

Design of 8051 Microcontroller Based Security System with a Laser Beam Network

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Abstract

This article describes a low cost microcontroller based security system using a laser beam for use in highly restricted office areas, buildings etc. The laser beam from the laser diode is directed to fall on an LDR by reflecting the beam using four mirrors placed at the four corners of the door. As the beam is interrupted by the intruder, a buzzer raised to the circuit goes ON. The system also has a password lock and entering the wrong password too triggers the buzzer to go ON. An 8 bit password can be programmed in to the microcontroller. On entering the correct password, the shutter, driven by a stepper motor connected is Port0 of 8051 microcontroller through the buffer IC ULN2003, is opened the control programs have been developed using 8051microcontroller assembly language.

Keywords: Laser Diode, Microcontroller, Stepper Motor

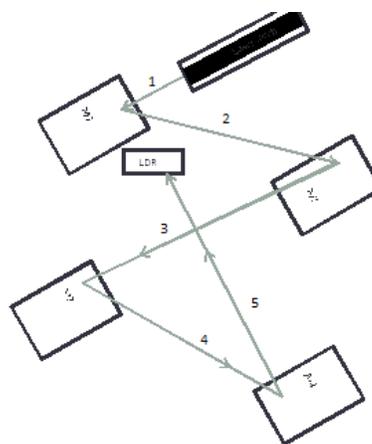
1. Introduction

In our daily life there is an increase in the number of cases of thefts and robbery. Therefore, it has become very essential to implement a security system in our house, office buildings, lands, banks etc. There are many electronic security systems available today but those equipment's are very costly. This work is intended to design a low cost security system with locally available materials³.

2. System Approach

The system uses a Laser beam network formed by reflecting the beam from four mirrors. A Combination of plain mirrors M1 through M4 is kept at four corners of the door forming a Laser beam network and the final beam is directed to fall on the LDR^{1,9}. Any interruption of the beam or the alteration of the security

password by the intruder or trespasser would activate the buzzer thus informing the authorities about the intrusion¹⁰.



ARRANGEMENT OF LASER BEAM NETWORK

Figure 1. Mirror Setup.

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3. System Structure

An overview of the system is presented here in ref Figure 2. The security system is controlled by means of an 8 bit security password². The password is programmed in to port1 of the microcontroller. Eight toggle switches are used for entering the password which is resettable by the administrator¹¹.

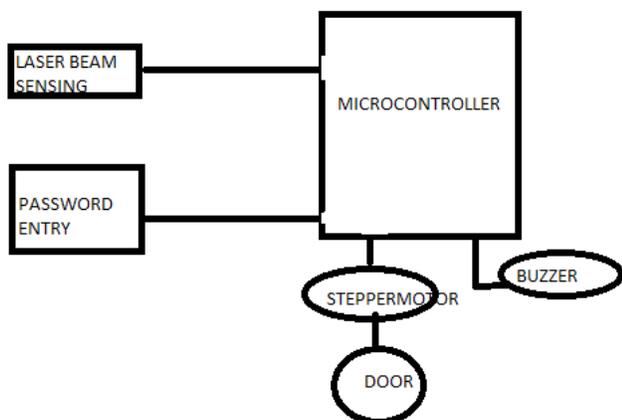


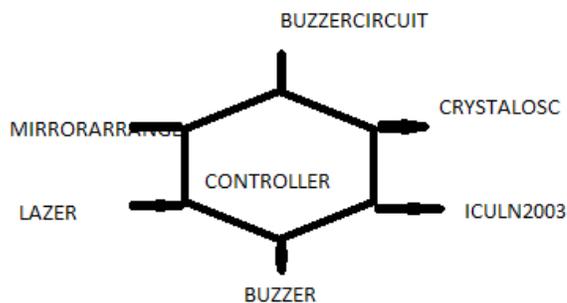
Figure 2. Block diagram of System Structure.

The Laser beam network is formed by the reflection of laser beam from a laser diode by mirror M1 through M4 placed at four corners of the door or shutter. The reflected beam is finally made to fall on an LDR which drives a switching circuit formed of transistors. The Laser beam has very good focusing power³. The input and output ports of the microcontroller can be used to control the module. The shutter is driven by a stepper motor that can translate electrical pulses in to mechanical movement⁵.

4. Design and Hardware and Software Development

The system consists of a laser beam network, a sensor circuit, a microcontroller and a stepper motor. The Laser beam network is formed by the laser diode and mirror, as per Figure 3. The sensor circuit consists of a switching circuit formed of two transistor stages⁴. The Laser beam is continuously allowed to fall on the LDR. The resistance of the LDR drops thus driving transistor T1, ON and T2, OFF. Whenever, the laser beam is interrupted, the resistance of the LDR increases and the collector of transistor

T2 connected to interrupt pin12 of the microcontroller goes low^{5, 6}.



This enables the buzzer connected to pin p2.1 to output.

The next stage of the design section is developed with the help of a program as per Figure 4.

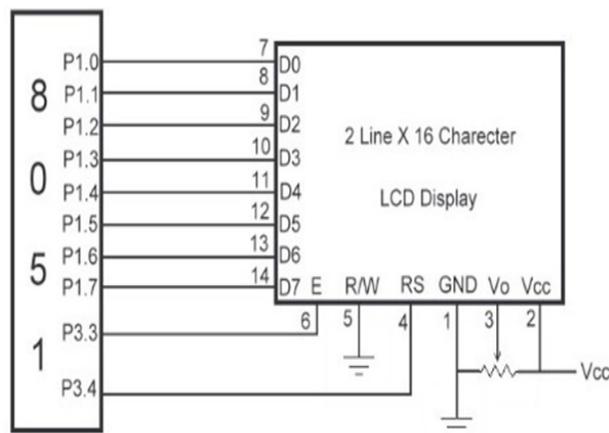


Figure 4. Interfacing Circuit.

5. Result and Discussion

The system has been implemented in 8051 assembly language and built using the Ride development software and at the output stage loaded to At89C51 microcontroller using a Flash programmer^{7,8}.

6. Conclusion

The security system using the laser beam network is very simple in design. The components of the systems are available in local market and also we can easily redesign the system as per our requirement.

7. Future Work

The real time work only for the small scale approach. So we are in research for the project to function in Multi-Dimension approach.

8. Acknowledgment

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