

## SECURE ELECTRONIC LOCK USING BLUETOOTH

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**ABSTRACT:**The purpose of the proposed system is to provide extra security measure that can be used in homes and offices. The proposed system is based on a 2 – way verification method. The password for security is initially stored in the Electrically Erasable Programmable Read Only Memory (EEPROM). If the user enters correct password then for the 2 – way verification, a randomly generated OTP is sent on the user’s device via Bluetooth. If the entered OTP is matched then the system will be unlocked and the required task can be initiated. If either of the password or OTP is wrong then the access is denied and user will be provided with only limited number of chances (3 chances in the proposed system). Our main objective is to build an integrated home security system by using wireless (Bluetooth device) and embedded (Microcontroller) technology. The proposed system provides low cost service as well insured high security as compared to the available security systems.

**KEYWORDS:** Microcontroller, Security, LCD (liquid crystal display), Keypad, Bluetooth

### I. INTRODUCTION

Various control systems have been designed over the years to prevent access to unauthorized user. The main aim for providing locks for our home, school, office, and building is for security of our lives and property. It is therefore important to have convenient way of achieving this goal [1].

Automatic door system has become a standard feature on many different types of buildings and homes. And they are becoming popular every day to develop effective electronic devices which provide security. Home security has been a major issue because of the increase in crime rate and everybody wants to take proper action to prevent unauthorized user.

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. DESCRIPTION OF SOFTWARE

Embedded C compiler based software is used to create a hex file from Embedded C code. Then simulation software is used to test the prepared code (fig. 2). After successful testing of prepared Embedded C code. Then another software is used to burn the hex file inside the MCU [10].

### III. HARDWARE DETAILS

The ATmega16 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC Architecture. ATmega16 has 16 KB programmable flash memory, static RAM of 1 KB and EEPROM of 512 Bytes. ATmega16 is a 40 pin microcontroller. There are 32 I/O (input/output) lines which are divided into four 8-bit ports designated as PORTA, PORTB, PORTC and PORTD.

The HC-05 Bluetooth Module has 6 pins- EN, Vcc, GND, TX, RX and State [4]. The HC-05 Bluetooth Module can be used in a Master or Slave configuration, making it a great solution for wireless communication. The range for Bluetooth communication is usually 30m or less.

LCD screen is an electronic display module. A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD [6].

Keypad 4X4 is used for loading numeric into the microcontroller. It consists of 16 buttons arranged in a form of an array containing four lines and four columns. Typically one port pin is required to read a digital input into the controller. When there are a lot of digital input that has to be read, it is not feasible to allocate one pin for each of them. This is when a matrix keypad arrangement is used to reduce the pin count.

All the components used are shown in fig. 3

### IV. WORKING

When the system starts, it asks the user to login from a device connected via Bluetooth to identify the user. This is the first step of verification of the genuine user. The password or the verification code used in connecting the system to the device will only be known to genuine users. If the login is successful then user is asked to enter pin using

the keypad. The Pin is saved in the EEPROM. This Pin could be reset when required. If the Pin is wrong then the user is prompted to enter the Pin again (3 Chances given). If the user fails to enter the correct Pin for more than 3 times the system is disabled. If the entered Pin is correct then for 2-way verification, an OTP is sent on the user's device via Bluetooth. The OTP is a random 4-digit number generated. This number is different every time it is generated. Then user is asked to enter the OTP using Keypad. If the OTP is incorrect then a new OTP is sent on the user's device. If the user fails to enter the correct OTP for more than 3 times then system is disabled. If the OTP is correct then system is unlocked and the required task can be performed.

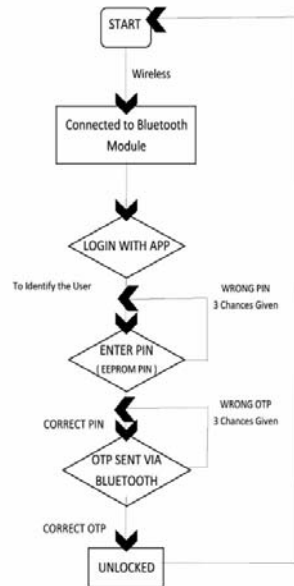


Fig. 1 Flowchart of Working

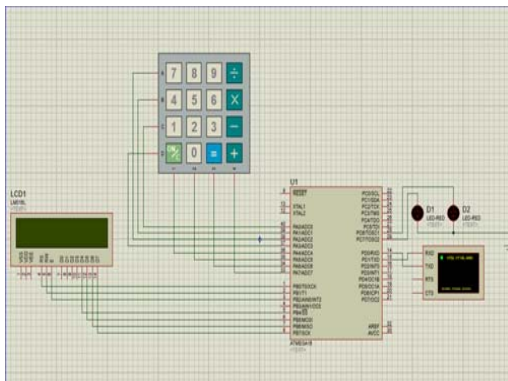


Fig. 2 PROTEUS SIMULATION

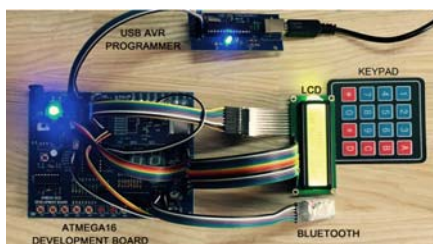


Fig. 3 Hardware

## V. CONCLUSION

Many times we forgot to carry the key of our home. Or sometimes we come out of our home and door latch closes by mistake. In these cases it is really difficult to get inside the house [3]. This project will help in keyless entry and at the same time will be more secure. This idea will minimise the overall cost by the use Bluetooth instead of GSM (which charges for providing service).

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