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Mobile Controlled Door Lock System

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ABSTRACT

The traditional door locking system comprises of a physical lock and a key, even though this system is efficient it is not flawless. The major problem of existing system is that it can be easily compromised and it also requires carrying a separate key for each lock to which access is needed. In large organizations this distribution of keys is a costly affair. The aim of our project is to create an advanced system which gets rid of the problems in the existing system while keeping the costs low.

Keywords:- Lock, LCD CMOS

I. INTRODUCTION

Home/office security is top priority of all concerned. Today there are plenty of home/office security products to ensure your family's security completely. Security is a prime concern in our day-today life. Everyone wants to be as much secure as possible. Home/office security is the most significant one for every home/office owner either in an individual house or an apartment. For that different security systems are available. Those are smart cards, RFID's, I-button, password and biometrics etc. An access control for doors forms a vital link in a security chain. The microcontroller based Door locker is an access control system that allows only authorized persons to access a restricted area.

II. OVERVIEW

A. Existing System

The existing system largely consists of physical lock and keys. The problem with existing system is that the physical key is easy to manipulate also for multiple doors one needs to carry multiple keys. This increases the hassle of carrying multiple keys as well as the possibility of the keys being misplaced. Physical key also limits the number of people who can access the particular lock.

Fig. 1 Existing door lock system

B. Proposed System

The main idea of designing digital locking system is to provide many modern security features than mechanical lock. The system has a Bluetooth Receiver by which the password can be received. This password should be entered through an application installed on Android mobile. When entered password matches with the password stored in the memory then the DC motor rotated clockwise so that the door is opened then it will be paused for some time and again rotated anti-clockwise so that door is closed. If we enter a wrong password then appropriate message is displayed on the LCD. Applications are entrance doors, car doors, bank lockers etc. Many times people misplace their keys or accidently lock their door. In these cases it is really difficult to enter the house. This project is designed to overcome this problem. Main concept behind this project is to open a door using a password entered through an Android application. As well as turning on the Buzzer when password is entered wrong for multiple times. To use the proposed system user needs to install a bluetooth application and then perform the following steps:

- Open the installed application
- Connect the mobile device to the system via bluetooth.
- Now pair the system with the mobile device using default pairing code.
- Enter the password and if the password is correct access is granted else access will be denied by the system.

III. THE PROPOSED SYSYTEM

A. Block diagram

The block diagram of proposed system is as shown below

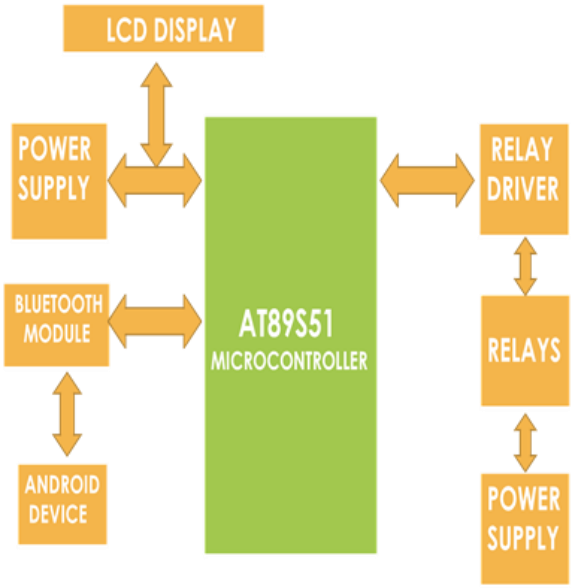

Fig.2 Block diagram

B. Description of Blocks

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

- **Microcontroller**

The microcontroller is responsible for detection and polling of the peripherals status. It is responsible for making decisions for opening/closing the door/windows. It is responsible for prioritizing all the devices attached to it. We have used the ATMEL 89S51 microcontroller. The AT89S51 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. It has got 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and a clock circuitry. It is the major part of the system which controls all the operation of the circuit such as LCD interfacing, square wave generation. It also decides the messages to be displayed on the LCD along with the time duration for which they should be displayed on the LCD. Microcontroller also decides the frequency of square wave output. The main function of microcontroller is to read data from bluetooth, process it and send the output to the LCD to be displayed.[10]

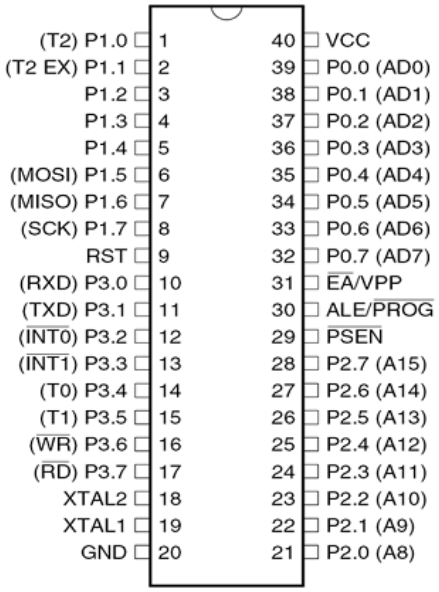

Fig.3 Pin diagram of 8951 microcontroller

- **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.

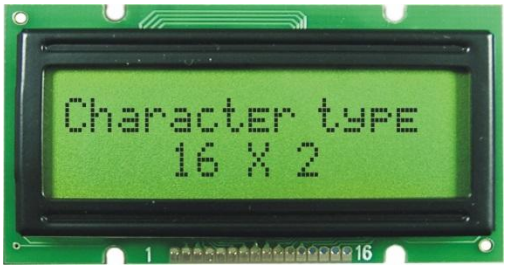

Fig.4 16x2 LCD

- **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 Bluetooth technology.

- **Bluetooth Decoder**
  The bluetooth decoder is used for transmitting as well as receiving the serial data. The range of bluetooth decoder depends upon its class. The bluetooth decoder used in the proposed system has a range of 10 meters.

- **DC Motor Driver**
  This IC is used to convert 5v to 12v which is required to drive the DC motor, which is used to open the gate. The L293D is a quadruple half H-bridge bidirectional motor driver IC that can drive current of up to 600mA with voltage range of 4.5 to 36 volts. It is suitable to drive small DC-Geared motors, bipolar stepper motor etc.[10]

- **DC Motor**
  A DC motor is a mechanically commutated electric motor powered from direct current (DC). In DC motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. Opposite (North and South) polarities of magnet attract, while like polarities (North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion. The DC motor used in the proposed system is of approximately 100 rpm.[7]

- **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.

- **Power Supply**
  The power supply gives +5v and +12v supply to the circuit. The power supply consists of four stages namely transformer, rectifier, filter, and regulator. Transformer is a step-down transformer taking input of 230v AC and giving output of 15v at the secondary. This 15v AC is rectified by bridge rectifier consisting of four diodes, which converts the AC wave into fully rectified wave. The next stage is the filter stage consisting of capacitor, which converts the fully rectified wave into the DC wave with some ripple. Last stage is the regulator stage. Regulator removes the entire ripple and gives pure DC[10]

A Features Of The Proposed System

The important features of the system are as follows:

- Eliminates the hassle of carrying multiple keys.
- Provides higher security compared to traditional lock and key.
- As bluetooth is used for data transfer, the range can be varied as required.
- The application for accessing the lock can be installed on any android device.
- Buzzer system helps to recognize wrong password.
- Password can be changed multiple times for better security.

B. Softwares And Programming Languages

The following softwares were used for development of the proposed system

- EAGLE software for PCB designing
- KEIL compiler

C. 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.
- Burnning the code on the IC.
- Testing the entire system.
- Preparing a working model.
- Documentation.

IV. 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.

V. CONCLUSION

During the development of this project we learnt many new aspects of embedded system as well as the microcontroller. This knowledge will help us to develop more systems that are based on developing mobile supported applications. This project has also helped us to get ourselves acquainted with the android operating system and the microcontroller programming.

VI. ENHANCEMENTS

Our area of interest is control of door lock using mobile phones via Bluetooth. Our 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.

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