SMART ROOM

S3-EE1953-Engineering design
Department of Electrical Engineering
University of Moratuwa

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DESCRIPTION OF THE PROJECT

- In our project we have implemented a smart room using automatic lighting system with IOT based remote controlling.

- When person enters the room, Bulb will turn on with the intensity of the light inside the room, And turn off when the person leaves the room or nobody inside the room.

- We can also switch on the appliances inside the room through mobile or using any smart devices from anywhere.

	Dark time	Day time
Person in room	Bulb on	Bulb off
No one in room	Bulb off	Bulb off

Reason for our project:

❖ Power saving by operating the bulbs and other appliances in efficient manner
❖ Can control from anywhere in the world
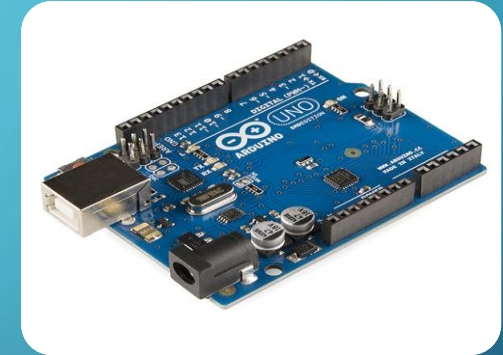❖ Convenient use

Sensors and other components

✓ Ultrasonic distance sensor
Specification: HC-SR04

✓ LDR
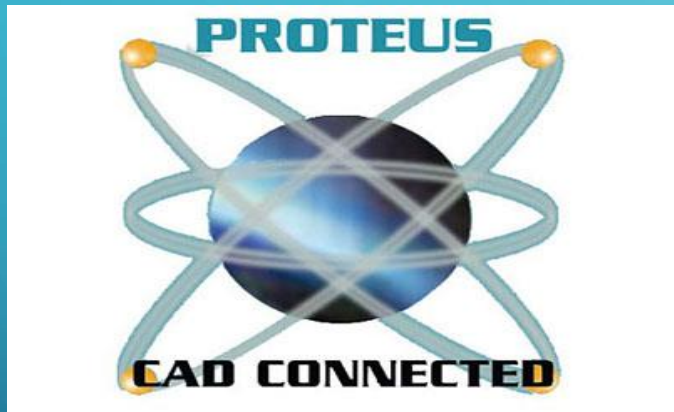

✓ Arduino Uno board

✓ Wi-Fi module ESP8266(nodemcu)
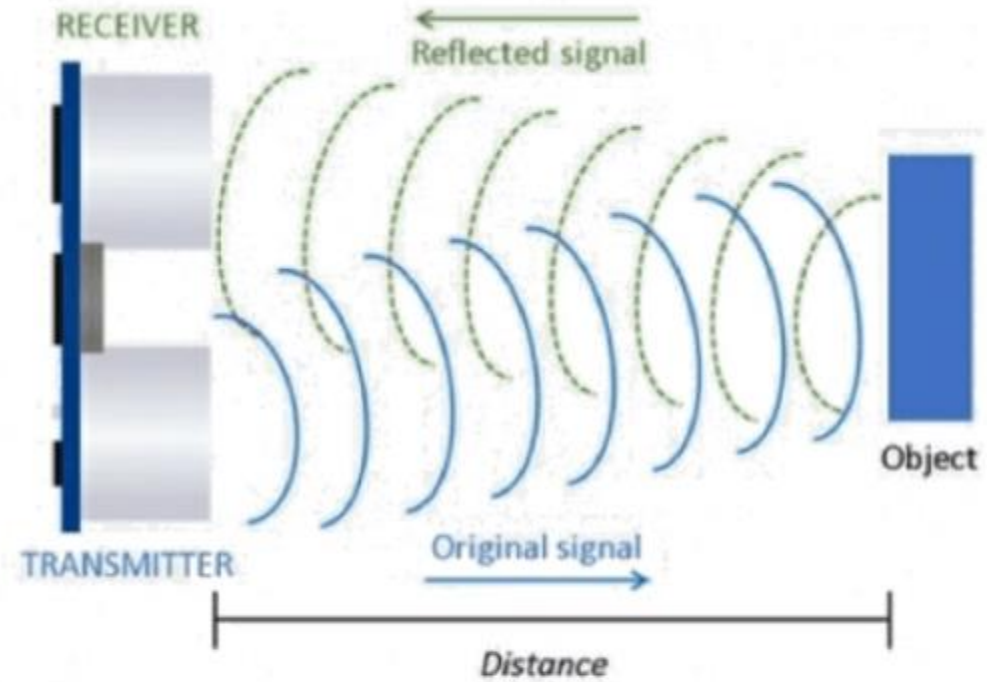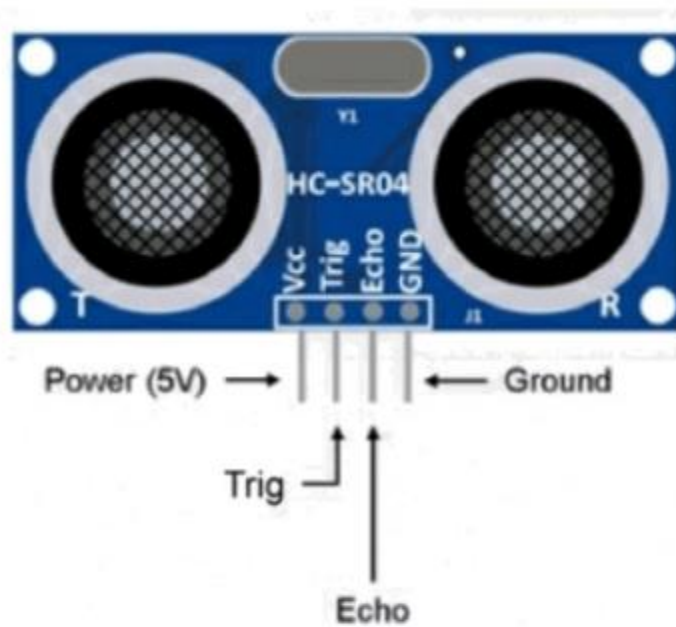

✓ Relay

Software used.......

- proteus
- Arduino
- Arduino iot cloud

Ultrasonic sensor working principle

LDR SENSOR

It has a resistance that changes with light intensity that falls upon it.

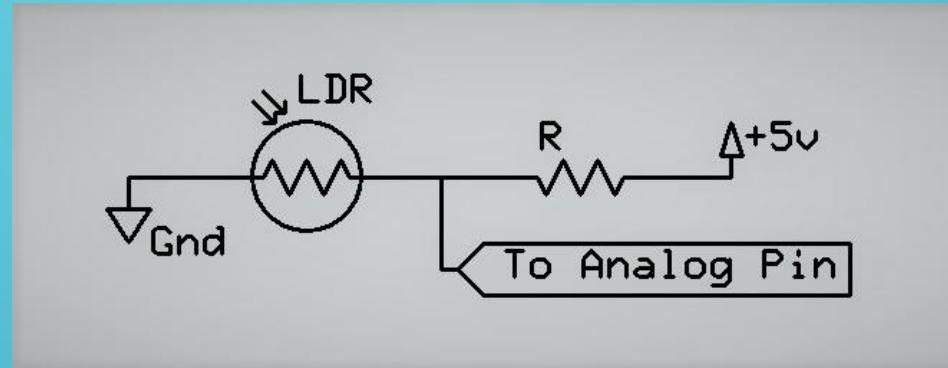$$R_{ldr} = \frac{500}{lux}$$

$$V_{out} = \frac{5*R_{ldr}}{R+R_{ldr}}$$

We used R as 10KΩ in practical

$$R_{ldr} = \frac{10*V_{out}}{5-V_{out}}$$

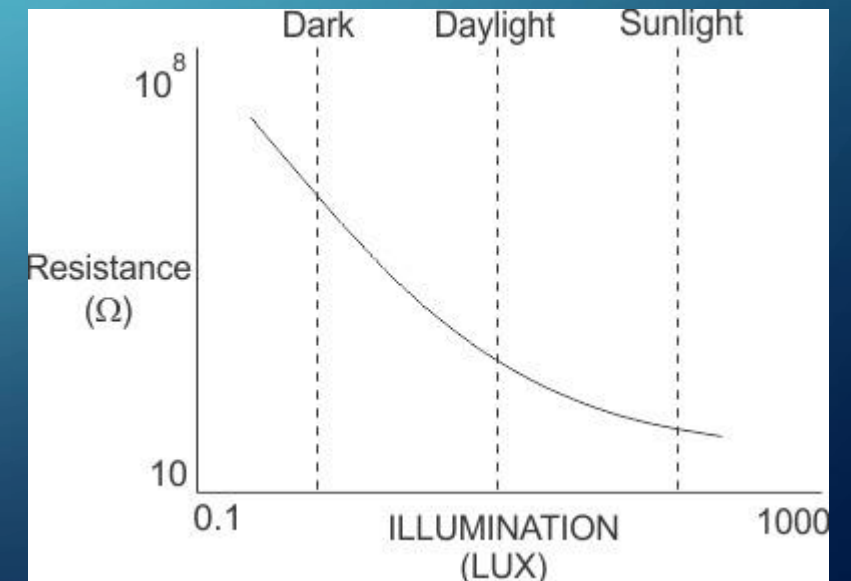0 < ADC value <1024

$$V_{out} = \text{ADC value} * \frac{5}{1024} = \text{ADC value} *0.004828125$$

$$\text{lux} = \frac{500}{R_{ldr}} = \frac{500(5-V_{out})}{10V_{out}} = \frac{50(5-V_{out})}{\text{ADC value} * 0.004828125}$$

Resistance vs lux

Arduino codes

File Edit Sketch Tools Help

Group13final

```
#define echopin_s1 A2 // echo pin
#define triggerpin_s1 A3 // Trigger pin

#define echopin_s2 A0 // echo pin
#define triggerpin_s2 A1 // Trigger pin
int Light_A = 12;
int Light_B = 13;
int Light_C =11;
int Bulb1 = 0;
int Bulb2 = 0;
int Bulb3 = 0;
long dis_1 = 0;
long dis_2 = 0;
int flag1 = 0;
int flag2 = 0;
int person = 0;
int sensorPin = A4; // select the input pin for LDR
int sensorValue = 0; // variable to store the value coming from the sensor

void ultra_read(int pin_t,int pin_e,long &ultra_distance){
long time;
pinMode(pin_t,OUTPUT);
pinMode(pin_e,INPUT);
digitalWrite(pin_t,LOW);
delayMicroseconds(2);
digitalWrite(pin_t,HIGH);
delayMicroseconds(10);
time=pulseIn (pin_e,HIGH);
ultra_distance =  time / 29 / 2;
}
```

```
//Lux
double Light (int RawADC0){
double Vout=RawADC0*0.0048828125;
//int lux=500/(10*((5-Vout)/Vout));//use this equation if the LDR is in the upper part of the divider
int lux=(2500/Vout-500)/10;
return lux;
}

void setup(){
Serial.begin(9600);// initialize serial communication at 4600 bits per second:
pinMode(sensorPin, INPUT);
pinMode(Light_A, OUTPUT);
pinMode(Light_B,OUTPUT);
pinMode(Light_C,OUTPUT);
}

void loop()
{
ultra_read(triggerpin_s1,echopin_s1,dis_1);delay(10);// dis_1 is distance of found object less than 50cm from the sensor 1
ultra_read(triggerpin_s2,echopin_s2,dis_2);delay(10);//dis_2 is distance of found object less than 50cm from the sensor 2
sensorValue = int(Light(analogRead(A4))); // read the value from the sensor
delay(1000);
Serial.print("distance 1 is :");
Serial.println(dis_1);
Serial.print("distance 2 is :");
Serial.println(dis_2);
if(dis_1<90 && flag1==0){flag1=1;
if(flag2==0){person = person+1;}
}
```

```
if(dis_2<90 && flag2==0){flag2=1;
if(flag1==0){person = person-1;}
}

if(dis_1>90 && dis_2>90 && flag1==1 && flag2==1){
flag1=0, flag2=0;
delay(1000);
}


Serial.print("Person Inside Room: ");
Serial.println(person);
delay(1000);
Serial.print("Ldr value:");
Serial.println(sensorValue); //prints the values coming from the sensor on the screen
/*Serial.println(flag1);
Serial.println(flag2);*/
if (Serial.available()){
int state=Serial.read();
Serial.println(state);

if (state == 48){
  if (Bulb1 == 1){
  Bulb1=0;
  digitalWrite(Light_A,LOW);
  Serial.println("Light_A OFF");
  }
}
if (state == 49){
  if (Bulb1 == 0){
```

```
if (state == 48){
  if (Bulb1 == 1){
  Bulb1=0;
  digitalWrite(Light_A,LOW);
  Serial.println("Light_A OFF");
  }
}
if (state == 49){
  if (Bulb1 == 0){
  Bulb1=1;
  digitalWrite(Light_A,HIGH);
  Serial.println("Light_A ON");
  }
}
if (state == 50){
  if (Bulb2 == 1){
  Bulb2=0;
  digitalWrite(Light_B,LOW);
  Serial.println("Light_B OFF");
  }
}
if (state == 51){
  if (Bulb2 ==0 ){
  Bulb2=1;
  digitalWrite(Light_B,HIGH);
  Serial.println("Light_B ON");
  }
}
if (state == 52){
  if (Bulb3 == 1){
```

```arduino
if (state == 52){
  if (Bulb3 == 1){
  Bulb3=0;
  digitalWrite(Light_C,LOW);
  Serial.println("Light_C OFF");
  }
}
if (state == 53){
  if (Bulb3 == 0){
  Bulb3=1;
  digitalWrite(Light_C,HIGH);
  Serial.println("Light_C ON");
  }
}
}
if (Bulb1 ==0)
{
if(person>0 && sensorValue < 150)
{
  digitalWrite(Light_A,HIGH);
  Serial.println("Need light-Switch on Light A");
}
else
{
  digitalWrite(Light_A,LOW);
  Serial.println("No need light");
}
}
}
```
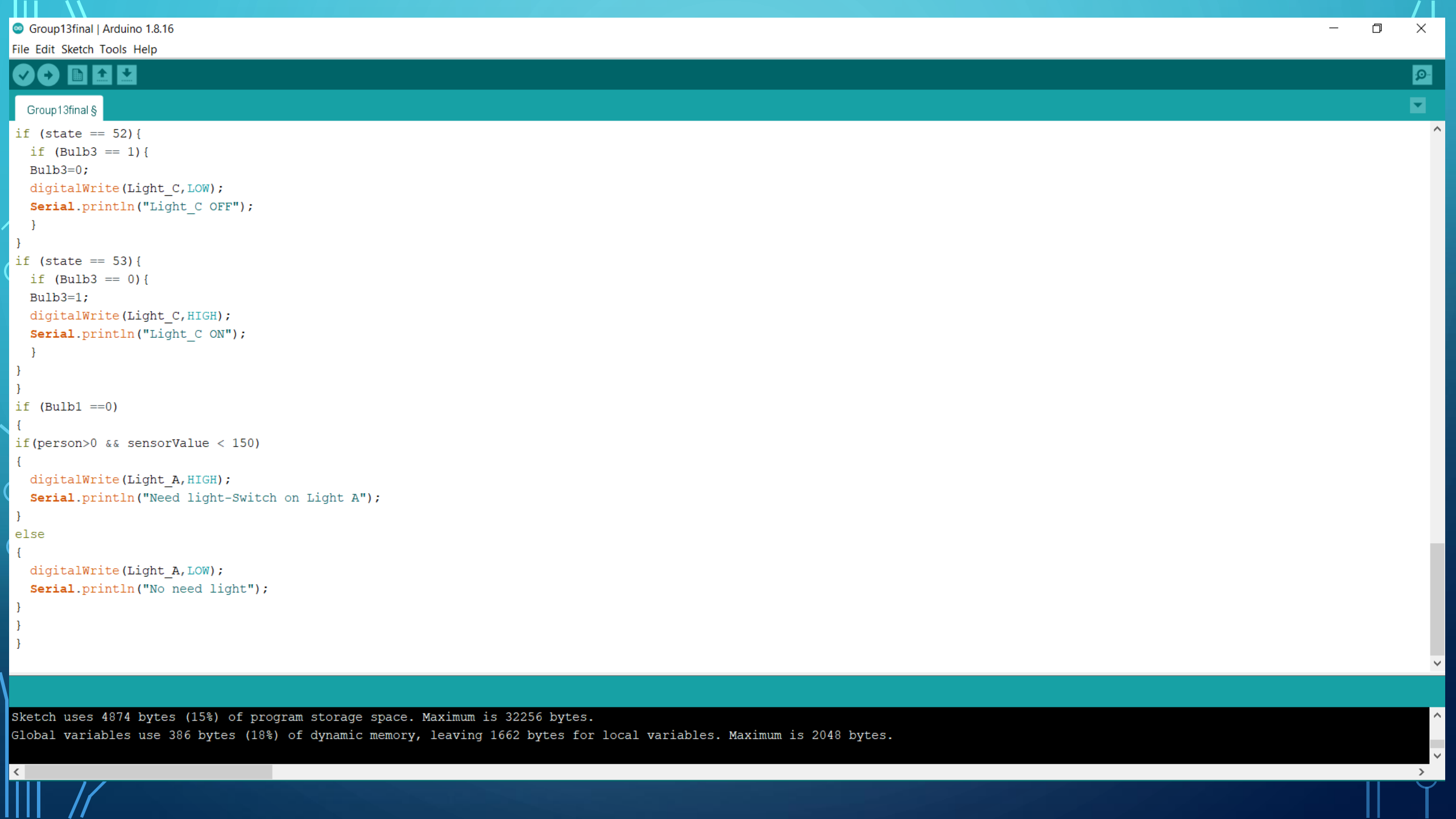
IOT Cloud Interface

create.arduino.cc/iot/things/7104fa50-e36f-4bf3-af1d-9fe1cbad1980/setup

∞ IOT CLOUD

Things   Dashboards   Devices   Integrations   Templates

UPGRADE PLAN

Setup	Sketch

Variables   ADD

Group13

ID: 9ba7c036-eb0b-49ea-a1da-...

Type: NodeMCU 1.0 (ESP-12E Module)

Status: ● Online

Name ↓	Last Value	Last Update
Light_A `bool light_A;`	false	20 Feb 2022 14:41:08
Light_B `bool light_B;`	false	20 Feb 2022 14:04:37
Light_C `bool light_C;`	false	20 Feb 2022 14:04:37

Change   Detach

Network

Wi-Fi Name: svenug...

Password: •••••••••

Secret Key: •••••••••...

Set webhook   Timezone: Asia/Kolkata ▼

Feedback

> EDITOR

NEW SKETCH

Sketchbook

Examples

Libraries

Monitor

Reference

Help

Preferences

Features usage

CLOUD

SEARCH SKETCHBOOK

ORDERING BY LAST MODIFIED

Untitled_feb12a

Untitled_2_nov15a

Untitled_nov15a

Untitled_2_nov14a_copy

Untitled_sep28a

Untitled_feb12a

UPGRADE PLAN

Board as NodeMCU 1.0 (ESP-12E Module)   COM7   ...   GO TO IOT CLOUD

Untitled_feb12a.ino   ReadMe.adoc   thingProperties.h   Secret

```
1   // SoftwareSerial for esp8266 - Version: Latest
2   #include <SoftwareSerial.h>
3
4   /*
5     Sketch generated by the Arduino IoT Cloud Thing "Untitled"
6     https://create.arduino.cc/cloud/things/7104fa50-e36f-4bf3-af1d-9fe1cbad1980
7
8     Arduino IoT Cloud Variables description
9
10    The following variables are automatically generated and updated when changes are made to the Thing
11
12    bool light_A;
13    bool light_B;
14    bool light_C;
15
16    Variables which are marked as READ/WRITE in the Cloud Thing will also have functions
17    which are called when their values are changed from the Dashboard.
18    These functions are generated with the Thing and added at the end of this sketch.
19   */
20   SoftwareSerial me(3,1);
21   #include "thingProperties.h"
22   void setup() {
23
24     // Initialize serial and wait for port to open:
```

Budget

COMPONENTS	COST
2 Ultrasonic distance sensor	Rs 360.00×2 =720.00
1 LDR	Rs100.00
1 Arduino Uno	Rs 2000.00
Nodemcu	Rs 900.00
1 Relay	Rs 800.00
3 Bulb	Rs 170.00× 3= 510.00
Total	RS 5030.00

Group members

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