The citizen's fingerprint does not show on the printed ID card
3.   Double registration: there is always double registration of citizens because their database is not a distributive database. So there is no data update during registration.
4.   Missing of citizen's name or spelling during registration.
5.   No security number to cross-check double registration

Justification of the proposed system

From the weakness of the present system discussed above. We were able to make prescription of what the proposed system would hold, so as to surpass the weakness of the present system and achieve its major objectives. The proposed system will provide a complementary electronic assistant to the INEC staff records and citizen's registration record.

1.   It will enhance decisions that involve retrieving   and   appending   citizen's information
2.   It will provide a more convenient way of monitoring the activities of the INEC officers.
3.   The proposed system will print out the citizen's fingerprint on the ID card
4.   It will provide security to data and information   supplied   by   each   INEC member.
5.   The proposed system will reduce the number of double registration processing and   monitoring,   thereby   reducing inefficiency in the result.

Analysis of the proposed system

In the present system, it makes use of a distributive database management system. The citizens register are automatically uploaded and updated as it is being registered. Data validation is done automatically since it is a network application. The issue of double registering of citizens is not possible since database checks are made before saving to know if record had been previously saved and to verify if the record is already existing in which case the processing will be terminated immediately.
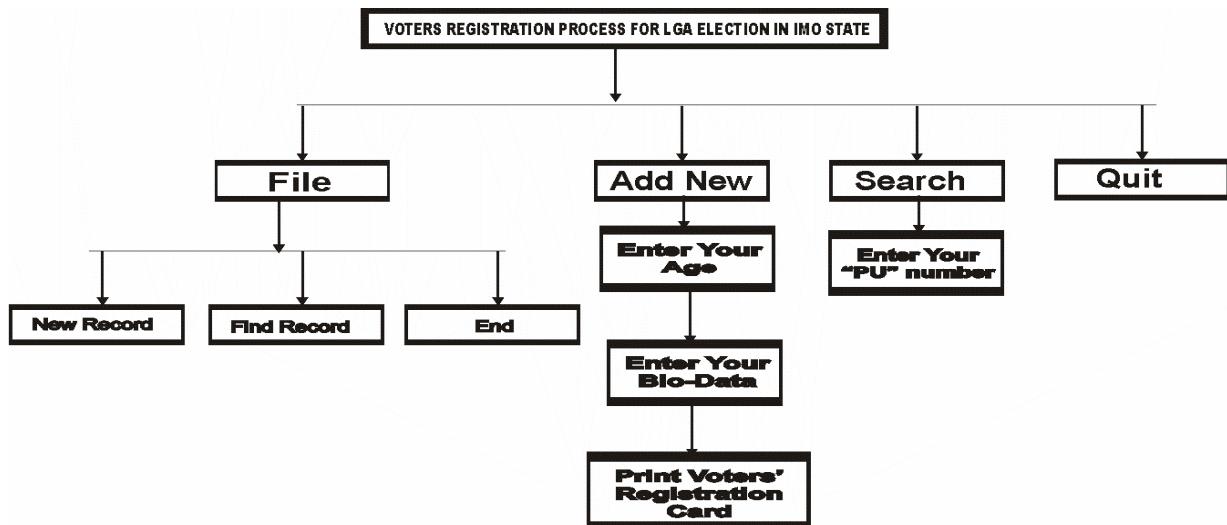
Fig. 1: Voters Registration Process

System Design

Objectives of Design

The objective of this project is to design a real time system for NIMC registration that will be able to address the below irregularities and to add more security in the system.

i. Computerized the Voters' Registration Process.
ii. Build a computer based system that will add more security measures to the Voters' Registration ID card.
iii. To provide a preview windows for cross-checking spellings. he registration records of citizens would be saved.
iv. It will facilitate the processing of information and the management of same obtained for statistical purposes.
v. To print out the Voters' Registration ID card showing the fingerprint of the citizen.

The research carried out portrayed a very little advantage of the present system being used in Independent National Electoral Commission (INEC) .The advantage is that; it dose not require a Trained staff; the present system which involves distributive database management system does not require a special training by any of the member to handle it.

Thus, it can be undertaken by any INEC member who has been used to the old system in terms of operation.

Weakness

The weakness identified in the present system which motivated the researchers to propose a new system for the management of INEC registration is as follows:

i. Central server is not being dated at the same time the registration is being done.
ii. It is difficult to install. With the identified weaknesses, the proposed system will be capable of eliminating the shortcomings in the present system.

Specifications

a. Table 1: Database

S/N	Fileld Name	Type	Size
1	Name	Text	50
2	Gender	Text	6
3	Address	Text	150
4	Age		
5	Date of Birth	Date	8
6	Occupation	Text	50
7	Ward	Text	50
8	Processing Centre	Text	150
9	L.G.A	Text	50
10	Ward	Text	50
11	Today's Date	Date	8
12	Passport	Text	250
13	Fingerprint	Text	250

b. Table 2: Program Module Specification

S/N	NAME	DESCRIPTION
1	FrmAddID	Registration Module
2	FrmEdit	Edit/update module
3	Frmpreview	Record preview module
4	Frmsearch	Searching if VRC
5	Frmview	View all records
6	VRIfrmmenu	VRC main menu

Input Design

The input design refers to nature and format of input that the system needs for its proper functionality.

Fig. 5: Input Design

Output Design

The reliability and acceptability of a system is determined by one major factor, which is the quality or its output. The application to be designed is windows based application. The interface is user friendly. The user interface is made up of menus to access the commands and tools contained in the application controls, form, image and icons. In this design, information is presented in the best possible way to highlight import detail.

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VOTERS REGISTRATION PROCESS FOR LGA ELECTION IN IMO STATE

SURNAME	Xxxxxxxxxx	Processing Centre	Xxxxxxxxxx
Other Name(s)	Xxxxxxxxxx	Address	Xxxxxxxxxx
Gender	Xxxxxxxxxx		
Occupation	Xxxxxxxxxx		
Age	999		Picture
Ward	Xxxxxxxxxx		
Todays Date	99/99/99		
Date of Birth	99/99/99		Fingerprint
LGA	Xxxxxxxxxx		

Duster   Cancel   Save   Passport>>

Fig. 6: Output Design

Algorithm For Each Module to be Programmed

The algorithm for each module of the entire software to be programmed will be illustrated using the flowchart approach. A flowchart is graphical representation of a programs logical flow that can represent an algorithm
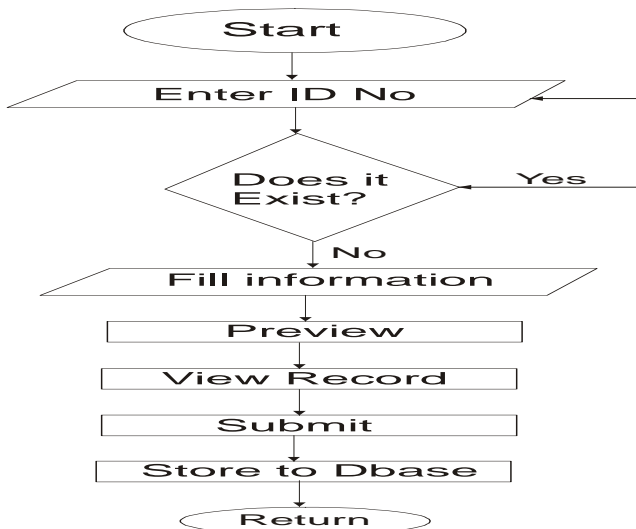
.

Start
Enter ID No
Does it Exist? — Yes
No
Fill information
Preview
View Record
Submit
Store to Dbase
Return

Fig. 7: Access Control

Start
Enter ID No
Does it Exist? — No
Yes
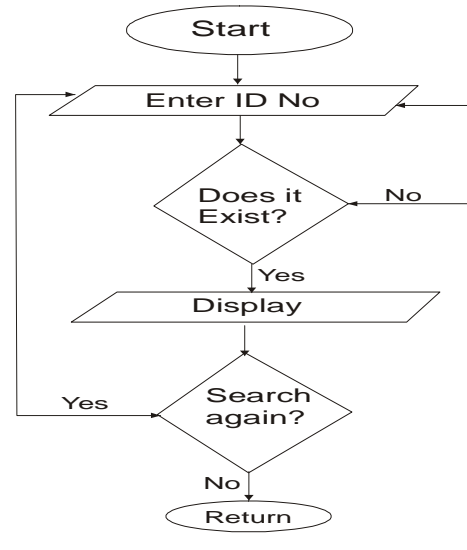Display
Search again? — Yes
No
Return

Fig. 8: Access

Choice and Justification of Programming Language Platform

The language used for the design and coding of this project work is Visual Basic.Net. The programming language platform was deployed for the following reasons:

a) It is a window based programming language.
b) It is user friendly.
c) It has a graphic user interface which makes it more flexible, even to novice
d) It is an object oriented programming
e) It supports polymorphism and inheritance.

System Documentation

System Documentation is written information on the system works. It involves a well documented detail of the procedure, process, operations, problems and solution implemented in the present system. This aspect of documentation, normally called the user documentation, only describes those aspects of the system that are of interest to the end user. Every user requires an operational manual, which would serve as preliminary guide to underlying operational principles.

System Requirements

System requirements are the foundations on which the new system will function properly, which includes:

a) Hardware Requirements
b) Software requirements

The following hardware is required for the new system:
a) Hard disk with at least 10GB free space and above.
b) At least a VGA monitor.
c) A processor with at least 1.6GMHZ of speed.
d) A RAM of at least 1GB
e) A mouse

e) An enhanced keyboard.
f) A stabilizer

Software Requirement

The software required includes:
a) Microsoft windows of any version installed in the computer system.
b) Visual Studio compiler
   In other to install software into your system, the following steps are needed:

- Boot your system by pressing the power button for both the monitor and the system unit. Click on my computer icon on your desktop.
- Select the drive where you have the software i.e (Floppy or CD-ROM).
- Double click the drive in other to install the software. Click on the software on the desktop, to start using the program.

Maintenance Details

The system has been developed, so in other for the system to operate effectively and error free, certain maintenance procedures have to be put in place. The maintenance procedures include:

a) Install an updated version of any Utility software like; Avg, Karparsky, Bit Defender, avast etc.
b) Always scan the system daily, in Other to ensure the program function properly.
c) Make use of a surge suppressor, to avoid damage to the operating system housing the program.
d) Always close the program after use, and shut down properly.

Training of Operators

The operator or user should have the basic computer knowledge. Practical knowledge of a software will lead to perfect operation. For functional usage

of the system, it is important to train its user.

Application Details
The system helps the user to easily and conveniently register themselves effectively with no room for lost of names or irregularities in services.

Changeover Procedure Recommended
This basically involves changes in mode of a data processing within a period of time that is the period when the existing system is supported by the new system until the new system can be fully relied upon. There are three method of changeover, which are:
a) Parallel (b) Direct (c) Pilot

Changeover Recommended
Parallel changeover was recommended for this work. This involves the operation of the old system and new system alongside each other. This type of change over allows for comparison between the two systems but it is expensive.

Summary, Conclusion And Recommendation

Review of Achievements
There are evidence that computer can be used to perform many functions. This research work has produced as output a computer software forVoters' registration. The data capturing algorithm of the existing system was enhanced to eliminate the difficulties encountered in data capturing.

Area of Application
The system can be used in the National Identity Card Registration, in biometric systems, Nigerian Police Force etc. It can also be adapted for the Nigerian Immigration Service Commission for crime detection.

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Suggestion for further Research
Further researches can be carried out by another scholar to enhance what has been achieved in our present effort.

Recommendations
The Voters' Registrations software, when implemented will eliminate the myriads of problems associated with the present system. It is highly recommended to be in used in the countries ID card process to improve their services and reduce the number of anomalies in election process. To insure the integrity of the process through Automation, an effective data capturing algorithm should be put in place. This work has brought into focus what it takes to have credible and secure Voter's Registration Exercise for Imo State citizens. The following recommendations are therefore presented:
Achieving credible and secure Voter's Registration exercise, most often entail introduction of new technology.
The technology to be introduced in a country is a function of so many factors including cost, literacy level, and workability of the system; just as in our case where the finger print is the most important and key element. The making of a credible register is a continuous process. It requires constant fine-tuning as technology is dynamic.

Conclusion
In the production and maintenance of registration lists of the citizen, the kind of links to be expected between registration lists of the citizen and other types of registries basically depends upon the special circumstances under which Voters' Registration is organized, most frequently in the case of emerging and post-conflict situations.
The ability for citizens to participate fully in the registration is of paramount importance for the commission to actualize their goals. Updating the registration should become a routine exercise. Employing the latest technology, the ISIEC should organize this important process in an orderly and accessible fashion.

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