

# Laser Security System Using IOT

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**Abstract:** In this era security is major issue for home environment and home security system is very essential these days as intrusions are increasing year after year. We should use latest technologies as thieves are also getting smarter, they now know how to break locks. We need a security system that is satisfactory in terms of security as well as cheap. In recent times many organization invested a lot in home security systems. This paper deals with design and implementation of “Laser based security system” which uses laser as a mean of catching or detecting intrusion. LDR (Light dependent resistor) is the main component of this system as it detects the intrusion in the laser which then further sends signals and alert the owner. The second major component of this system is Arduino which is be used to inform the owner about the intruder with an alert. It is hidden security system that intruder would not be known about as laser is not visible within the air and it only be giving light on LDR. This system is one of the efficient and cheapest security system that can be used anywhere not only in homes.

**Keywords:** Laser Security System, Light Dependent Resistor (LDR), IOT, Arduino, GSM Module (SIM900).

## 1.Introduction

In old days the need for security makes many people think to be innovative<sup>1</sup>. The vision of the Internet of Things has evolved due to a

convergence of multiple technologies, including ubiquitous wireless communication, real-time analytics, machine learning, commodity sensors, and embedded system. This means that the traditional fields of embedded systems, wireless sensor networks, control systems, automation (including home and building automation), and others all contribute to enabling the Internet of things (IOT). The vast network of devices connected to the Internet, including smart phones and tablets and almost anything with a sensor on it- cars, machines in production plants, jet engines, oil drills, wearable devices, and more, and these things exchange data over a network. Laser Web Security system works on same principle, the laser web electronic circuit is connected to a IOT System, if the Laser Web is interrupted the alarm will be on to notify the near ones about the interruption. It is very useful in the places security and where humans are not allowed. This system is easy to install and can be used anywhere inside or outside the home or any other place. It can easily be installed on doors of homes and offices, or any other restricted areas. This system is efficient, cheap, and easy to install. It also has very low maintenance cost as cost of the parts used in system is very cheap and also has really long life. It uses very less power consumption. It can work for very long time until owner wants it to get off. IOT makes it really fast and effective; initially security systems were made which only has alarms now with help of IOT owner far away from home will also get to know about the intrusion within some seconds through different type of alerts on their smart phones. In this techie world we are innovating things beyond our thinking which help us a lot in this speedy world when everyone is busy. With the help of technological innovations the cost of human resource has also been reduced to a very large extent. This system is really safe and cheap making a great option as a security system<sup>2</sup>.

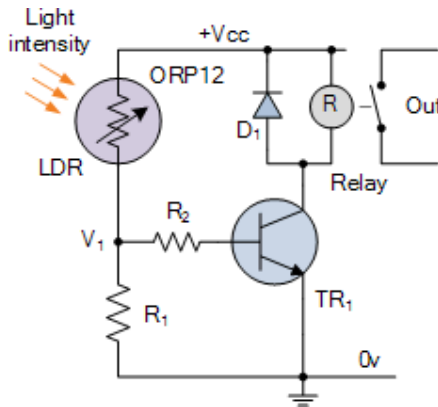
## **2. Related Work**

Various studies had been made to improve and enhance laser security systems<sup>3</sup>. The previously made systems had been proposed with the intent of making the alarm ring when intrusion is detected. The old Laser Security Systems doesn't have IOT used in it, so those are purely electronics systems without the use of latest and powerful internet technologies. With the power of IOT this security system can be enhanced to next level which makes it best among the other security systems. The previous systems with use of IOT in security field included PIR sensors which detects the motion in the surroundings. The IOT was used as a switch to those systems while it is

used for enhancing the enhancing the system proposed in this paper. Previously proposed Laser Security System were not that much advanced and enhances.

### 3. Results and discussion

The proposed system consist of two parts: The first one is electronics part and the other one is IOT part. Electronic part has LDR, Transistor, Resistor, Laser, Capacitor, Piezo buzzer, and 9V-12V DC Power Supply. These are connected together such that whenever an intruder comes in the way of LDR and the Laser the Piezo buzzer will be on and make the loud noise so that the surrounding people gets alert. The LDR is used to detect the laser getting emitted from another end towards it. The transistor is acting as a switch which gets ON whenever an intrusion is detected. Whenever an intrusion is detected the Piezo buzzer will continue to ring for some time with help of capacitor which get charged from transistor.



**Figure 1.** Circuit diagram for dark activated switch

The LDR is a electronic components called as photo resistor also whose resistance varies with the light intensity falling on it. LDR would have low resistance when it is receiving a high intensity light and would get increased when light gets dimmer<sup>4</sup>. Figure 2 shows the image of LDR used in the proposed system.



**Figure 2.** LDR used in the system

The other part is IOT which give a great extension and enhancement to the electronic part of the design. It basically has a microcontroller connected to the electronic circuit with the help of which we sent an alert to the owner of the property. At the moment microcontroller gets the information of intrusion with the help of electrical signals it will send an alert and the owner will get notified.



**Figure 3.** Arduino UNO used in the system

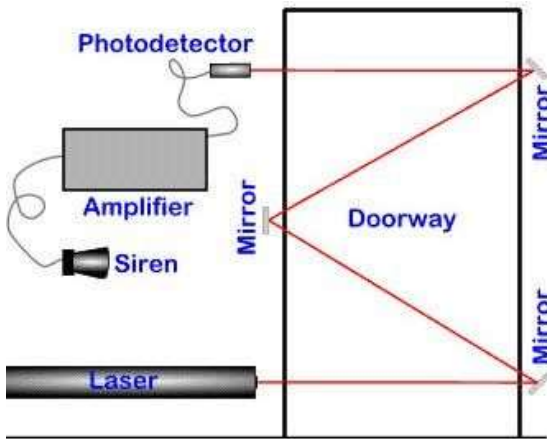
The Arduino has its own IDE (Integrated Development Environment) to design the code for microcontroller and download it in the microcontroller of Arduino. The microcontroller used in the proposed design is ‘Arduino UNO’ board, the proposed system also needs a ‘GSM Module’ device to support GSM services and can send SMS. GSM module is the second part used in IOT part of the proposed design. It is the device which gives or provides GSM services to microcontroller.



**Figure 4.** GSM module used in the system

The programming language of Arduino is purely object oriented and java based. It does not have any complicated syntax. It is easy to code in Arduino programming language. Figure 6 shows the user interface used of the integrated development environment of the Arduino.

The necessary information between Arduino and GSM module is passed through RX and TX pins. Whenever the command of sending message is executed in microcontroller, the instruction to GSM modules are passed through RX and TX pins.



**Figure 5.** Arrangement of system

The arrangement of the system is shown in figure 5. The system is arranged on the doorway. The Laser is at the bottom end on one side of the door and the LDR i.e. a photo resistor is at the upper end on the other side of the door. The mirrors are arranged on the both side of the door such that the laser falls on mirror and reflects on the other mirror and goes on till it is reflected on LDR i.e. photo resistor.



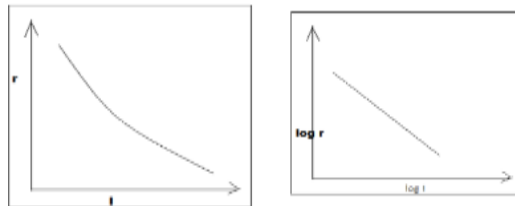
**Figure 6.** Piezo buzzer

If meanwhile, intrusion happens the moment come when there would be no laser light on LDR making it exhibit maximum resistance then the current will go on Piezo buzzer and Arduino would be activate giving signal to GSM module to send an alert to the owner and meanwhile Piezo buzzer will ring loudly. Figure 8 shows the Piezo buzzer used in the proposed system.

#### 4. Results and Discussions

There are some other microcontrollers in the market available as well like Raspberry pi, Intel 8051, etc but Arduino is the best value for money in the market highly efficient for these kinds of systems. Arduino gives the flexible environment in terms of feature the system whereas Raspberry pi is intransigent which makes it highly dependable part of the system and also very expensive in comparison with Arduino.

The LDR will produce variant resistance with light as a function, therefore whenever the light on LDR changes the resistance will be changed, however we need to detect the situation only when the light is completely absent i.e. when an intruder is passed. The resistance of the LDR is maximum when there is no light and minimum when the intensity of light is maximum. Different measures of resistance on different intensity of light have been taken and following results are obtained.



**Figure 7.** Graph of change of resistance with light intensity

Where 'r' is resistance and 'I' is intensity of light.. The LDR does not take much time to change its electrical resistance; the resistance is changed within an instance of time. As soon as IOT part gets the electrical signal about intrusion it reacts within a second. The system is really quick as in few seconds the owner of property will get notified about the intrusion. On an average it takes about 4-5 seconds to successfully send the message after the time of intrusion which is really fast.

## 5.Conclusion

The Laser Security system is successfully implemented which is highly efficient, fast, reliable and cheap as well. The system components also are not much expensive thus making its maintenance cost very low. The system is light and takes very less space giving it advantage to be used in homes. This system can be used at any property at any place. It is potentially the best home security system in terms of cost and efficiency as well. It is easy to install at homes by a Lehman or a technician<sup>5</sup>. It has a very low electricity consumption which also supports it to be home ready security system. Although few years back these kinds of system were not easy to afford in country like India which is still in developing phase. Its low cost also will actively encourage and promote it in India and makes the properties more secure than ever. The owner can forget about his worries for the property with this system because as soon as the intruder passed the laser in the system the buzzer will make loud noise to alert the near ones and the owner itself will be notified about the intrusion. This paper introduces a security system, with an advance feature of IOT and with support of GSM services, making the homes smarter and secure<sup>6,9</sup>. This system can also be used as a subsystem of many other projects like in farming system to know the interruption by birds and many more like this.

There always a scope to enhance a system, this system similarly also has scope to get improved, all the changes for enhancement of this system is most welcomed.

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