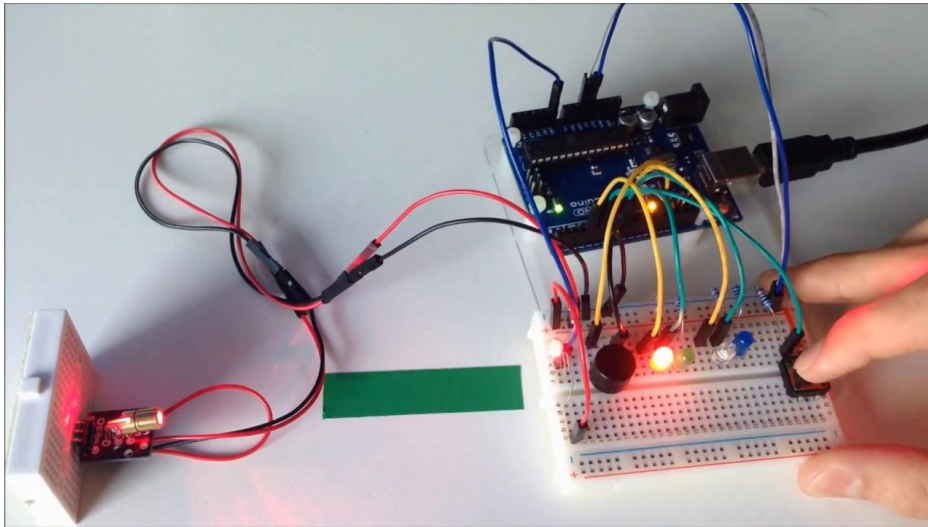


# VELAMMAL COLLEGE OF ENGINEERING AND TECHNOLOGY

(Department of Electronics and Communication Engineering)

## TRANSDUCER ENGINEERING (OIC751)

### Mini Project Report



**PROJECT TITLE : LASER LIGHT SECURITY SYSTEM**

### **TEAM MEMBERS:**

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### **EVALUATION TABLE:**

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| Demonstration | 20  |  |
| Novelty       | 20  |  |
| Total         | 100 |  |

## **ABSTRACT**

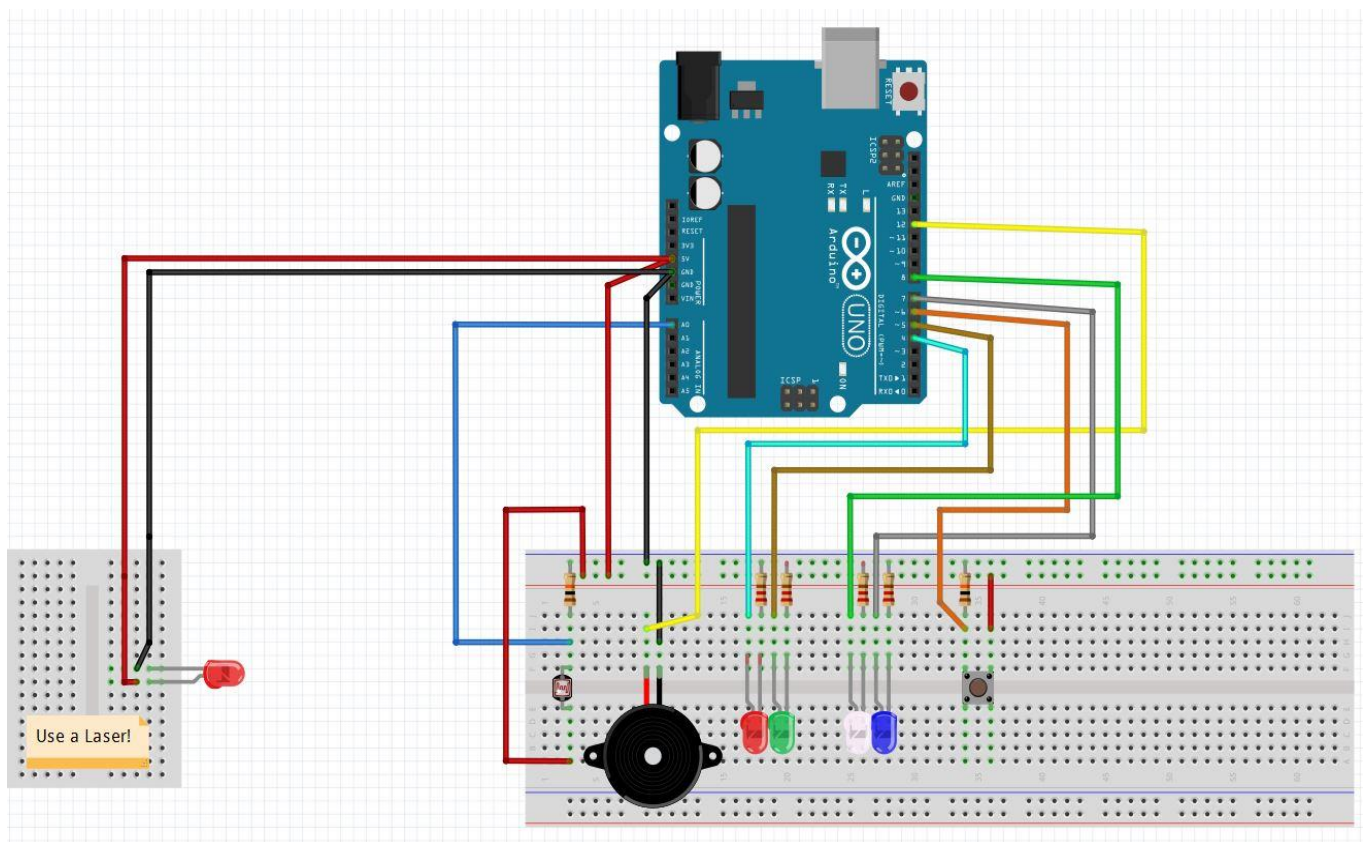
This project deals with a model of laser security alarm system design. Laser security systems used to be difficult to install and rarely available to anyone other than the super-rich. Now, there are dozens of different security systems on the market that utilize lasers and can effectively protect everything from small apartments and businesses to large areas of property. Most home laser security systems consist of two parts: a basic alarm unit and an infrared motion detector. Laser based security system is a type of security and alarm system that uses laser light and a light sensor. It is known that a laser light goes through long distance without any scattering effect (disturbing) and it is only visible at source and the destination point so it can be used as mediator between source and destination but to analyze the source a sensor is needed, here the use of LDR is applicable. Just analysis is not enough, alerting should be done with sound effect so here buzzer is also used. Making use of this, a laser security system is designed. This project can be implemented anywhere, not only buildings or premises but many precious things like jewelry, diamonds, precious antique items in the museum, and many other things are also secured using LASER light. Many people secure their home, office, shops, warehouses, etc with the LASER light security system.

## **INTRODUCTION:**

Need of security is the basic necessity of any individual. The feeling that we are safe and everything around us is all right is imperative for a peaceful living. But in this unsafe world, when crime, terror and threats are on their peak, how can one attain that sense of security? 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. Various electronic security systems can be used at home and other important working places 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 defence starting from the security of simple house hold material to a very high valued material of an organization. They once used to be expensive solutions for security needs. Owing to cost cutting and fast technological advancements, this form of security system is becoming more affordable. Lasers differ from other light sources in a few significant ways. There are two features that are important for security systems. Unlike a light bulb or flashlight, laser light doesn't spread out, it is a narrow beam. And laser light is essentially a single colour. Because laser light doesn't spread much, it can be sent it a long way and still have enough energy in a small area to trigger the security system detector. Because it's a single wavelength, it can put a blocking filter on the detector to let laser light through without letting

background light onto the detector. Laser light travels in a straight line. For instance, to protect the front of the yard, putting the laser at one corner and the detector at the other corner would do the job. That's not a very practical configuration, though. More typically, if it is needed to protect the perimeter of a room, or at least the enhances. So laser security systems start with a laser pointing to a small mirror. The first mirror is angled to direct the beam to a second small mirror, and so on until the final mirror directs the beam to the detector. If the beam is interrupted anywhere between the laser and the detector, the electronics will put the warning signal.

## **CIRCUIT DIAGRAM**



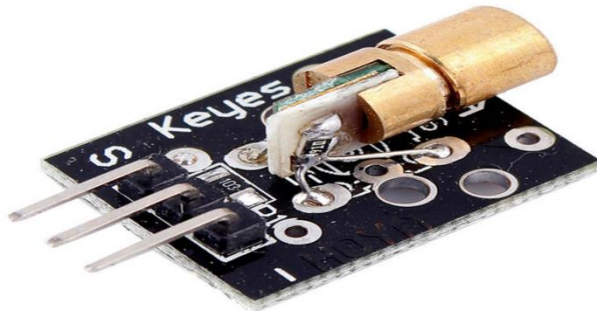
## **COMPONENTS REQUIRED**

1. Arduino UNO Board
2. LASER Diode Module KY-008
3. Buzzer
4. LDR
5. Resistors (10k)
6. Push Button Switch
7. Bread Board
8. Jumper Wires
9. LEDS

## **HARDWARE COMPONENTS**

### **1)LASER DIODE MODULE(KY-008)**

Laser Transmitter module KY-008 for Arduino emits a dot-shaped, red laser beam. The KY-008 Laser transmitter module consists of a 650nm red laser diode head and a resistor. Handle with caution, do not look directly into the laser head.



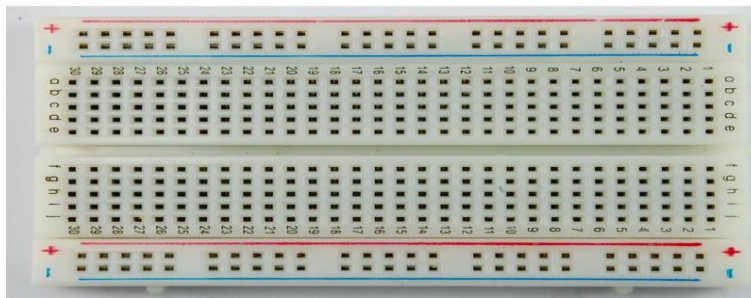
### **2)ARDUINO**

Arduino is an open source platform used for building electronic projects. Arduino consists of both physical programmable circuit board (often referred to as microcontroller) and a piece of software or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.



### **3)Breadboard**

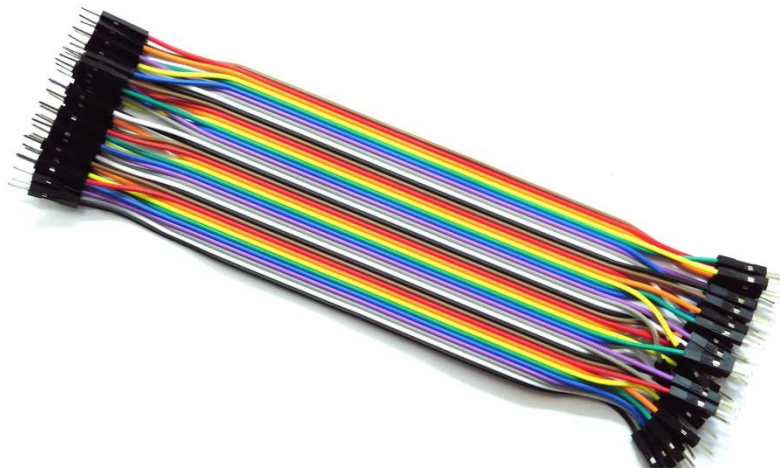
A breadboard is a construction base for prototyping of electronics. These solderless breadboards does not require soldering, it is reusable. This makes it easy to use for creating temporary prototypes and experimenting with circuit design. A modern solderless breadboard socket consists of a perforated block of plastic with numerous tin plated phosphor bronze or nickel silver alloy spring clips under the perforations. Interconnecting wires and the leads of discrete components such as capacitors, resistors, and inductors, power supply, one or more signal generators, LED display or LCD modules, and logic probes can be inserted into the remaining free holes to complete the circuit. A bus strip usually contains two rows: one for ground and one for a supply voltage. Typically the row intended for a supply voltage is marked in red, while the row for ground is marked in blue or black.





#### **4)JUMPER WIRES**

Jump wires (also called jumper wires) for solderless bread boarding can be obtained in ready- to-use jump wire sets or can be manually manufactured. The latter can become tedious work for larger circuits. Ready-to-use jump wires come in different qualities, some even with tiny plugs attached to the wire ends. Jump wire material for ready-made should usually be solid copper, tin-plated wire - assuming no tiny plugs are to be attached to the wire ends. Shorter stripped wires might result in bad contact with the board's spring clips (insulation being caught in the springs). Longer stripped wires increase the likelihood of short-circuits on the board. Needle-nose pliers and tweezers are helpful when inserting or removing wires, particularly on crowded boards.



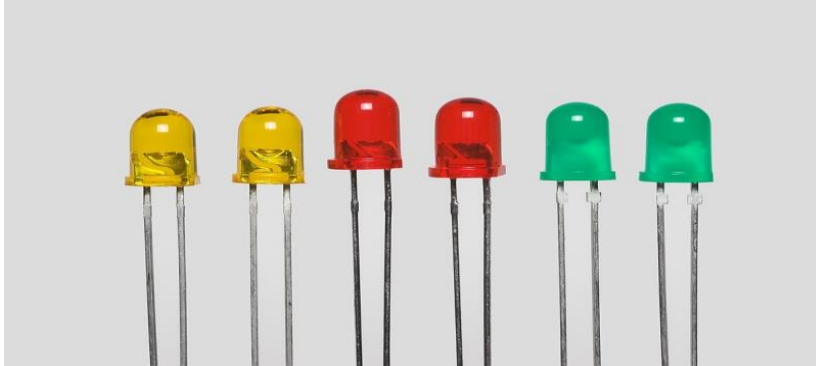
#### **5)BUZZER**

This buzzer can be used by simply powering it using a DC power supply ranging from 4V to 9V. A simple 9V battery can also be used, but it is recommended to use a regulated +5V or +6V DC supply. The buzzer is normally associated with a switching circuit to turn ON or turn OFF the buzzer at required time and require interval. This buzzer can be used by simply powering it using a DC power supply ranging from 4V to 9V. A simple 9V battery can also be used, but it is recommended to use a regulated +5V or +6V DC supply. The buzzer is normally associated with a switching circuit to turn ON or turn OFF the buzzer at required time and require interval.



## **6)LEDs**

A light-emitting diode (LED) is a semiconductor light source that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. Recent developments have produced high-output white light LEDs suitable for room and outdoor area lighting.



## **7)LDR**

A photo resistor or light dependent resistor is an electronic component that is sensitive to light. When light falls upon it, then the resistance changes. Values of the resistance of the LDR may change over many orders of magnitude the value of the resistance falling as the level of light increases. Although other electronic components such as photodiodes or photo- transistor can also be used, LDRs or photo-resistors are a particularly convenient to use in many electronic circuit designs. They provide large change in resistance for changes in light level. The most common type of LDR has a resistance that falls with an increase in the light intensity

falling upon the device (as shown in the image above). The resistance of an LDR may typically have the following resistances: Daylight=  $5000\Omega$ , Dark=  $20000000\Omega$ .



## **8)RESISTORS**

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. Resistors act to reduce current flow, and, at the same time, act to lower voltage levels within circuits. In electronic circuits resistors are used to limit current flow, to adjust signal levels, bias active elements, terminate transmission lines among other uses. High-power resistors that can dissipate many watts of electrical power as heat may be used as part of motor controls, in power distribution systems, or as test loads for generators. Fixed resistors have resistances that only change slightly with temperature, time or operating voltage. Variable resistors can be used to adjust circuit elements (such as a volume control or a lamp dimmer), or as sensing devices for heat, light, humidity, force, or chemical activity.





## **9)PUSH BUTTON**

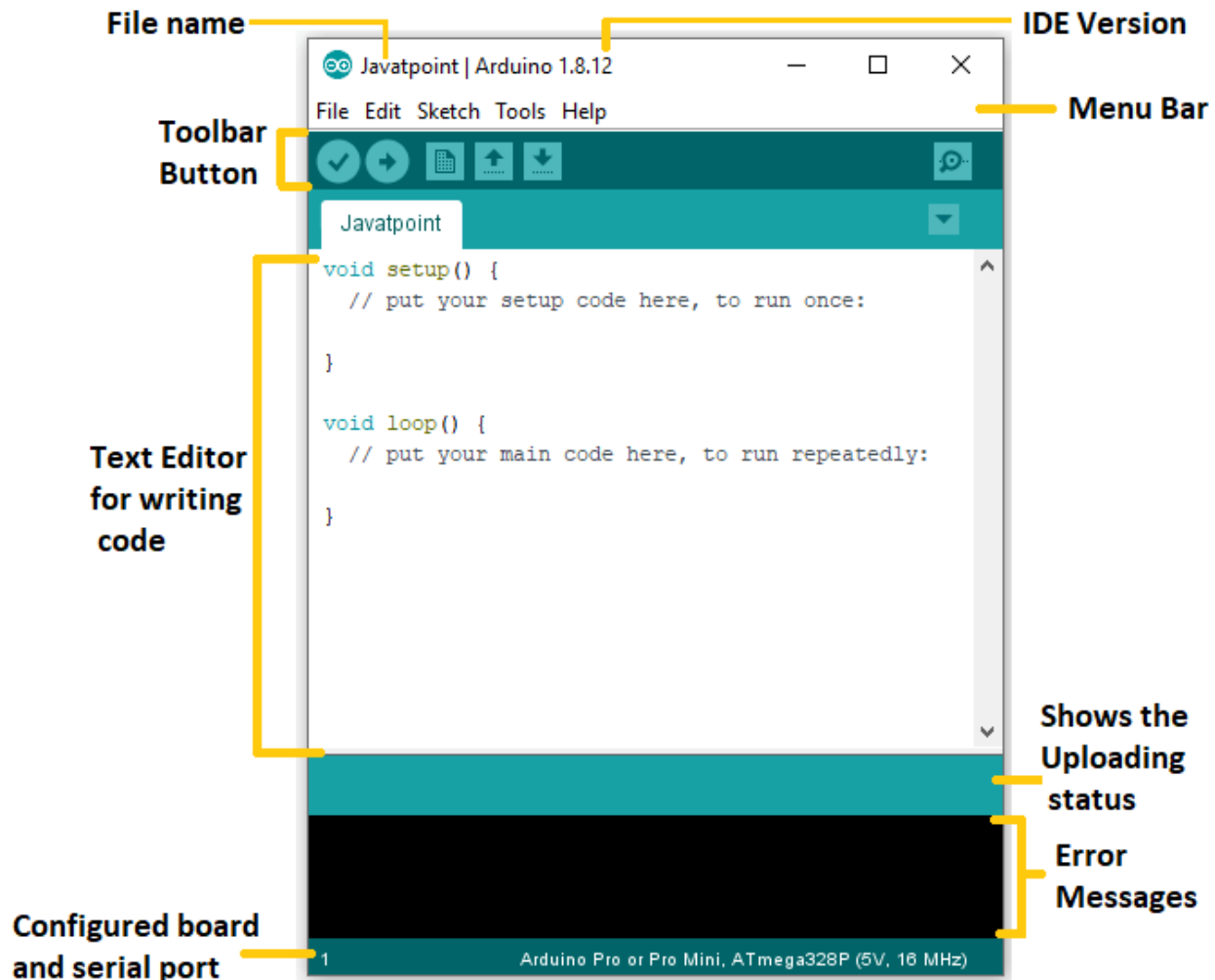
A push button switch controls an action in a machine or other type of process. They are common features within the home and workplace, and are also referred to as pushbutton switches or push switches. The buttons are typically made from plastic or metal and the push button may either be flat or customised to ergonomic specifications. There is a wide variety of button switch models, which are powered either by momentary or latching action.



## **REQUIRED SOFTWARE:**

### **Arduino IDE:**

The Arduino IDE is an open-source software, which is used to write and upload code to the Arduino boards. The IDE application is suitable for different operating systems such as Windows, Mac OS X, and Linux. It supports the programming languages C and C++. Here, IDE stands for Integrated Development Environment. The program or code written in the Arduino IDE is often called as sketching. We need to connect the Genuino and Arduino board with the IDE to upload the sketch written in the Arduino IDE software. The sketch is saved with the extension '.ino.'

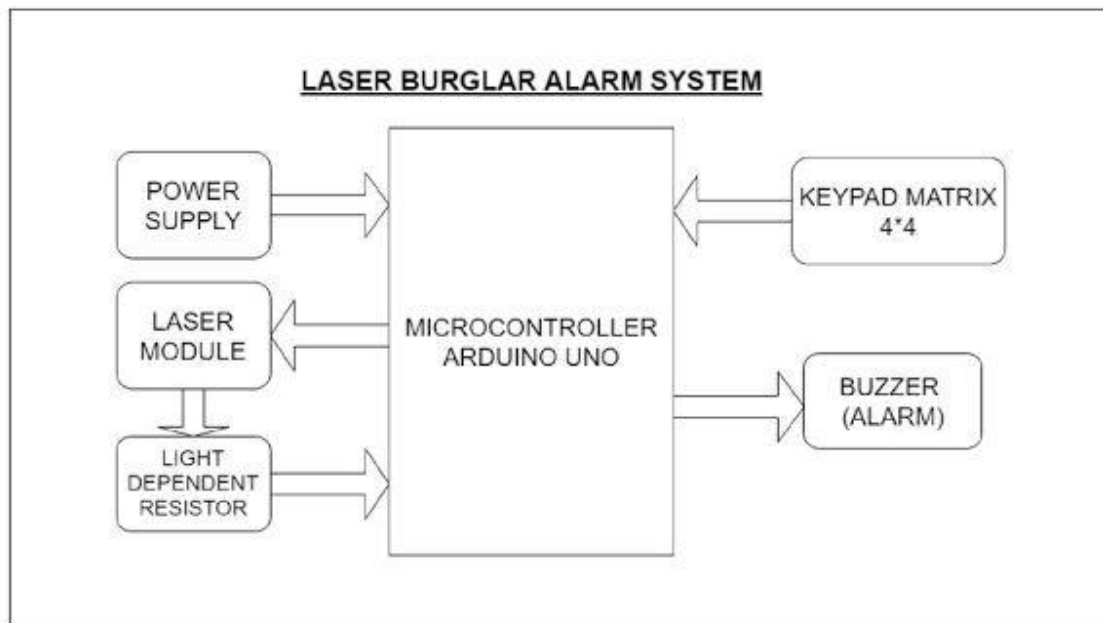


## WORKING:

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. The 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. There is a laser diode that generates the laser beam which continuously strikes over the Light dependent resistor sensors. When any person crosses the path, it inhibits laser to reach LDR and the sensor generate a low which is read by controller to power on the buzzer.

## **BLOCK DIAGRAM:**

### **Block Diagram**



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## **BLOCK DIAGRAM EXPLANATION**

A security system working on LASER technology detects and alerts the intrusion attempt in the following steps –

- The Security System keeps on transmitting the narrow beam of light through LASER in the air.
- The transmitted light travels in the air until it is blocked by a fixed object in front of it.
- The beam of light on hitting the fixed object gets reflected back into the LDR.
- The LDR continuously keeps on measuring the light falling on it after reflection.

- When the Laser Security System is idle with no one coming into the path of the light beam, there will always be the same amount of light coming to the detector.
- When any burglar comes in the path of the light beam, the path of light gets disturbed and the amount of reflected light falling on the LDR gets altered.
- On noticing the change in the falling light, the LDR considers it as an intrusion attempt and activates the alarm unit to generate the alarm.
- The alarm goes off with a loud sound to alert the intruder as well as the security personnel of the premises.

### **CODE:**

```
int laserPin = 3;
int sensorPin = A0;
int buttonPin = 12;
int buzzerPin = 11;

int laserThreshold = 10;

void setup() {
  pinMode(laserPin, OUTPUT);
  pinMode(buttonPin, INPUT_PULLUP);
  Serial.begin(9600);
}

boolean alarmState = false;

void loop() {
  if (! alarmState) {
    delay(1000);
    digitalWrite(laserPin, HIGH);
    delay(10);
    unsigned long startTime = millis();
    while (millis() - startTime < 1000) {
      int sensorValue = analogRead(sensorPin);
      Serial.println(sensorValue);
      if (sensorValue > laserThreshold) {
        alarmState = true;
        break;
      }
    }
  }
}
```

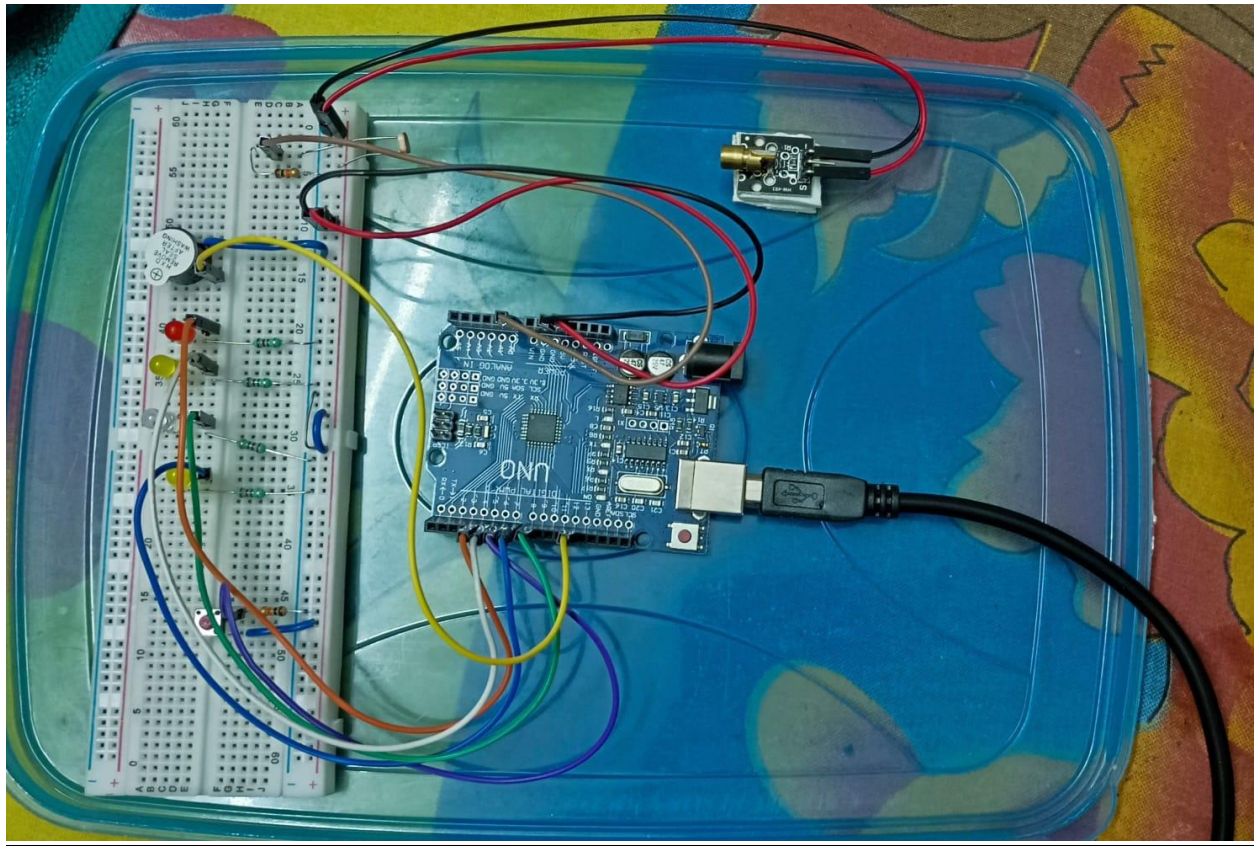
```

}
delay(10);
}
digitalWrite(laserPin, LOW);
} else {
tone(buzzerPin, 440);
if (! digitalRead(buttonPin)) {
alarmState = false;
noTone(buzzerPin);
}
delay(10);
}
}

```

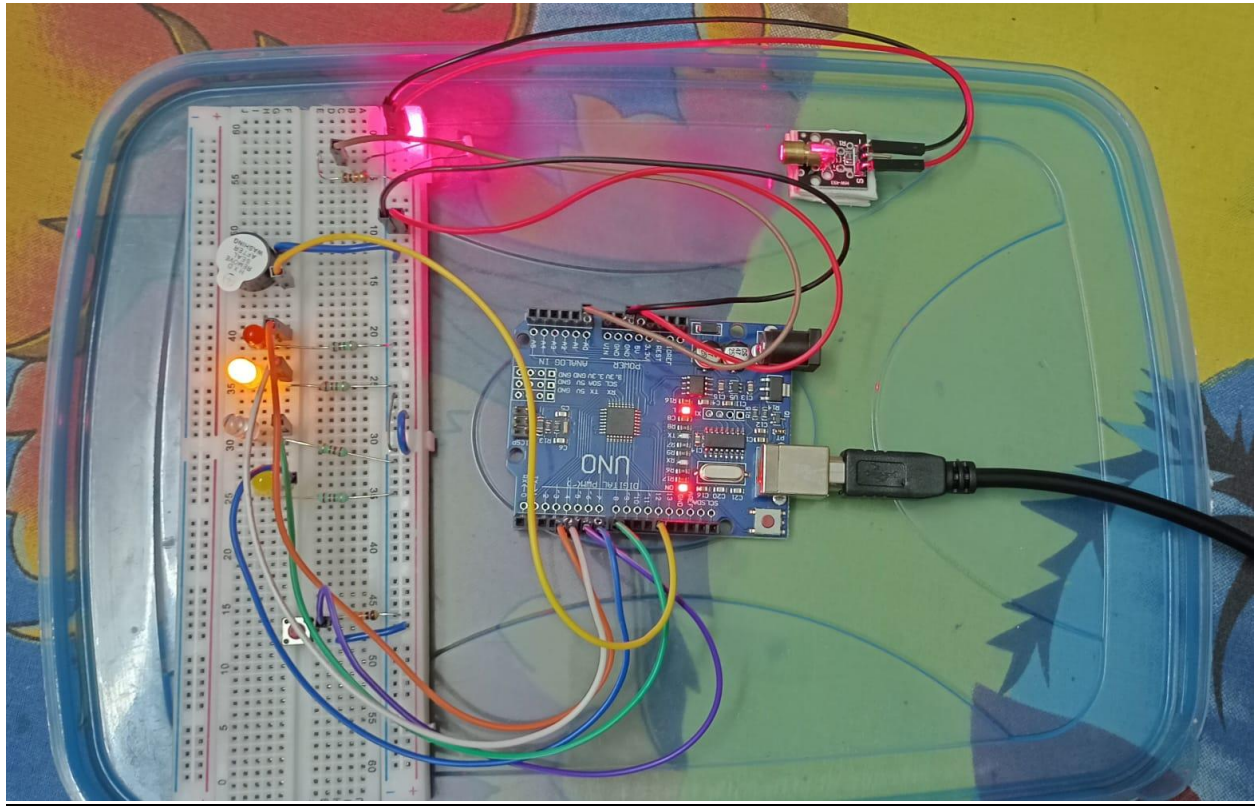
## DEMO

## Circuit Diagram

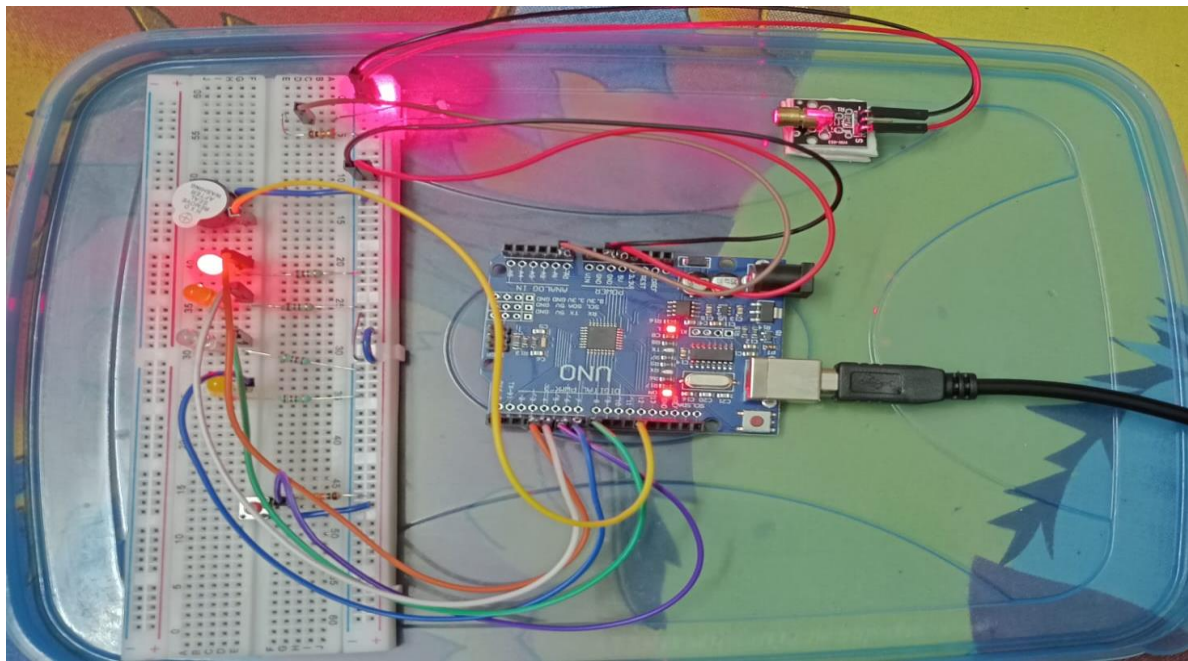




## NORMAL MODE

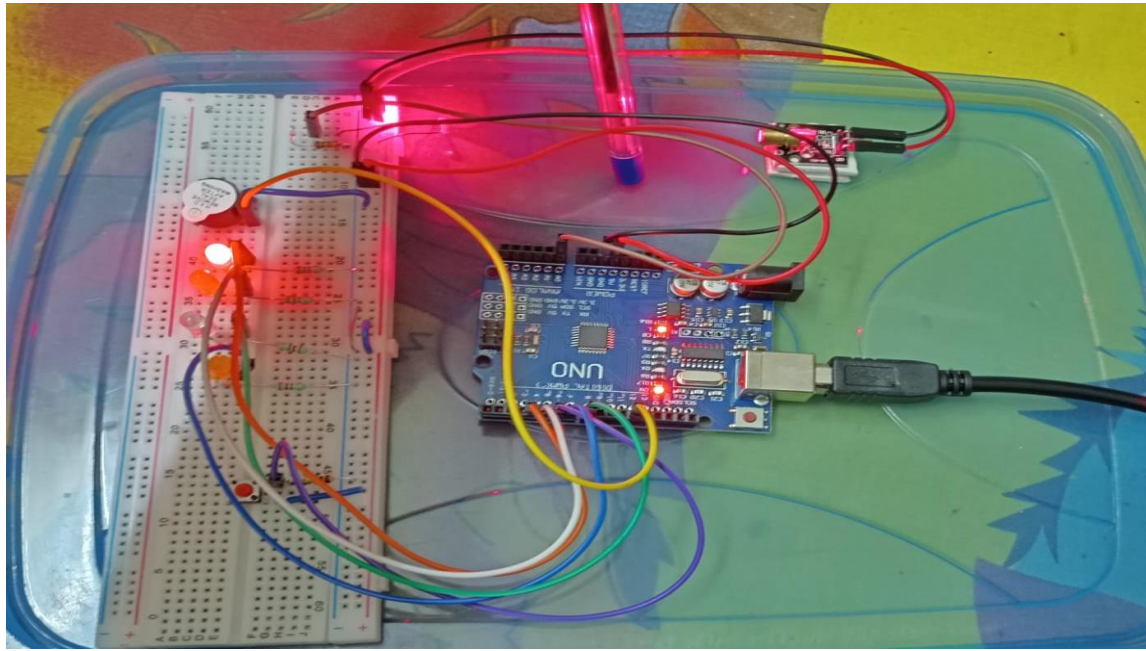


## DETECTION MODE





# DETECTING THE INTRUDER



## ARDUINO IDE

```
Laser_Project | Arduino IDE 2.0.1
File Edit Sketch Tools Help

Arduino Uno

Laser_Project.ino
1  const int triggeredLED = 7;
2  const int triggeredLED2 = 8;
3  const int RedLED = 4;
4  const int GreenLED = 5;
5  const int inputPin = A0;
6  const int speakerPin = 12;
7  const int armButton = 6;
8
9  boolean isArmed = true;
10 boolean isTriggered = false;
11 int buttonVal = 0;
12 int prev_buttonVal = 0;
13 int reading = 0;
14 int threshold = 0;
15
16
17 const int lowrange = 2000;
18 const int highrange = 4000;
19
20 void setup(){
21
22   pinMode(triggeredLED, OUTPUT);
23   pinMode(triggeredLED2, OUTPUT);
24   pinMode(RedLED, OUTPUT);
25   pinMode(GreenLED, OUTPUT);
26   pinMode(armButton, INPUT);
27   digitalWrite(triggeredLED, HIGH);
28
29 }
30
31 void loop(){
32
33   buttonVal = digitalRead(armButton);
34   if (buttonVal == HIGH) {
35     isArmed = !isArmed;
36     if (isArmed) {
37       digitalWrite(triggeredLED, LOW);
38       digitalWrite(triggeredLED2, LOW);
39       digitalWrite(RedLED, LOW);
40       digitalWrite(GreenLED, LOW);
41     } else {
42       digitalWrite(triggeredLED, HIGH);
43       digitalWrite(triggeredLED2, HIGH);
44       digitalWrite(RedLED, HIGH);
45       digitalWrite(GreenLED, HIGH);
46     }
47   }
48
49   reading = analogRead(inputPin);
50   if (reading > threshold) {
51     isTriggered = true;
52     digitalWrite(triggeredLED, LOW);
53     digitalWrite(triggeredLED2, LOW);
54     digitalWrite(RedLED, LOW);
55     digitalWrite(GreenLED, LOW);
56   } else {
57     isTriggered = false;
58     digitalWrite(triggeredLED, HIGH);
59     digitalWrite(triggeredLED2, HIGH);
60     digitalWrite(RedLED, HIGH);
61     digitalWrite(GreenLED, HIGH);
62   }
63
64   delay(100);
65 }

Output
Sketch uses 3152 bytes (9%) of program storage space. Maximum is 32256 bytes.
Global variables use 33 bytes (1%) of dynamic memory, leaving 2015 bytes for local variables. Maximum is 2048 bytes.

Ln 6, Col 29 UTF-8 Arduino Uno on COM6 01:29 18-11-2022
```

## **CONCLUSION**

Laser security system provides us the security against any crime, theft in our day-to-day life and so people are installing them in order to stay safe, secure and sound. Various electronic security systems can be used at home and other important working places for security and safety purposes. It is a great opportunity and source of saving man power contributing no wastage of electricity. The "Laser Security System" is an important helping system. Using this system robbery, thefts & crime can be avoided to large extend. Avoiding thieves results in 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 system senses 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. This highly reactive approach has low computational requirement; therefore, it is well suited to surveillance, industrial application and smart environments.

## **NOVELTY:**

i) Mostly the security systems are installed with alarms to alert the user about the theft or burglar. But in this project in addition to it we have introduced the LASER because "Beam Travels A Long Distance". You won't have to worry about protecting your house far enough out because that laser beam is going to travel further than you might think. It's also able to reflect and bounce around several times in that distance, meaning a single beam can cover more distance than you might think.

ii) We have introduced two modes:

a) Normal Mode

b) Detection Mode

### **Normal Mode**

This mode is introduced so that whenever the user is in the home he/she doesn't want this security system to be turned on so the system will not give any sound if the people of the house passes through it thereby saving the overall power consumed.

### Detection Mode

This mode comes into action whenever the user wants to go away from the house he/she should change the mode to detection mode .So now the system will start detecting the intruder and once the system finds someone entering the house and the buzzer starts to give the sound.

### **ADVANTAGES:**

i)These are easy to install and work at both within as well as outside houses. These are very effective perimeter alarm systems around properties. In indoor systems can utilize the normal power outlets and jacks making them inconspicuous. At outside these can be easily be hidden behind the bushes or plants without causing any damage. They consume less power when compared to the laser system as the whole, which is expensive.

ii)These laser systems can be installed in homes either by self or by hiring a technical person. By technological innovations cost of the security systems has been cut to a large extent. So, making laser systems one among affordable security system options can be very safe.

iii)Lasers are strong in beam width and can be focused on the perfect target. By using laser security system one can be safe in the case of harmful effects to the body. As the beam width used in the laser security systems are not strong beam widths.

iv)The circuit, construction and setup for the Laser Security System are very simple. If used with a battery, the laser security system can work even when there is a power outage.

### **APPLICATIONS:**

i)Laser Security System can be used in safety lockers in our homes, where even if the locker's code is hacked, it acts as an additional layer of security.

ii)Apart from security systems, this laser-based setup can also be used to check if pets or babies crossed a certain boundary.

iii)These are easy to install and work at both within as well as outside houses. These are very effective perimeter alarm systems around properties. In indoor systems can utilize the normal power outlets and jacks making them

inconspicuous. At outside these can be easily be hidden behind the bushes or plants without causing any damage. They consume less power when compared to the laser system as the whole, which is expensive.

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### **FUTURE SCOPE:**

LASER can be replaced with OPTEX LASER because

- OPTEX LASER based products are highly accurate in detecting objects.
- The OPTEX products can identify the size, speed, distance of moving objects.
- OPTEX Laser security system is not affected by extreme weather conditions.
- In OPTEX Laser security system, the zone can be further divided into Sub-Zones by using Optex Redwall software.
- These products can be mounted both vertically and horizontally depending upon the requirement.
- OPTEX products with LiDAR technology are equipped with built-in assistance cameras which simplifies installation and walk test.
- These products can be mounted on walls, ceilings or poles without any installation difficulty.
- OPTEX Laser security system is resistant to animals and hence do not give false alarms.

### **REFERENCES:**

#### **1. YOUTUBE: -**

<https://www.youtube.com/watch?v=alQ9v8dyaTs> 2.

<https://www.youtube.com/watch?v=RB YUATNB6RQ>

## **2. GOOGLE: -**

1. [https://images-na.ssl-images-amazon.com/images/1/81vNQTDA2GLSL1500\\_.jpg](https://images-na.ssl-images-amazon.com/images/1/81vNQTDA2GLSL1500_.jpg)
2. <https://miro.medium.com/max/797/14ky719RL4Bg4f9cZFX7gw.jpeg>
3. [https://www.androiderode.com/wp-content/uploads/2020/06/laser security.png](https://www.androiderode.com/wp-content/uploads/2020/06/laser%20security.png)



