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Software Development for Electronic Policing Of a Typical Environment

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Abstract: *Electronic policing of an environment is becoming more appreciated to curb indiscipline, unwholesome attitudes, as well as nib in the burled at early stages of terrorism. This work aims to develop a software to police an environment by acting as a reliable receiver end and document the detail report of incidence with security features for security agencies attention in real time. The environment to be policed is coded in the database with zone code definitions with their corresponding code numbers, names, streets, area and house numbers for easy access, with time of alert and date for concrete evidence as stored in the database with restricted access. . The development was tested and the input output response time was determine to be less than 2sec. The software performs well in accepting the digital coded signal from the input source to determine the distress point of call, and make a print out of the caller. The developed software, by its design makes it difficult for any erasure of the information received from its line, and stores it in the ROM, with the time of occurrence and date. The precision detailed information of events from distress point of call [DPOC], stored in the system for checks and verification, is expected to reduce the laxities and negligence of duties on the part of a Nigerian policeman, and claim of innocence of not being timely informed of any security break. It is also believed that crime rate with the use of software is expected to be highly reduced, thus creating a better image of the Nigerian nation as well as others implementing the scheme in their security outfits, and create a platform to strengthen the "caught- in the –act" scheme as against the present "after –the- act "investigations being adopted by the Nigerian police and other developing Nations to combat crime.*

Keywords: *Area, code numbers, database, policing, streets, zones*

I. Introduction

A total Police communication system can be extremely complex, but its complexity varies with the needs associated with particular Police organisation and their operational environmental situations. Each Police function or situation calls for its own subsystem of communication. In a large city, the sources of information that must be fed into the central system are remarkably varied. Police may be on foot or motorcycles, in patrol cars, in patrol boats or in aircraft. In addition, the system must encompass the likes of fire stations, ambulance services, traffic control systems; rescue teams, alarm systems, emergency utility services, crime – information systems and crime laboratory. A variety of fixed and mobile systems are in use, including radio, television (CCTV), telephone and computers [1,2]. The geographic distribution of Police communication centre has been broadened to include locations in different zones of an environment. This necessitates the need for internetworking the zones for effective and timely communication.

While the methods being used by these countries is very laudable in principle and practice to achieve all the legal objectives of policing, for effective control of crimes, the capital investment involved in acquiring this technology is very high. It is said [3] that about 3 billion dollars (about 360 billion Naira) annually would be required by the Nigerian police for a minimum of 4 years to be able to provide the services being rendered by the British police. This limits the implementation of above mentioned to the developed worlds. Also, this method of crime prevention and control may not be easily realized in Nigeria whose total budget is between 9.5-14 Billion dollars since 1999 [3] and other developing nations, because of its cost implications and orientation of its present police. Thus, most of the developing nation's police including Nigeria still rely much on "after the act"investigation of crimes with little success. Therefore, with the need for effective policing and reduction of crimes, this work becomes necessary to find a method of incorporating a simplified electronic policing into the system with connectivity to a dedicated computerized system.

Software-based electronic policing is gradually being appreciated with the mapping software that was developed in the U.K., which takes into account the previous occurrence that has taken place in an area, to predict the next housing unit to be attacked [4,5]. It has been proved to have about 72% success. Another software is the "ORION the hunter" which is a database search engine software that is used by the Italian police to track down mafia leaders [6].In this work, the software being developed is to work with a wireless one-touch sender in each housing unit or office in a particular estate or area. The software is installed on a system in a central security office within the coverage area, the local policing station (LPS). The software receives digital information from the one touch digital system and decide which house or office the digital information is

coming from, based on the digital information received from local area electronic policing controller LAEPC [7,8]. To make the decision, it will check the diary in its database to decide the address corresponding to the digital information it received. The software will then;print the address of the corresponding housing unit involved through a printer connected to the system.

Display the address of the housing unit and the road network on the monitor, sound a system alarm that will alert the officer at work, Store the time, data and address in a memory [9,10] accessible only by an authorized personnel.

Update the number of occurrences in the estate or community in the number of occurrence column on the screen, continuously check the line status to ensure that a dedicated connection to a particular point is still intact, andpermit an update work to be done on the diary to allow the addition of new customer, change of address of an existing customer within the Estate or Area.

II. Materials And Methods

The system requirement for the program is divided into two: Hardware requirement and Software requirement

2.1 Hardware requirement

For every software to operate properly, there must be adequate hardware on ground that will ensure proper operation of the software. For this software, the following minimum configuration is recommended,
A Pentium three board, with 800 MHz speed, 2GB Hard disk, 128MB memory, 31/2 floppy drive, A LaserJet printer, Enhanced keyboard and mouse, Speakers

2.2 Software requirement

The programming language used in this program is visual basic (6.0 version). The programming language is used along with the Microsoft Access. The Microsoft Access is the back-end of the program with the front-end of the program as Microsoft visual Basic [11,12]. The database in Access holds all the data in the diary and all necessary records. Visual Basic is tool of choice for programming in the windows environment. Visual basic is the most commonly used visual programming environment. It allows us to create front-end applications. The ability to create and access a database such as Microsoft Access gives us many programming advantages.It simplifies our programming

It allows our application to share data with other programs. Data access on visual Basic consists of performing operations on physical database [13,14]. We can display the resolution of these operations and accept input from the user on visual basic forms using controls. The other software that will be needed included a Corel draw which is used to edit or draw the diagram of the area and the road network.

2.3 Choice of programming language

Visual basic is the programming language of choice. This is because it is an event driven and object – oriented programming language compared to other procedural programming languages like BASIC, FORTRAN, PASCAL [6,9,10,15]. It allows us to create forms as front-end to interface our database which is the back-end with some data control tools to link the forms and the database together. This encourages the end users to embrace computerization because of its visual appearance. The visual basic coding environment supports object oriented programming (O.O.P), which combines data and the code to manipulate that data into a programming object. For example, a drawn command button is a programming object. The command button contains data that describes its position and properties, and contains code to manipulate it (methods). It also has the ability to implement statements that perform particular functions. The data store contains the objects properties. Visual Basic allows for interface (the communication medium between the user and the computer) quickly without directly writing the code. The interface can be used to hold BASIC programming code [16,17] to perform operations and manipulate the interface as desired.Object oriented programming started from the structured programming techniques that guided software development in the 1970's to the early 1990's. However, with the introduction of programming languages such as c++, object oriented programming has come to stay. Visual Basic ultimately allows the programmer to create software with what is known as the graphical user interface (G.U.I.s), which dominates the scene in operating systems, such as windows [16,18,19].

III. Design Of The Proposed System

The design of the proposed system is categorically divided into input design, output design and the database design.

3.1 Input design: Before a computer can produce an output, it must be given an input. The input to this software is the output from the 80CH51 microcontroller of the LAEPC. The 14 or 22 digital signals are converted to its decimal equivalent by the software, and the digital equivalent result is searched for within the

addresses of the design. When the address is found, it works on other requirements as specified in the flow - chart of Figure1 to output the required result. If the address is not within the software installed in the said LPS, an alarm is raised to alert the police of a problem somewhere outside their jurisdiction as specified in the software, for a possible assistance to the nearby policing station.

3.2 Output design

In every computer program there is always an output or a result for the processed information. The output of this software is multidimensional as it is billed to do a lot of things as it receives the information from LAEPC. This includes;

Display of the Address, Name, Date and Time corresponding to the received signal

(ii) Sounding a system alarm to indicate the receipt of a signal.

(iii) Storage of the displayed data in a special memory.

(iv) Print- out of received information.

(v) Display of the area map indicating road inlets and outlets to the DPOC.

3.3 Database design: The software is database oriented because the received signal will act on the database already on ground. As such, the database is designed to receive customer's data and a unique code assigned to the customer's data. The database also allows a customer's data to be updated or changed as necessary. The database also includes the information stored into the memory for future reference. It is designed in such a way that it cannot be accessed except by an authorized officer that has the password. In the software, various buttons under the menu included are :

Line Status: To check if there is still a dedicated line between the software and installed OTS in the customer's building.

Change Clients Address: To adjust or update an existing clients address in case of change of address.

Change Password: Available for the authorized officer to change his password for security purpose

Add: -To add new customer's data; LOGIN TO MANAGER'S OFFICE: To view existing address or received messages. PRINT :-To print selected data; SAVE :-To save selected data in a storage system.

3.4 Program development

The program developed for the on-line microcomputer to receive information from the transmitting end is

User interface and application code: The user interface is what the user sees and interacts with. It contains forms that display the data and enable the user to view or update. These forms are manipulated using the Visual Basic code application that has methods to, request database service like adding or editing records or performing queries.

Software installation

The software developed with the flow-chart of Figure 1, was written to an installation compact disk (CD) , and can be installed, by taking the following steps :

Step 1=> make sure no other program is running on the system

Step 2=> Insert the installation Disk consisting of the application program

Step 3=> Double click on the CD drive of the computer

Step 4=> Double Click on setup

Step 5=> Follow the instruction and make sure that all the necessary questionsare answered correctly

Step 6=> when setup is complete click finish .

Step 7=> Open the support folder and copy the file Muyiwa .dB to theprogram file in C

Step 8=> Close and remove the disk.

The software is now ready to be run, and to be installed on another systemup to as many as required..

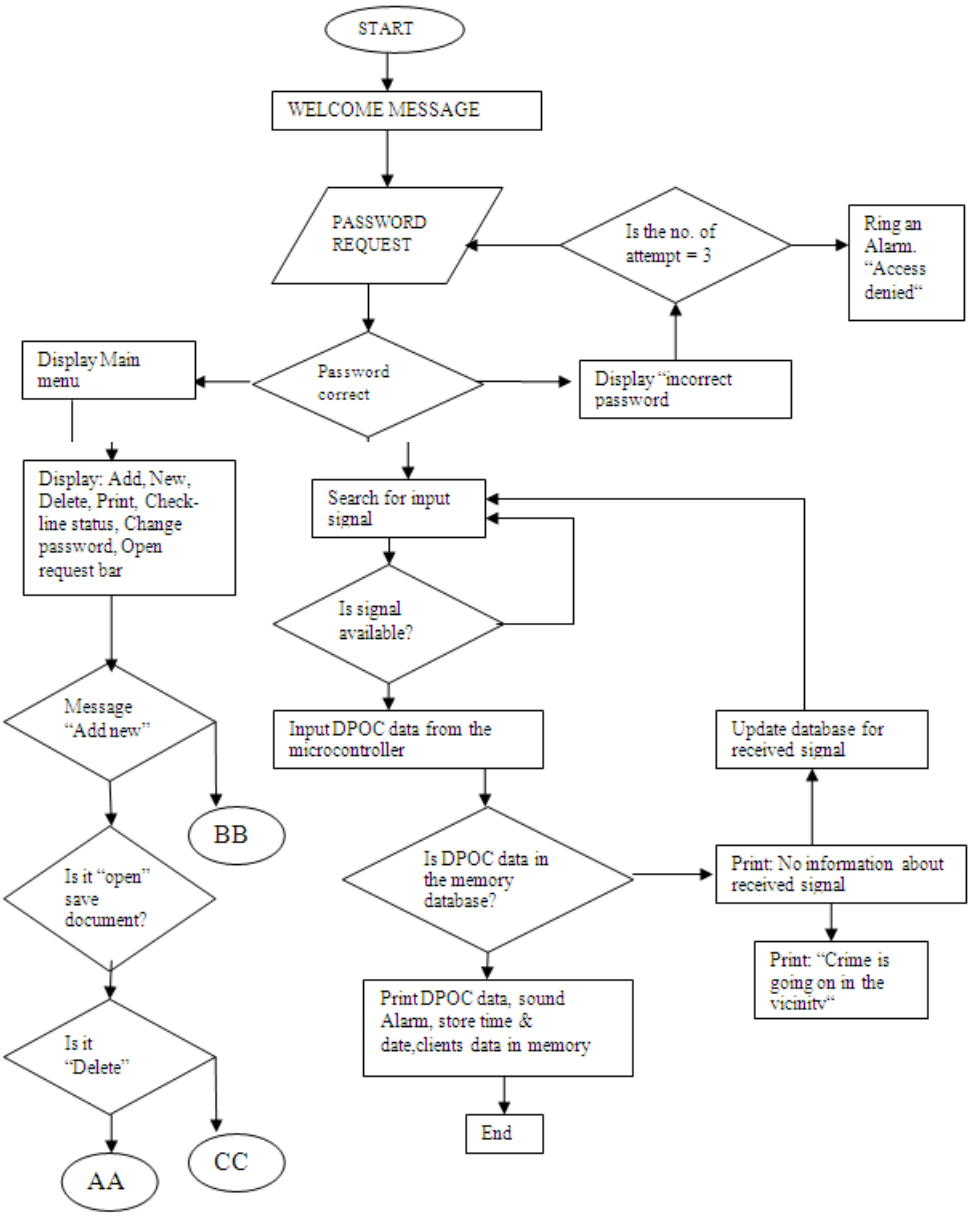
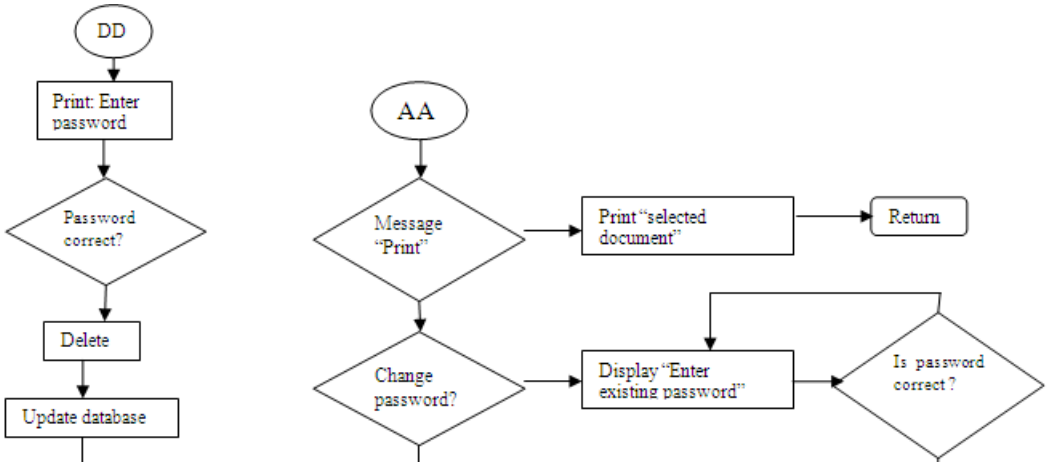


Figure 1 : Flow-chart for electronic policing software.



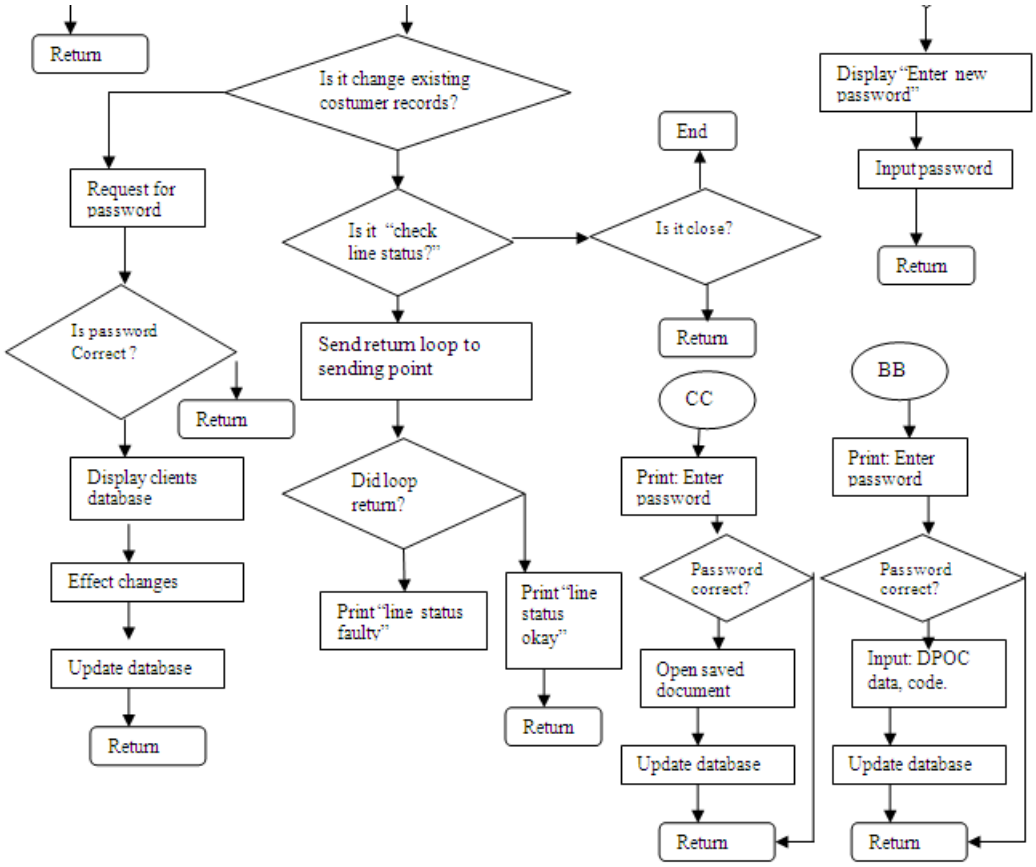


Figure1: Flow-chart for electronic policing softwarecontinues.

Step 9=> click on the start menu and then click on program

Step 10=> Click on Generalized Electronic policing

Step 11=> if it can't find the path, click on browse.

Step 12=> Click on MUYI(real) 002 and enjoy the software

Step 13=>the current password is Muyi. It can be changed to suit the user.

IV. Results And Discussions

At the start prompt of a dedicated u-computer with the installed software, a Login prompt displayed a request for the username and its password for activation as shown in Figure 2. This denies an unauthorized user from having access to the network. The area of operation that can be accessed by the user depends on the status as defined in the developed database with its result of access as exemplified in Table 1. For example, for a username "dare", the database menu shows that he can only view the records of subscribers and not to add or modify the records in the system. Figure 2, shows the forms necessary to be filled in by the operator to register a subscriber to the network. This can be upgraded/updated or deleted with an access grant using a password. The line status of the network can equally be monitored using the software.

Figure 3: login prompt to accept or deny access grant.

Table 1: User's profile definition in the database.

UserProfile				
UserName	**Password**	**AddRec**	**ViewRec**	**ModifyRec**
dare	dare	No	Yes	No
fagbohun	fagbohun	Yes	No	No
muyiwa	muyiwa	No	No	Yes
oludare	oludare	Yes	Yes	Yes

The whole idea of the work is being exemplified with the software implementation of the one touch sender as a client computer, while the developed software for the work resides in the main server. The two computers were linked together using a wireless LAN network, and when a code is being entered into the client system, by the activation of the request switch as shown in Figure 5, the server in an average of 60meters distance of separation responds with the print out of the information of the code bearer as shown in Figure 6 with the network diagram for easy location, within 30 seconds.When the server is locked up in a room, and the client in another, within a separation of about 20 meters, the client system was able to respond within the set time of 30 seconds. This validates the idea that with the proper implementation of the designed software, the idea will perform the set objectives as being proposed with the design. The records of all information received from the distress point of call (DPOC) are stored in the LPS computer database as depicted in Figure 8. The records of all subscribers to the network can easily be seen as shown in Table 2 with their respective codes, which is only accessible to a restricted verifier, using the developed software.

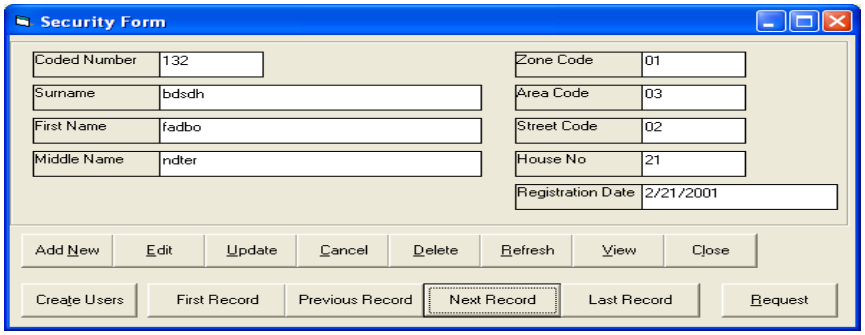


Figure 4: Subscribers form to be filled –in before activation.

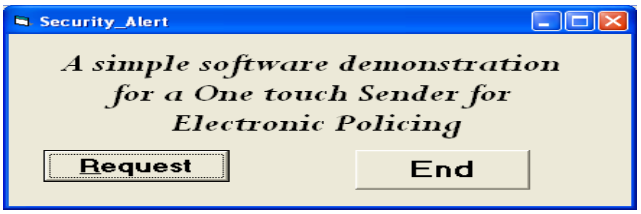


Figure 5: Request call demonstration form from the DPOC end.

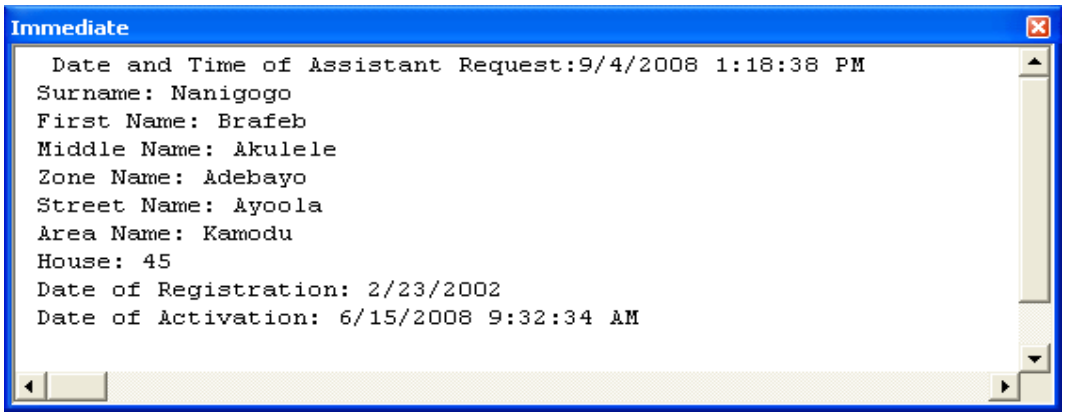
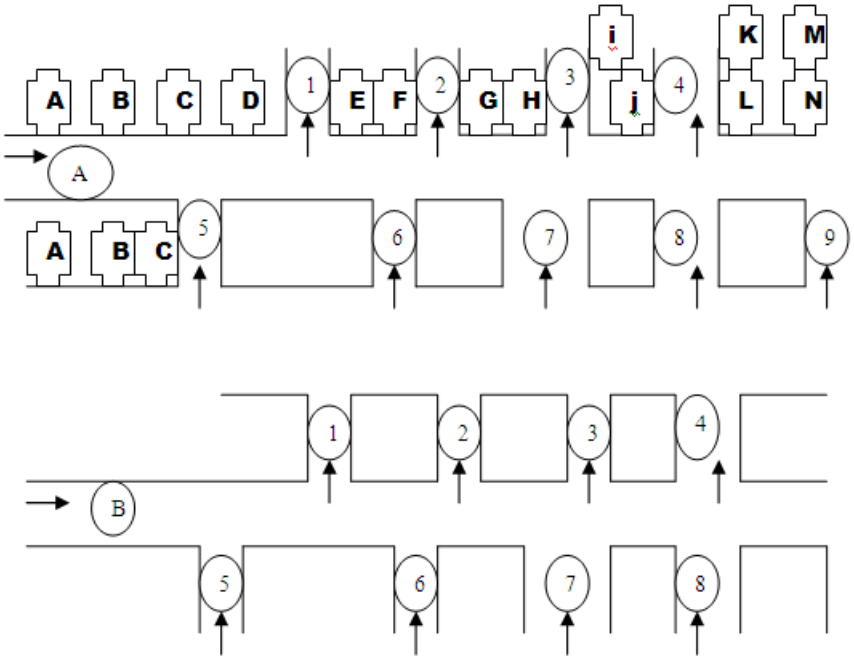


Figure 6 : Report from a DPOC as seen at the LPS.

In the database of the system, the records of Zone code definitions are stored as shown in Table 3. Table 3a shows the zones definition table, while 3b and 3c shows the street and Area definitions as stored exemplified. Table 4 shows a sampled list of reports from the DPOC with their corresponding code numbers, names, streets, area and house numbers for easy access, the time of alert and date for concrete evidence as stored in the database with restricted access.The transferred code from the microcontroller to an on-line micro-computer is being used to locate the DPOC address and relevant information from the system database. The use of straight binary coding method for the OTS, reduces the number of bits required to code a large number of housing units and area within a zone, which increases the efficiency and reliability factor, and simplicity of the design. The local LAEPC for the LPS , which receives the information sent by the OTS, process the modulated signals to recover the digital information sent, and using the redundancy error detection method, the software detects whether or not there is an error in the received signal. This is in line with the objective of the design.



Legend

Zones : A, B, C 。

Streets : 1,2,3,4…

Areas : a,b,c,d….

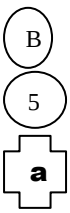


Figure 7. Policing area layout example

Thus, the Electronic policing system software performs well in accepting the digital coded signal from the microcontroller [10,19] to determine the distress point of call, and make a print out of the caller. The developed software, by its design makes it difficult for any erasure of the information received from its line, and stores it in the ROM, with the time of occurrence and date. In the event of not being able to get the information of the DPOC in its database, a signal is generated which turns on an alarm, to alert the policemen on duty of an activity in a nearby home, requesting for the attendance of the police. This message is an alert only. The software equally performs well in the area of password alert.The input - output response time of the software is in the range of 1 second, as determined on an Acer computer Aspire 5572ZN, used for the execution of the program.

V. Conclusion

The problems of policing in Nigeria can be reduced by the electronic policing system designed, which solves the problems of timing alert, precise details of information, strategic prevention of casualties. Thus, we believe that the widespread cry of citizens at night in the hands of robbers and arm-bandits can be drastically reduced, if not eliminated, with the use of the developed software as a household link to security outfits.

Table 2: Records of subscribers in a typical policing Station LPS

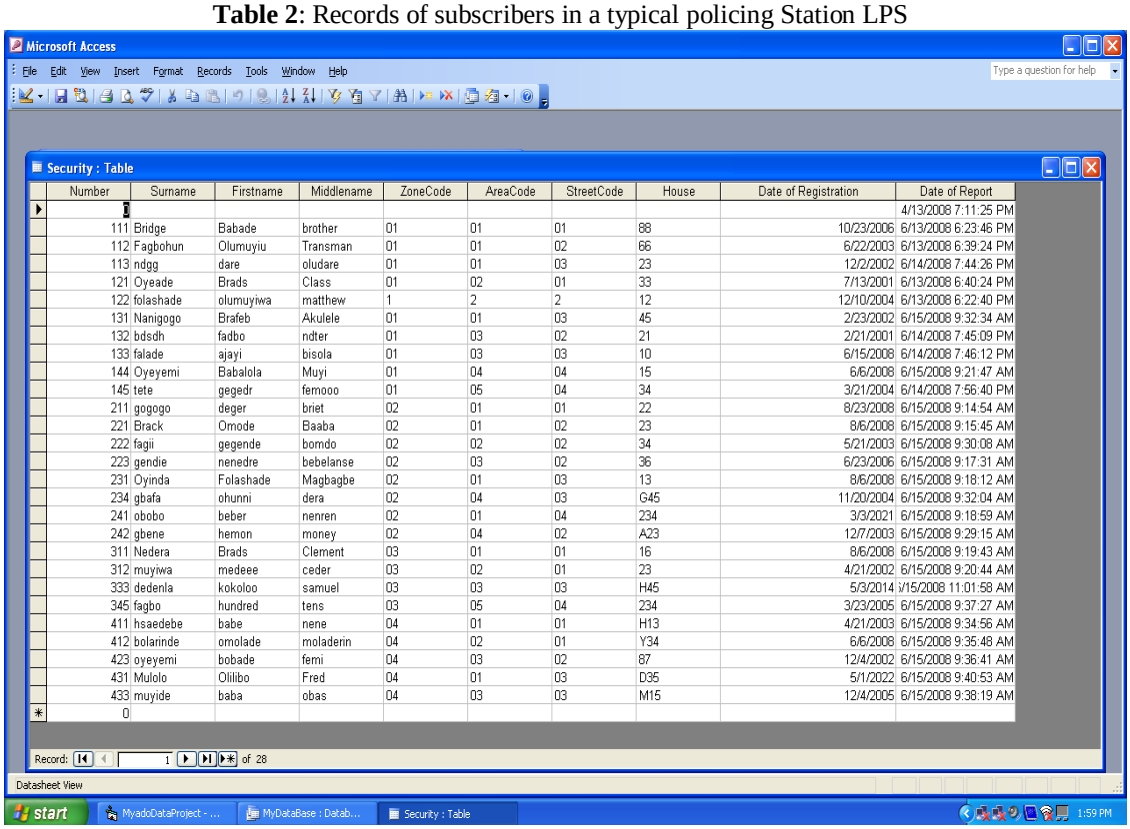


Table 3a: Zone definition as stored in the database

ZoneDefinition	
ZoneCode	**ZoneName**
01	Adebayo
02	Oke-ila
03	Maryland
04	FederalHousing
05	Ajilosun
06	Idofin
07	Okeusi
08	Parliament
09	Arakale
10	OjaOba
11	Gombe
12	Porta
13	Lomodemi

Table 3b: Street definition as stored in the database

StreetDefinition		
ZoneCode	**StreetCode**	**StreetName**
01	01	Kayode
01	02	Adebayo
01	03	Ayoola
01	04	Bodmas
02	01	Abbey
02	02	Cladius
02	03	Brome
02	04	Cradle
03	01	Kaka
04	03	plateau
04	04	Eleyele

StreetDefinition		
ZoneCode	**StreetCode**	**StreetName**
05	01	Wellinbod
05	02	Damollede
05	03	Motoride

Table 3c: Area definition as stored in the database

AreaDefinition			
ZoneCode	**StreetCode**	**AreaCode**	**AreaName**
01	01	01	Babade
01	01	02	Kajola
01	01	03	Kampe
01	01	04	Brutus
01	02	01	Naraguta
01	02	02	Lolarin
01	03	04	Staride
01	03	05	Classic
01	03	06	Obembe
01	04	01	Starman
01	04	02	Guilder
01	04	03	Cocatino
01	04	04	Morufu
02	01	01	Deleoba
02	01	02	Obajana
02	03	03	Obakio
03	01	02	Krestly
03	02	04	Olobiiri
03	03	01	Emulewu
03	03	02	Bamikemo
03	03	03	Allanburg
03	04	03	Adenrele
03	04	04	Ojota-Obu
04	01	01	Banglesh
04	01	02	Allen
04	04	02	Didilolo
04	04	03	Gongoaso
04	04	04	Bekekoli

The crime rate with the use of software is expected to be highly reduced, thus creating a better image of the Nigerian nation as well as others implementing the scheme in their security outfits. Assassinations can equally be reduced to unsuccessful attempts with the application of the system. The use of night guards, which are not reliable and dependable during attacks, will be highly reduced. The money being used for their hire, if directed to policing security fund being suggested, through the citizens subscription to the network, would release more funds for the purchase of more sophisticated weapons and equipment required for crime prevention.The precise detailed information, stored in the system memory for checks and verification, will reduce the laxities and negligence of duties on the part of a Nigerian policeman, and the claim of innocence of not being timely informed will be totally eradicated because all the information received at the station is already stored with restricted access in the station on-line u-computer. The designed with its attachments, will increase the "caught- in the –act" scheme as against the present "after –the- act " investigations being adopted by the Nigerian police to combat crime. The "caught- in the –act" scheme is necessary to prove the case of criminality beyond any reasonable doubt, in a law court.

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