Password Based Door Lock System

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Abstract - The need of safety can be achieved by making locks which can be electrical or mechanical with one or a few keys, but for locking a big area many locks are required. As everyone knows old fashioned locks are heavy weight and fragile also depending on the tools therefore electronic locks are given more value than those of mechanical locks. Nowadays every device's operation is based on digital technology. For example, technology based identity devices are used for automatic door unlocking or locking. These locking systems are used to control the movement of door and are functional without requiring a key to lock or unlock the door. These locking systems are controlled by a keypad and are installed at the side hedge of the door. The main objective of this project is to give safety at every common places like home, public places. In this user would give a known password. The information will be stored in database. When the correct passcode will be entered, the microcontroller will give instruction to servo motor. Servo motor will perform the action on door unlocking. Thus, what we want is digital technology to construct an integrated and well customized safety system at a price which is reasonable.

1. INTRODUCTION

Password Based Door Lock System is designed using ARDUINO UNO where in once the correct code or password is entered, the door is opened and the concerned person is allowed access to the secured area. Password Based Door Lock System using Arduino UNO is a simple project where a secure password will act as a door unlocking system. Old fashioned lock systems use mechanical locking and these can be replaced by new advanced techniques of locking systems. These methods are a combination of mechanical and electronic devices and are highly intelligent. One of the distinct features of these intelligent lock systems is their simplicity and high efficiency. Such an automated lock system consists of electronic control assembly, which controls the output load through a password. The example of this output load can be a motor or a lamp or any other mechanical/electrical load.

Here, we made an electronic code lock system using Arduino UNO, which provides control to the actuating the load. It is a simple embedded system with takes input from the keyboard and the output being actuated accordingly. This system demonstrates a Password based Door Lock System using Arduino UNO, wherein once the correct code or password is entered, the door is opened and the concerned person is allowed access to the secured area. If another person arrives, it will ask to enter the password again. If the password is wrong, then door would remain locked, denying access to the person.

Main idea behind this project is of a door-latch opening using a password entered through keypad. As well as turning on the **Buzzer** when passcode is entered **wrong** for multiple times. User can modify this password anytime he/she wishes using a keypad. The main component in the circuit is Arduino UNO which is basically used to send a text message to owner of the house about the breach of security.**4*4 keypad** is used to enter the password. The entered password is compared with the known password. If it is correct password, the system opens the door by **servo motor** and displays the status of door on **LCD**. If the password is wrong then door remains closed and displays "WRONG PASSWORD" on LCD.

2. MATERIALS

2.1 Arduino UNO

This microcontroller is based on the ATmega328P. There are total of 20 pins (0-19) out of which 6 are analog inputs, 14 are digital input output pins(6 pins provide PWM voltage) which can also be used as general purpose pins, a ceramic resonator of frequency 16 MHz, an USB connection, a power jack and a reset button. It has an operating voltage of 5V. It contains everything needed to support a microcontroller.
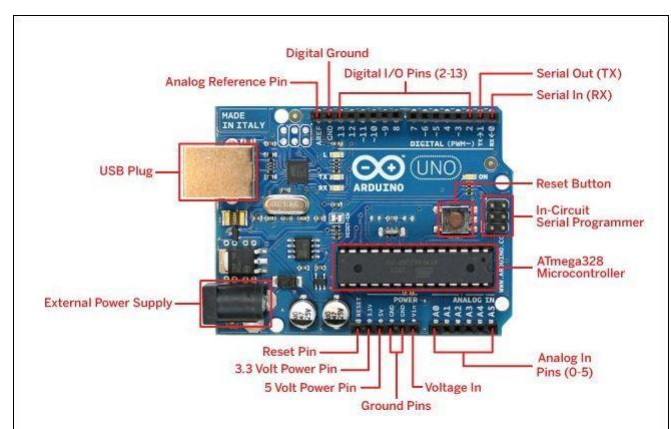

Fig -1: **Arduino Uno**

2.2 LCD

Liquid Crystal Display, which we are using in our project is 16*2 LCD. This display consists of 16 columns and 2 rows. This is programmed using the library <LiquidCrystal.h>
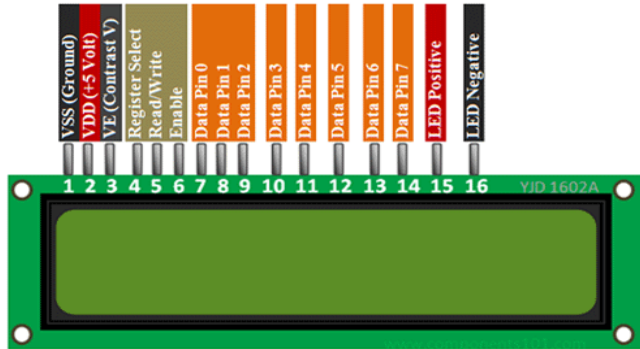

Fig -2: 16*2 LCD

2.3 Membrane Keypad

In our project we will be using 4X4 matrix membrane keypad. This 16 button keypad will provide user interface component for Arduino project. This is programmed using the library <Keypad.h>

Fig -3: 4*4 Keypad

2.4 Servo Motor

The servo motor used in the project is SG90 Micro Servo weighing about 9g. This is programmed using the library <Servo.h>
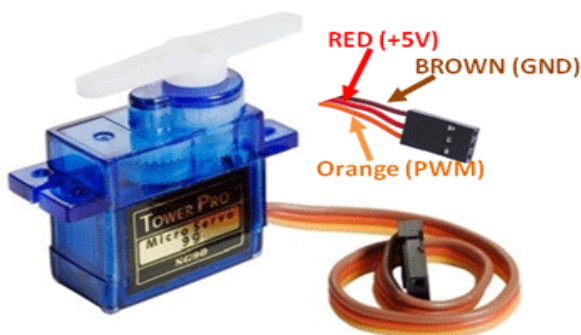
Fig -4: Servo Motor

2.5 Buzzer

In our project the buzzer is used for beep sound indicating the entry of wrong password.
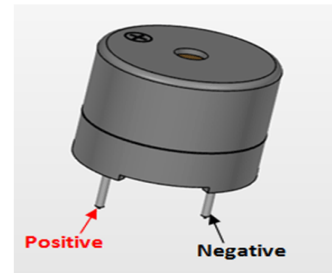

Fig -5: Buzzer

2.6 Potentiometer

In our project we have used a potentiometer of 10Kohm resistance in order to adjust the contrast of the Liquid crystal display.
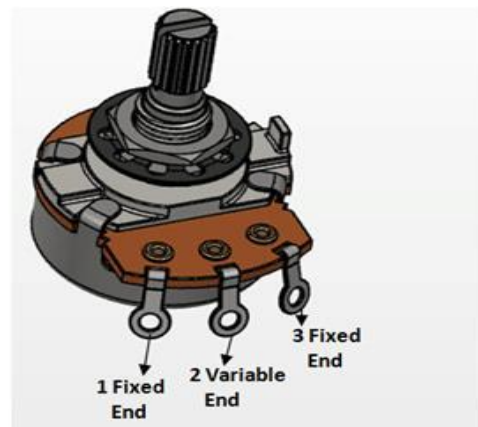

Fig -6: Potentiometer

2.7 GSM Module

A GSM module is a device which can be either a mobile phone or a modem device which can be used to create a computer or any other processor to communicate over a network. A GSM module needs a SIM card to be operated and operates over a network range subscribed by the network operator.
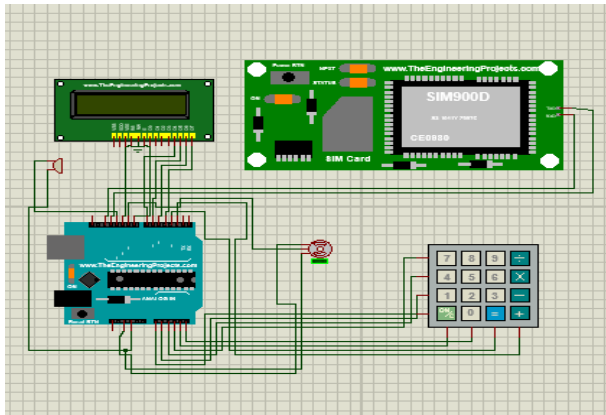

Fig -7: SIM 800L GSM Module
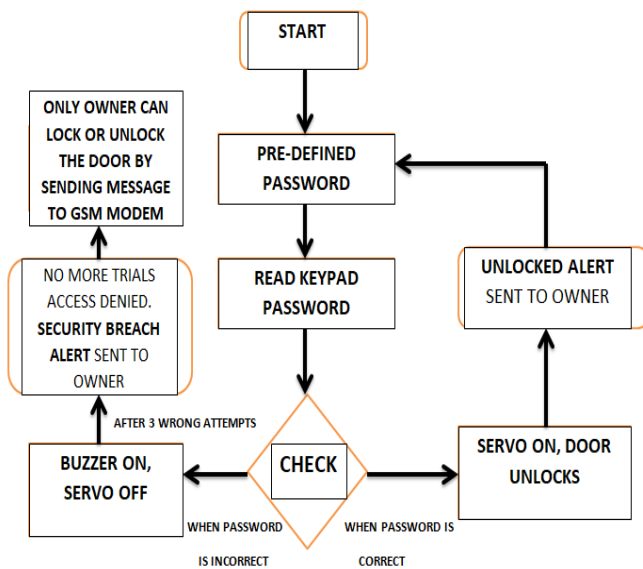
3. METHODOLOGY

Fig -8: Circuit Diagram

Fig -9: Flowchart

The above flowchart gives a brief idea as to how the project works. Initially the password is known. When the device is turned on, it resets the servo angle to lock the door. Now the user is prompted to enter the password. The user enters the passcode through a keypad which is read by the Arduino. Now the entered password is checked with the known password. If the password matches, then the servo motor deflects and the door unlocks for 10 seconds else the buzzer beeps indicating the invalidity of the password.

Owner do gets the information too about the locking and unlocking of door through SMS sent to his smart phone by GSM modem.

After 3 wrong attempts, the system automatically gets locked showing "NO MORE TRIALS ACCESS DENIED". Now, the password won't be entered through keypad but only the owner who knows some pre-defined code will be able to unlock or lock the door through SMS sent by his phone to the sim which is connected in GSM modem.
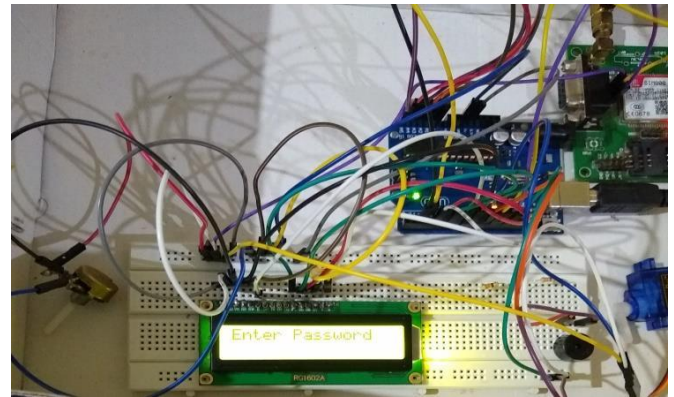
4. RESULTS

Fig -10: Showing user to enter the password

In the above figure, Fig-10 the LCD displays the user "ENTER PASSWORD". The entered password is displayed as characters on the LCD.

In the figure, Fig-11, the user has entered the correct password and the LCD shows "ACCESS GRANTED" on the LCD.
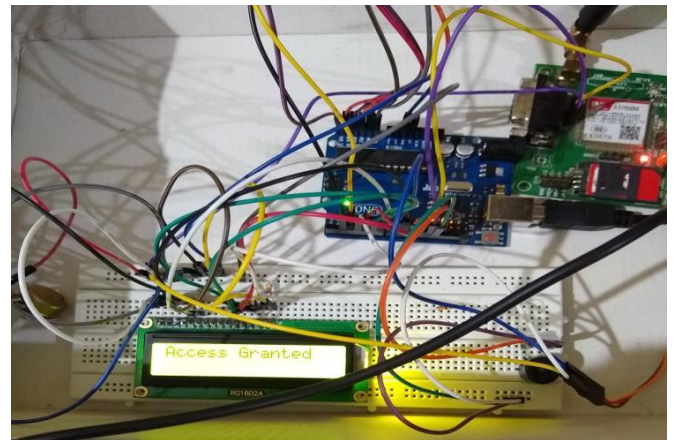
The servo motor deflects thus unlocking the door.

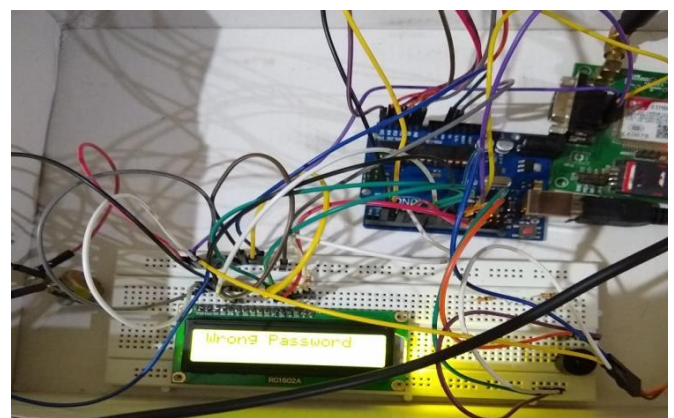**Fig -11: Access is granted and the door unlocks**

Fig -12: Showing user wrong password when the password entered does not match with the pre-defined password
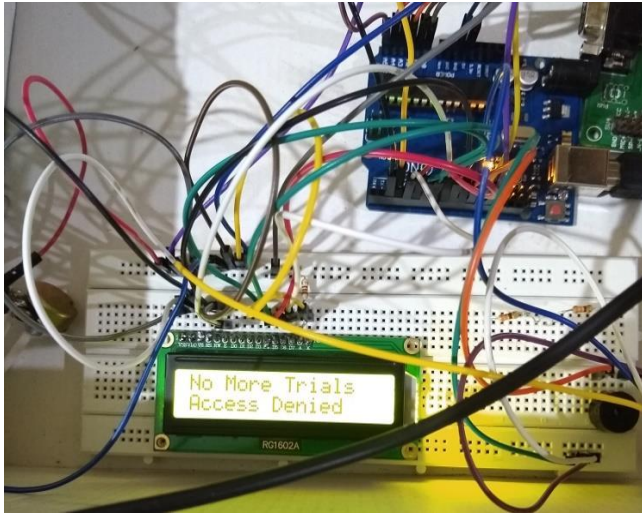
Fig -13: After 3 wrong attempts, system gets locked

When the system gets locked, password cannot be entered through keypad. Now only owner has the power to unlock or lock the door with the password he knows.
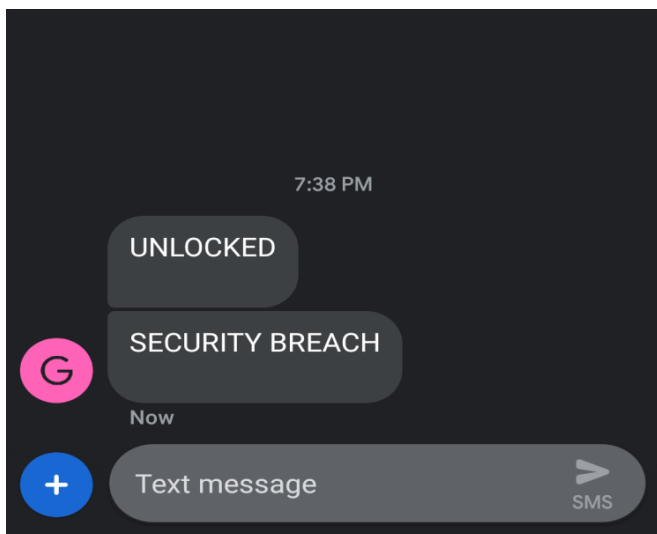

Fig -14: Owner getting information when the door is unlocked and on three wrong attempts

5. FUTURE SCOPE

The security level can be increased by adding a biometric fingerprint scanner. We can interface sensors like Fire, LPG, PIR motion detector to microcontroller in case of any accident so that door will open automatically. We can interface camera to the micro controller so that it could capture the picture of the thief who is trying to breach the security. This simple circuit can be used at places like home to ensure better safety. With a slight modification, this project can also be used to control the switching of loads through password. It can also be used at organizations to ensure authorized access to highly secured places.

6. CONCLUSION

This project is productive in providing enough security as long as the password is not shared. In future this "Password based Door Lock System" can be provided maximum security by the above enhancements in order to completely satisfy user's needs. Hence, a common man can afford to buy such locking system in minimal cost to keep his valuables safely without any worries.

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