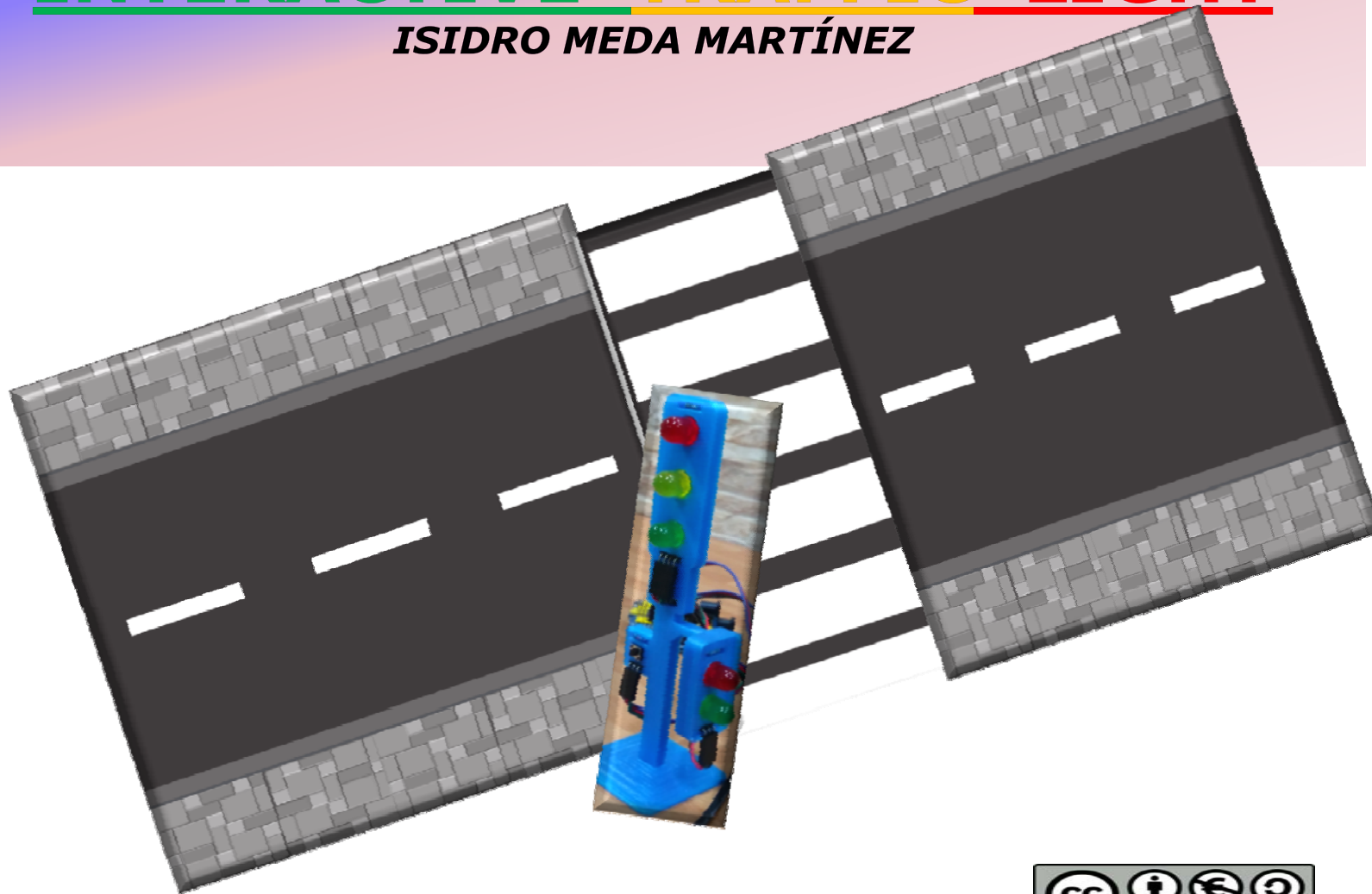


FINAL PROJECT

INTERACTIVE TRAFFIC LIGHT

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OBJETIVE

To build and redesign an interactive traffic light using LEDs, a push button, a breadboard and an Arduino Uno.

We are going to control a traffic light for vehicles and a traffic light for pedestrians, like in real life, using Arduino and a breadboard.

In the **normal state vehicles will have preference** and their light will be on green. But when the push button is pressed, the vehicle light will turn yellow and then red, and the pedestrian light will turn from red to green . After 5 seconds, everything will return to how it was initially.

LEVEL

3rd ESO; Technology, Programming and Robotics

SESSIONS

Three sessions

MATERIALS

Computer with Arduino Software Installed
Arduino kit

AIMS

- Learn about circuits, computers, and software coding.
- Learn how engineering can help solve society's challenges.
- Learn about teamwork and problem solving.

Warm-up

- Review with students before beginning how to connect a LED to Arduino.
- Review with students before beginning how to connect a PUSH BUTTON to Arduino.
- Review with students before beginning how to upload a program to Arduino.
- Review with students before beginning the structure of a program in Arduino.
- Students will watch a video of the interactive traffic light, and they will have to explain what is happening.

Preview of Vocabulary

Polarity

Anode

Cathode

Resistor

Sensor

Breadboard

JumperWires

USB Cable

LED

PUSH Button

Buzzer

Commented Code

Input/Output

Digital

if/else Statement

Pin State

Functions

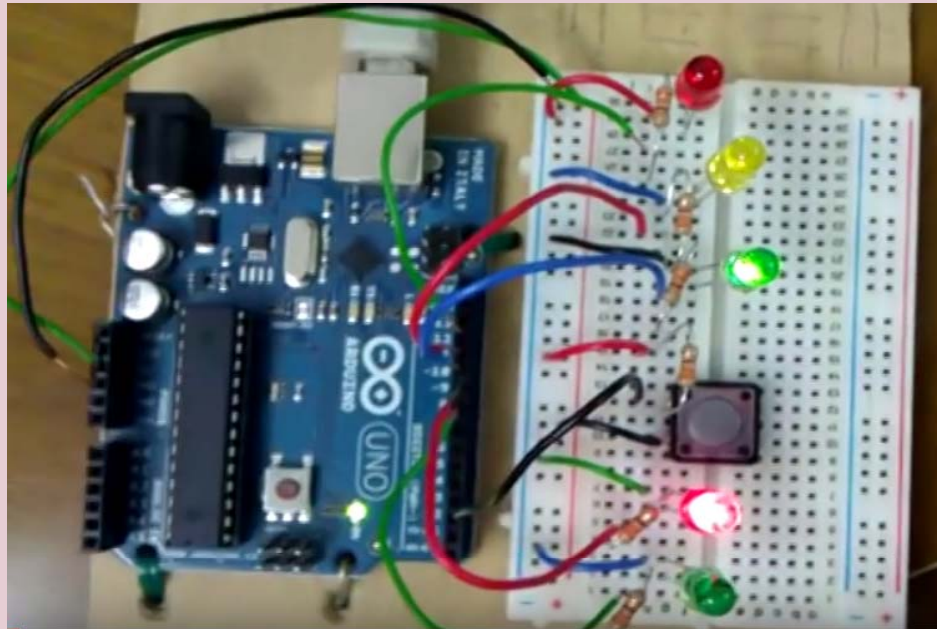
SETUP()

LOOP()

Modeling (video, pictures, etc...)

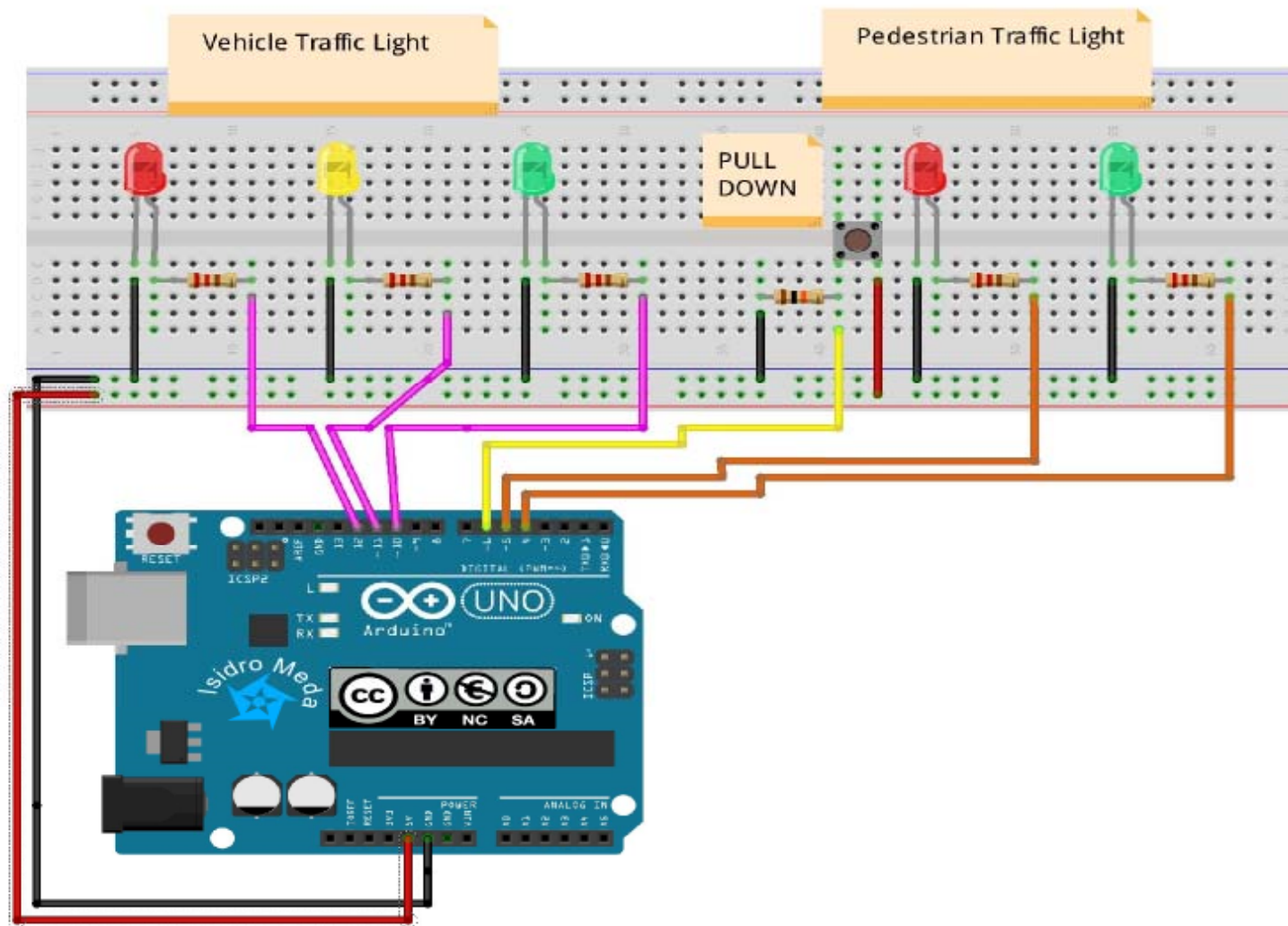
Watch this video about an *interactive traffic light*.

<https://www.youtube.com/watch?v=8hL3eZdutEk>



Modeling (video, pictures, etc...)

This is the diagram of your interactive traffic light.



STEPS

- 1.- Connect the Red, Yellow, Green, LED for the cars.
- 2.- Connect the push button.
- 3.- Connect the Red, Green, LED for the pedestrians.
- 4.- Upload the code. The *code is provided* in the next slides.
- 5.- Call your teacher to observe the final project.

STEP4.- UPLOAD THE CODE

Connect the Arduino board to the computer. Open the Arduino IDE. Copy the code shown in the programming area.

```
/*We are going to control a traffic light for vehicles and a traffic light for pedestrians using a button.
In the normal state vehicles will have preference and their light will be on green (pin 10).
When the push button is pressed (pin 6), the vehicle light will turn yellow (pin 11) and then
red (pin 12), and the pedestrian light will turn from red (pin 5) to green (pin 4).
After 5 seconds, everything will return to how it was initially.*/
// Declaring the constants
// Constants won't change. They're used here to set pin numbers:
const int LEDPinGREENPEDESTRIAN = 4;
const int LEDPinREDPEDESTRIAN = 5;
const int buttonPin = 6; //The number of the pushbutton pin
const int LEDPinGREENVEHICLE = 10;
const int LEDPinYELLOWVEHICLE = 11;
const int LEDPinREDVEHICLE = 12;
int buttonState = 0; // Variable for reading the pushbutton status
void setup() { //Is only run at the start of the program.
// We use it to configure the digital input or output pins
//Initialize the LEDs pins as outputs
pinMode(LEDPinREDPEDESTRIAN, OUTPUT);
pinMode(LEDPinGREENPEDESTRIAN, OUTPUT);
pinMode(LEDPinGREENVEHICLE, OUTPUT);
pinMode(LEDPinYELLOWVEHICLE, OUTPUT);
pinMode(LEDPinREDVEHICLE, OUTPUT);
pinMode(buttonPin, INPUT); //Initialize the pushbutton pin as an input:
}
```

STEP4.-UPLOAD THE CODE

```
void loop(){ // It runs continuously
  buttonState = digitalRead(buttonPin); //Read the state of the pushbutton value
  digitalWrite (LEDPinREDPEDESTRIAN, HIGH); // At the begining it is green for cars and red for
pedestrians
  digitalWrite (LEDPinGREENVEHICLE, HIGH);
  if (buttonState == HIGH) { // Check if the pushbutton is pressed. If it is, the buttonState is HIGH
    delay (2000); //After 2 seconds change, turn LEDgreenVehicle off, turn LEDyellowVehicles on
    digitalWrite (LEDPinGREENVEHICLE, LOW);
    digitalWrite (LEDPinYELLOWVEHICLE, HIGH);
    delay (3000); // After 3 seconds change, turn LEDyellowVehicles off, turn LEDredVehicles on,
and turn LEDgreePed on
    digitalWrite (LEDPinREDPEDESTRIAN, LOW);
    digitalWrite (LEDPinYELLOWVEHICLE, LOW);
    digitalWrite(LEDPinGREENPEDESTRIAN, HIGH);
    digitalWrite (LEDPinREDVEHICLE, HIGH);
    delay(5000); // After 5 seconds change, both traffic lights return to the begining, LEDgreeVe
on and LEDredPed off
    digitalWrite (LEDPinGREENPEDESTRIAN, LOW);
    digitalWrite (LEDPinREDVEHICLE, LOW);
  }
  else {
    digitalWrite (LEDPinREDPEDESTRIAN, HIGH); // If the buttoState is not pressed, state LOW, keep
LEDgreen for vehicles
    digitalWrite (LEDPinGREENVEHICLE, HIGH);
  }
}
```

REFLECTION / DEBRIEF

- 1.- What do you think is the most challenging part?
- 2.- Can you imagine other kind of traffic light?
- 3.- **Extra point.** Redesing one.
Where you able to modify the code to change the green pedestrian light, so that, it blinks at the end as a warning to hurry on becouse lights are about to change?
- 4.- **Extra point.** Redesing two.
If you design something it must be as useful as posible. So, can you redesign and rebuilt your interactive traffic light to help blind people?

RUBRICS

	LEVEL 1 (40%-60%)	LEVEL 2 (60%-80%)	LEVEL 3 (80%-100%)
1. Use accurately the programming of an electronic system	Minimal comments, poor variable names, no indentation.	Some comments, satisfactory variable names, attempted indentation	Excellent use of comments, variable names and indentation.
2. Develop programs to control the operation of an electronic system. Identify and use the analog or digital inputs and outputs of the electronic system.	Project does not work / causes errors.	Project works but is not finished. It is not shared with other people.	Project is finished, complete with final challenge. It is shared with other people.
3. Explain to other students the project.	Student cannot explain the main ideas.	Student can explain the main ideas an some questions about the project.	Student can explain everything about the project.
4. Valuation of the use of English as a communication vehicle.	Frequently is unable to understand or respond appropriately.	Able to understand and respond appropriately most of the time.	Able to understand and respond appropriately all of the time.