🏆 A5.1 Learning activity

Sensor system and actuation of the color of an object, and visual interface

Instructions

- Perform a color identification system using a TCS34725 RGB sensor, a nodeMCU ESP32, an SG90 Servomotor actuator, any communication protocol and a visual interface that it can be developed by the team or supported by others such as Node-red for example.
- Any activity or challenge must be carried out using the **MarkDown style with .md** extension and the VSCode development environment, and must be prepared as a **single page** document, that is, if the document has images, links or Any external document must be accessed from tags and links, and must be named with the nomenclature **A5.1_TituloAactivity_NombreAlumno.pdf.**
- It is a requirement that the .md contains a tag of the link to the repository of your document in GITHUB, for example **Link to my GitHub** and at the end of the challenge it should be uploaded to github.
- From the **.md** file, export a **.pdf** file that must be uploaded to classroom within its corresponding section, serving as evidence of its delivery, since being the **official** platform, the rating of your activity.
- Considering that the .PDF file, which was obtained from the .MD file, both must be identical.
- Your repository in addition to having a **readme**.md file in your root directory, with information such as student data, work team, subject, career, advisor data, and even logo or images, it must have a section of contents or index, which really are links or **links to your .md documents** , _ avoid using text_ to indicate internal or external links.
- A structure is proposed as indicated below, however any other that supports you can be used to organize your repository.

```
- readme.md
  - blog
    - C5.1_TituloActividad.md
    - C5.2_TituloActividad.md
  - img
  - docs
    - A5.1_TituloActividad.md
    - A5.2_TituloActividad.md
```

Development

1. Use the following list of materials to prepare the activity

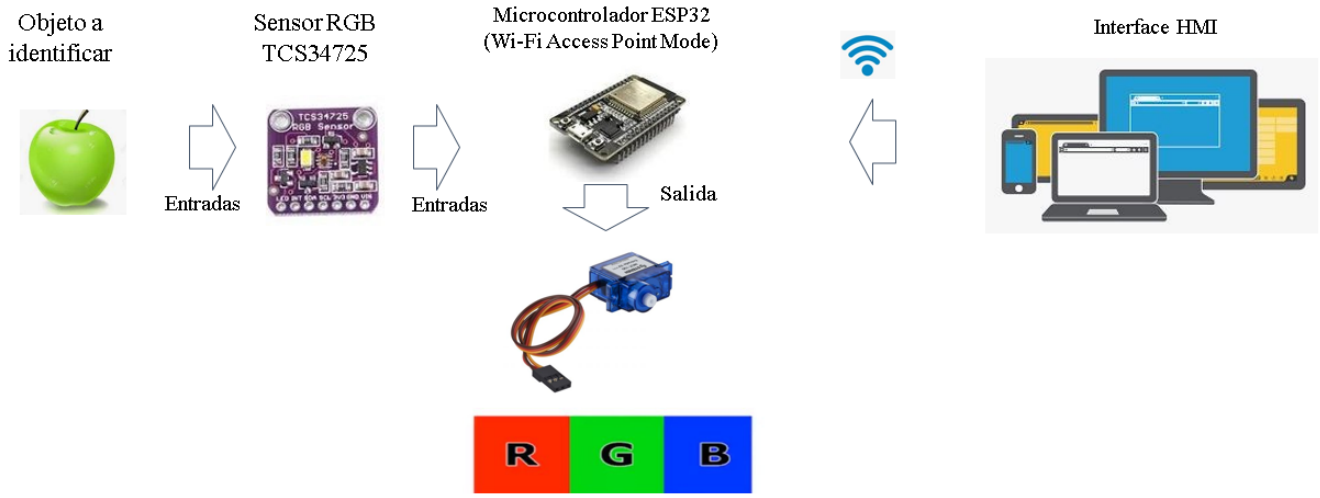
Quantity	Description
1	RGB Sensor TCS34725
1	5V voltage source

Quantity	Description
1	NodeMCU ESP32
1	BreadBoard
1	Jumpers M/M
1	SG90 servo motor

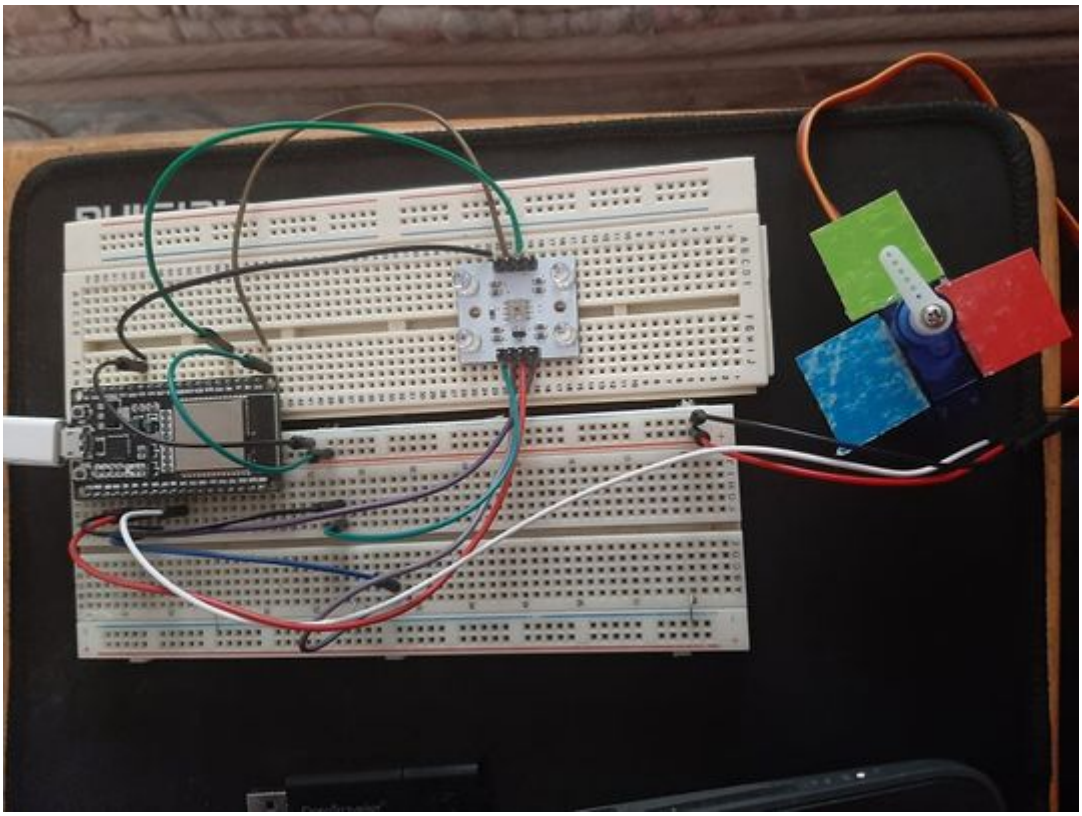
2. Based on the images shown in **Figure 1** , assemble an electronic circuit, in order to obtain a system capable of complying with the following instructions:

- The first phase of the activity will consist of, when placing an object in front of the RGB sensor, it should Identify what color it is (it is recommended to use Red, Green, and Blue objects to greater precision), which should show in a visual interface which color was detected.
- The second phase will consist of adding an actuator that and a color identifier leaning on of a color band as shown in image 1; knowing the color of the object the The actuator should point to the color being detected.

Figure 1 ESP32 Color Sensor and Servomotor Circuit



3. Place the picture of the assembled circuit here



4. Place the program created within the Arduino environment in this place

```
#define S0 15 //Pin de resolucion de datos
#define S1 2 //Pin de resolucion de datos
#define S2 0 //Pin para el filtro de color
#define S3 4 //Pin para el filtro de color
#define Color 34
#define ServoM 5
#include <WiFi.h>
//Servidor web en puerto 80
WiFiServer server(80);

int freq = 50, ServoChannel = 0, resolution = 8;
String C;


//Datos de la red wifi
const char* ssid = "INFINITUM537D";
const char* password = "1263743512";

//Variables globales
int contConexion = 0;
String header; //Variable para guardar el HTTP request

//Codigo HTML
String PAG = "<!DOCTYPE html><html>"
"<head><meta name=\"viewport\" content=\"width=device-width, initial-scale=1\">"
"<META HTTP-EQUIV='Refresh' CONTENT='1'>"
"<link rel=\"icon\" href=\"data:,\">"
"<style>html { font-family: Helvetica; display: inline-block; margin: 0px auto;
```

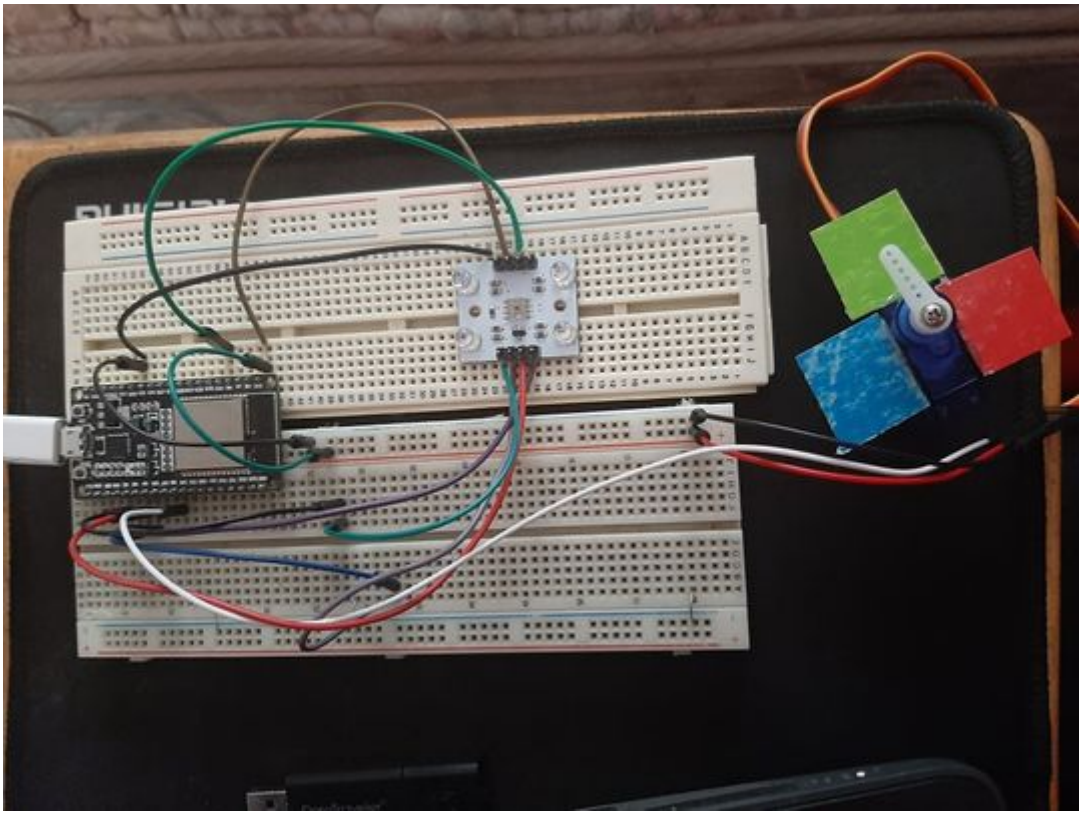
```
text-align: center;}"
".button { background-color: #009E06; border: none; color: white; padding: 16px
40px;"
"text-decoration: none; font-size: 30px; margin: 2px; cursor: pointer;}"
".button2 {background-color: #FF0000;}.button3 {background-color: #000CFF;}
</style></head>"
"<body><h1>Actividad 5.1 Sensor de colores </h1>";

String CR = "<p> Color: ROJO </p>"
"<p><a><button class=\"button button2\"> ROJO </button></a></p>";
String CV = "<p> Color: VERDE </p>"
"<p><a><button class=\"button\"> VERDE </button></a></p>";
String CA = "<p> Color: AZUL </p>"
"<p><a><button class=\"button button3\"> AZUL </button></a></p>";

String END = "</body></html>";


void setup() {
  // put your setup code here, to run once:
  pinMode(S0,OUTPUT);
  pinMode(S1,OUTPUT);
  pinMode(S2,OUTPUT);
  pinMode(S3,OUTPUT);

  pinMode(Color,INPUT);

  digitalWrite(S0,HIGH);
  digitalWrite(S1,HIGH);

  ledcSetup(ServoChannel, freq, resolution);
  ledcAttachPin(ServoM, ServoChannel);
  Serial.begin(115200);

   WiFi.begin(ssid,password);
  //Cuenta hasta 50 si no se puede conectar lo cancela
  while(WiFi.status() != WL_CONNECTED and contConexion < 50)
  {
    ++contConexion;
    delay(500);
    Serial.print(".");
  }
  if(contConexion<50)
  {
      Serial.println("");
      Serial.println("WiFi conectado");
      Serial.println(WiFi.localIP());
      server.begin(); // Iniciamos el servidor
  }
  else
  {
     Serial.println("");
     Serial.println("Error de conexion");
  }
```

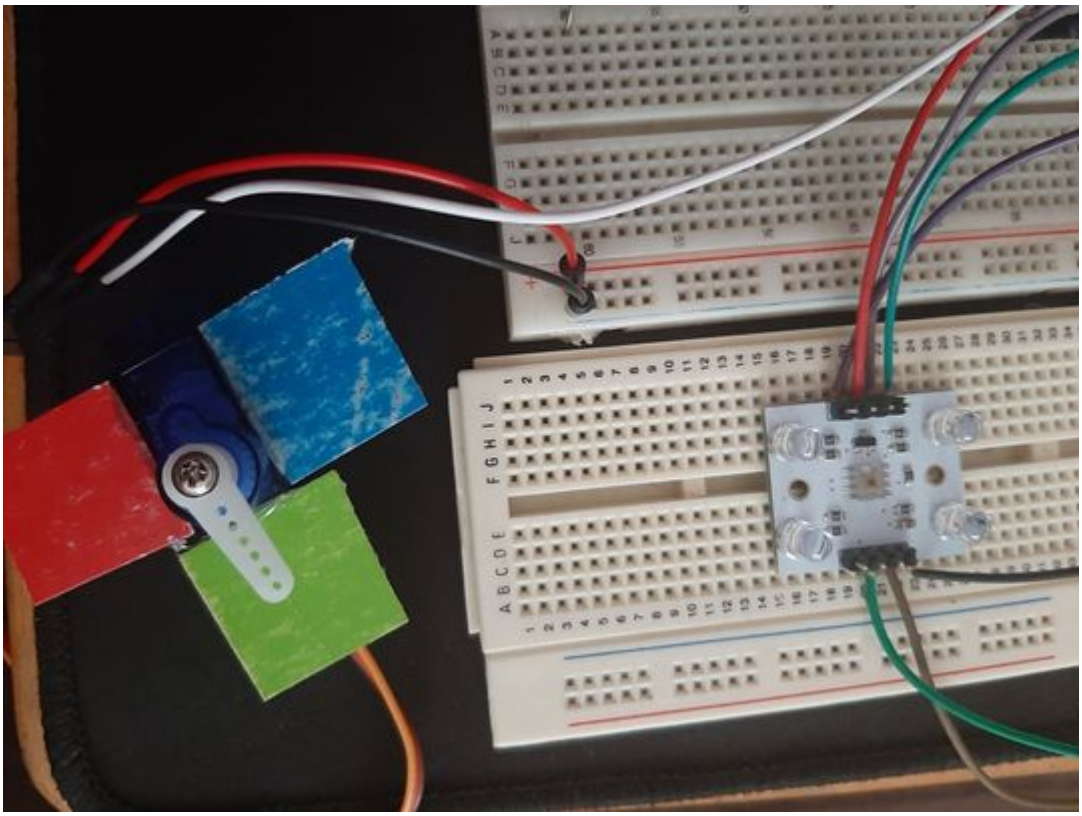
```
}

void loop() {
  // put your main code here, to run repeatedly:
   ColorSensor();
   Pagina();

}

void ColorSensor(){
  digitalWrite(S2,LOW);      // establece fotodiodos
  digitalWrite(S3,LOW);     // con filtro rojo
  int rojo = pulseIn(Color, LOW); // obtiene duracion de pulso de salida del
sensor
  delay(200);       // demora de 200 mseg

  digitalWrite(S2,HIGH);    // establece fotodiodos
  digitalWrite(S3,HIGH);    // con filtro verde
  int verde = pulseIn(Color, LOW);  // obtiene duracion de pulso de salida del
sensor
  delay(200);       // demora de 200 mseg

  digitalWrite(S2,LOW);     // establece fotodiodos
  digitalWrite(S3,HIGH);    // con filtro azul
  int azul = pulseIn(Color, LOW); // obtiene duracion de pulso de salida del
sensor
  delay(200);       // demora de 200 mseg

  Serial.print("R:");     // muestra texto
  Serial.print(rojo);     // muestra valor de variable rojo

  Serial.print("\t");     // espacio de tabulacion

  Serial.print("V:");     // muestra texto
  Serial.print(verde);      // muestra valor de variable verde

  Serial.print("\t");     // espacio de tabulacion

  Serial.print("A:");     // muestra texto
  Serial.println(azul);     // muestra valor de variable azul
            // y salto de linea

  if ( rojo < 25 && verde > 58 && azul > 7){   // si valores dentro del rango
    Serial.println("ROJO");  // muestra texto
    C = "ROJO";
    ledcWrite(ServoChannel,8);// 0 grados
  }
    else if ( verde < 50 && rojo > 30 && rojo < 70 && azul > 9){  // si valores
dentro del rango
    Serial.println("VERDE");        // muestra texto
    C = "VERDE";
    ledcWrite(ServoChannel,24);// 90 grados
  }
```

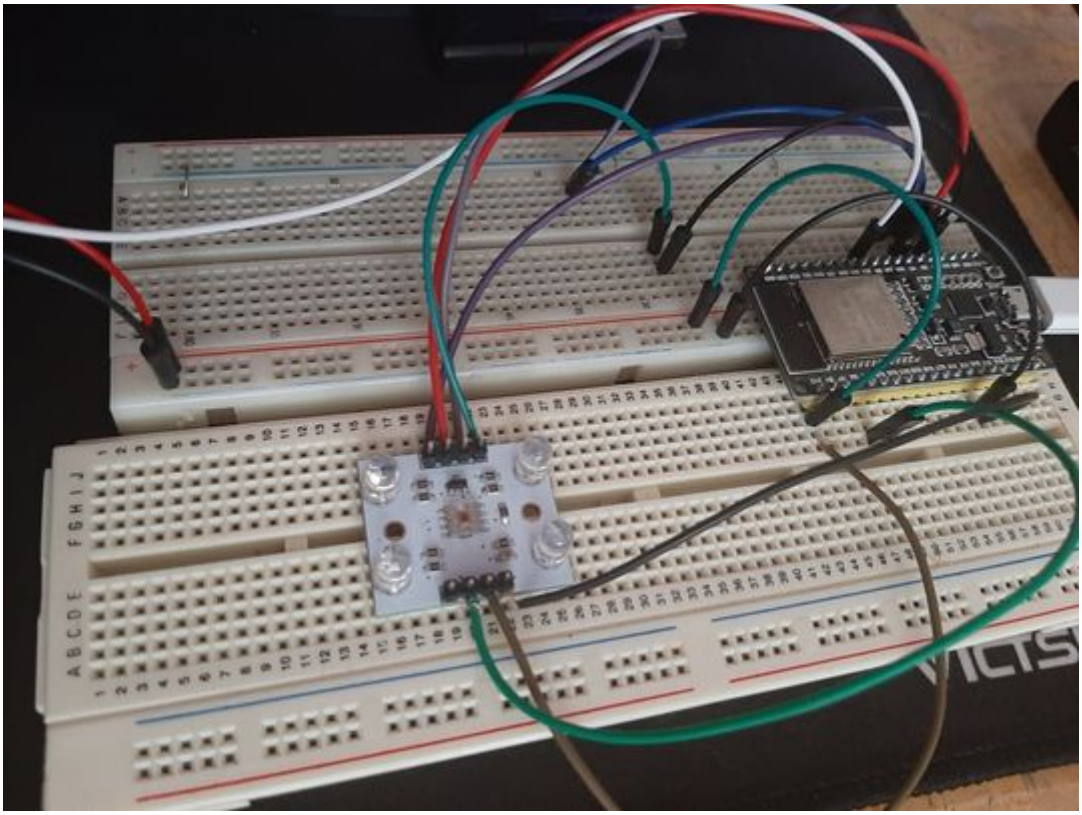
```
    else if ( azul < 25 && rojo > 70 && verde > 40){  // si valores dentrol del
rango
    Serial.println("AZUL");       // muestra texto
    C = "AZUL";
    ledcWrite(ServoChannel,34);//180 grados
  }
}

void Pagina()
{
  WiFiClient client = server.available();   // Escucha a los clientes entrantes

  if (client) {                             // Si se conecta un nuevo cliente
    Serial.println("New Client.");          //
    String currentLine = "";                //
    while (client.connected()) {            // loop mientras el cliente está
conectado
      if (client.available()) {             // si hay bytes para leer desde el
cliente
        char c = client.read();             // lee un byte
        Serial.write(c);                    // imprime ese byte en el monitor
serial
        header += c;
        if (c == '\n') {                    // si el byte es un caracter de salto
de linea
          // si la nueva linea está en blanco significa que es el fin del
          // HTTP request del cliente, entonces respondemos:
          if (currentLine.length() == 0) {
            client.println("HTTP/1.1 200 OK");
            client.println("Content-type:text/html");
            client.println("Connection: close");
            client.println();

            client.println(PAG);

            if(C == "ROJO")
            {
              client.println(CR);
            }
            else if(C == "VERDE")
            {
              client.println(CV);
            }
            else if(C == "AZUL")
            {
              client.println(CA);
            }

             client.println(END);
            // la respuesta HTTP temina con una linea en blanco
              client.println();
              break;
          } else { // si tenemos una nueva linea limpiamos currentLine
            currentLine = "";
```

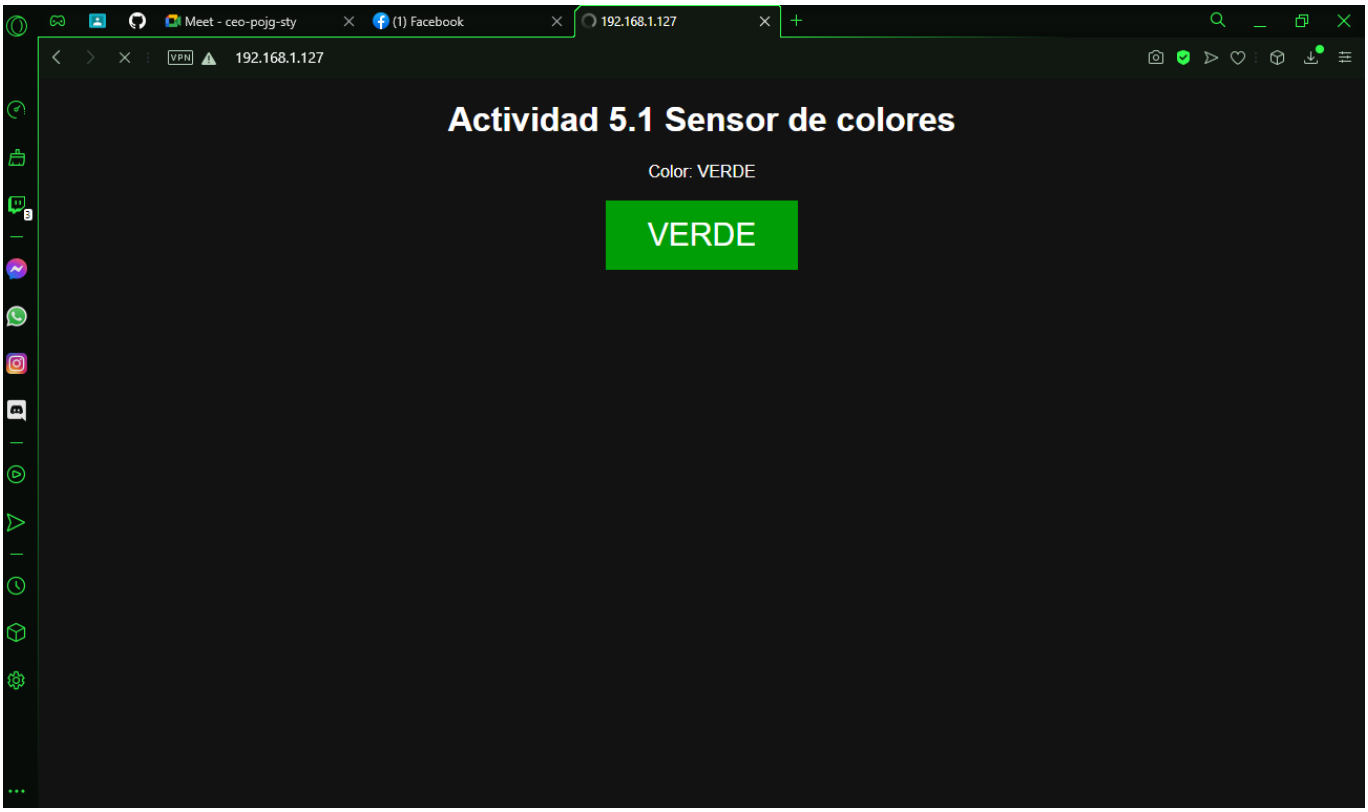
```
          }
        } else if (c != '\r') {  // si C es distinto al caracter de retorno de
carro
          currentLine += c;      // lo agrega al final de currentLine
        }
      }
    }
    // Limpiamos la variable header
    header = "";
    // Cerramos la conexión
    client.stop();
    Serial.println("Client disconnected.");
    Serial.println("");
  }

}
```

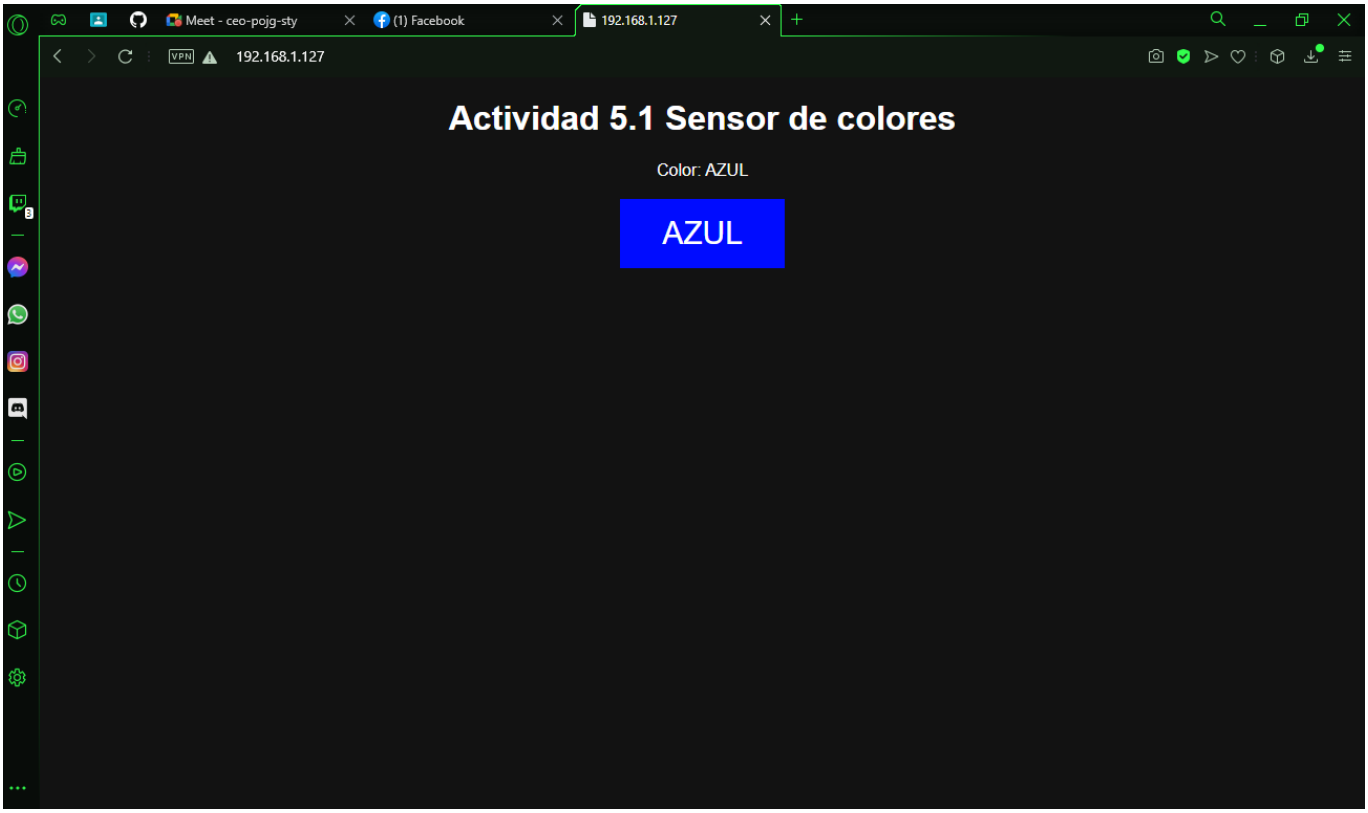
5. Place here evidence that you consider important during the development of the activity.

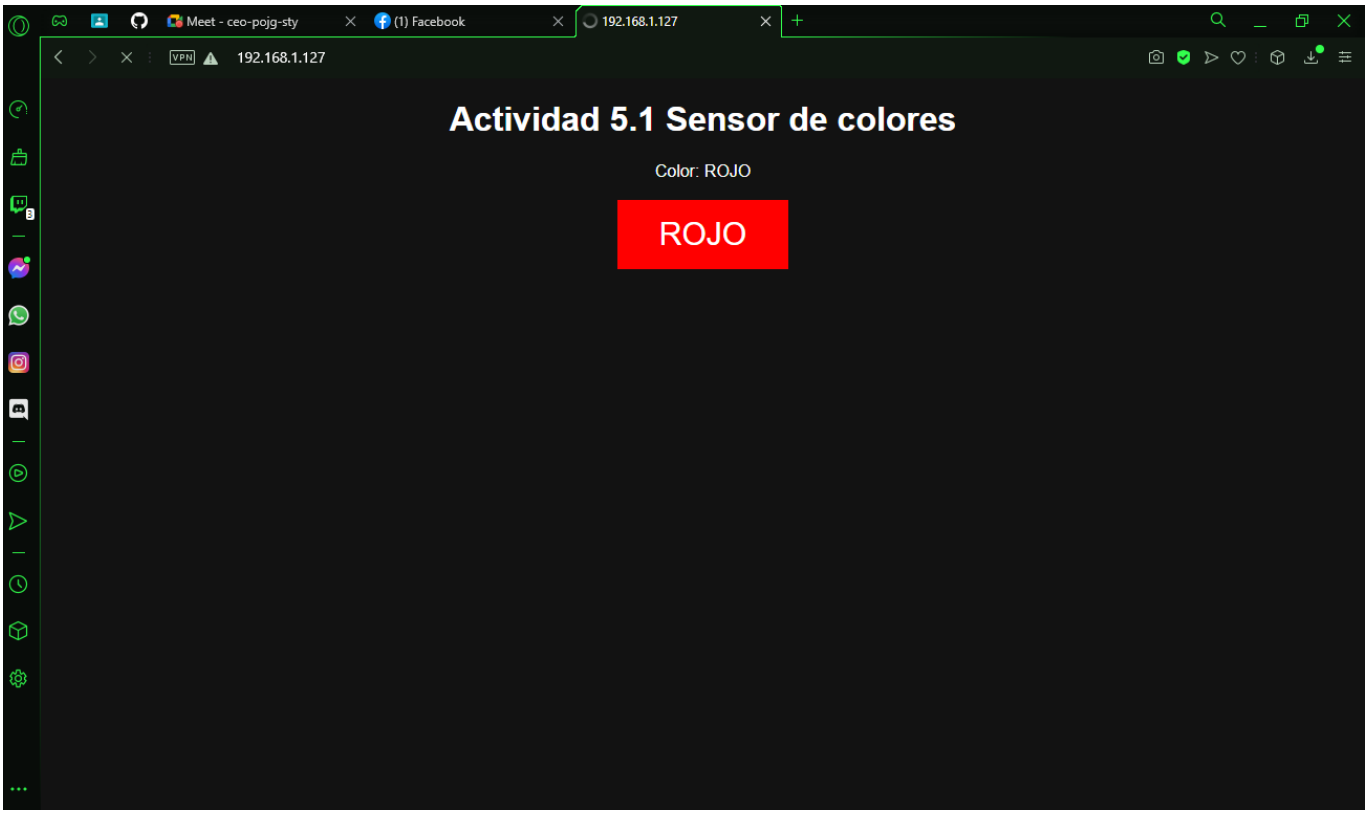






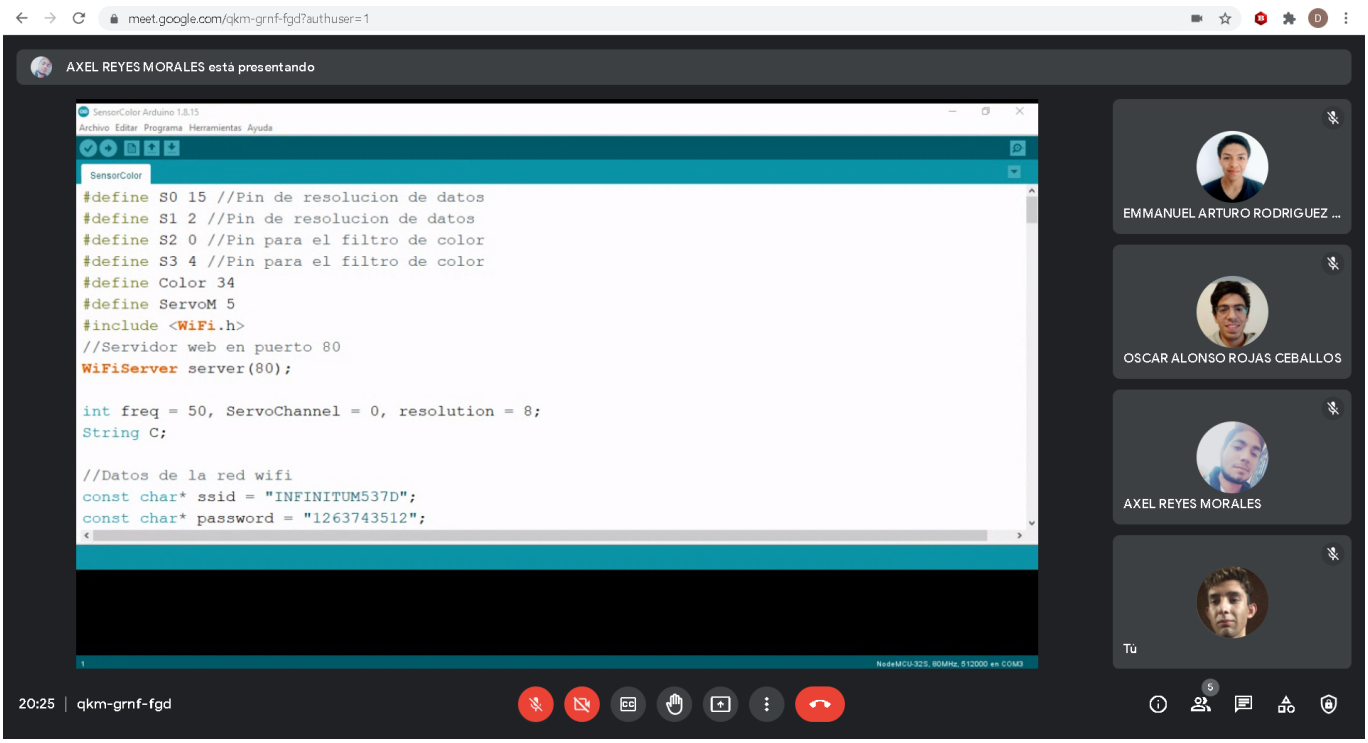

Meet - ceo-pojg-sty
(1) Facebook
192.168.1.127
192.168.1.127
Actividad 5.1 Sensor de colores
Color: VERDE
VERDE

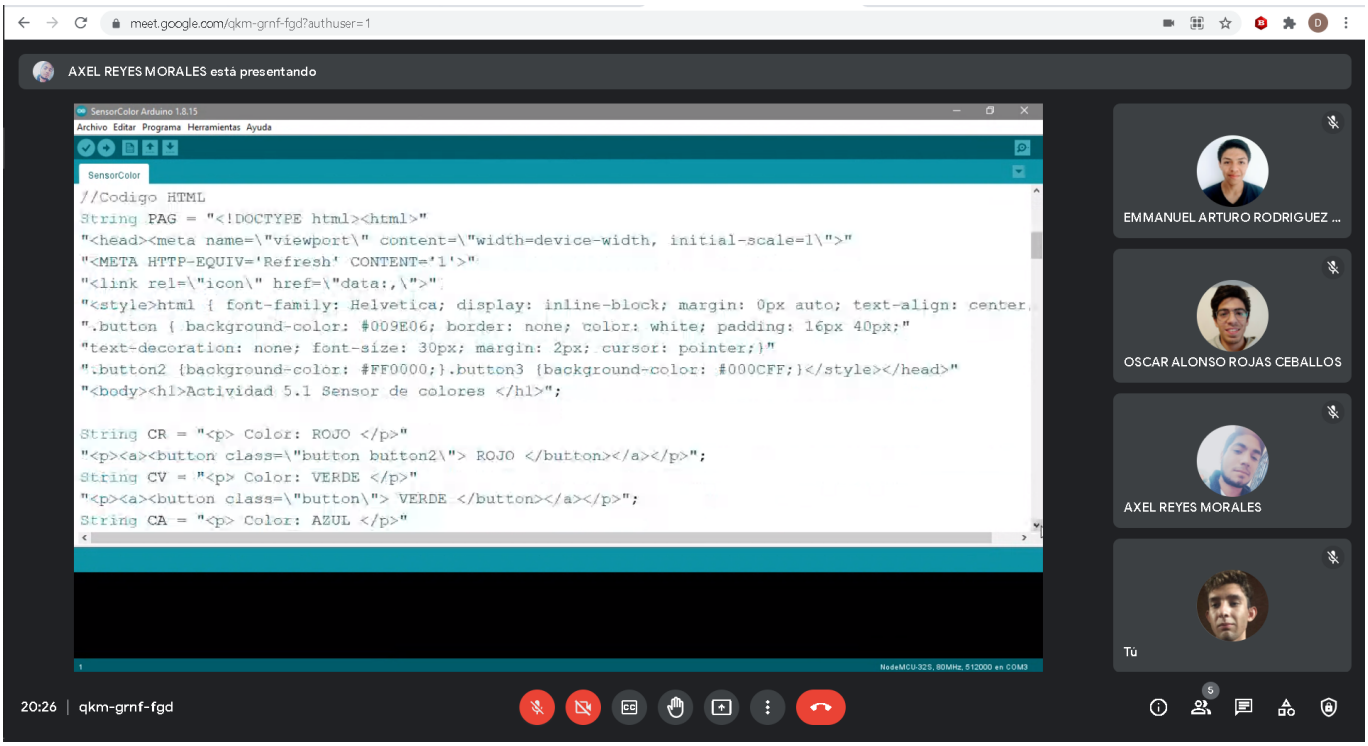

Meet - ceo-pojg-sty
(1) Facebook
192.168.1.127
192.168.1.127
Actividad 5.1 Sensor de colores
Color: AZUL
AZUL

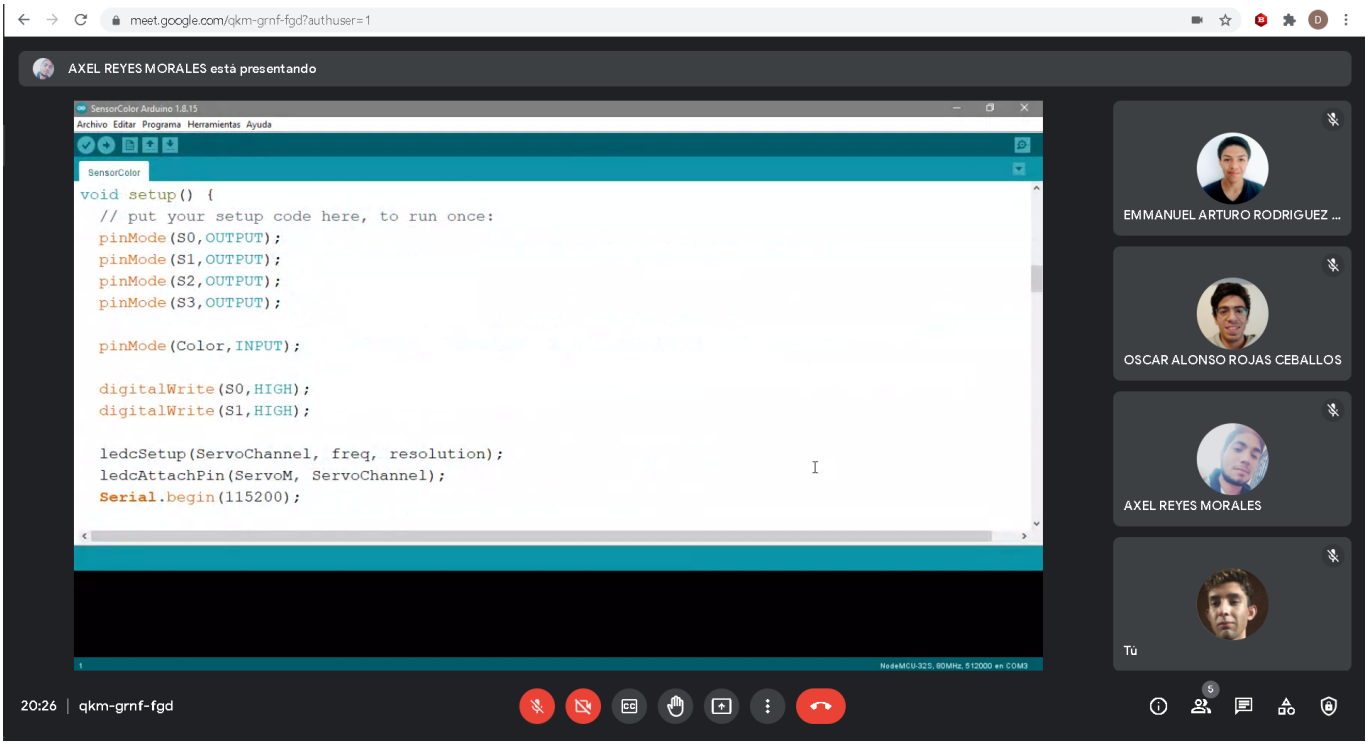


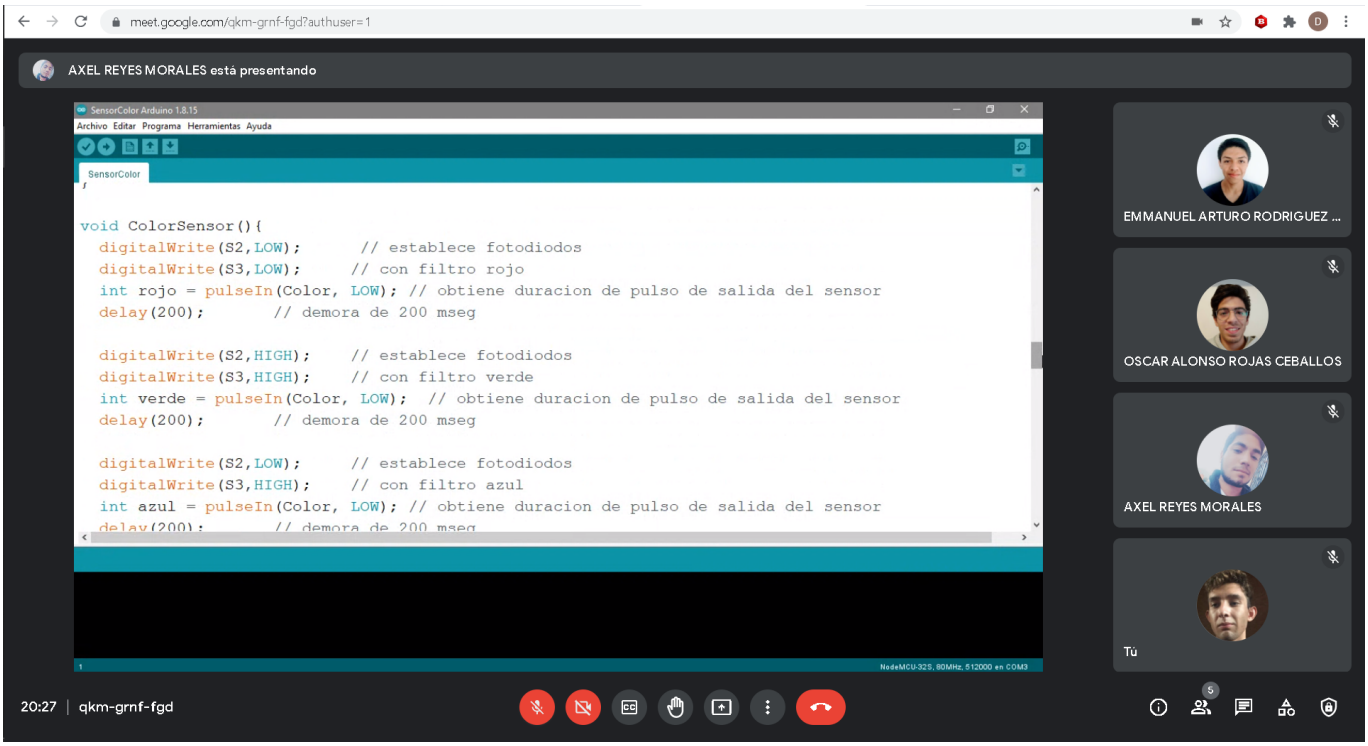
6. For the demonstration of the activity, more than one object must be used to cover at least three colors.

7. Insert images of **evidence** such as meetings of the team members held for the development of the activity




meet.google.com/qkm-grnf-fgd?authuser=1
AXEL REYES MORALES está presentando
SensorColor Arduino 1.8.15
Archivo Editar Programa Herramientas Ayuda
SensorColor
//Codigo HTML
String PAG = "<!DOCTYPE html><html>"
"<head><meta name=\"viewport\" content=\"width=device-width, initial-scale=1\">"
"<META HTTP-EQUIV='Refresh' CONTENT='1'>"
"<link rel=\"icon\" href=\"data:,\">"
"<style>html { font-family: Helvetica; display: inline-block; margin: 0px auto; text-align: center;
".button { background-color: #009E06; border: none; color: white; padding: 16px 40px;"
"text-decoration: none; font-size: 30px; margin: 2px; cursor: pointer;}"
".button2 {background-color: #FF0000;}.button3 {background-color: #000CFF;}</style></head>"
"<body><h1>Actividad 5.1 Sensor de colores </h1>";
String CR = " Color: ROJO "
" <a><button class=\"button button2\"> ROJO </button> ";
String CV = " Color: VERDE "
" <a><button class=\"button\"> VERDE </button> ";
String CA = " Color: AZUL "
NodeMCU-32S, 80MHz, 512000 en COM3
EMMANUEL ARTURO RODRIGUEZ ...
OSCAR ALONSO ROJAS CEBALLOS
AXEL REYES MORALES
Tú
20:26 | qkm-grnf-fgd


meet.google.com/qkm-grnf-fgd?authuser=1
AXEL REYES MORALES está presentando
SensorColor Arduino 1.8.15
Archivo Editar Programa Herramientas Ayuda
SensorColor
void setup() {
// put your setup code here, to run once:
pinMode(S0,OUTPUT);
pinMode(S1,OUTPUT);
pinMode(S2,OUTPUT);
pinMode(S3,OUTPUT);
pinMode(Color,INPUT);
digitalWrite(S0,HIGH);
digitalWrite(S1,HIGH);
ledcSetup(ServoChannel, freq, resolution);
ledcAttachPin(ServoM, ServoChannel);
Serial.begin(115200);
NodeMCU-32S, 80MHz, 512000 en COM3
EMMANUEL ARTURO RODRIGUEZ ...
OSCAR ALONSO ROJAS CEBALLOS
AXEL REYES MORALES
Tú
20:26 | qkm-grnf-fgd


meet.google.com/qkm-grnf-fgd?authuser=1
AXEL REYES MORALES está presentando
SensorColor Arduino 1.8.15
Archivo Editar Programa Herramientas Ayuda
SensorColor
void ColorSensor(){
digitalWrite(S2,LOW); // establece fotodiodos
digitalWrite(S3,LOW); // con filtro rojo
int rojo = pulseIn(Color, LOW); // obtiene duracion de pulso de salida del sensor
delay(200); // demora de 200 mseg
digitalWrite(S2,HIGH); // establece fotodiodos
digitalWrite(S3,HIGH); // con filtro verde
int verde = pulseIn(Color, LOW); // obtiene duracion de pulso de salida del sensor
delay(200); // demora de 200 mseg
digitalWrite(S2,LOW); // establece fotodiodos
digitalWrite(S3,HIGH); // con filtro azul
int azul = pulseIn(Color, LOW); // obtiene duracion de pulso de salida del sensor
delay(200); // demora de 200 mseg
NodeMCU-32S, 80MHz, 512000 en COM3
EMMANUEL ARTURO RODRIGUEZ ...
OSCAR ALONSO ROJAS CEBALLOS
AXEL REYES MORALES
Tú
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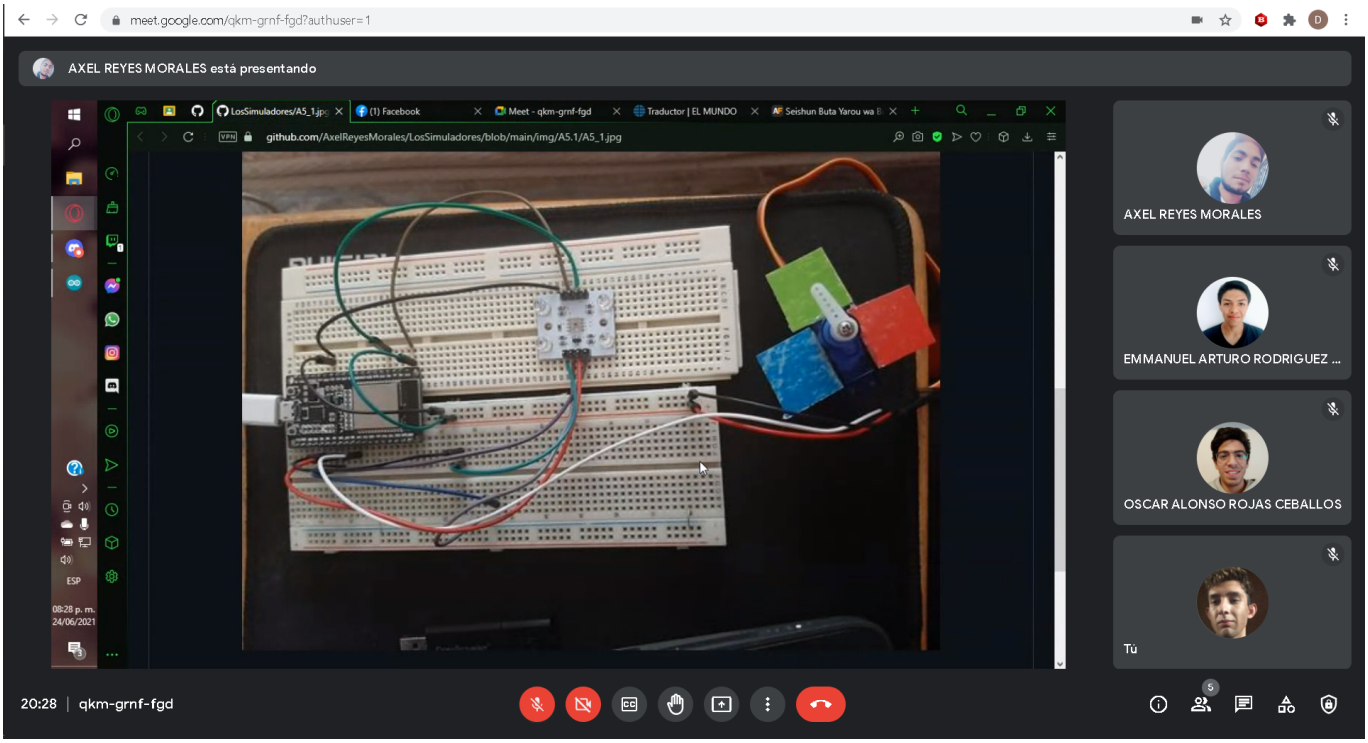
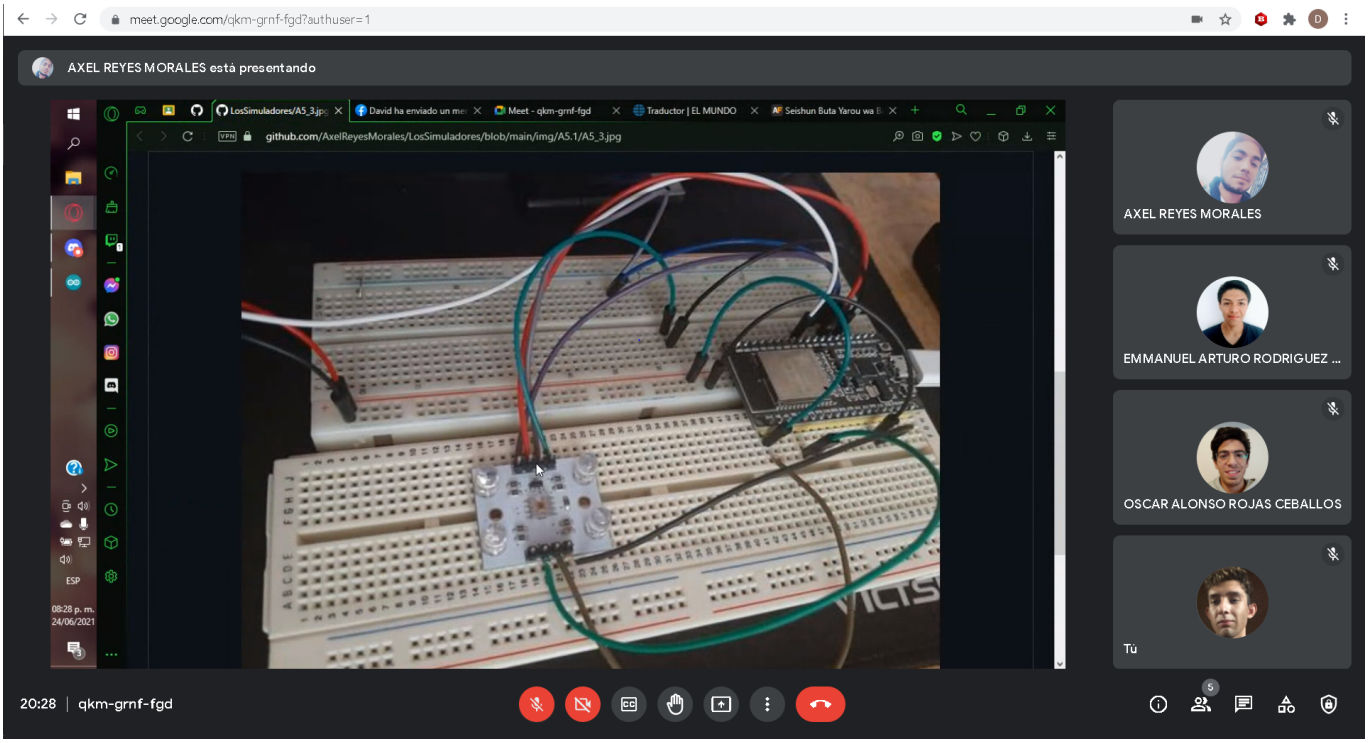

meet.google.com/qkm-grnf-fgd?authuser=1
AXEL REYES MORALES está presentando
github.com/AxelReyesMorales/LosSimuladores/blob/main/img/A5.1/A5_1.jpg
AXEL REYES MORALES
EMMANUEL ARTURO RODRIGUEZ ...
OSCAR ALONSO ROJAS CEBALLOS
Tú
20:28 | qkm-grnf-fgd



Conclusions

Axel: To conclude I can say that this practice was somewhat laborious to understand the behavior of the color sensor readings to be able to identify the colors that were needed to identify, in addition to trying to create the interface in Node-Network but for lack of time not concrete and had to use a website created from the ESP32, since it was possible to identify colors, work with a servo motor to move it and point to the color that had been put on the sensor and that could also be seen on the website that was created, it was somewhat complicated but the expected result was reached.

David: Among the things we could observe during the development of the activity was the functionality of the RGB sensor and the servomotor, wich we were able to use to make this activity work, during this activity we made a UI with a web page, we were able to make it quite easy because we had already work with one during the preavious activity, but the implementation of the RGB sensor was quite tricky and we had to investigate to be able to use it and make it work, fortunatly we were able to finish the activity and see the results before the time limit.

Emmanuel: In conclusion, a circuit was made where the color of an object would be identified, between the colors red, green and blue, using an RGB sensor TSC3200 which will distinguish the difference of colors and this will be sent to the ESP32 which depending on the color that detected, it will move an SG90 servomotor, which will point to a certain degree depending on where the color identifier is placed and finally it will also be received by a web server, which we used in a previous practice, and this page will show the color that the sensor detects giving as a result of the server operation, together with the servo motor and the RGB sensor.

Oscar Rojas: In this practice we learned how to make use of a rgb sensor to detect wich is the color of the object in front of the sensor, in this case we make use of a TSC3200 sensor, we implemented a servomotor to idicate wich color is the one the sensor is detecting, in this case we only use 3 color, red, blue and green, like in the previous practice we make use of a web server inside the ESP32 to indicate the color that the sensor was detecting.

Repositories

Axel Go to my repository

David Go to my repository

Emmanuel Go to my repository

Oscar Rojas Got to my repository