Laser Light Security System Using Arduino with Alarm



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Declaration

It is declared hereby that this thesis paper or any part of it has not been submitted to anywhere else for the award of any degree.

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Certification

This is to certify that this project entitled "**Laser Light Security System Using Arduino with Alarm** " is done by the following students under my direct supervision. This project work has been carried out by them in the laboratories of the Department of Electrical and Electronic Engineering under the Faculty of Engineering, Sonargaon University (SU) in partial fulfillment of the requirements for the degree of Bachelor of Science in Electrical and

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ABSTRACT

In this project, we have designed Laser Light Security System Using Arduino with Alarm with the application of Laser Diode Module. The project idea revolves around creating a security system. Whenever any object will obstruct the LASER ray the buzzer alarm will start ringing.

This project can be implemented anywhere, not only buildings or premises but many precious things like jewelry, diamonds, precious antique items in the museum, etc many other things are also secured using such an invisible LASER beam. Many people secure their home, office, shops, warehouses, etc with the LASER beam security system.

CHAPTER I: INTRODUCTION

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CHAPTER I

INTRODUCTION

1.1 Introduction

Security is a most important factor in day to day life. Need of security is the basic necessity of every individual. The feeling that we are safe and everything around us is all right is imperative for a peaceful living. Be that as it may, in this unsafe world, when crime, terror and dangers are on their pinnacle, how might one achieve that suspicion of safety? For that Here, laser security system provides us with a solution and for this reason more and more people are installing them in order to stay safe and secure. Different electronic security systems can be utilized at home and other significant working spots for security and safety purposes. Laser Security alarm is a device used for security purposes. It has a wide application in fields of security and defense starting from the security of a simple house hold material to a very high valued material of an organization. They once used to be very expensive solutions for security needs. Owning to cost cutting and fast technological advancements, this form of security system is becoming more affordable.

1.2 Background Study

Hard to believe: The first electro-magnetic alarm system in the world was already patented on 21 June 1853 in the name of a man called Augustus Russell Pope, an inventor from Sommerville in Boston. Up until then, people had mainly relied on the loud chatter of their startled geese, the integrity of their guard dogs or mechanical ringing to catch any intruders on their property.

1.3 Objectives

The core objective of this project is to design a laser security system with laser and light dependent resistor.

1.4 Project Organization

The project involves the use of Arduino UNO, Laser light, Buzzer, ... of a simple house hold material to a very high valued material of an organization.

CHAPTER II

THEORY OF THE PROJECT

2.1 Introduction

Security is a most important factor in day to day life. Need of security is the basic necessity of every individual. The feeling that we are safe and everything around us is all right is imperative for a peaceful living. Be that as it may, in this unsafe world, when crime, terror and dangers are on their pinnacle, how might one achieve that suspicion of safety? For that Here, laser security system provides us with a solution and for this reason more and more people are installing them in order to stay safe and secure. Different electronic security systems can be utilized at home and other significant working spots for security and safety purposes. Laser Security alarm is a device used for security purposes. It has a wide application in fields of security and defense starting from the security of a simple house hold material to a very high valued material of an organization. They once used to be very expensive solutions for security needs. Owning to cost cutting and fast technological advancements, this form of security system is becoming more affordable. We probably seen an old western movie where the good guys settle down and run a string at ankle height around their camp, tying it to the filled with rocks. When the bad guys try to sneak up in the mid night, they kick the wire and pull over, making a rattle that awakens the sleeping good guys, who win the day. A laser security system works with the same principle. Instead of a string, there's a ray of light surrounding the area, and instead of the rocks, there’s an alarm of one sort or another.

2.2 Theory

This system for security uses the combination of LASER light and LDR. The LDR module has an onboard potentiometer to adjust the sensitivity of LDR, so that it only senses laser light falling onto it. The concept is quite simple and similar to what we see in movies where antique, priceless ornaments are protected under laser lights. As someone crosses these lights, an alarm runs on to indicate unauthorised presence. This project works similarly. In normal conditions, where there is always laser light falling on the LDR, the LDR module always gives a high signal to microcontroller. When someone crosses this laser light, it will behave as an obstruction between the LDR module and laser light, resulting in no light falling on LDR. In such cases LDR module gives a low signal to the microcontroller, which indicates it to switch on an alarm

2.2.1 Arduino Uno

Arduino Uno is a microcontroller board based on the ATmega328P . It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed tosupport the microcontroller; simply connect
it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get
started.

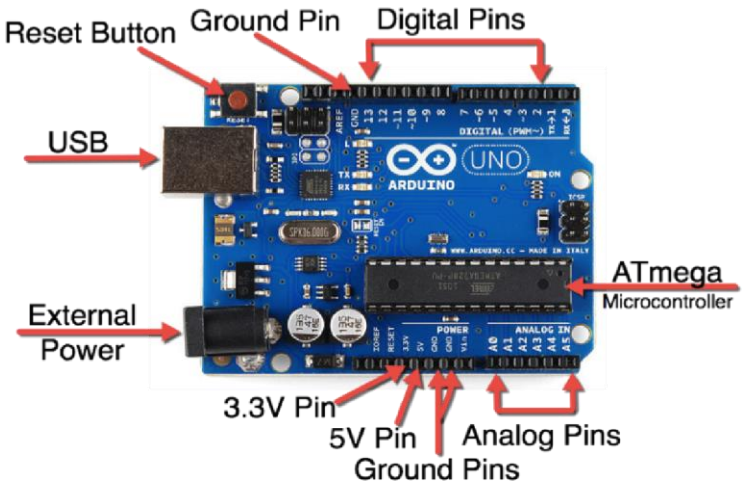
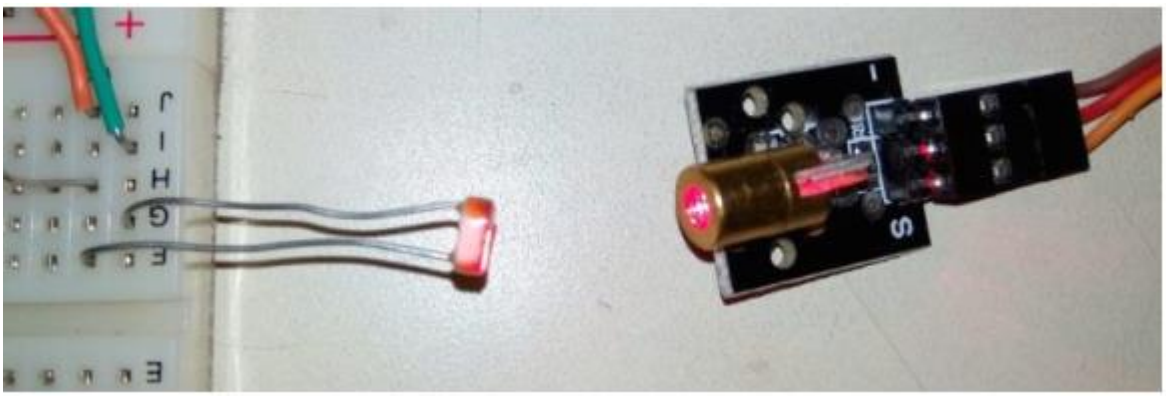


Fig: 2.2.1.1 Arduino UNO Pin Diagram

Working of the Laser Light Security System Using Arduino

The project basically works on the principle of interruption. If by any means the LASER light is interrupted the alarm will start unless it is reset with push-button. The laser is a concentrated light source that puts out a straight beam of light of a single color.



he LDR is sensitive to light and puts out a voltage when the laser light hits it. When the laser beam is interrupted and can’t reach LDR, its voltage output changes, and eventually the alarm will ring.

2.3 Source Code/Program:

```
#include <SoftwareSerial.h>
SoftwareSerial mySerial(8, 9); // RX, TX Serial communication for SIM800L
int buzzerPin = 4;
int LaserPin = 2;
int LdrPin = 12;
void setup()
{
Serial.begin(115200); // Begin serial Communication with Baud rate 115200 for DebugingmySerial.begin(115200); // Begin serial Communication with Baud rate 115200 for SIM800L
pinMode(buzzerPin,OUTPUT);
pinMode(LaserPin,OUTPUT);
pinMode(LdrPin,INPUT);
digitalWrite(buzzerPin,HIGH);
Serial.println("Initializing...");
delay(1000);
//delay(15000);
digitalWrite(LaserPin,HIGH);
Serial.println("done...");
Serial.println("done...");
updateSerial();
mySerial.println("AT+CMGF=1"); // Configuring TEXT mode
updateSerial();
mySerial.println("AT+CNMI=2,2,0,0,0"); //Configure the SIM800L on how to manage the Received SMS... Check the SIM800L AT
updateSerial();
}
void loop()
{
// If LDR pin Low mean something in front of laser beam.
if(digitalRead(LdrPin) == 1)
Serial.println("high"); // for debugging
digitalWrite(buzzerPin,LOW); // start buzzer.
make_call();
send_sms();
}
else{
Serial.println("low");
}
updateSerial();
}
void make_call()
{
mySerial.println("AT");
pdateSerial();
```

```
updateSerial();
void make_call()
{
mySerial.println("AT");
updateSerial();
updateSerial();
 pinMode(LdrPin,INPUT)

void send_sms

mySerial.println("AT");

 updateSerial();

void updateSerial()

{

mySerial.println("ATD+ +8801742452449;");

  updateSerial();

}

void send_sms()

{

  mySerial.println("AT");

  updateSerial();

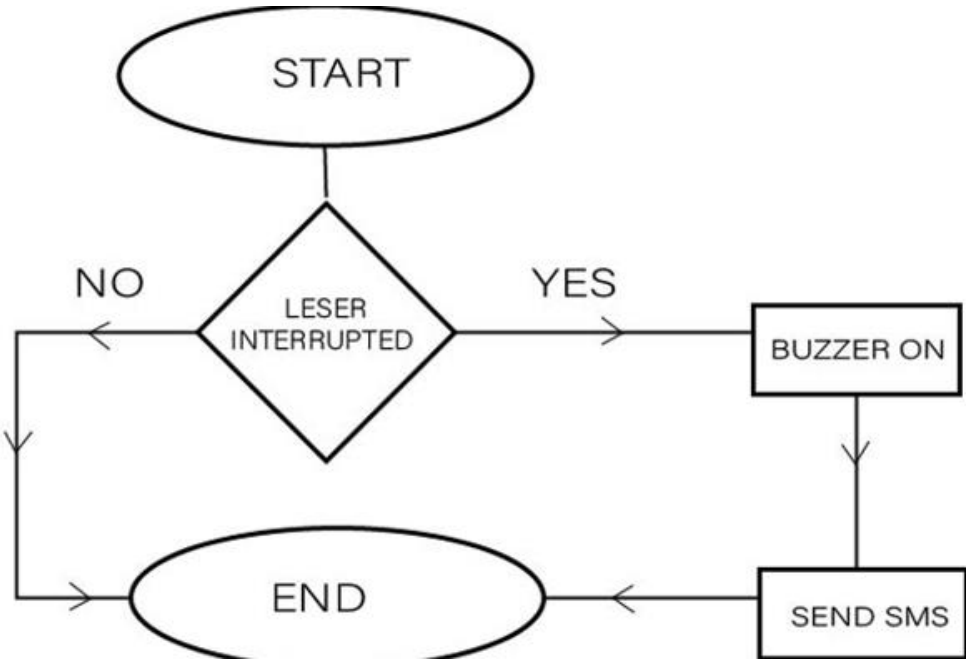
  mySerial.println("AT+CMGF=1");

  updateSerial();

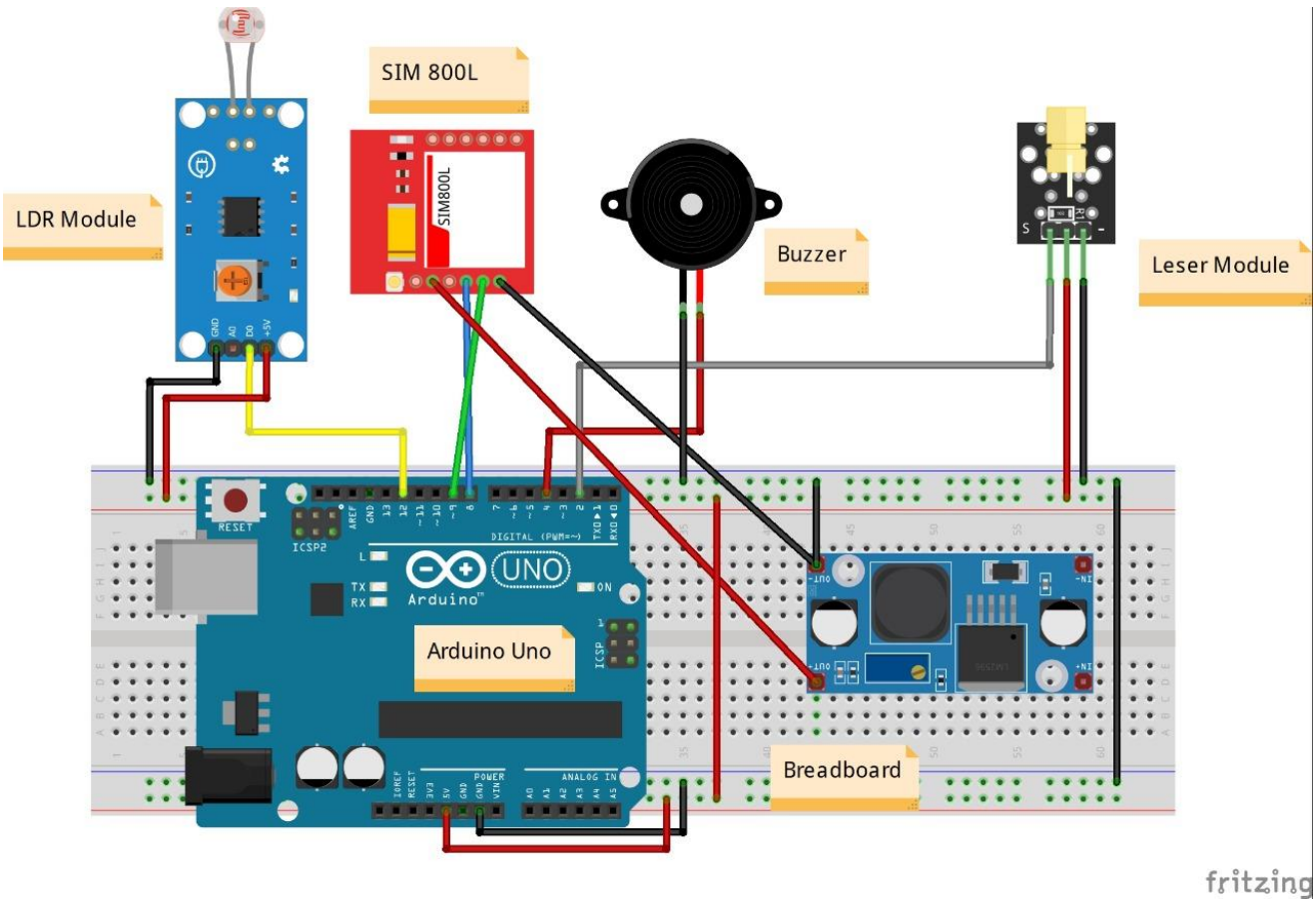
  mySerial.println("AT+CMGS=\"+8801742452449\"");
```

```
  updateSerial();
  mySerial.print("Security Alert! take action immediately.");
  updateSerial();
  mySerial.write(26);
}
void updateSerial()
{
  delay(500);
  while (Serial.available())
  {
 mySerial.write(Serial.read());
  }
while(mySerial.available())
  {
  Serial.write(mySerial.read());
```

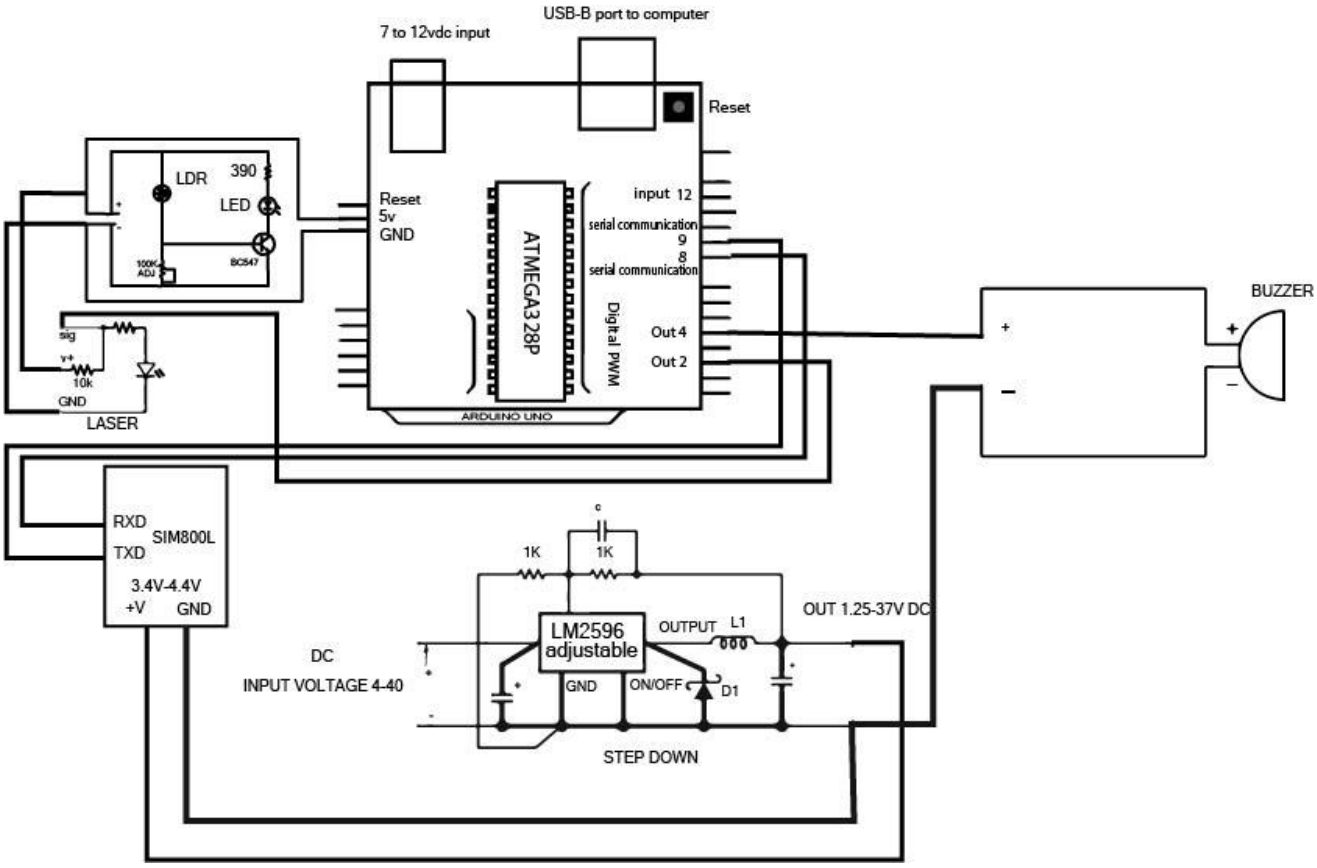
2.4 Flowchart



2.5 Block Diagram



2.6 Circuit Diagram



2.7 LIST OF COMPONENT

- ☐ Arduino Uno
- ☐ LDR Sensor
- ☐ Laser Light
- ☐ Buzzer
- ☐ GSM SIM800I
- ☐ Power Supply

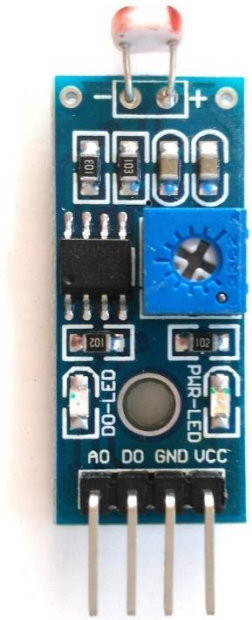
2.8 GSM SIM800I



Laser based security system is designed to provide maximum security to a given restricted area where the presence of any person is not desired. If someone tries to pass over the boundary line defined by laser lights, an alarm will be triggered and a SMS to the authorized person will be sent. Proper messages will also be displayed on the LCD. With this obstacle sensor, you can find out your car's distance to another car behind it while backing. In the kit laser based security system Light Dependent Resistors analog to digital converter (LDR) is used as a laser light sensor. If the laser lights are cut, even for a moment, the intensity of the light on the LDR will decrease. On this

momentary duration the output of the ADC converter will go low and the microcontroller can sense this information quickly. Now the microcontroller will trigger an alarm and will send a SMS or call using GSM. The GSM modem is connected with the controller serially which works on series of commands given by the microcontroller. This device is shown on picture 1 and includes the following tools: 1. GSM Modem: GSM modem allows the computer to communicate over the mobile network through calls, SMS and MMS messages. It consists of a SIM card and operates over a subscription through a mobile network. 2. Arduino Uno (mega) board is a microcontroller this is the heart of the system wherein central processing of data takes place, by receiving the sensor signals, it takes the corresponding course of action by sending commands to the output devices. 3. Jumper Wires to connect sensors to each other and to the board arduino 4. Led for given signal by lighting. 5. LCD monitor for given signal by shown on screen how different massages and to show how to enter your password. 6. Buzz sound given signal sound when a stranger pass the laser light without to enter the password or fingerprint. 7. 1 Breadboard (small board to connect the wires and to save pins on board Arduino). 8. Keypad is a set of buttons arranged in a block, used to enter the password to turn off the system or switch off the laser. 9. Fingerprint in its narrow sense is an impression left by the friction ridges of a human finger, the recovery of fingerprints from a crime scene is an important method of forensic science. Fingerprints are easily deposited on suitable surfaces by the natural secretions of sweat from the eccrine glands that are present in epidermal ridges, here we used as a password for our system. 10. It could have a camera for taken picture and send to the owner directly by GSM. 11. Also we can add different sensory systems like motion, smoke, gas, temperature, glass break or door break detectors and fire alarm systems. Conclusion • The advantage of this development is the circuit, construction and setup for the Laser Security System is very simple. • The whole system can be powered from any 12VDC/2A power supply unit/batte

2.9 LDR SENSOR



LDR Full From (**Light Dependent Resistor**)

number ofcharge carriers. Theresult of this process is more and morecurrentstarts flowing through the device when thecircuit is closed and hence it is said that the resistanceof the device has been decreased. Thisis the most common working

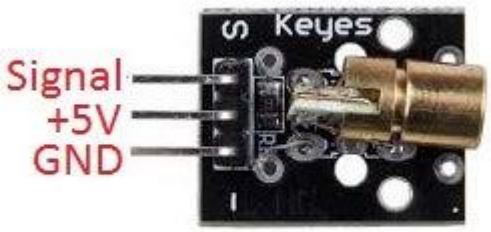
principle of LDR

In the dark, a photo resistor can have aresistance as high as a few mega ohms (M ohms), while in the light, a photo resistor can havea resistance as low as a few hundred ohms. If incident light on a photo resistor exceeds acertain frequency, photons absorbed by the semiconductor give bound electrons enoughenergy to jump into the conduction band. The resulting free electrons conduct electricity,thereby lowering resistance. The resist

A photo resistor or light-dependent resistor (LDR) or photocell is a light-controlled variableresistor. The resistance of a photo resistor decreases with increasing incident light intensity;in other words, it exhibits photoconductivity. A photo resistor can be applied in light-sensitive detector circuits, and light- and dark-activated switching circuits.Photo resistors work based off of the principle of photoconductivity. Photoconductivity is an

optical phenomenon in which the material's conductivity is increased when light is absorbed by the material. When light falls i.e. when the photons fall on the device, the electrons in thevalence band of the semiconductor material are excited to the conduction band. Thesephotons in the incident light should have energy greater than the band gap of thesemiconductor material to make the electrons jump from the valence band to the conductionband. Hence when light having enough energy strikes on the device, more and more electronsare excited to the conduction band which results in a large ance range and sensitivity of a photo resistor cansubstantially differ among dissimilar devices. Moreover, unique photo resistors may reactsubstantially differently to photons within certain wavelength bands.

3.0 Laser Light



The LASER MODULE 650NM 5V head is composed of a light-emitting tube, condenser lens, and adjustable copper sleeve and it is assembled when delivered, the focal length of the lens is adjusted glued by strong glue stick, which can work directly after connecting to a 5V DC power supply.
Package Includes :
1 x Laser Module 650NM 5V

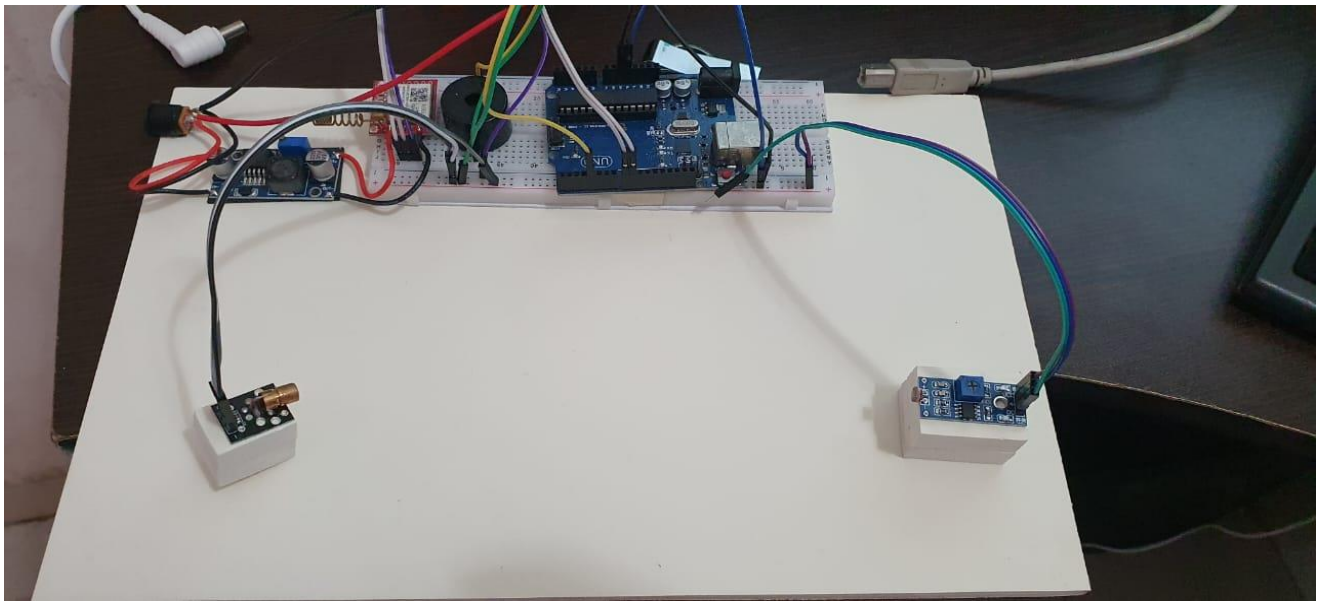
3.1 BUZZER



A buzzer or beeper is an audio signalling device, which may be mechanical,electromechanical, and piezoelectric. Typical uses of buzzers and beepers include alarmdevices, timers and confirmation of user input such as a mouse click or keystroke.Early devices were based on an electromechanical system identical to an electric bell withoutthe metal gong. Similarly, a relay may be connected to interrupt its own actuating current,causing the contacts to buzz. Often these units were anchored to a wall or ceiling to use it as asounding board. The word "buzzer" comes from the rasping noise that electromechanicalbuzzers made.The buzzer consists of an outside case with two pins to attach it to power and ground. Whencurrent is applied to the buzzer it causes the ceramic disk to contract or expand. Changingthis then causes the surrounding disc to vibrate. That's the sound that you hear. Adjust thepotentiometer to increase or decrease the resistance of the potentiometer. If you increase theresistance of the potentiometer then it will decrease the Volume of the buzzer. If you decreasethe resistance of the potentiometer then it will increase the Volume of the buzzer.

- Annunciator panels
- Electronic metronomes
- Game show lock-out device
- Microwave ovens and other householdappliances
- Sporting events such as basketball games
- Electrical alarms

3.2 Project Picture



3.3 CONCLUSION

Laser security system provides us the security against any crime, theft in our day to day lifeand so people are installing them in order to stay safe, secure and sound. Various electronicsecurity systems can be used at home and other important working places for security andsafety purposes. It is a great opportunity and source of saving man power contributing nowastage of electricity. The "Laser Security System" is an important helping system. Usingthis system robbery, thefts & crime can be avoided to large extend. Avoiding thieves resultsin the safety of our financial assets and thereby this system provides us protection against all.The Laser & LDR system is highly sensitive with a great range of working. The systemsenses the light emitted by the Laser falling over the LDR connected with the circuit.Whenever the beam of light is interrupted by any means, it triggers the alarm or siren. Thishighly reactive approach has low computational requirement, therefore it is well suited tosurveillance, industrial application and smart environments

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3.4 References

[1] Olarewaju .I. K, Ayodele, O. E, Michael. F. O, Alaba. E. S, Abiodun. R. O, 2017. “Design and Construction of an Automatic Home Security System Based on GSM Technology and Embedded Microcontroller Unit”, American Journal of Electrical and Computer Engineering, Vol. 1,No. 1, pp. 25-32, Doi: 10.11648/j.ajece.20170101.14 [2] Zungeru. A. M, Kolo. J. G, Olumide. I, September 2012. “A Simple and Reliable Touch Sensitive Security System”, International Journal ofNetwork Security&ItsApplications, ISSN 0975-2307, Volume: 4; Issue: 5; pp. 149-165, DOI: 10.5121/ijnsa.2012.451