



# REPORTS ON MECHATRONICS SYSTEM INTEGRATION

## REPORT 9 COLOUR DETECTION

SECTION 1, SEMESTER 2, 23/24

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## Introduction

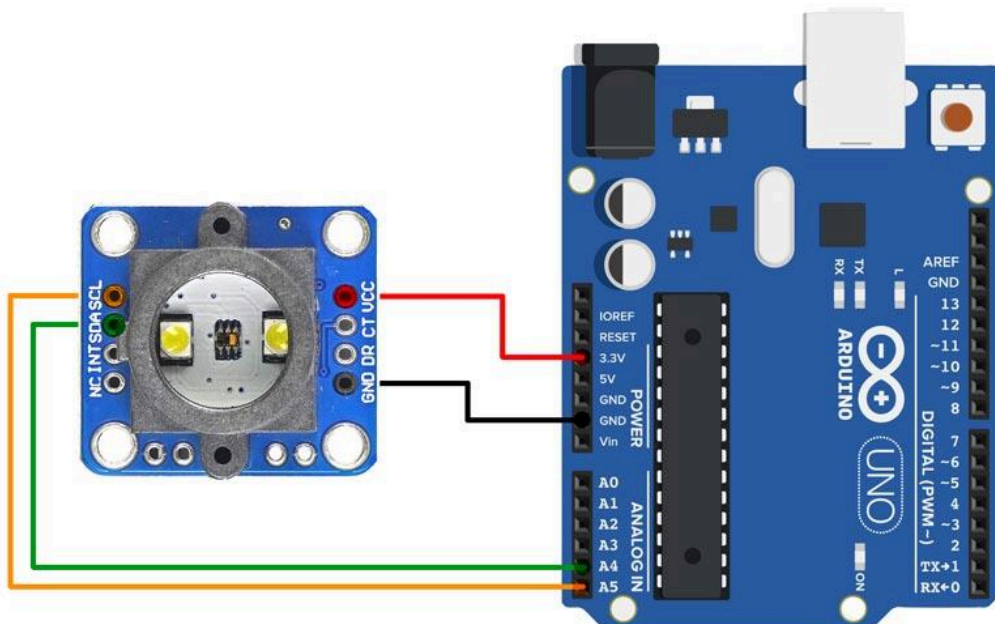
The objective of this experiment is to detect colour of an object by using colour detection component which is in our experiment, we are using GY-33 TCS34725. This device are able to detect the colour of an object that are being placed close enough the the sensor and display it in a range of percentage of red, blue and green.

The object of this experiment is to obtain a valuable source of information for a wide range of project and devices using the MPU6050 device that require motion and orientation data which has ability to combine accelerometer and gyroscope in order to produce those values..

## Materials and Equipment

Arduino Board	X 1
GY-33 TCS34725	X 1
Jumper Wires	X 4
LED(optional)	X 1
Breadboard	X 1
USB cable	X 1

## Experimental setup

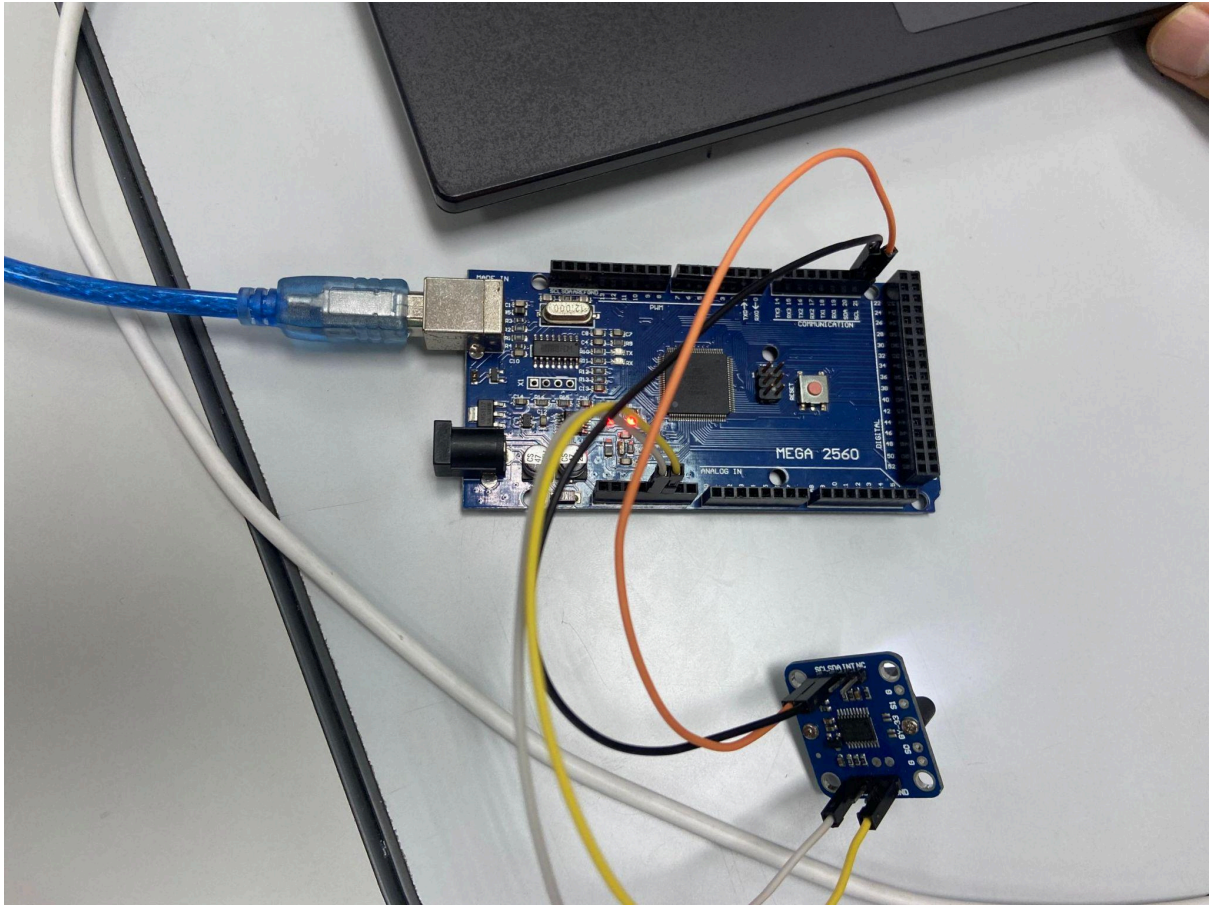


## Methodology/Procedures

1. Connect the GY-33 TCS34725 colour sensor to the Arduino board using the appropriate pins. The GY-33 TCS34725 typically uses I2C communication, so connect the SDA and SCL pins of the GY-33 TCS34725 to the corresponding pins on the Arduino (usually A4 and A5 for most Arduino boards). Since we are using Arduino Mega 2560, we connect it to communication port SCA and SCL.
2. Connect the power supply and ground of the GY-33 TCS34725 to the Arduino's 5V and GND pins.
3. Ensure that the Arduino board is connected to PC via USB.

## Result

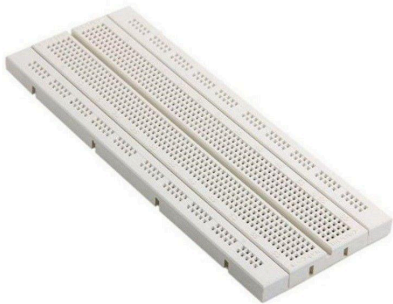
The result of this experiment was acquired by constructing a basic circuit using a GY-33 TCS34725 sensor to detect the colour of an object where any object that is placed near the sensor will be detected. Once the sensor are able to detect the colour of an object, the sensor show the value recorded through the serial communication in the PC.



# Discussion

## Hardware Discussion

### 1) Breadboard



Breadboard is used to connect components with arduino through wire connection.

### 2) Arduino Mega 2560



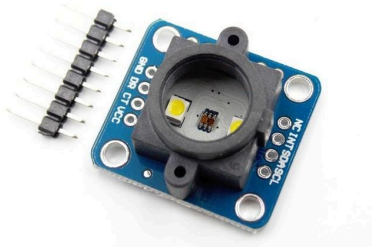
Microcontroller used for our experiment is Arduino Mega 2560.

### 3) Male to male jumper wires



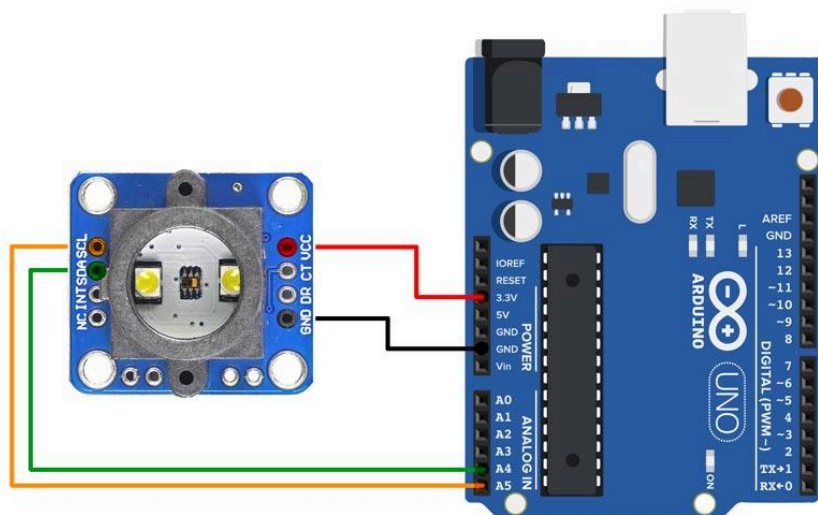
Male to male jumper wires are used to connect all of the components on the breadboard with Arduino Mega.

#### 4) GY-33 TCS34725 colour sensor



To detect the colour of an object using the sensor.

### Electrical Discussion



Male to male jumper is used to connect the GY-33 TCS34725 colour sensor to Arduino Mega 2560 using a breadboard. VCC of the sensor is connected to 5V port on the arduino. The ground pin of the sensor is connected to the ground port of arduino. For SCL and SDA pin of the sensor, instead of connecting it to the analog port, we changed it to the communication port of the arduino since the analog port are unable to read the input produced from the sensor. So, SCL pin of the sensor is connected to SCL port of the communication port while SDA pin is connected to SDA port of the communication port on

the Arduino Mega 2560. DR, CT, INT and NC pin of the sensor is ignored and are not connected to any port since this experiment is not using them.

## Software Discussion

Attached below is the coding of the project. The software part of this mechatronic system project involves programming an Arduino Mega 2560 to interface with the GY-33 TCS34725 colour sensor.

### Arduino code

```
#include <i2cmaster.h>

#define uint16_t unsigned int
typedef struct
{
    uint16_t Red;
    uint16_t Green;
    uint16_t Blue;
    uint16_t Clear;
} RGB;
unsigned char Re_buf;
unsigned char sign=0;
RGB rgb;
uint16_t CT=0,Lux=0;
byte color=0,rgb_data[3]={0};

void setup() {
    Serial.begin(115200);
    i2c_init();
    delay(1);
}

void loop() {
    unsigned char data[9]={0};
```



```

if(!sign)
{
  iic_read(0x00,data,8);
  rgb.Red=(data[0]<<8)|data[1];
  rgb.Green=(data[2]<<8)|data[3];
  rgb.Blue=(data[4]<<8)|data[5];
  rgb.Clear=(data[6]<<8)|data[7];
  Serial.print("Red: ");
  Serial.print(rgb.Red);
  Serial.print(", Green: ");
  Serial.print( rgb.Green);
  Serial.print(",Blue");
  Serial.print( rgb.Blue);
  Serial.print(",Clear");
  Serial.println(rgb.Clear);
  iic_read(0x08,data,4);
  Lux=(data[0]<<8)|data[1];
  CT=(data[2]<<8)|data[3];

  Serial.print("CT:");
  Serial.print(CT);
  Serial.print(",Lux:");
  Serial.println( Lux);
  iic_read(0x0c,data,3);
  rgb_data[0]=data[0];
  rgb_data[1]=data[1];
  rgb_data[2]=data[2];
  Serial.print("r:");
  Serial.print( rgb_data[0]);
  Serial.print(",g:");
  Serial.print( rgb_data[1]);
  Serial.print(",b:");
  Serial.println( rgb_data[2]);
  iic_read(0x0f,data,1);
  color=data[0];
  Serial.print(",color:");
  Serial.println( color,HEX);
}

```

```

}
if(sign==1)
{
    iic_read(0x10,&data[8],1);
    i2c_start_wait(0xb4);
    i2c_write(0x10);
    i2c_write(0x31);
    // i2c_write((data[8]|0x01));
    i2c_stop();
    sign=3;
}
delay(200);
}

void iic_read(unsigned char add,unsigned char *data,unsigned char len)
{
    i2c_start_wait(0xb4);
    i2c_write(add);
    i2c_start_wait(0xb5);
    while(len-1)
    {
        *data++=i2c_readAck();
        len--;
    }
    *data=i2c_readNak();
    i2c_stop();
}

void serialEvent() {
    while (Serial.available()) {
        Re_buf=(unsigned char)Serial.read();
        if (Re_buf=='a')
            sign=0;
        if (Re_buf=='b')
            sign=1;
        Re_buf=0;
    }
}

```

## Conclusion

In conclusion, the GY-33 TCS34725 colour sensor is a very useful and commonly used electronic component used to detect the colour of the object that is placed near the sensor. With the right arduino coding and connection, this electronic component is able to detect and measure the colour of any object with proper lighting. Once an object is placed near the sensor, the GY-33 TCS34725 sensor will automatically detect and display the value percentage of range of colours(Red, Green and Blue) that object has through the serial communication of the software.