IoT Course Project

Blanche Perez

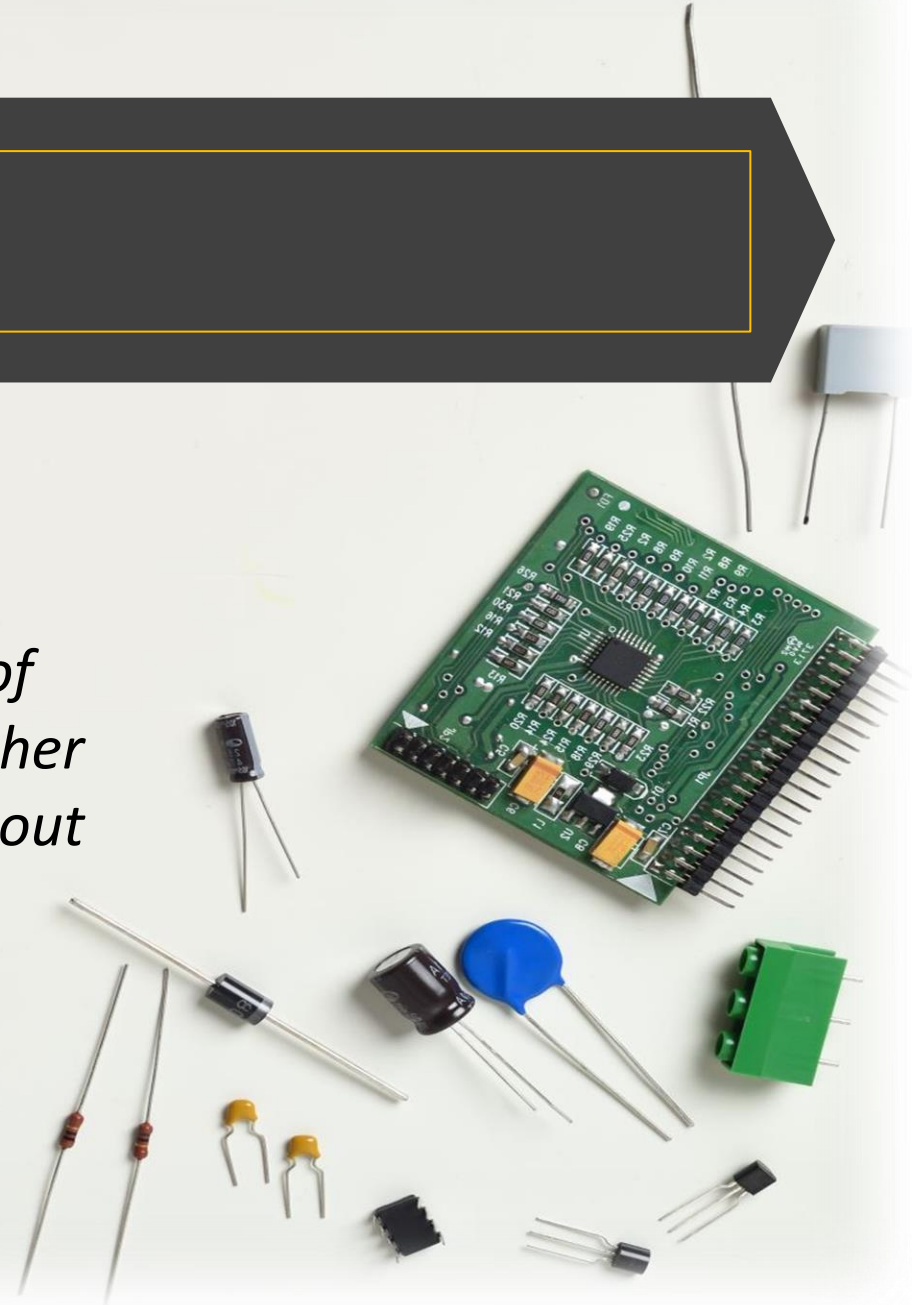
DeVry University

CEIS101 – Introduction to Technology and Information Systems

Introduction

What is IoT?

The Internet of Things (IoT) consists of a collection of integrated, internet-connected devices that can gather and transmitting data over a wireless network without human activity.



My Portfolio Contains:

1. Career skills
2. Modules
3. Challenges within each module
4. Conclusion (What Was Learned)

Career Skills Learned in Each Module

Technical skills:

Hardware deployment

Operating system knowledge

Network configuration

Coding

Soft skills:

Communication

Organization

Analytical abilities

Problem-solving

Resourcefulness

Flexibility

Module 1: Kit Inventory

In this first module, it was required to gather the items needed for the Arduino project.

Inventory (Picture)

Arduino Starter Kit

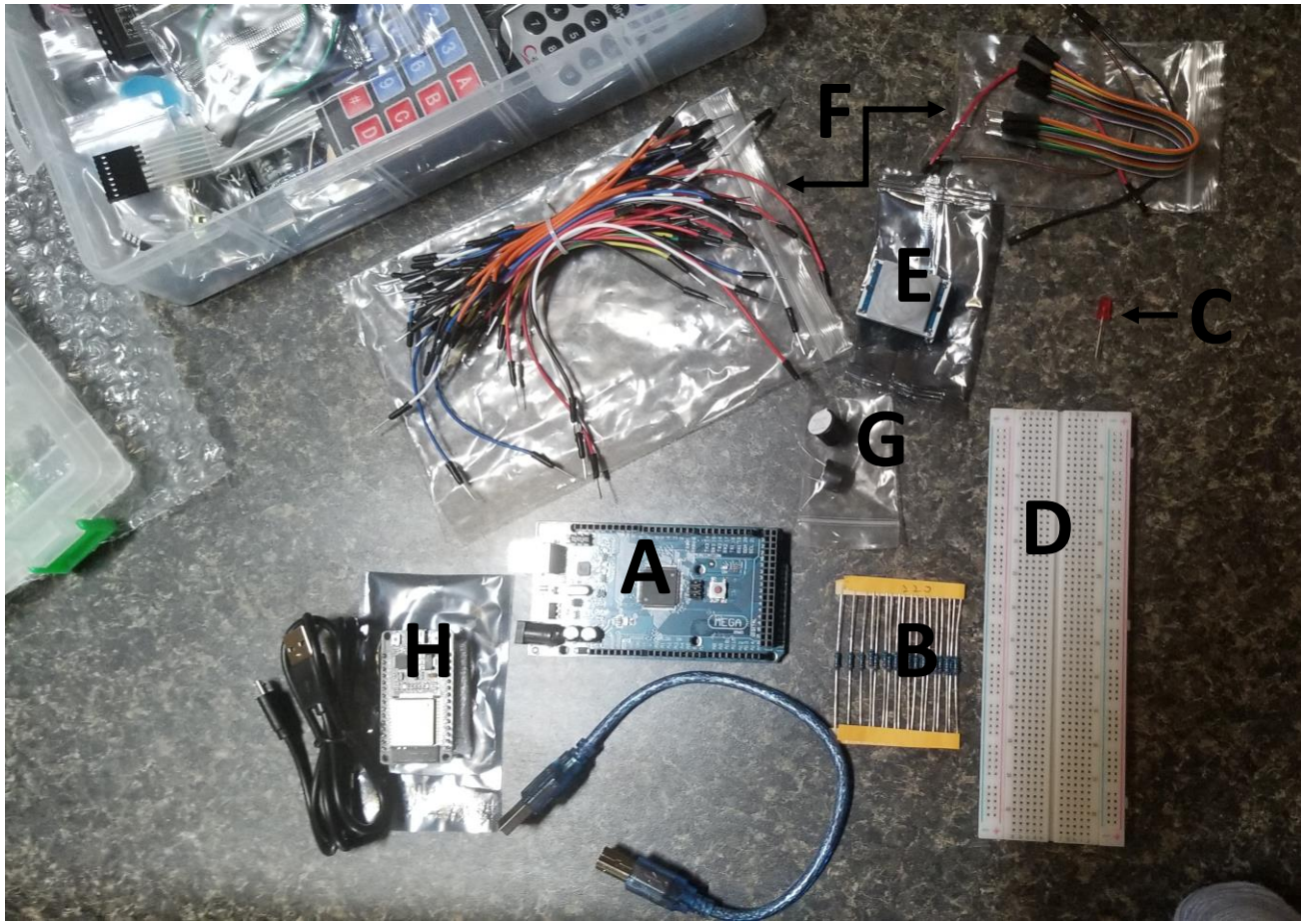
Mini-Smart Router

USB-micro USB Cable

Esp32 Board

Organization (Picture)

A. Arduino Mega board
B. Resistor - 220Ω
C. LED
D. Breadboard
E. Motion Sensor
F. Wire(s)
G. Buzzer
H. Esp32 Board



Challenges in the module:
The only challenge within the module was to identify the needed material for the project.

Skills Learned in Module 1:

- Organization – Knowing what materials will be used; identify and put the items together in a neat group.
- Resourcefulness – Making sure all items are properly identified.

Module 2: Flowchart

What is a flowchart?

A flowchart is a diagram that displays a sequential order of processes. These processes identify specific procedures in a wide range of purposes.

Input – Processing - Output

This terminology is used in flowcharts to demonstrate the programming of a specific device to transmit data for it to function.

Input	Process	Output
Sound/motion	Detect sound and motion	Buzzer/LED light

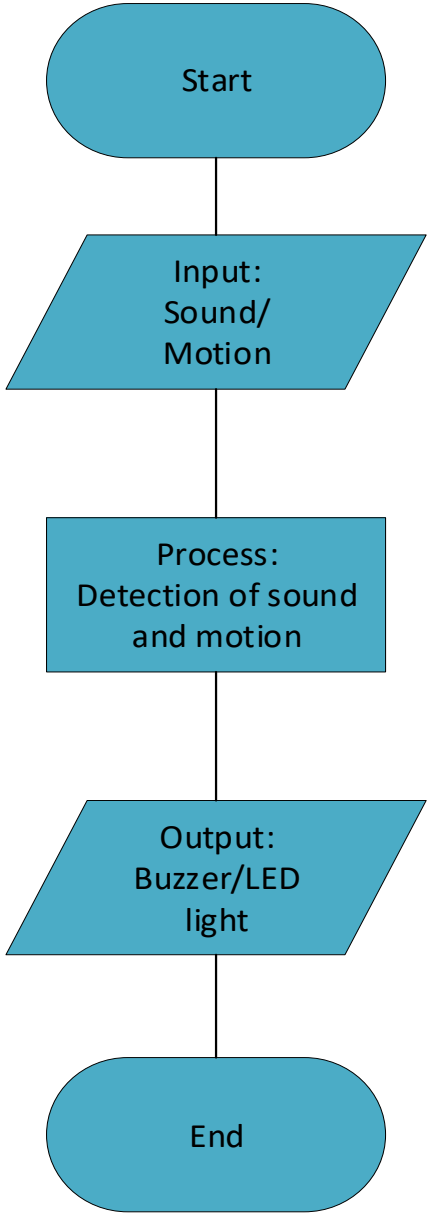
What companies use flowcharts?

Office, sales, and tech related companies use flowcharts to maintain a cycle, but simultaneously plan different business strategies in order to keep the flow of these companies going.

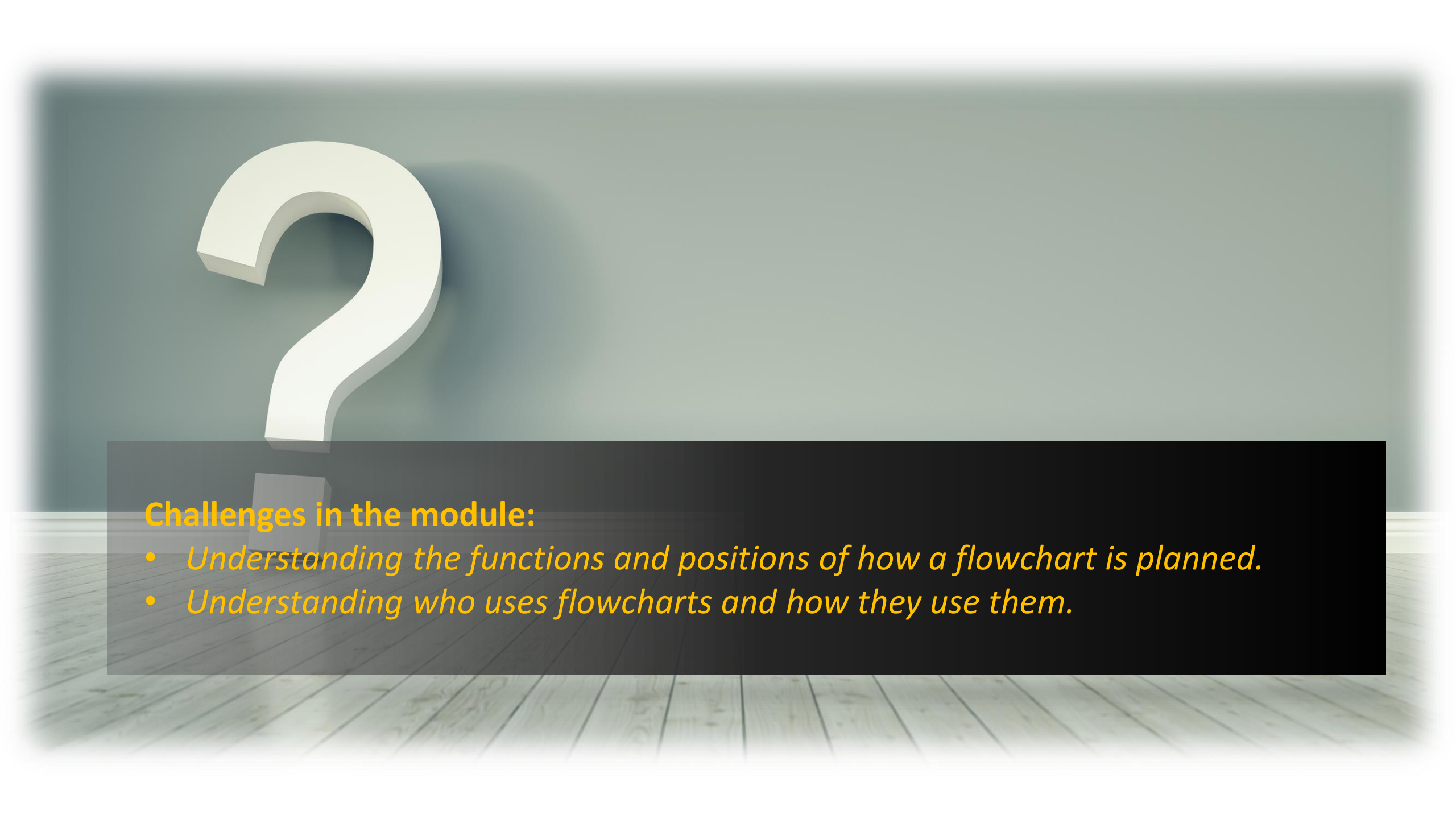
Flowchart

Flowchart with three shapes:

- Circle – Start and end
- Parallelogram – Input and output
- Rectangle - Process



Why might they use flowcharts?
It depends on what type of company it is. As stated before, they need flowcharts to map out different strategies and plan out the flow of things that can occur within that sector within certain companies.



Challenges in the module:

- *Understanding the functions and positions of how a flowchart is planned.*
- *Understanding who uses flowcharts and how they use them.*

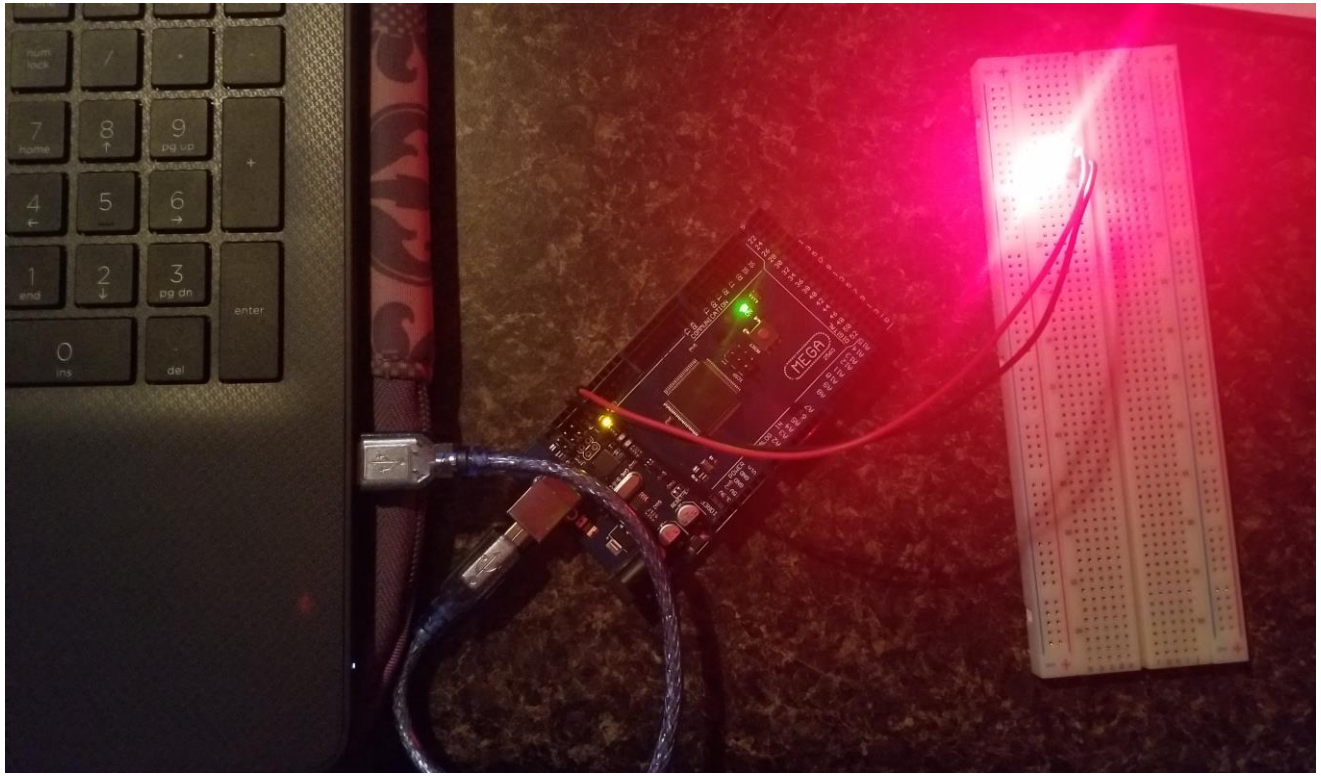
Skills Learned in Module 2:

- Organization – Having a clean workspace and avoiding hazards due to wiring.
- Resourcefulness – Thinking quickly to troubleshooting without wasting a lot of time.
- Problem-solving – Able to configure technical issues.
- Analytical abilities – When troubleshooting, identifying the technical difficulties is important when problem-solving.

Module 3: Installing the Arduino IDE and Running the Blink Code

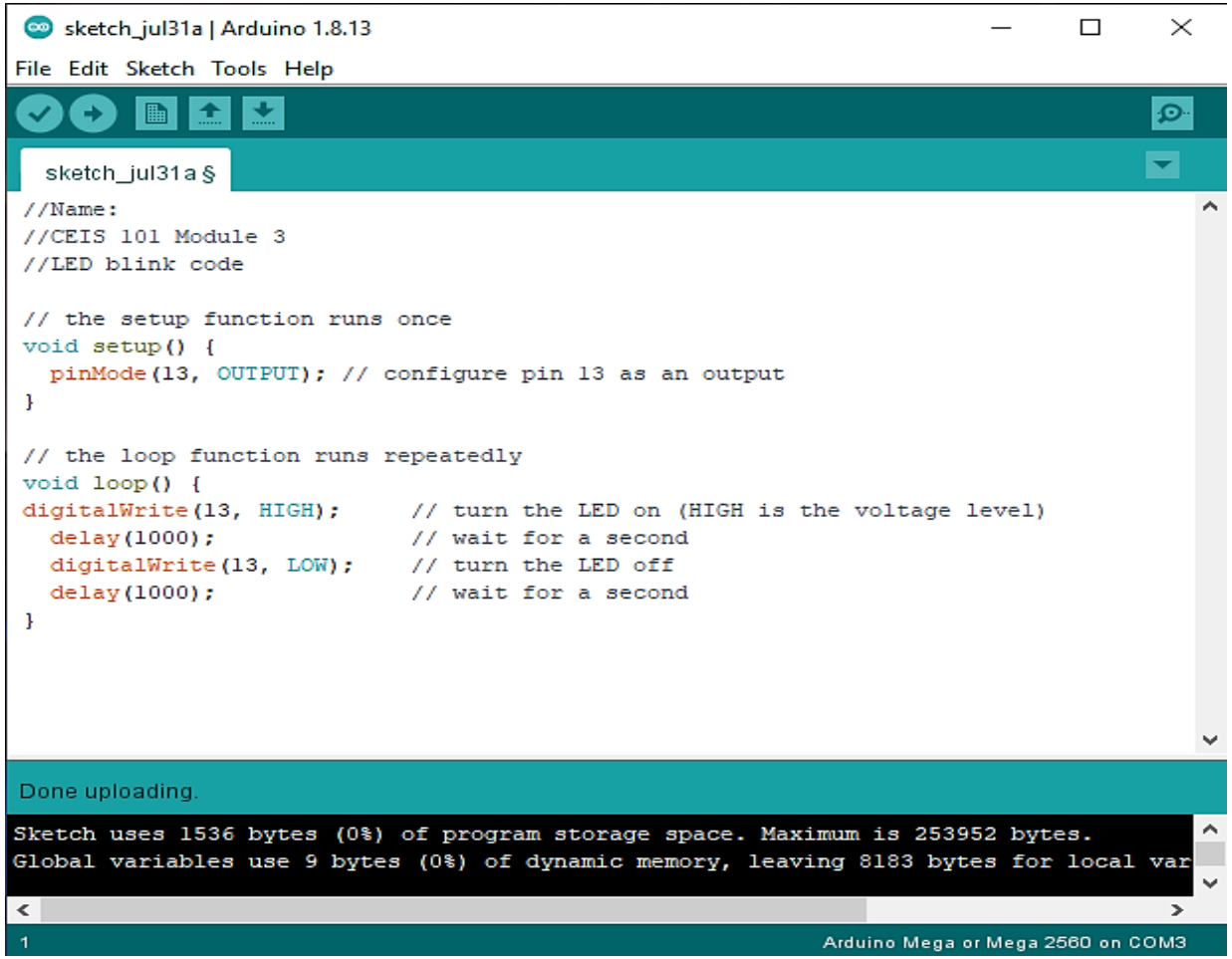
In this module, the Arduino is set up and installed. Also, adding the LED light and putting in the code for the light to blink.

Circuit (Picture or Video)

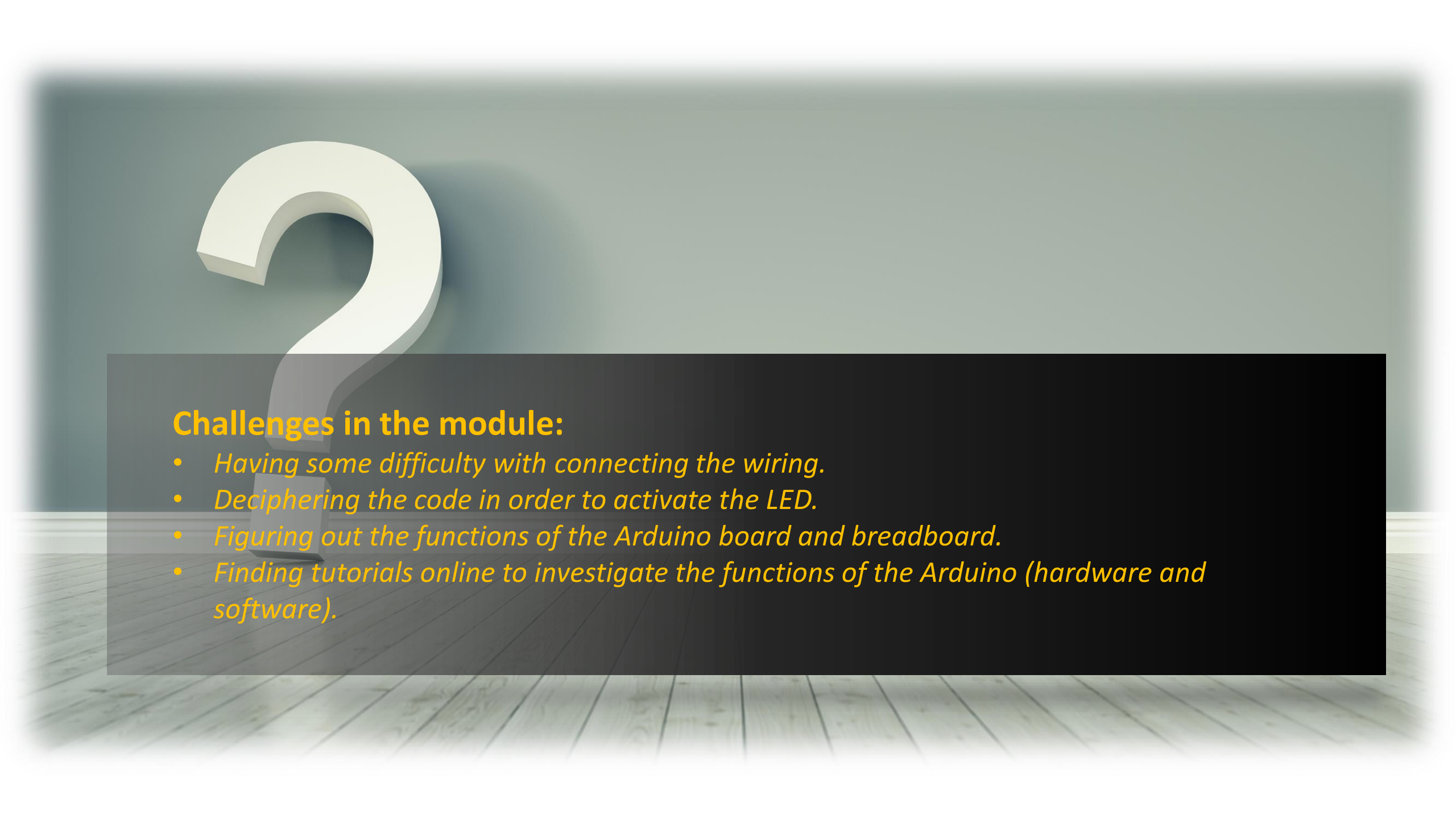


Arduino and breadboard with LED connected to breadboard

Code for LED (Screenshot)



Screenshot of the code that is used for the LED in Arduino IDE



Challenges in the module:

- *Having some difficulty with connecting the wiring.*
- *Deciphering the code in order to activate the LED.*
- *Figuring out the functions of the Arduino board and breadboard.*
- *Finding tutorials online to investigate the functions of the Arduino (hardware and software).*

Skills Learned in Module 3:

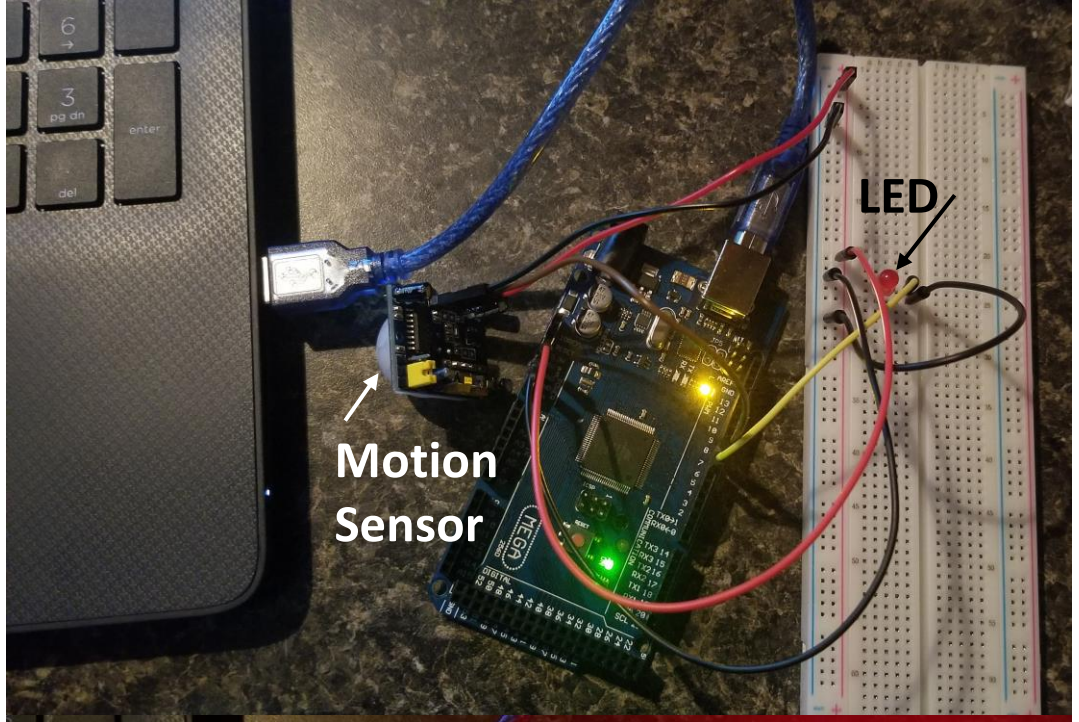
- Problem-solving – Figuring out how the code is used in Arduino.
- Hardware deployment – Testing the Arduino board and breadboard, as well as tinkering with the wiring.
- Resourcefulness – Having the knowledge to utilize the guide and videos that was given.
- Flexibility – Able to demonstrate and display the testing product.

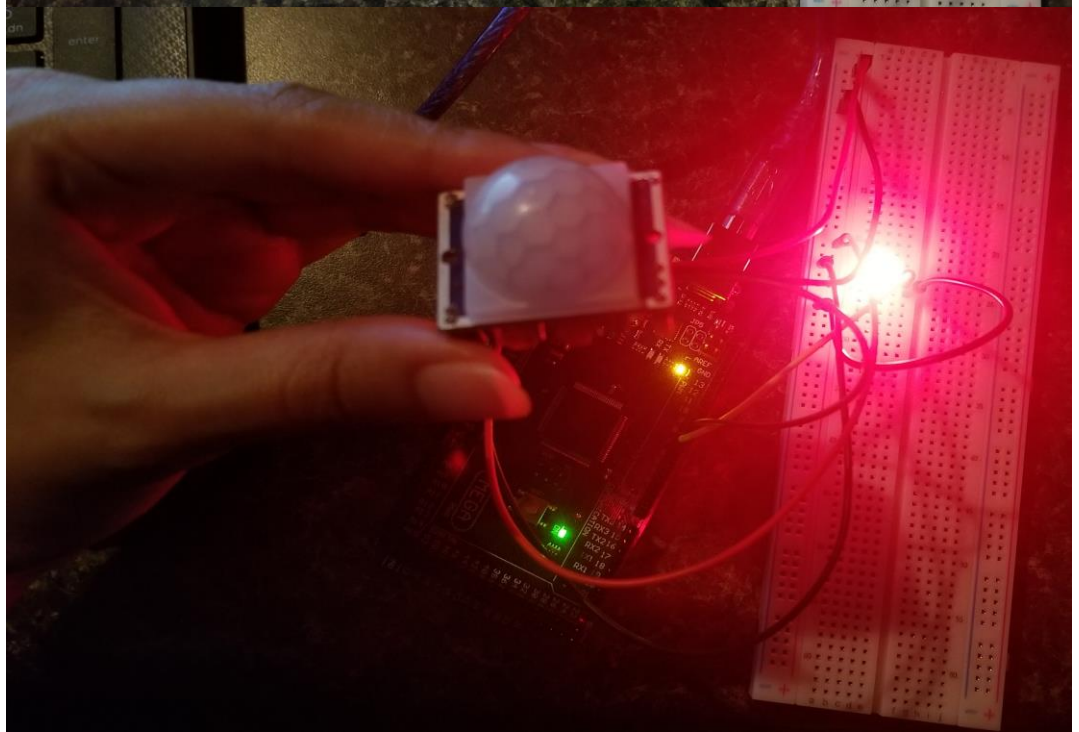
Module 4: Setting Up the Home Security System With a Motion Sensor

In this module, we set up our home security system and adding our motion sensor; using an LED or a buzzer to detect motion.

Circuit with Motion Sensor and LED

Arduino with breadboard including motion sensor with LED

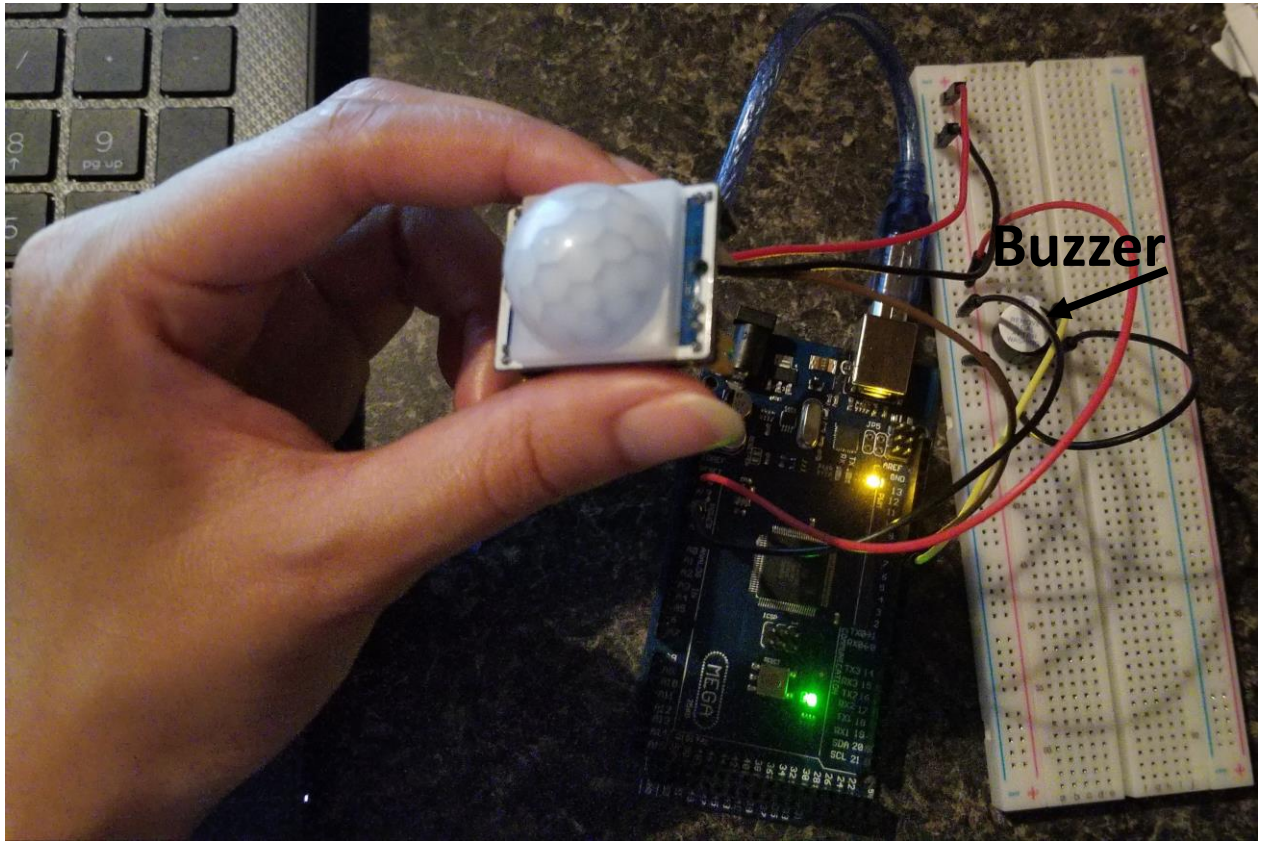




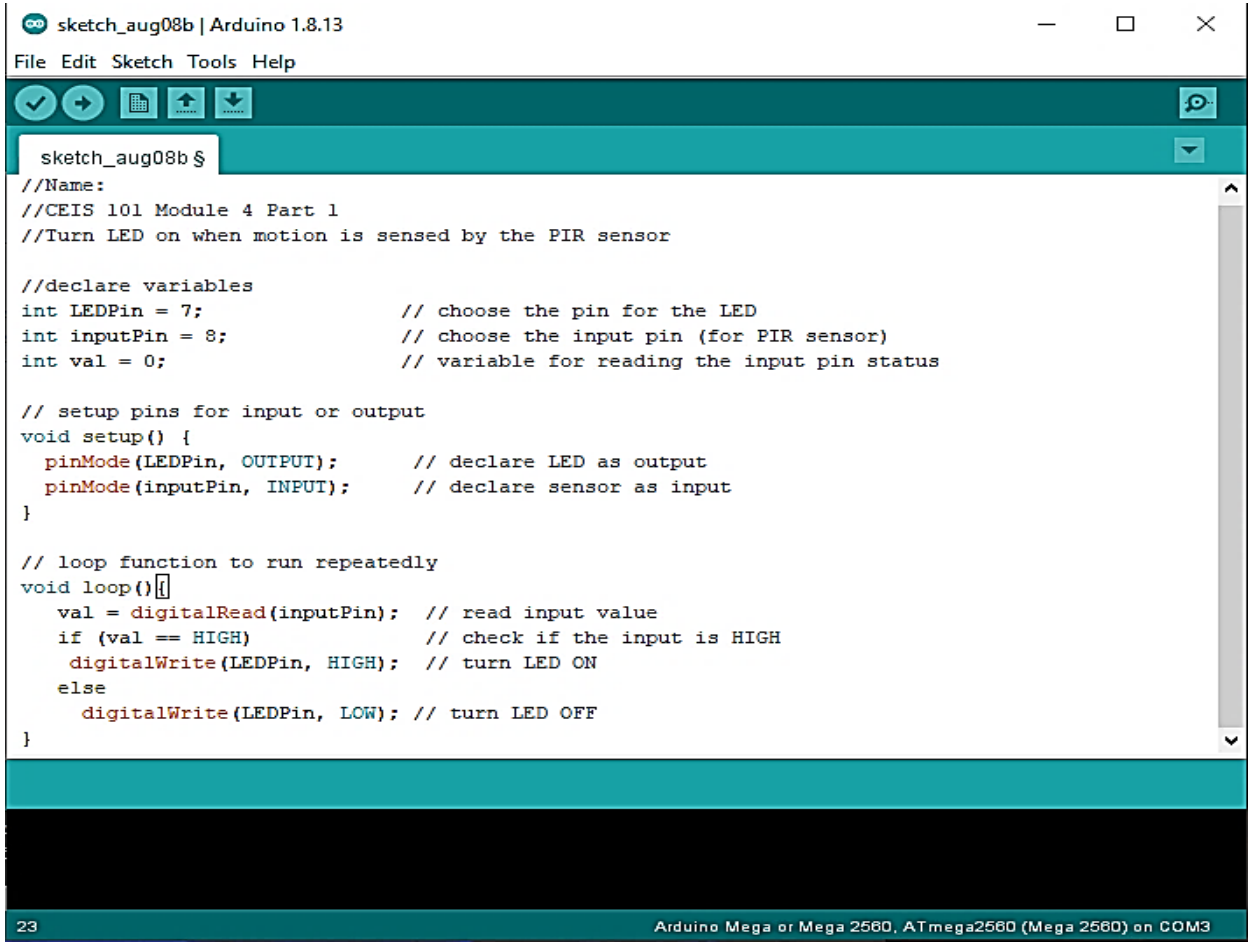
What pin is the input pin? What pin is the output pin? How do you know?
The input pin is pin 8 and the output pin is the LED or buzzer. When either of them are activated, the input processes its way to the output; making the device come on instantly.

Circuit with Motion Sensor and Buzzer

Arduino with breadboard including motion sensor with buzzer



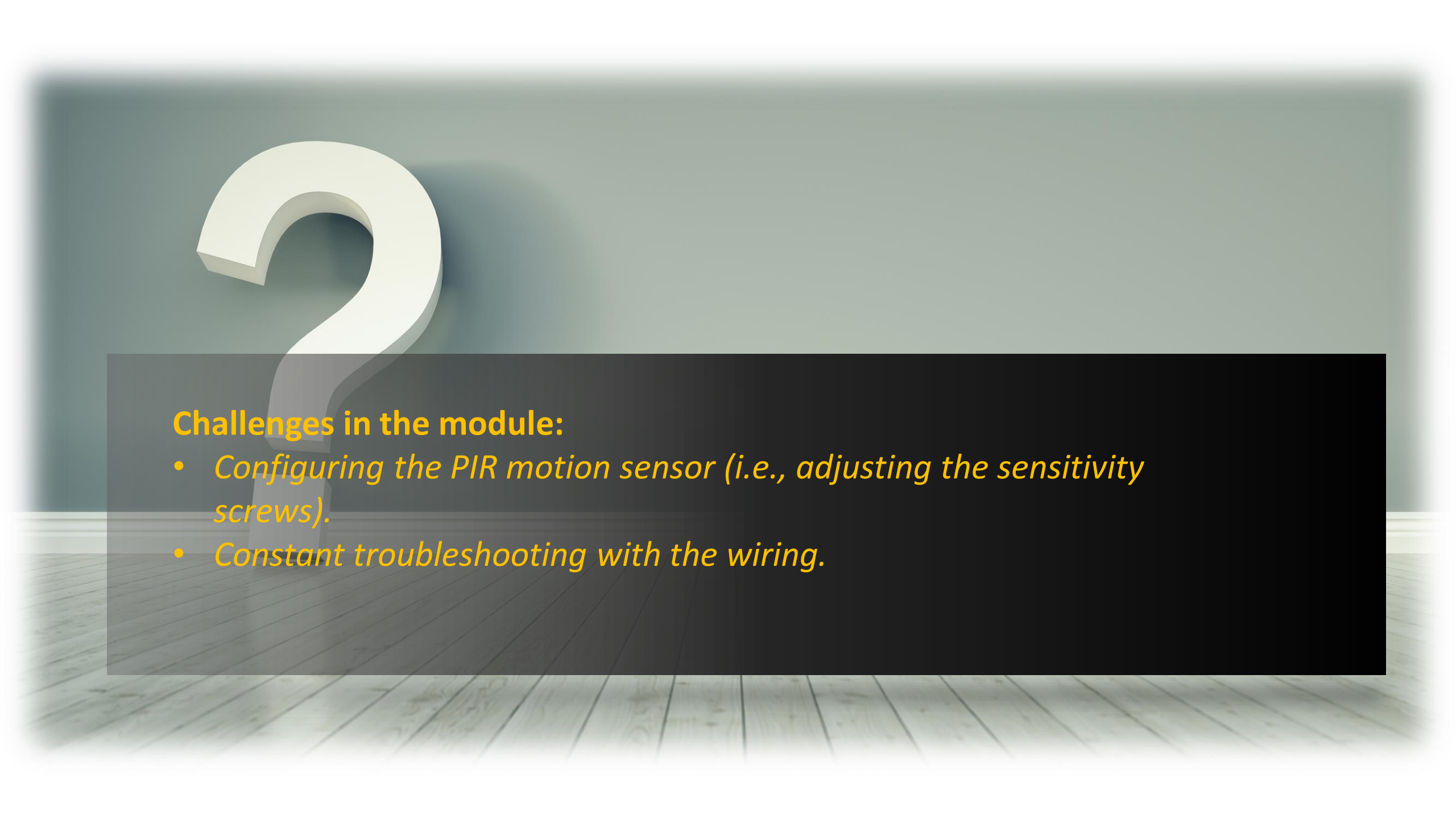
Code for Motion Sensor and LED (Screenshot)



Screenshot of the code in Arduino IDE for motion sensor and LED. Codes are similar as they implement the concept of code reuse.

How many times does the Arduino IDE setup() function run?

The setup() function runs only once, after each time Arduino board powers up or resets.



Challenges in the module:

- *Configuring the PIR motion sensor (i.e., adjusting the sensitivity screws).*
- *Constant troubleshooting with the wiring.*

Skills Learned in Module 4:

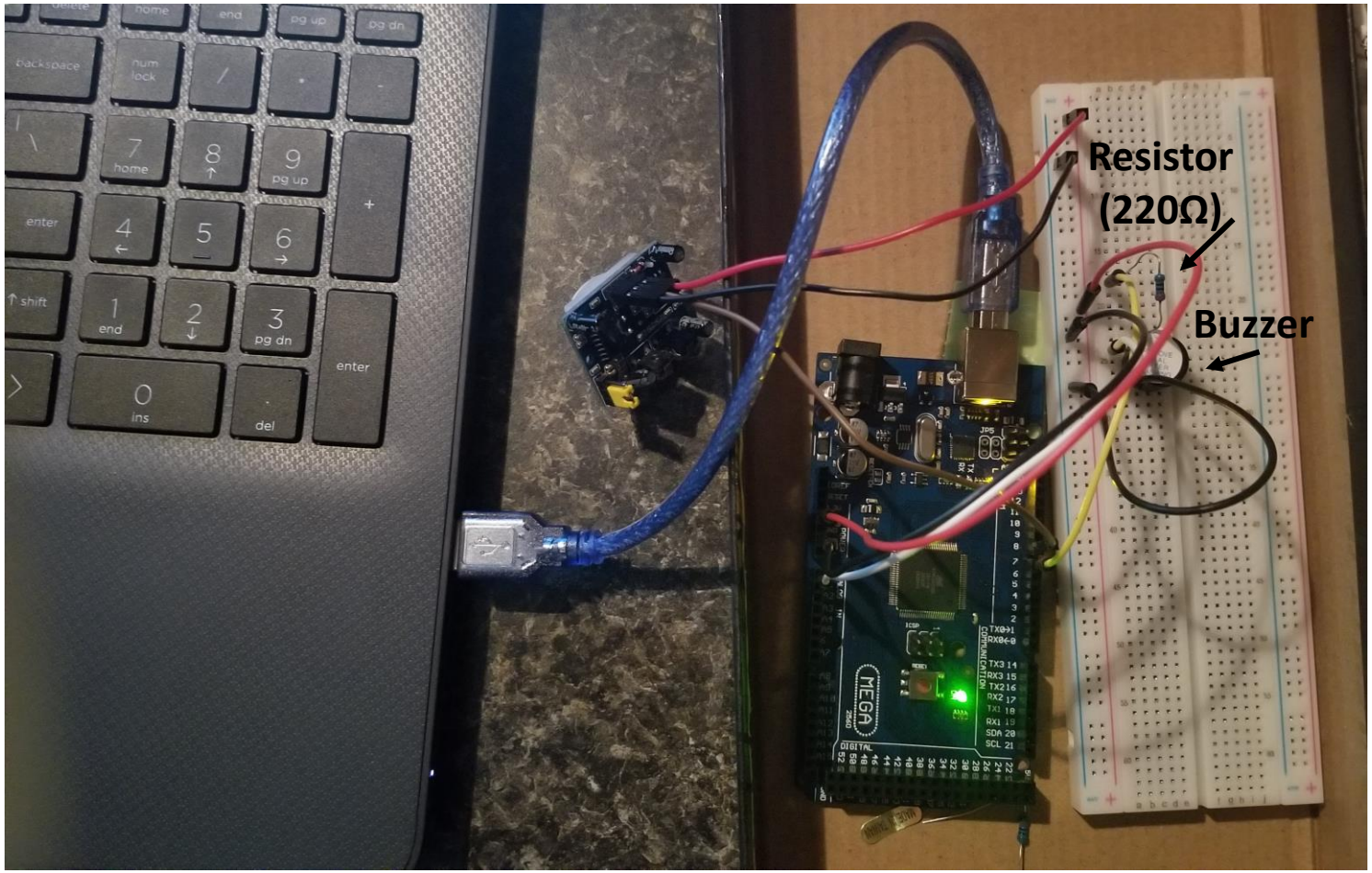
- Problem-solving – Configuring the PIR motion sensor, LED, and buzzer.
- Hardware deployment – Testing PIR motion sensor and adjusting the sensitivity screws.
- Analytical abilities – Able to read the code on the Arduino application to activate the motion sensor.
- Resourcefulness – Using previous skills learned from previous modules.

Module 5: Data Display

In this module, we learned about using the Arduino serial monitor; to which it displays the voltage difference (i.e., how many times motion is detected).

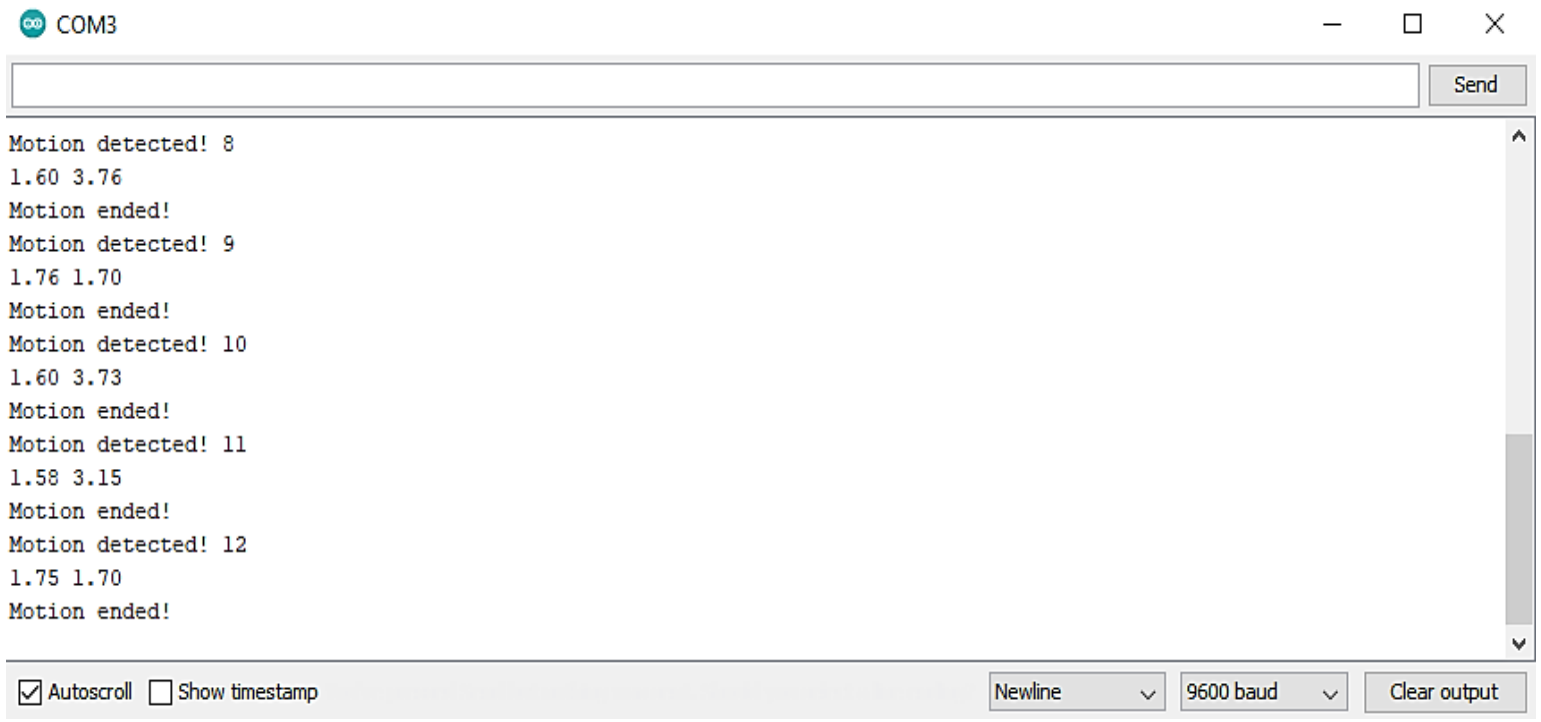
Circuit with Buzzer and Resistor (220Ω)

Motion sensor circuit with new resistor



Serial monitor (Screenshot)

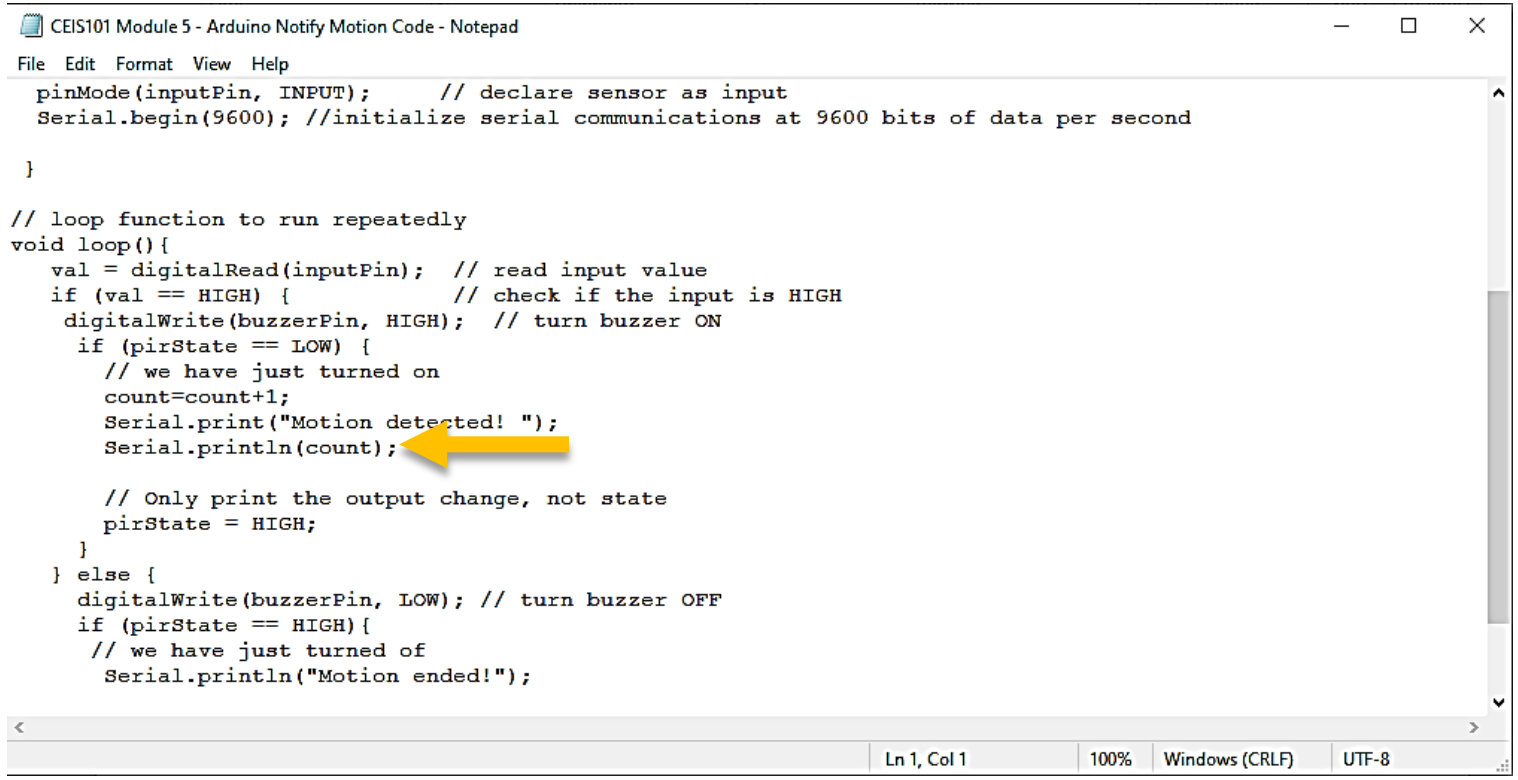
Screenshot of serial monitor showing voltage difference and count of motion detected



How can viewing data on the serial monitor give you information about your circuit?
It all depends on the code that you enter on the sketch screen. For example, entering the input and output for the buzzer for it to translate the information onto the serial monitor; once the motion detector goes off (to which it is the input for motion), the buzzer can transmit noise.

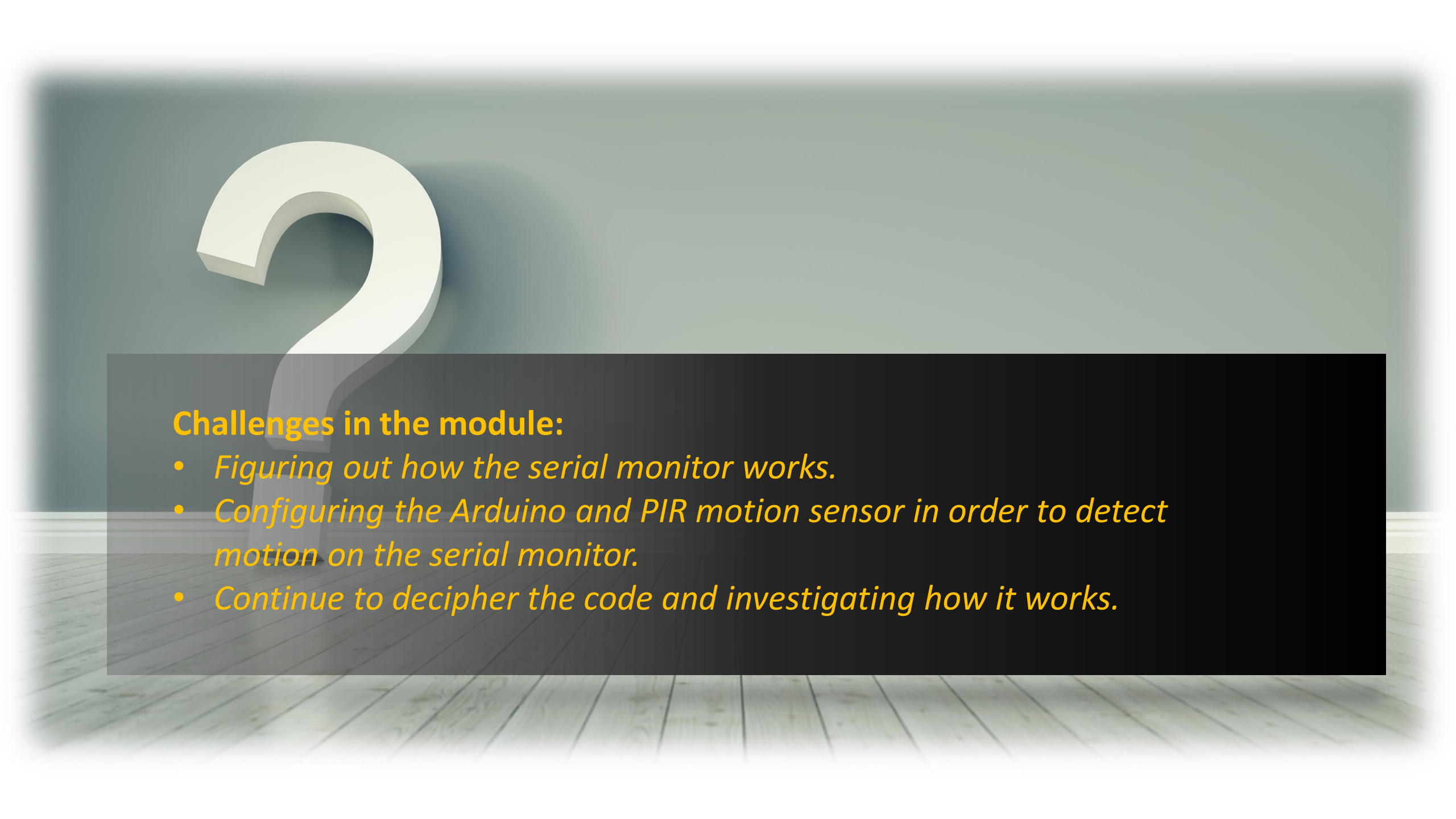
Screenshot Code

Partial screenshot of code for PIR motion sensor and buzzer



What is the line of code that displays the count of how many times motion has been detected?

Underneath the "serial.print," the "serial.println()" displays the count of how many times motion has been detected.



Challenges in the module:

- *Figuring out how the serial monitor works.*
- *Configuring the Arduino and PIR motion sensor in order to detect motion on the serial monitor.*
- *Continue to decipher the code and investigating how it works.*

Skills Learned in Module 5:

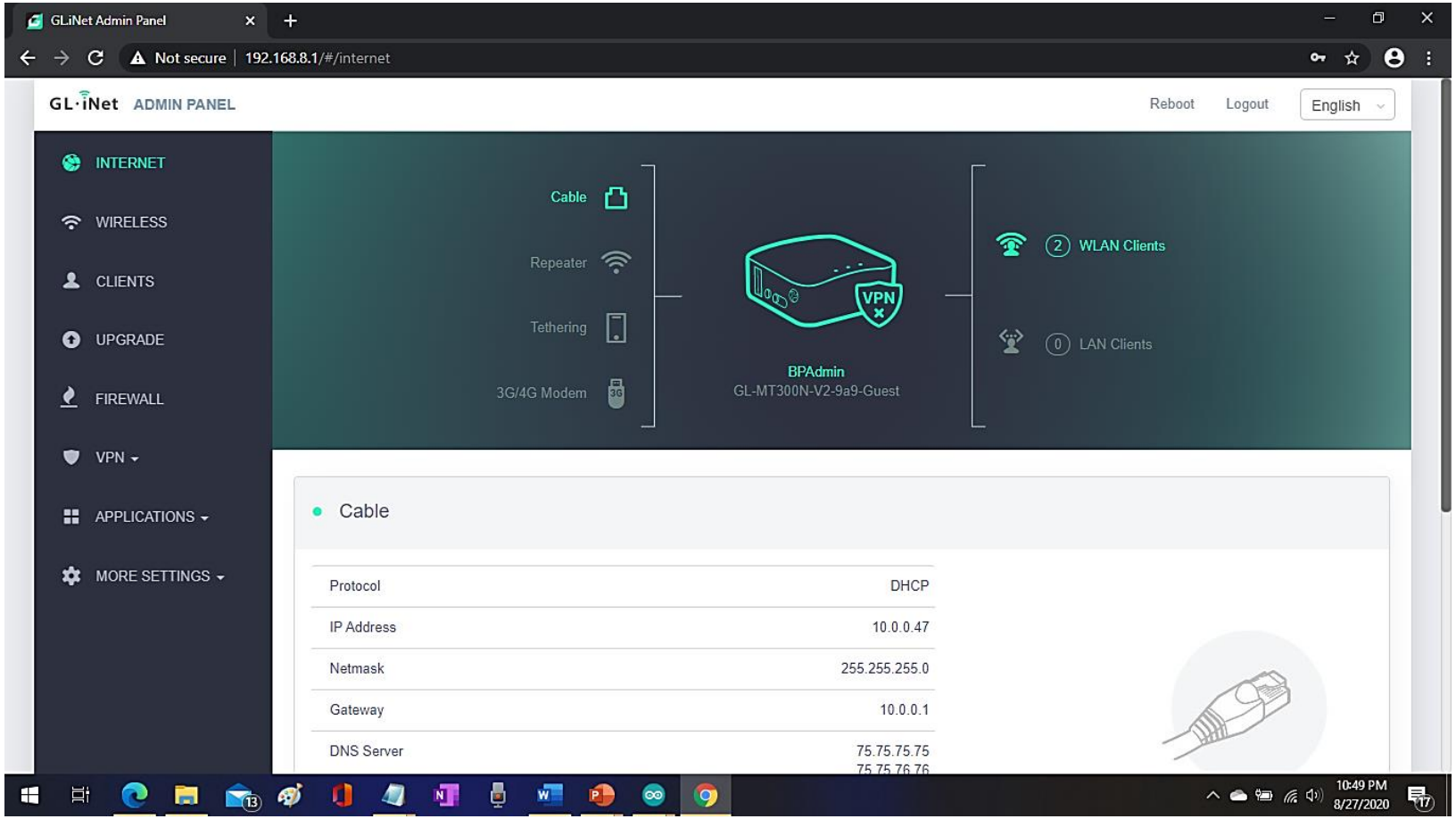
- Hardware deployment – Testing with the PIR motion sensor and buzzer with resistor.
- Problem-solving – Troubleshoot the buzzer’s noise that transmits with 2 different resistors.

Module 6: Networking and Security

For 2 weeks (Week 6-7), setting up and testing a safe Wi-Fi connection was performed.

Router (Screenshot)

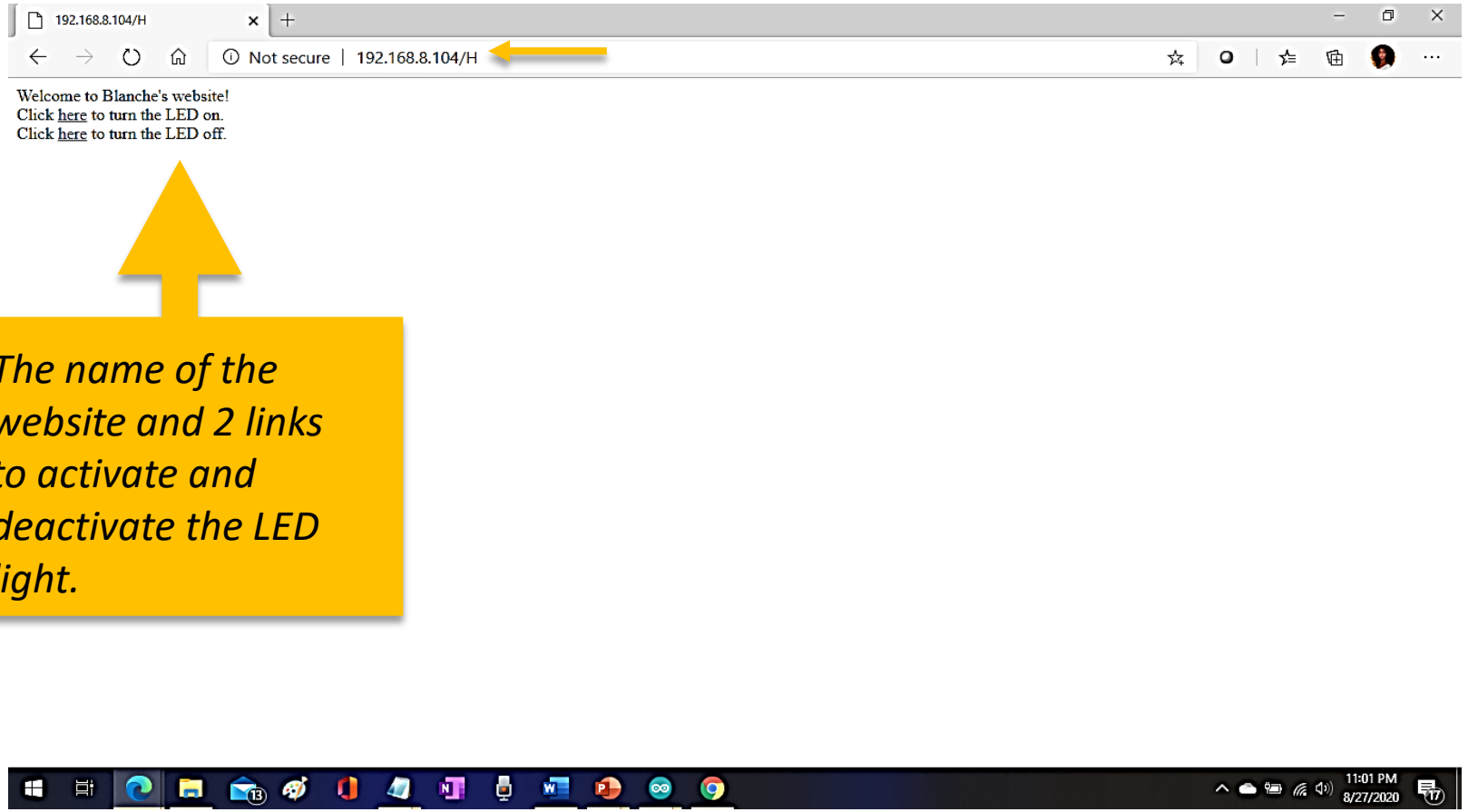
Screenshot of router setup page



Above, the screenshot displays the mini smart router that is connected to the Internet, via Ethernet; as well as, numerous settings.

Web page (Screenshot)

Web server screenshot showing turning on and off the light from the web.

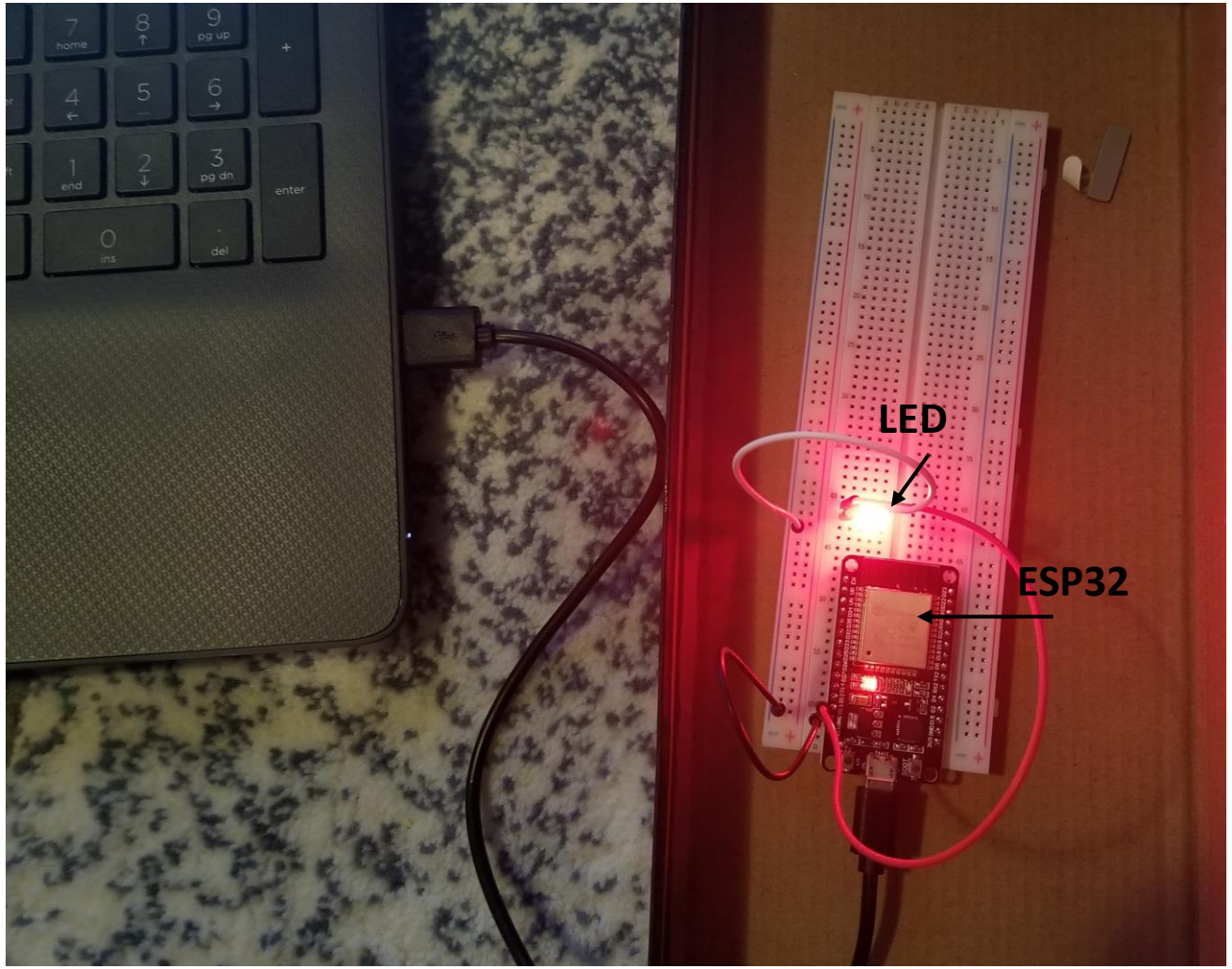


The name of the website and 2 links to activate and deactivate the LED light.

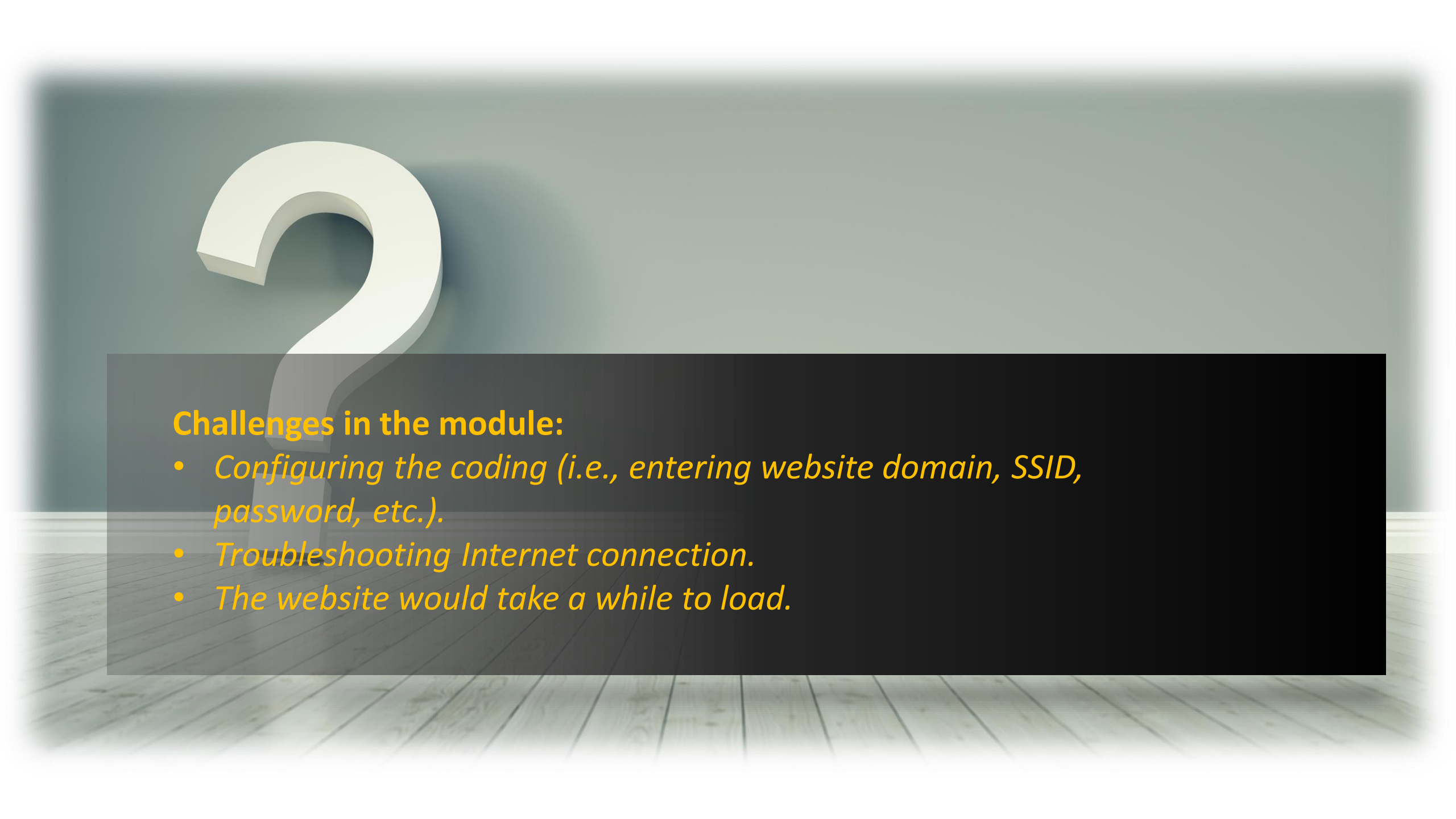
This screenshot displays the website domain that is connected from the smart router and the ESP32 board. Via Arduino, the IP address was entered from the serial monitor to the web browser.

Circuit Breadboard and ESP32 with LED

Picture of circuit with ESP32 board on breadboard with LED



After clicking the one of the links, it would activate LED light to turn on. When clicking the other link, the light is deactivated.



Challenges in the module:

- *Configuring the coding (i.e., entering website domain, SSID, password, etc.).*
- *Troubleshooting Internet connection.*
- *The website would take a while to load.*

Skills Learned in Module 6:

- Hardware deployment – Testing Wi-Fi connection with ESP32 first, then installing the mini router to use with ESP32.
- Operating system knowledge – Configuring connections through the Device Manager, or through networks.
- Network configuration – Finding the right Internet connection by entering the correct information (i.e., SSID and password).
- Coding – Learning from previous modules, understanding to enter the correct input for the website work sufficiently.
- Problem-solving – Troubleshooting the technical difficulty of the connection of an IP address that was entered.
- Resourcefulness – Finding other possibilities of troubleshooting a bad network connection.

What Was Learned…

Learning about IoT is an experience (virtual and hands-on); in order to have the knowledge and understanding of the Internet of Things, we can simply learn by applying some of the knowledge that we already have. On the other hand, others who have little or no experience at all would be a little confused. When handling new material, one can get lost and wonder how these devices function. It takes knowledge, research, and a lot of tinkering to understand and demonstrate how IoT works.

Thank you.

Feedback is welcome!