

DEVELOPMENT OF A SOFTWARE PROGRAM FOR SIGNAL STRENGTH MEASUREMENT AT GSM FREQUENCY

OLUWAJOBI Festus Idowu , Rufus Giwa Polytechnic Owo Electrical Electronic Engineering Department

Abstract

In mobile communication, the GSM needs adequate signal strength to properly receive calls. Signal strength varies based on location. In this paper, measurement of received signal strength was made at locations (Old Ikare Road, Idasen and Rufus Giwa Polytechnic) within Owo in Ondo state. The methodology adopted is to develop software program that detect and monitor the signal strength of the three mobile operators i.e. MTN, GLO and AIRTEL at the same time and also display them. In each of the location, the signal strength for each of the three leading GSM network were monitored at the same time using the same mobile phone.

Keywords: visual basic, software, flowchart, signal strength, Global System for Mobile Communications, Main Development Interface (MDI)

Introduction

Tremendous changes are taking place in the area of mobile technologies, and the worldwide push toward 3rd generation services is currently at the forefront of these transformations. The successful development and deployment of GSM over the past two decades is most significant (Audrew S. 2000). Mobile phone based on cellular network with multiple base stations located relatively close to each other and protocols for the automated “handover” between two cells when a phone moved from one cell to the other. It operates at either the 900MHZ or 1800MHZ frequency sand. A major breakthrough is the wireless telephone system, which comes in either fixed wireless lines or the global system for mobile communication (GSM) (Wojuade, 2005). Although, prior to the introduction of GSM in 2001 there were over fifty Private Telecommunications Operators (PTOs) offering different forms of telecommunications services in Nigeria. (Chukwudebe *et al.*, 2001).

RELATED WORK

In mobile communication, the cell phone needs adequate signal strength to properly place or receive calls. Signal strength varies based on location and multipath is one of the

conditions that lead to signal variation in a given environment. Mobile communications started in Nigeria following the liberalization policy introduced in August 2001. As of now, there are more than four GSM (Global System for Mobile Communications) technology operators in the country. In the area of data service, it is instructive that the major Internet Service Providers (ISPs) in Nigeria currently are GSM operators MTN, Glo, Airtel and Etisalat etc. These operators now provide true mobile broadband services. The mobile that connected to Base Transceiver Station (BTS) in the area can get by some software: the sector number, tower number, and signal strength.

SIGNAL STRENGTH

For moving mobile phone, each tower BTS in GSM system has a signal strength vary from others in same location, so if the mobile node nearest to tower it will get a highest power or signal strength, and if it far from the tower it will get lower power. This called a path loss. One way to illustrate free space path loss is to use a balloon analogy. Before a balloon is filled with helium, it remains small but with a dense rubber thickness. After the balloon is inflated and has grown and spread in size, the rubber becomes very thin. RF signals will lose strength in much the same manner. Path loss is the reduction in power of an electromagnetic wave as it propagates through space. It is a major component in analysis and design of link budget of a communication system (Jorgen A. B et al, 1996) . It depends on frequency, antenna height, receive terminal location relative to obstacles and reflectors, and link distance, among many other factors. Propagation path loss models prediction plays an important role in the design of cellular systems to specify key system parameters such as transmission power, frequency, antenna heights etc. GSM (Global System for Mobile Communications) comes under wireless communication, which depends on the propagation of waves in the free space and providing transmission of data (Minuddin A.A. et al 2007).

Folarin and Abdul-Hameed (2010), proposed an adopted a descriptive survey through collection of data from Nigeria communication Commission (NCC) and the service providers. These was conducted in the last quarter of the year 2008, investigated the number of Subscribers and forecasted growth trend on three different GSM service providers in Nigeria from 2009 to 2013. The data were analysed using

linear regression analysis and the outcome of the analysis was used to develop a software package for forecasting the likely future growth pattern on the network of the providers. Yekeen and Michael (2011), examines the effect of rain on signal strength dependence on atmospheric particulates. A series of meteorological and signal strength measurements were taken before and after heavy downpour. From the result, marked improvement in propagation signal strength corresponding to clear sky condition was measured. This study suggests that clear-sky refractivity response is a useful indicator of signal Profile traversing the atmosphere and its fluctuations determining nominal signal degradation.

METHODOLOGY

The data were collected and analysed at the three locations chosen within Owo metropolis i.e. Rufus Giwa Polytechnic, Idasen and Old Ikare Road respectively. Based on the outcome of the analysis, visual basic programme was written to display the signal strength of the mobile phones. The program software is design to detect the signal strength of the three mobile operators i.e. MTN, GLO, and AIRTEL at the same time and also display them. In each of the location, the signal strength for each of the three leading GSM network were monitored at the same time using the same mobile phone. Three mobile phones (Samsung SGH-J700L) were used to monitor the signal strength with each SIM card for the GSM networks in consideration. The visual basic programme was adopted because it is easier than other programs when writing code of higher graphics and it has more graphical user interface which makes it more versatile and adaptable.

DEVELOPMENT OF A SOFTWARE PROGRAM

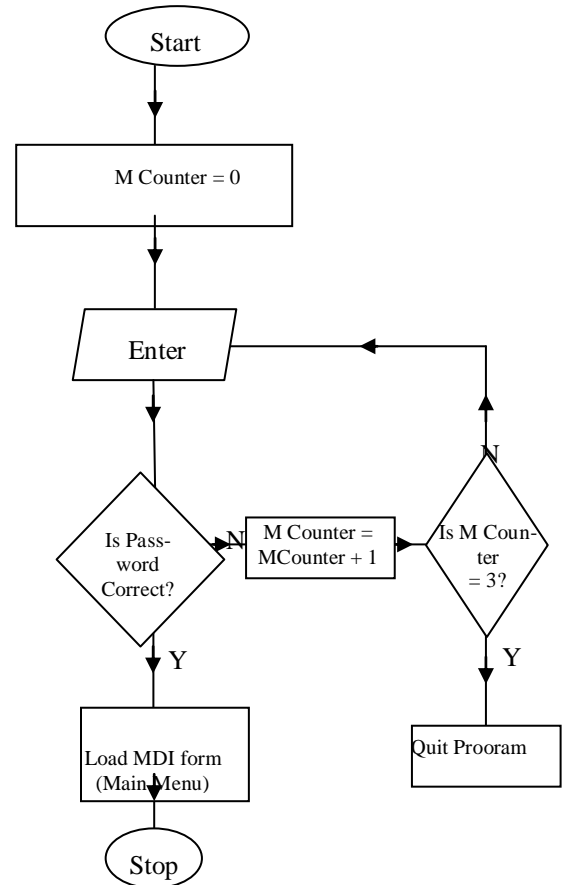
The software program is a menu driven one that caters for detecting and measuring of signal strength at GSM frequency. The main aim of the software is to see that the system directly performs all intended functions and it operates efficiently. If the objectives were not met, any possible conversion would result in an error. The chosen software to write the lines of codes and edit this package is Visual Basic. This platform is being adopted for reasons of flexibility, ease of learning and debugging, modularity and its support for graphics.

The development environment used to write this programs is called the Microsoft visual studio Integrated Development Environment, (IDE). When it is time to run and test the program, there is only a brief delay to finish compiling. If the compiler finds an error, it is highlighted in the code. The error can be fixed and therefore continue compiling without having to start over. Because of the interactive nature of Visual Basic, the program will be running frequently as it is being developed.

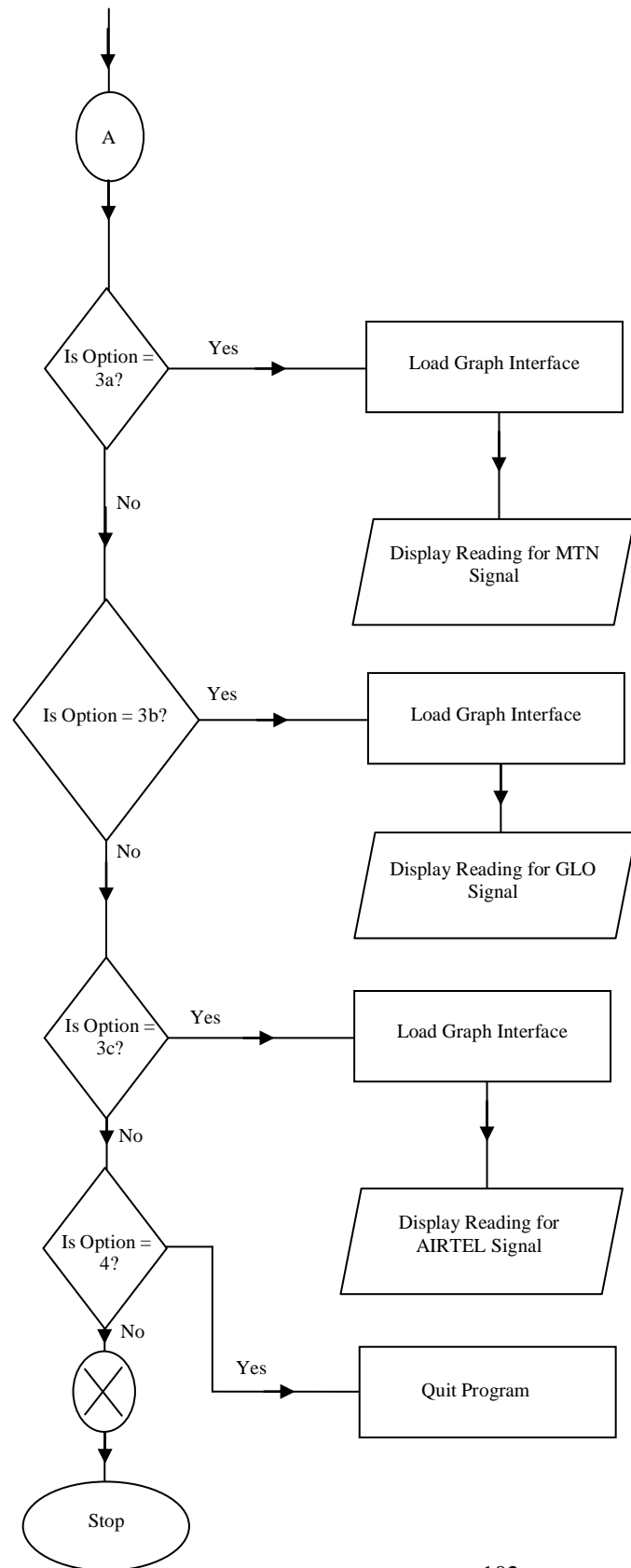
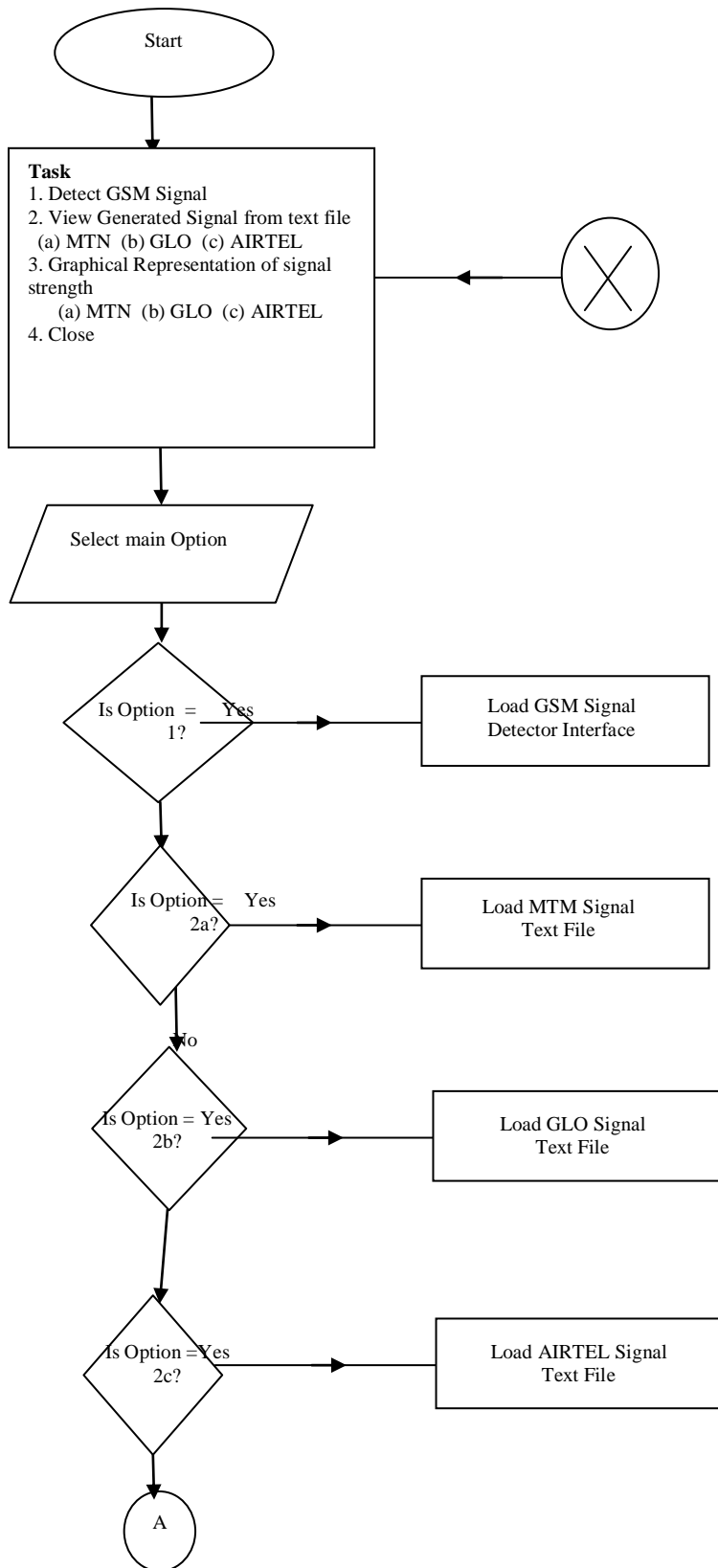
FLOWCHART FOR THE SOFTWARE

DEVELOPMENT:

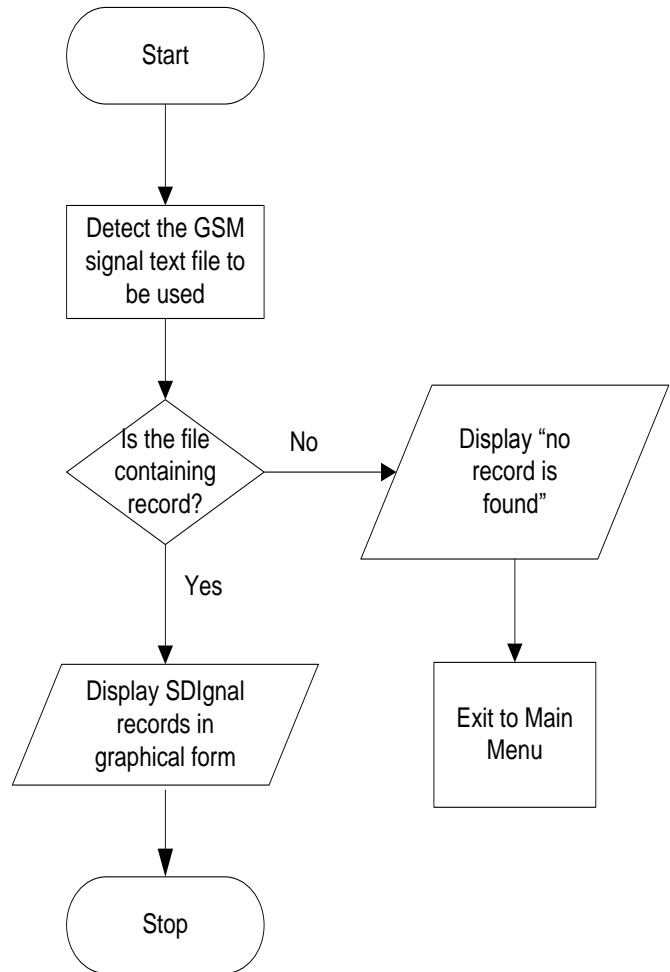
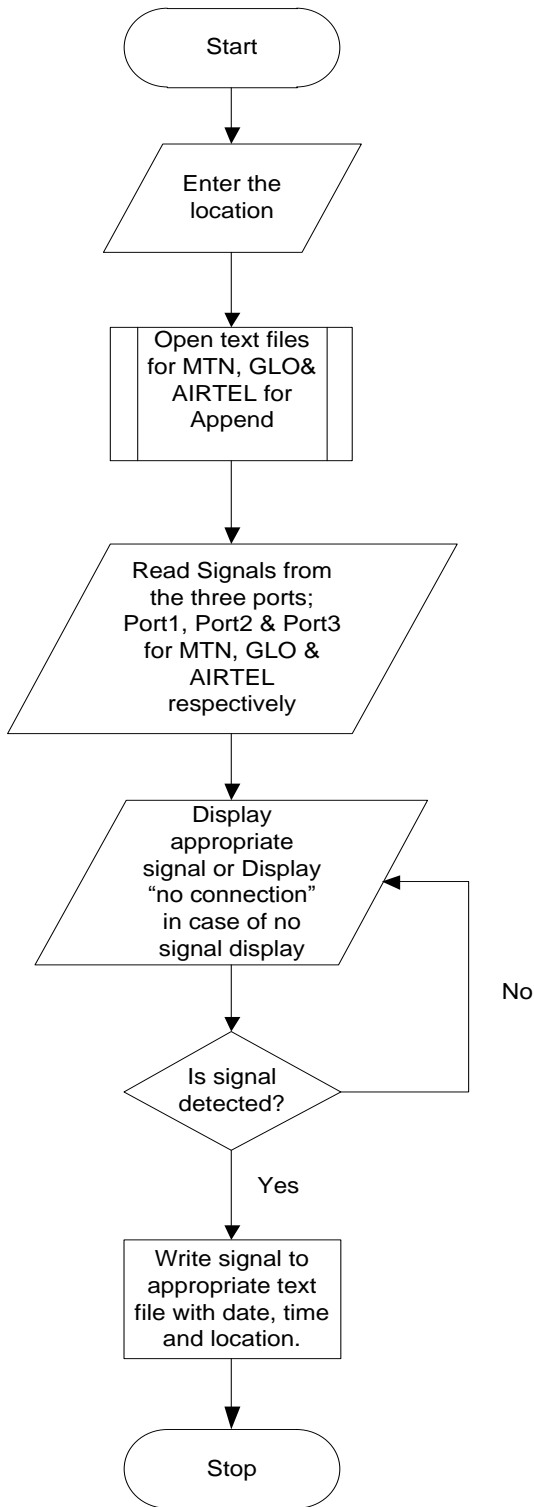
THE LOGIN FORM



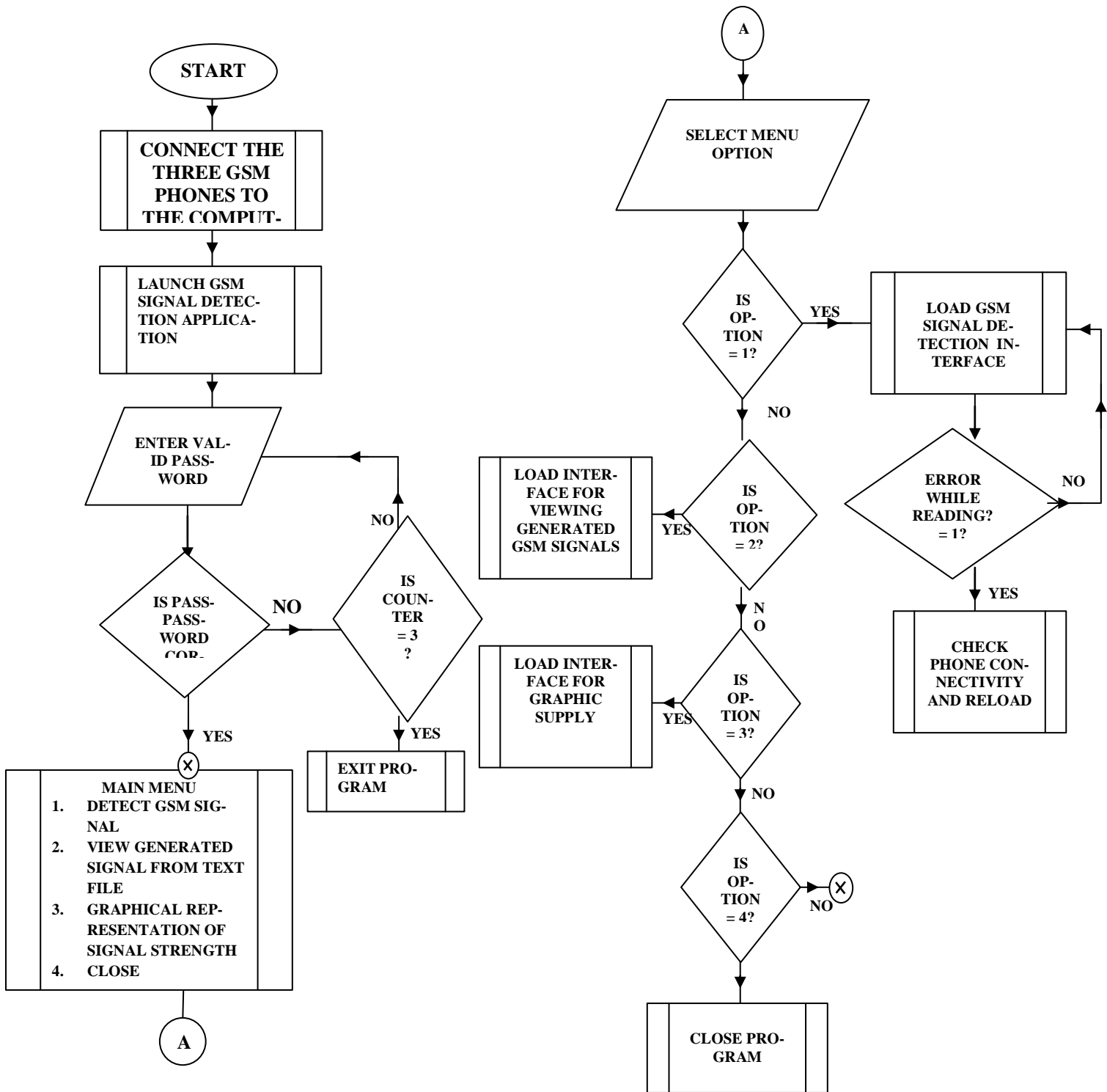
THE MDI FORM (MAIN MENU)



GSM SIGNAL DETECTOR INTERFACE



3.5.2 FLOWCHART FOR THE OPERATION OF THE COMPUTER AIDED SOFTWARE.





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ty , Ado, Ekiti State, in 1988, the M.S. degree in Electrical Engineering from the University of Benin, Benin , Edo State, in 2007. A Senior Lecturer of Electrical Engineering department at Rufus Giwa Polytechnic Owo.

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Biographies

OLUWAJOBI FESTUS IDOWU received the B.S. degree in Electrical Engineering from the Ekiti State Universi-