Making a Laser Security System with Arduino

A "Laser Security System" might feel like something out of an action movie. But with the advancements in Arduino and its many components, it allows us to convert it from reel life to real life. These types of systems are usually placed to protect high-value articles and detect unwanted guests or activity. So let's get started.

The system will work like so:
Whenever the laser path is disrupted, a sensor will detect the obstruction by noticing the change in the light intensity, and send this information to a microcontroller which will then send a signal to a buzzer which will make a sound and alert the user. Once the alarm is sounded it can be turned off with a remote.

Hardware Required:

- **Arduino UNO**
  This microcontroller board will be the main brain of the system. Gathering information from LDR Sensor and IR Receiver and outputting to the Buzzer module to make a sound.

- **LDR Sensor**
  A Light Dependent Sensor is used to measure the intensity of light hitting it. The version used in this project has an LDR sensor on a circuit board that can be powered by Arduino's 5v output and can output Digital signals as well as analog signals. For this project analog output will be required.

- **IR Transmitter and Receiver**
  Infrared or IR technology uses infrared light which is invisible to the human eye. The Transmitter (a remote in this case) will send a signal to the receiver which will then be decoded by Arduino in HEX values to turn off or to test the alarm.

- **Buzzer**
  Once the intrusion will be detected, the system will be able to send out an alert signal in the form of sound. The buzzer module here is also placed on a board with which we will be able to sound the alarm at different frequencies.

- **Laser Module**
  A simple 5v laser module will be directly pointed at the LDR sensor. So, if anything or anyone disrupts the path of the laser, the system will trigger the alert.

Let's start with the first step which is to connect all of the components. Follow the circuit diagram below for reference.
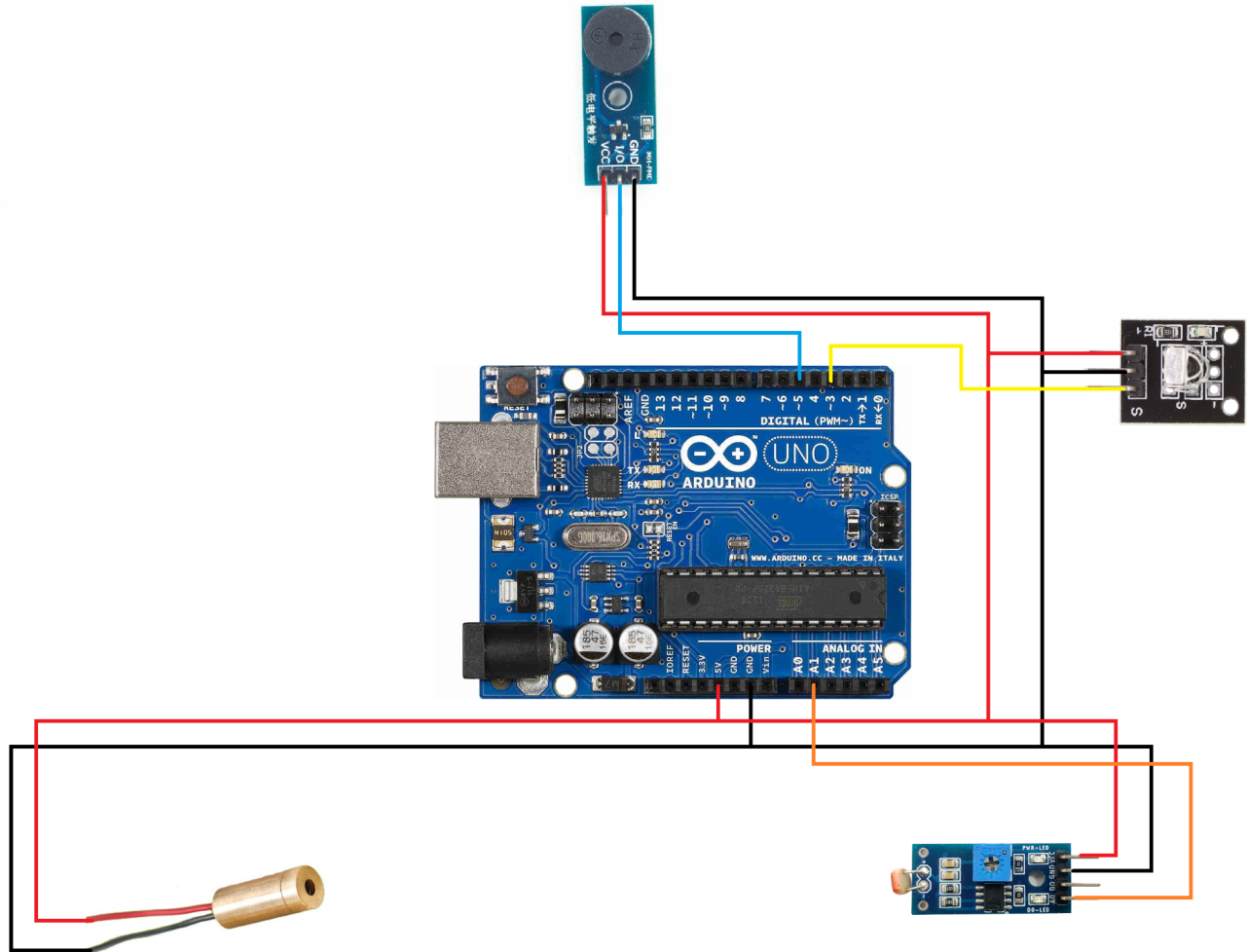
Make sure to see the markings on the sensor pins as sometimes sensors have pins in different orientations.

Now connect the Arduino board to the computer with the USB cable, after that launch the Arduino IDE.
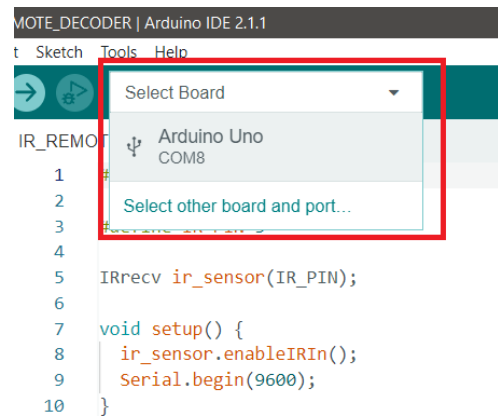
Now install the library named "IRremote" by shirriff, z3t0 and ArminJo. To do that follow these steps:
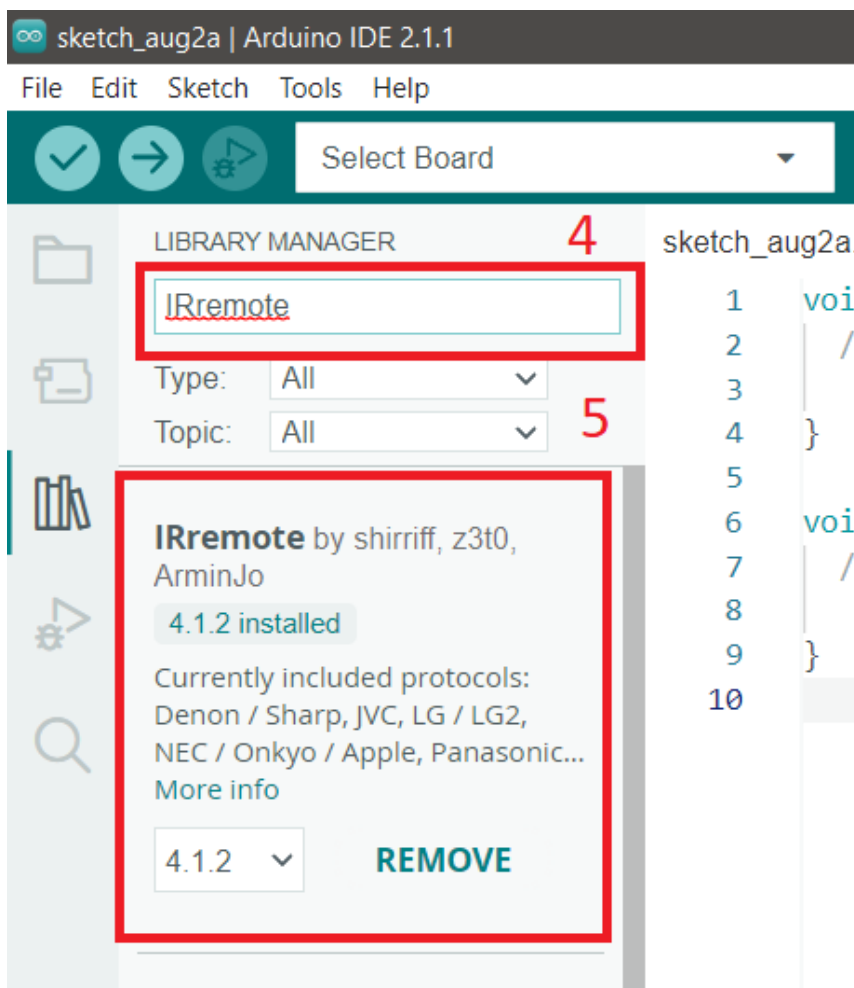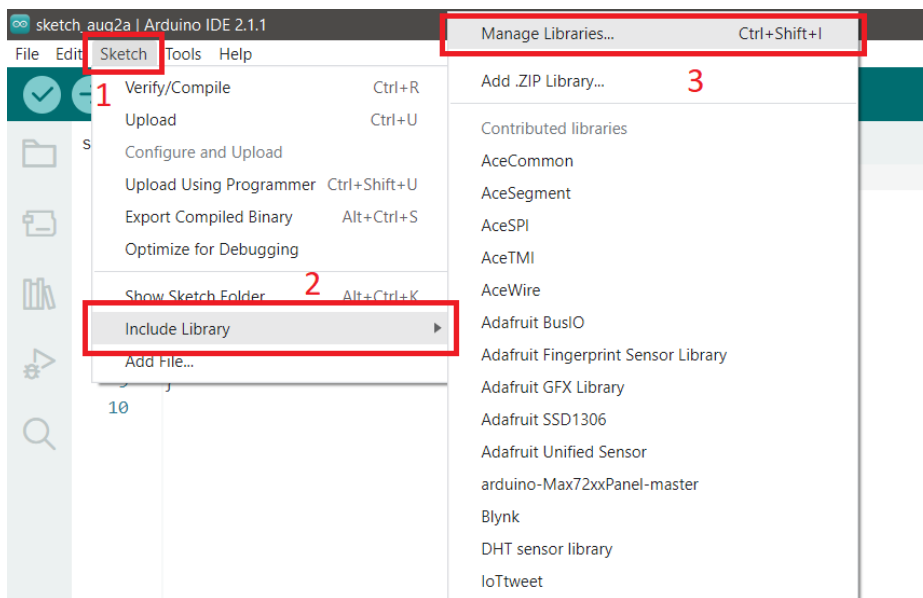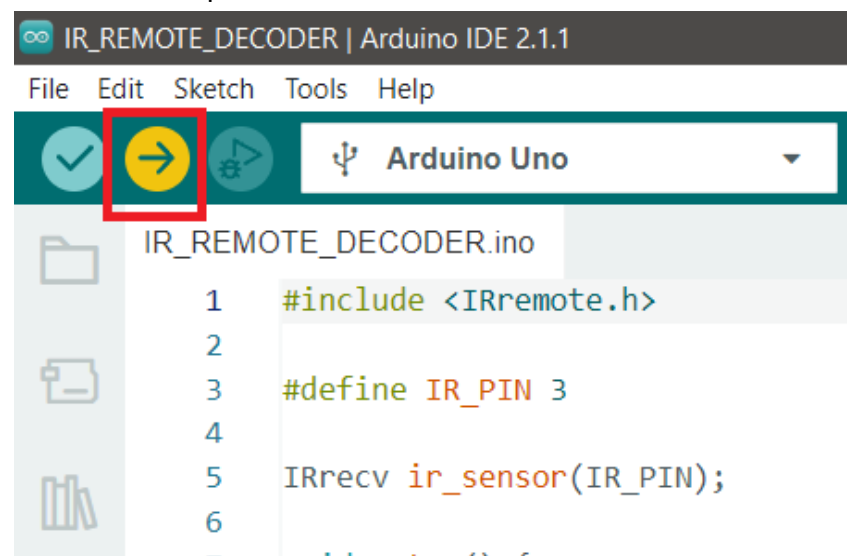
The library is already installed in this IDE so it has the "Remove" option instead of "Install".

After installation of the library, copy the code "IR_REMOTE_DECODER" to the IDE.
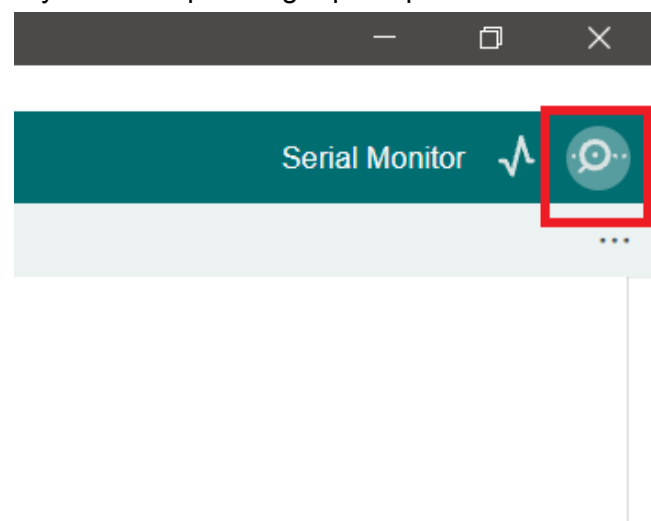
Select the board and the COM port in which the Arduino is connected.
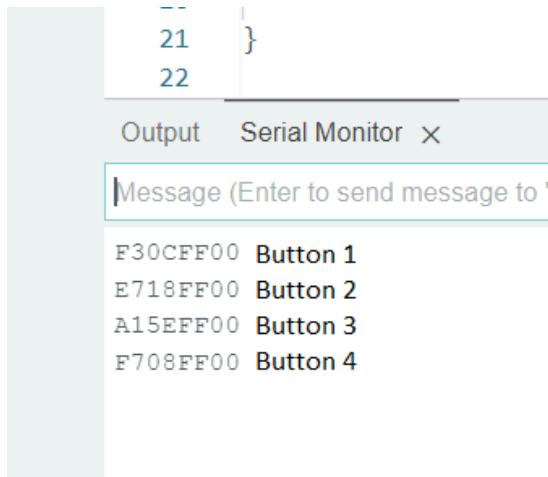

Then click on upload.

This will first compile the code. Once the code is compiled it'll start uploading it to the board. When it says "Done Uploading" open up the serial monitor.

Now start pushing buttons on the IR Transmitter and you'll see that when a button is pressed a unique HEX value eg. 1E5A92BC is printed on the serial monitor.

```
21    }
22
```

Output   Serial Monitor ✕

Message (Enter to send message to '

```
F30CFF00  Button 1
E718FF00  Button 2
A15EFF00  Button 3
F708FF00  Button 4
```

Each value is tied to a unique button on the Transmitter. Note down these values for future reference. We need a total of four button values, one for testing the alarm, one for turning it off, and two for disabling and re-enabling the whole system.

Next, upload the second code to measure the light intensity. Again open up the serial Monitor, now values in the range of 0 to 1023 will be printed on it. Notice how the value changes when the laser path is obstructed. Without obstruction, it should only move in the range of 50-40 units.
From here take two values upper and lower to allow a slight change in light intensity. Here try to simulate night and day cycles to get variation in the light intensity. Note down the lowest and the highest values.

Output   Serial Monitor ✕

Message (Enter to send message to 'Arduino U

```
118
127
124
127
116
122
118
```
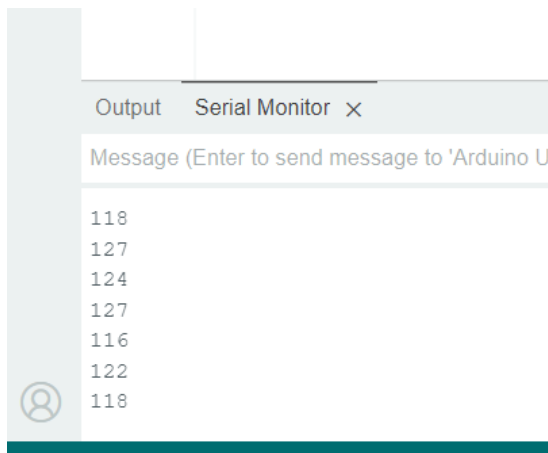
With this observation we can take upper limit as 130 and lower limit as 100

Now we have a total of six values.
Intensity upper
Intensity lower
HEX value of buttons 1, 2, 3 and 4
In this project "Button 1" is for testing the alarm, "Button 2" is to turn off the alarm, "Button 3" is to disable the system, and "Button 4" is to re-enable the system.

Put these values in the code like so

```
#define upper_intensity 130
#define lower_intensity 100

#define alarm_off 0xF30CFF00
#define alarm_test 0xE718FF00
#define system_enable 0xA15EFF00
#define system_disable 0xF708FF00
```

Now we can upload the final code "LASER_SECURITY_SYSTEM" with the modified values to the Arduino board and install the system in such a way that one must cross the path of the laser to get to the valuable item.

Conclusion

In this way we have made a Home Laser Security system which can help you get alerts when there is an intruder.