

Password Based Door Locking System Using GSM

Chaitanya Rane

Department Of Electronics and Telecommunication Engineering
Thadomal Shahani Engineering College
Mumbai – India

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 micro controller 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 micro controller 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 micro controller using a device called the programmer by placing the micro controller on it socket equal to the pin number.

Keywords:- Door Lock, GSM.

I. 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 the best suitable for corporate offices, automated machine (ATM s) and home security.

II. OVERVIEW

A. Existing System



The existing system largely consists of physical lock and keys. The problem with existing system is that it can cause security issues with the case of burglaries. The burglar can grapple with the vault key and study it which can cause considerable damage to the property and valuable materials in the safe. Also, physical locks can be opened by lock picks.

B. Proposed System

The main idea of designing the micro controller based digital lock locking system is to provide many modern security features than mechanical lock. It comprises 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 passwords and the secret code can be changed any time after entering the current code (Master code).

The project intends to interface the micro controller 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 micro controller 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 micro controller 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 micro controller 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 micro controller as the central processing unit. Specifically the prototype make used of AT89s52 micro controller with Programs written in assembly language burnt inside the micro controller to perform the following capabilities;

Assembly language is used to write the interfacing program and compiled with M-IDE studio for MC51 compiler 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. In addition to doors are; deadbolts, frame reinforcements, door chains and hinge screws - long 3” screws but despite these reinforcement 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 electromagnet is mounted on the door frame and a corresponding armature is held fast to the magnet (McKenzie, 1995) mag locks by design fail unlocked, that is if power is removed they unlock.

III. WORKING PROCEDURE OF THE PROJECT

The operation of this project is summarized as follows;

1. A call is placed to the phone that is connected to the system, this call is like any normal call to a friend, colleague etc. the call made is set to be automatically answered at the other (i.e. door) end, the caller immediately presses six digits numbers (password).
2. The signal qualities of the tones are first increased by passing it into a step up transformer, the output of which goes to the DTMF decoder.
3. In the DTMF decoder the tones are received and decoded into a binary code equivalent, the output of the decoder is sent to the micro controller.
4. The micro controller's internal programming processes the output from the DTMF decoder. Here, these decoded signals are identified as the keys pressed on the phone keypad. The micro controller output these informations into three unit;
5. Liquid crystal display unit, to show the user the digit pressed.
6. The ULN2003 driver. This converts the logic level from the micro controller's TTL to the signal that controls the switching sequence of the relay.
7. The Buzzer alarms. This sound to alert the user when a digit is pressed and also sound continuously when wrong numbers are entered by intruder.
8. On entry of the six digit code the “#” button of the keypad is pressed as confirmation of the code. If the code entered is correct, (if the user mistakenly typed wrong digit, this can be delete by pressing “0” key to backspace) data is sent to the micro controller to activate door opening sequence; this sequence includes the display of an “Access Granted” text on the LCD screen and the output of a signal to the transistor driving the relay. This signal causes the relay contacts

to switch and completes the motor circuit thereby causing the door to open.

9. The door closes automatically after precisely 8 seconds, but user can close the door by pressing the “#” key on the keypad. The micro controller is programmed to recognized this character and bring about the switching action of another relay which closes the door.

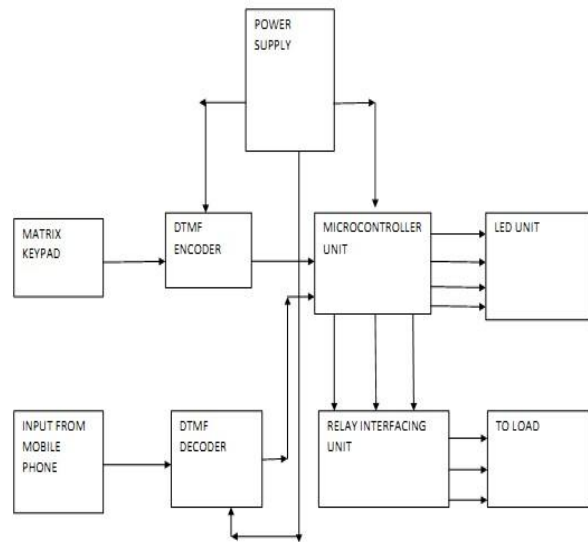
PURPOSE OF THE PROJECT:

- The goal of the project is to develop a unique system through **MOBILE TECHNOLOGY** which can control various units of the houses, industries, and also provides a security system.
- The various appliances can be utilized by managing them remotely by using GSM technology, which enables the user to **remotely control** the operations of the appliances.
- Just by pressing **keypad of remote telephone** the user can perform ON/OFF operations on the appliances.
- Unlock the door by using pre-decided **password**.
- Increase the security level to prevent an **unauthorized unlocking** of the door.
- To prevent the opening of the door by unauthorized persons.
- Flexibility to the user to change or reset the password
- More secure yet cost-efficient way of door locking-unlocking system.
- Contains a matrix key pad, door system and a GSM modem for the security dial up interfaced to the micro controller.
- The keypad interfaced to the controller is used as the password entry.
- As soon as the user enters the correct password, the door lock opens.

IV. THE PROPOSED SYSTEM

A. Block diagram

The block diagram of proposed system is as shown below



B. Description of Blocks

The major blocks used in the said system are as follows:

• **MICROCONTROLLER**

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using ‘Atmel’ high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the ‘Atmel’ AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.

The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt

architecture, a full duplex serial port, on-chip oscillator and clock circuitry. In addition, the AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes.

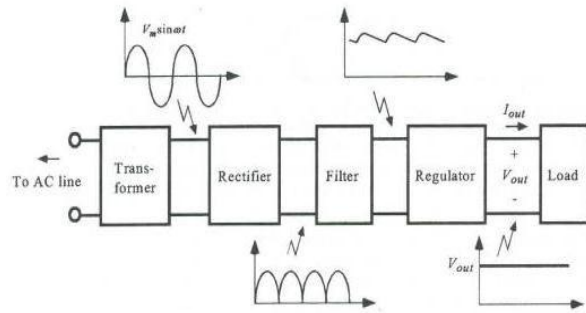
The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and Interrupt system to continue functioning. The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware reset.

PIN DIAGRAM

(T2) P1.0	1	40	VCC
(T2 EX) P1.1	2	39	P0.0 (AD0)
P1.2	3	38	P0.1 (AD1)
P1.3	4	37	P0.2 (AD2)
P1.4	5	36	P0.3 (AD3)
(MOSI) P1.5	6	35	P0.4 (AD4)
(MISO) P1.6	7	34	P0.5 (AD5)
(SCK) P1.7	8	33	P0.6 (AD6)
RST	9	32	P0.7 (AD7)
(RXD) P3.0	10	31	EA/VPP
(TXD) P3.1	11	30	ALE/PROG
(INT0) P3.2	12	29	PSEN
(INT1) P3.3	13	28	P2.7 (A15)
(T0) P3.4	14	27	P2.6 (A14)
(T1) P3.5	15	26	P2.5 (A13)
(WR) P3.6	16	25	P2.4 (A12)
(RD) P3.7	17	24	P2.3 (A11)
XTAL2	18	23	P2.2 (A10)
XTAL1	19	22	P2.1 (A9)
GND	20	21	P2.0 (A8)

• POWER SUPPLY

The input to the circuit is applied from the regulated power supply. The ac input i.e., 230V from the mains supply is step down by the transformer to 12V and is fed to a rectifier. The output obtained from the rectifier is a pulsating dc voltage. So in order to get a pure dc voltage, the output voltage from the rectifier is fed to a filter to remove any ac components present even after rectification. Now, this voltage is given to a voltage regulator to obtain a pure constant dc voltage.



Components of a regulated power supply

• LCD

The LCD used here is 16x2 alphanumeric Liquid Crystal Display (LCD) which means it can display alphabets along with numbers on 2 lines each containing 16 characters. It is used to display the password entered and the status of the password. It can be used to display the various options and all the readings that have been stored in the EEPROM.



• Mobile handset

It consists of an android mobile handset having Bluetooth. The mobile device also needs to have the required application installed. This android mobile is used to send command using the GSM technology.

• GSM MODEM

GSM/GPRS MODEM is a class of wireless MODEM devices that are designed for communication of a computer with the GSM and GPRS network. It requires a SIM (Subscriber Identity Module) card just like mobile phones to activate communication with the network. Also, they have IMEI (International Mobile Equipment Identity) number similar to mobile phones

for their identification. A GSM/GPRS MODEM can perform the following operations:

1. Receive, send or delete SMS messages in a SIM.
2. Read, add, search phone book entries of the SIM.
3. Make, Receive, or reject a voice call.

The MODEM needs AT commands, for interacting with processor or controller, which are communicated through serial communication. These commands are sent by the controller/processor. The MODEM sends back a result after it receives a command. Different AT commands supported by the MODEM can be sent by the processor/controller/computer to interact with the GSM and GPRS cellular network.

• Relay

Relay acts as a switch which is used to control the 230 volt AC supply. This relay will be turned off if there is no person inside the room. This relay can be used to turn off the electrical appliances like fan, tubes etc.

• EEPROM Memory IC

EEPROM stands for electrically erasable programmable read only memory. It is a secondary storage device that once written (programmed) can hold data even when the power is switched off. The EEPROM is a read only memory that can be electrically erased and reprogrammed. We have used EEPROM to store the password of our system.

V. SOFTWARE AND PROGRAMMING LANGUAGES

The following software were used for development of the proposed system

- EAGLE software for PCB designing
- KEIL compiler

VI. STEPS IN PROJECT DEVELOPMENT

The following steps were taken during the development of the proposed system:

- Defining the problem.
- Research about existing systems.
- Developing the block diagram.
- Designing and testing the circuits.

- Developing the PCB layout using EAGLE software.
- Etching the PCB.
- Soldering all components on the PCB board.
- Testing and troubleshooting the PCB board.
- Software development.
- Testing and debugging the code.
- Burning the code on the IC.
- Testing the entire system.
- Preparing a working model.
- Documentation.

VII. APPLICATIONS

The proposed system as a wide range of applications, some of them are as follows:

- Home security
- Can be used in offices
- Can be used to secure industrial plants against intruders
- Can be installed at any place where remote access is required.

VIII. CONCLUSION

The work was successful. It is evidence that the use of mobile phones with the right circuitry can be used to operate a security system, since the mobile phone in today's world; it is an access device a lot easier and affordable to obtain as opposed to specially fabricated keys and smart-cards. The ability of the system to accesses a secure place (Home, office, ATM etc.) remotely almost anywhere in the world is a plus since technology has made the world a global village.

ENHANCEMENTS

My area of interest is control of door lock using mobile phones via Bluetooth. My future study of this project includes implementing more complex security mechanisms such as fingerprint detection and face detection for a more robust security mechanism as well as extending support to windows and 'iOS' devices so as to cover a wider range of devices.

REFERENCES

- [1] Component details <http://en.wikipedia.org/>
- [2] Theodore S. Rappaport, Wireless Communications, second edition, PHI. New Delhi

- [3] 4. Draft EN (GSM 03.40) v6.0.0 a. www.gsmworld.com
- [4] About AT89s8251 from www.atmel.com b. www.google.com
- [5] Internet Sources