

LASER SECURITY SYSTEM

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Abstract: While robbery and burglary is one of the most widespread criminal phenomena, with a very high recidivism rate, it has rarely been the subject of thorough empirical research. Security is an important issues for all confidential areas. Confidentiality is very important in every area whether it is professional or personal. This paper presents the Security System based on Laser. It works on the principle of voltage divider circuit. When the laser beam continuously falls on the LDR, the voltage drop across it is very low as the resistance of LDR becomes less and as soon as the laser beam is interrupted by any means of object or a barrier, the voltage drop across it becomes high due to change in LDR's resistance which traps the person inside by closing the main door of the confidential area.

Keywords: LDR, Laser

I. INTRODUCTION

The laser security system provides us with a solution to robbery and burglary cases which are on peak these days and for this reason the security systems are in demand. This system is very useful in highly confidential areas where only authorized person is allowed to enter. It is a cost efficient system which is easy to install. We know that laser light goes through long distance without scattering effect, it is visible at source and incident point only, invisible otherwise. These two properties helped us to build this laser system. When the laser beam is interrupted by means of any object or a barrier, the main door of the confidential area closes automatically trapping the person inside.

II. LASER SYSTEM

Laser stands for Light Amplification by Stimulated Emission of Radiation. Laser emits a coherent beam of light, operates by the process of optical amplification. Laser light contain only one wavelength and it is uni-directional. These are available in different types like semiconductor, infrared. It has a wavelength of approximately 800-900 nm and its divergence is equal to beam width. The laser pointer is used as the source of light beam. Laser systems have gained high popularity these days due to its simplicity. The installation and maintenance of this system is easy. Moreover, due to its cost effectiveness and fast technology it is used these days

III. COMPONENTS USED IN DESIGNING

1. LASER POINTER

Laser pointer is a small device that has battery as a power source and a laser diode which emits a narrow low-powered laser with light of only one wavelength. Power should not exceed 5 mW. The beam has small width and low power which makes the beam invisible, that only shows a point of light when it strikes any opaque object. The laser pointer that is used in this project is green in colour with a wavelength of 492nm to 577 nm. Laser pointers are a potent signaling tool that produce a bright signal for potential search.



Figure 1: Laser Pointer

2. LDR – LIGHT DEPENDENT RESISTOR

A Light Dependent Resistor (LDR) also known as photo resistor, is a device whose resistivity depends on the incident electromagnetic radiation. They are sensitive towards light. They are made up of semiconductor materials with high resistance. The resistance of LDR varies with light intensity falling on it. They can be used in light sensing circuits.



Figure 2: LDR

IV. WORKING OF THE SYSTEM

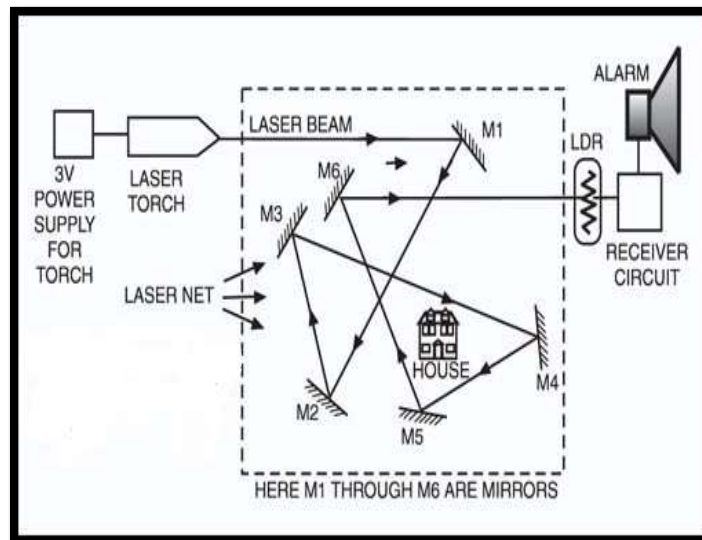


Figure 3: Block Diagram of Laser Security System[4]

The figure 3 depicts the overall arrangement of the laser security system. A laser light torch is given a power supply of 3V and is used to generate a laser beam. A combination of plain mirrors M1 to M6 is used to spread the laser beam around the area and form a mesh. The laser beam is directed in such a way that it falls on a LDR which is a part of receiver unit[3]. Any interruption of the beam by an unauthorized person will result into closing the main door. The receiver unit consists of a LDR and a transistor. This receiver section is responsible for closing and opening of door.

V. CIRCUIT DESIGN

The figure 4 shows the Proteus Design Suite circuit of the laser security system. Proteus design suite is a proprietary software which is used for electronic design automation and to make schematics and electronics print of the circuit[6].

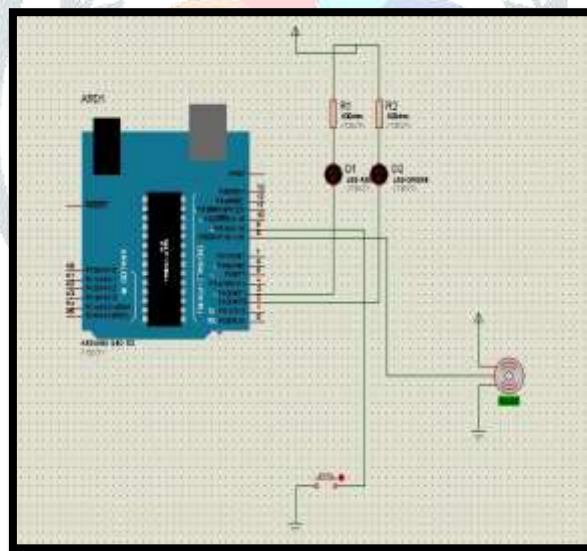


Figure 4: Proteus Schematic design of Laser System

The components used in this circuit are : 9V battery for power supply. A switch for reset, safety diode, avoid the damage that may be caused to the various components if improper voltage is applied, a regulator to continuously supply 5V as IC and SG90 that works on 5V. Atmega 328 IC is used in which a 16Mhz oscillator is connected to pin 9 and 10 of the IC. A capacitor is attached to pin 8 of IC to provide constant frequency, a potentiometer is used for pull up voltage which is used to set value for adjusting LDR. LDR is a light dependent resistor that works on analog voltage and series resistance is fed to it. Two transistors are used one of them gives active high voltage and other gives active low voltage. An SG90 servo motor is used to operate door.

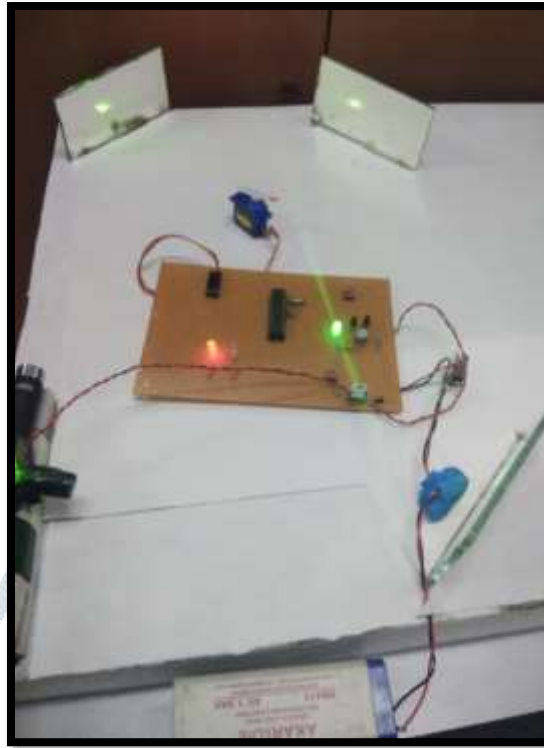


Figure 5: Actual Representation of Laser System

VI. RESULT

This system is based on the interruption of laser beam. If someone tries to enter the laser mesh the door of the confidential areas are closed automatically within 2s and the person is trapped inside.

VII. CONCLUSION

The designed system is efficient and all the components used are easily available at low cost. This system can be used in any confidential area. Laser beam of any wavelength and beam width can be used. It a low cost high tech security system which is capable of trapping the person inside and preventing all chances to escaape.

VIII. REFERENCES

- [1] Suman, LASER-SECURITY-SYSTEM International Journal of Scientific & Engineering Research, Volume 7, Issue 4, April-2016 214 ISSN 2229-5518 -Suman.pdf
- [2]A preview on experimentation on Laser security system 1 Diponkar Paul, Md. 2 Shohel Rana, 3 Md. Mokarram Hossain, 123World University of Bangladesh. <http://www.estij.org/papers/vol2no22012/32vol2no2.pdf>
- [3]Introduction to Laser security system- aishwaryaroa-Academia.edu. www.academia.edu.
- [4]https://www.google.co.in/search?biw=1094&bih=511&tbm=isch&sa=1&ei=4LHyWtrzJYjzvgTCzriYDg&q=laser+security+system&oq=laser+security+&gs_l=img.3.0.0110.59579.65878.0.67175.30.14.0.5.5.0.480.2637.25j0j3.8.0....0...1c.1.64.img..17.13.2684...0i67k1.0.DWKpL2IHAVA#imgrc=Sd76bzYePmy6wM
- [5]<https://gorillagadgets.com/products/50mw-green-laser-pointer>
- [6]<http://www.circuitstoday.com/proteus-software-introduction>
- [7]Madhu A et al. "LASER BASED SECURITY SYSTEM USING 555 TIMER" International Journal of Engineering, Basic sciences, Management & Social studies Volume 1, Issue 1, May 2017 Special Issue on "Emerging Trends in Electronics and Communication Engineering" 4th National Conference NCETEC-2017, Organized by Department of ECE, BGS Institute of Technology, BG Nagara, Mandya, Karnataka, India
- [8] <https://potentiallabs.com/cart/ldr-big>
- [9]https://www.researchgate.net/publication/275355188_Face_Detection_Using_Modified_Viola_Jones_Algorithm
- [10] <https://electronicsforu.com/electronics-projects/anti-theft-alarm>