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# Automated Password Protected Door Lock System

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**Abstract:** Now a day's most of the systems are automated in order to face new challenges and present day requirements to achieve good results. Automated systems have less manual operations, so that the flexibility, reliabilities are high and accurate. Hence every field prefers automated control systems, especially in the field of electronics. Traditional lock systems using mechanical lock and key mechanism are being replaced by new advanced techniques of locking system. These techniques are an integration of mechanical and electronic devices and highly intelligent. Such an automatic lock system consists of electronic control assembly which controls the output load through a password. This output load can be a door, a motor or a lamp or any other mechanical/electrical load.

**Keywords:** Automatic; password; flexibility.

## 1 INTRODUCTION

In this age of digital technology, every device and operation has become digital based. Now with digital based door lock systems, it is easier to control the door movement. The new automated door lock system does not need a key to lock or unlock the door. This digital door entry system is in fact controlled by keypad that is installed on the side wall of the door. The keyless door is an electronic circuit based device. The working of this locking system is very simple. It works on the entry number. The authenticated person has to enter the unique code using keypad. Moreover, in day to day life security of any object or place is plays a major role. Here we develop an electronic code lock system using 8051 microcontroller, which provides control to the actuating the load. It is a simple embedded system with input from the keyboard and the output being actuated accordingly. Once the correct code or password is entered, the door is opened and the concerned person is allowed access

to the secured area. Again if another person arrives it will ask to enter the password. If the password is wrong then door would remain closed, denying the access to the person.

This project has been developed using 8051 Microcontroller. A microcontroller is a single chip that contains the processor (the CPU), non-volatile memory for the program (ROM or flash), volatile memory for input and output (RAM), a clock and an I/O control unit. Also called a "computer on a chip," billions of microcontroller units (MCUs) are embedded each year in a myriad of products from toys to appliances to automobiles. The AT89C51 is a low-power, high-performance CMOS 8-bit microcontroller with 4K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 8051 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 AT89C51 is a powerful microcontroller, which provides a highly flexible and cost-effective solution to many, embedded control applications. The AT89C51 provides the following standard features: 4K bytes of Flash, 128 bytes of RAM, 32 I/O lines, two 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 AT89C51 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. The main advantages of this device are :

- (1) highly secure, (2) flexible and reprogrammable,
- (3) less power consumption, (4) cost effective and
- (5) easily available. A fair volume of work has been conducted on the topic of microcontroller driven password protected door lock system. Literature survey is carried out to gain information and knowledge. Before starting with the analysis and design of project, we referred many research papers, manuals, documents related to the concept of project.

Arpita Mishra, Siddharth Sharma , Sachin Dubey and S.K.Dubey ,UG Students of department of ECE, AIMT, Gr.Noida,India have performed a project on Password based security lock system.This paper gives overall idea of how to control home security for smart homes especially for door key locks.It also develops a unique system through mobile technology which can control various units of the houses, industries, and also provides a security system. It uses GSM technology, to enable 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. The project also exhibits low cost home security system which is widely employed in our daily life.[1]

Neelam Majgaonkar, Ruhina Hodekar and Priyanka Bandagale,students of Finolex Academy of Management and Technology, Ratnagiri, India have performed a project on Automatic Door Locking System [2, 3]. This project gives the idea of working of a door lock using an Android phone by means of the developed app. To interpret the data sent by the phone, firstly a Bluetooth module (HC-05) is connected to the Microcontroller [4]. The data which is been received by the HC-05 is then given to the Microcontroller (ATmega16),

which understands in ASCII format, now depending upon the received set of character operations are performed whether to unlock the door or to lock it. The app is well protected by means of a password thus neglecting any fraud access to the door and is been avoided to be provoked by anonymous user [5].

## 2 PROPOSED WORK

### 2.1 Working Principle

The main component in the circuit is 8051 controller.The 8051 is a Harvard architecture, CISC instruction set, single chip microcontroller ( $\mu$ C) series which was developed by Intel in 1980 for use in embedded systems.It has the following features: 4 KB on chip program memory,128 bytes on chip data memory(RAM),128 user defined software flags,8-bit data bus,16-bit address bus,32 general purpose registers each of 8 bits,16 bit timers,3 internal and 2 external interrupts, bit as well as byte addressable RAM area of 16 bytes, four 8-bit ports,16-bit program counter and data pointer,1 Microsecond instruction cycle with 12 MHz Crystal.

In this project, Atmel AT89C51 chip has been used in place of 8051 because of its similar features. 8 push button switches are used to enter the password. A seven segment display is there to indicate that the password is entered. The password which is entered is compared with the predefined password. When the correct password is entered, the door will open and it will remain open for 1 minute and 15 seconds and the green LED will glow. During the last 15 seconds the yellow LED will blink indicating closing of the door. Three attempts will be given to enter the correct password. On entering wrong password three times ,the red LED glows and the alarm rings. The administrator can enter the correct password to stop the alarm and reset the system.

The components required to build this project are mentioned in the Table I. The transformer is used to step down the high voltage AC to a low voltage AC. Then the rectifier is used to the alternating current(AC), which periodically reverses direction, to direct current(DC), which flows in only one direction. The process is known as rectification. The diodes are used to make the rectifier. Elimination of ripples in the rectified dc voltage is done by including a filter between load and rectifier. It is also called smoothing circuit. A capacitor is used for this. The rectified voltage is not suitable as a power supply as it is not steady. A linear regulator is a system used to maintain a steady voltage. The 78XX is a family of self-contained fixed linear voltage regulator integrated circuits. Here LM7805 IC has been used to yield a constant 5V supply.

Table 1: Components used.

Sl. No	Name of the Components	Specifications	Quantity
1.	Microcontroller chip	AT89C51 40 pin Dip	1
2.	Crystal	11.0592 MHz	1
3.	Transformer	12-0-12v/500mA	1
4.	Regulator IC	7805	1
5.	Diode	1n4007	2
6.	Resistors	8.2kohm 330ohm	1 17
7.	Capacitors	1000microfarad/63V 10microfarad/25V 33pf/50V	1 2 2
8.	7 segment display	Anode type	1
9.	LEDs	Green(high intensity) Yellow(high intensity) Red	2 1 4
10.	40 pin IC socket		1
11.	Printed Circuit Board	Structure like Vero board	1
12.	Heat sink with mounting screw	For 7805	1
13.	Push to on switch		12
14.	Relimate connector	Male & Female	1 set

Table 2. Equipments used.

Sl. No	Equipment	Company	Model Number
1.	Soldering station	WELLER	WEPC20 STATION
2.	Multimeter	RISH MAX 12	-
3.	Universal programmer	SUPER PRO XEL	280U
4.	Breadboard	PACIFIC	PDC20
5.	Oscilloscope	FLUKE	FLUKE43
6.	Assembler	-	MICRO 8051
7.	8051 Simulator	-	8051

The softwares used are, 8051 simulator and SUPERPRO for windows to process, debug and simulate the code of the project .This is mentioned in Table II.

### 2.2 Block Diagram

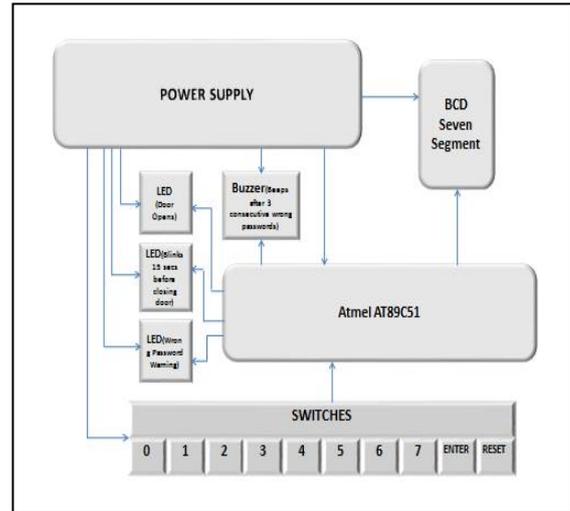


Fig. 1. Block diagram of the project.

### 2.3 Circuit Diagram

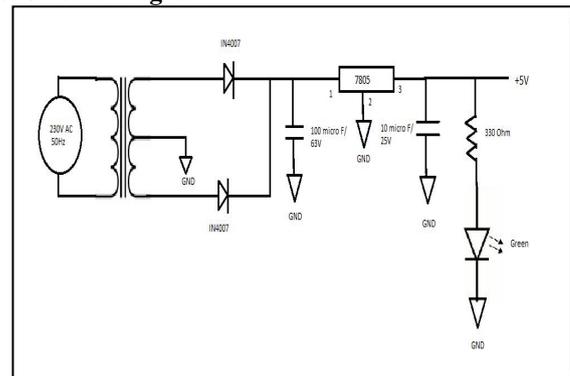


Fig. 2. Circuit diagram of power supply.

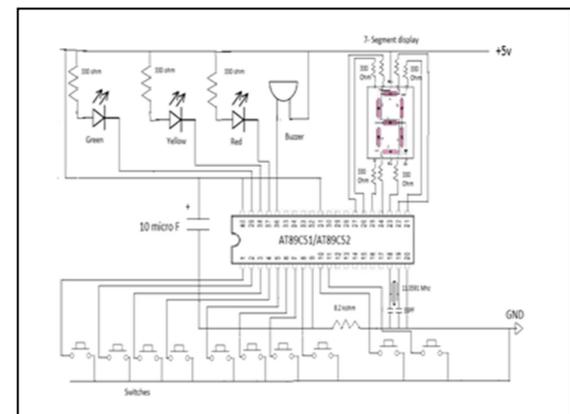


Fig. 3. Circuit diagram of the door locking system.

### 2.4 Flowchart

The system, in its “switched ON” mode, always waits for the door opening password to be entered. Once the password is entered, it starts a counter, which represents the “Number of times password is being entered”. This counter has been pre-programmed to the upper limit of 3. The model accepts the password as it is entered. If the password be correct then the door opens and the system goes back to the default state of being ready

to accept the password, once again. In case the password entered is wrong, the system gives a warning signal to the person entering the password and simultaneously the counter is incremented. There are 3 such tries given to the person entering the password, after which, the system triggers the alarm. To stop the alarm, there has been provided a provision of a “reset password” as well. This reset password is accepted by the system, while the alarm is still triggered. If this reset password be same as the correct one, then the system, at first switches off the alarm and then goes back to the default state and waits once again for the door opening password to be entered. If the tried “reset password” be wrong, the system continues to remain in the Alarm mode.

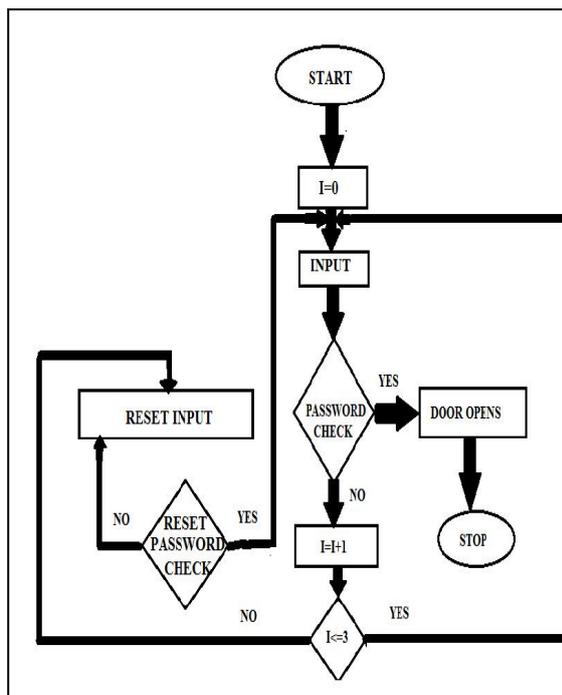


Fig. 4. Flowchart showing the working of the system.

### 3 RESULT AND ANALYSIS

When the 8 digit password is entered, the seven segment display will show “-” so that no one else can see the password. Only after pressing the enter switch, the password will be accepted. If it is the correct password, the door will open and the green LED will glow. After 1 minute the yellow LED will start blinking for 15 seconds indicating the closing of door. Then the door will be closed automatically. If the entered password is incorrect, the red LED will glow. The user will get three attempts to enter the correct password. If he fails, then the alarm will start ringing and it will stop only after resetting the password by the administrator. The administrator resets the system using the administrator password which is also predefined in the system.

This project can be applied in various practical situations. It can be used at residential places to ensure better safety. It can be used at organizations to ensure authorized access to highly secured places. With a slight modification this project can be used to control the switching of loads through password.

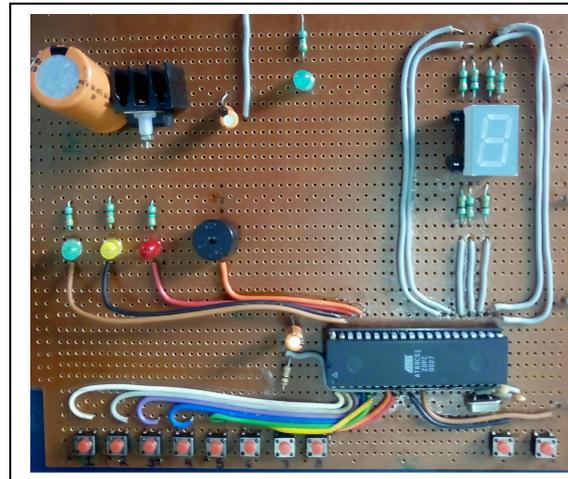


Fig. 5. Hardware realization of the project.

### 4 CONCLUSION

Security is prime concern in our day-to-day life. Everyone wants to be as much as secure as possible. An access control systems forms a vital link in a security chain. The microcontroller 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, ATMs and home security.

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