**SECURITY SYSTEM USING ELECTROMAGNETIC LOCK**

**ABSTRACT**

***This project presents a prototype security door that can be remotely controlled by a GSM phone set acting as the transmitter and another GSM phone set with a dual tone multi-frequency (DTMF) connected to the door motor through a DTMF decoder interfaced with microcontroller unit and a stepper motor .The design is composed of four main functional modules, namely; the GSM module, the decoding module, controlling module and the switching module. The GSM module act as both transmitting and receiving unit employs the use of a mobile phone set serving as the communication device between the user at one end and the object of access (i.e. the door) at the other receiving end. The decoding module and the controlling module are made possible using modern integrated circuit chips ensuring proper conversion of signal to binary codes, enabling the microcontroller to communicate properly with the switching device responsible for opening and closing the door. The codes for this project was written in assembly language with Visual basic software and compiled with M-IDE studio for MC-51compiler which work perfectly with Window XP environment, the program run without error before it was burn onto the microcontroller using a device called the programmer by placing the microcontroller on it socket equal to the pin number.***

Keywords: Door Locking, Security, GSM, Microcontroller and Stepper Motor

**INTRODUCTION:** Security describes protection of life and property. There are doors to keep people out,Key locks and chains reinforce the mode of security. Doors are being made of metals not just wood anymore. Influential persons in our society have bullet proof doors to ensure a good measure of security of self and family. The security sector is experiencing diversification as it has never seen before. This has brought about the need to review the reliability of already existing systems and look into the possibility of creating better systems that are smarter and more secure.

The micro controller based digital lock presented here is an access control system that allows only authorized persons to access a restricted area, this system is best suitable for corporate offices, automated machine (ATMs) and home security. It comprises of a small electronic unit which is in fixed at the entry door to control a solenoid-operated lock with the help of a stepper motor, when an authorized person enters predetermined user password via the global system for mobile communication (GSM) keypad, the stepper motor is operated for a limited time to unlatch the solenoid-operated lock so the door can be open. At the end of preset delay time, the stepper motor is operated in reverse direction and the door gets locked again.

When the code has been incorrectly entered three times in a row, the code lock will switch to block mode, this function thwarts any attempt by „hackers‟ to quickly try a large number of codes in a sequence. If the user forgets his password, the code lock can be accessed by a unique 8 digit administrator password and the secret code can be changed any time after entering the current code (Master code).

The project intends to interface the microcontroller with the GSM modem and start/stop the engine by sending the predefined messages from the mobile phone to the controlling unit, The software application and the hardware implementation help the microcontroller read the messages sent by the user from a mobile phone or send messages to the mobile phone through the modem and accordingly change the status of the engine motor required. The measure of efficiency is based on how fast the microcontroller can detect the incoming message and act accordingly.

The system is totally designed using GSM and embedded systems technology. The Controlling unit has an application program to allow the microcontroller read the incoming data through the modem and control the engine motor as per the requirement. The performance of the design is maintained by the controlling unit.

This project uses 8051 microcontroller as the central processing unit. Specifically the proto-type make used of AT89s52 microcontroller with Programs written in assembly language burnt inside the microcontroller to perform the following capabilities;

Assembly language is used to write the interfacing program and compiled with M-IDE studio for MC-51compiler which work perfectly with Window XP environment and may have compatibility problems with higher versions of the Window operating system

In residential applications: solid wood door, panel doors, metal skinned wood-edged doors and metal edge-wrapped doors (www.wikipedia.org, 2008). In addition to doors are; deadbolts, frame reinforcements, door chains and hinge screws – long 3” screws (www.statefarm.com, 2012) but despite these reinforcements door, security by itself is very porous. An electronics or electric lock is a locking device which operates by means of electric current (Gibson Stan, 2001). One of such locks is magnetic locked (mag locked).

A large electro-magnet is mounted on the door frame and a corresponding armature is held fast to the magnet (Mckenice, 1995).

Mag locks by design fail unlocked, that is if power is removed they unlock.

**SYSTEM DESIGN:** The design of a door locking security system using GSM is a complex design whichcomprises of so many modules (parts) brought together to form the overall design. Each of these modules is made up of discrete components that are joined together to achieve a particular purpose. These separate modules are: The Power Supply Unit, The Buzzer Unit, The micro controller Unit, Telephone unit and Switching.

These different units cannot function alone, they all need to function together to achieve the desired result.

The GSM modem received tone from the GSM network as shown by the direction of the arrow in the

Diagram below and transmit same to the DTMF decoder but the current value was very small (i.e. about

0.1mA) it was step-up by the tone transformer so that it could be decode by the DTMF decoder which then

Send the decoded codes to the microcontroller for processing and outputting to relevant component to act

Accordingly.

**SOFTWARE PROGRAMS FOR THE MICROCONTROLLER:** Microcontroller is a programmabledevice (Mazidi, 1997). It is an intelligent core for a specialised dedicated system (Sanchez & Canton, 2007). The firmware part deals with programming the microcontroller so that it can control the operation of the

IC‟s used in the hardware implementation. In the research, M-IDE studio for MC-51 software development tool is used to compile the source code, which was written in assembly language. The Universal programmer was used to burn the compile source code onto the microcontroller.

Software development involves a series of steps which are necessary for the development of reliable and maintainable software.