DeVry University

Security System

CEIS101 Final Course Project

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Introduction

- The objective of this project is to create a smart home automation and security system using an integrated IoT system. The project is comprised of six parts that will progressively build on each other to produce a prototype which includes various devices such as a door sensor, distance sensor, and automated lights.
- The following tools were used in the project: Tinkercad for computer-aided design (CAD), Arduino Uno, Breadboard, 10kΩ resistor, LEDs, Ultrasonic Sensor, Active Buzzer, Photoresistor, wires, and a slide switch.

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Module 2

Circuit Simulation in Tinkercad

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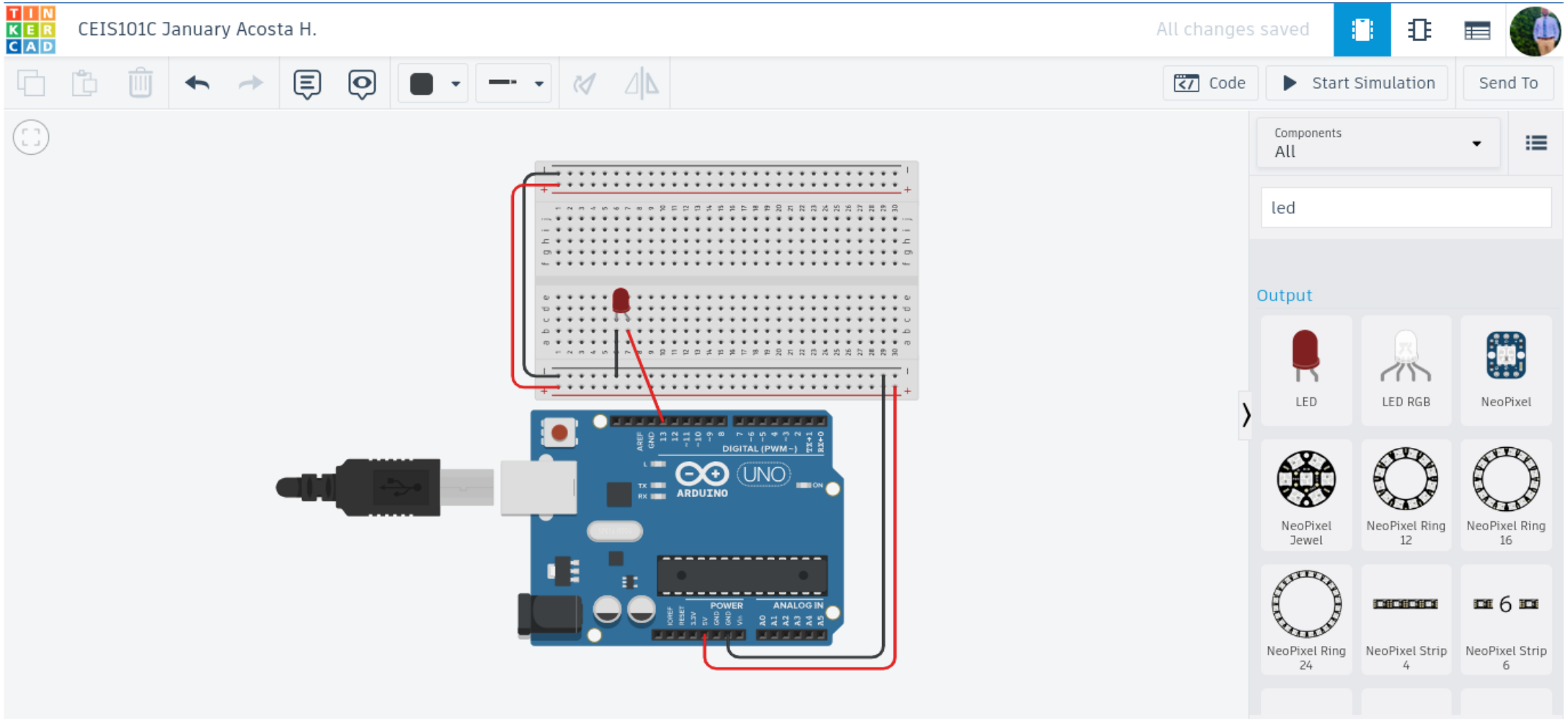
Circuit



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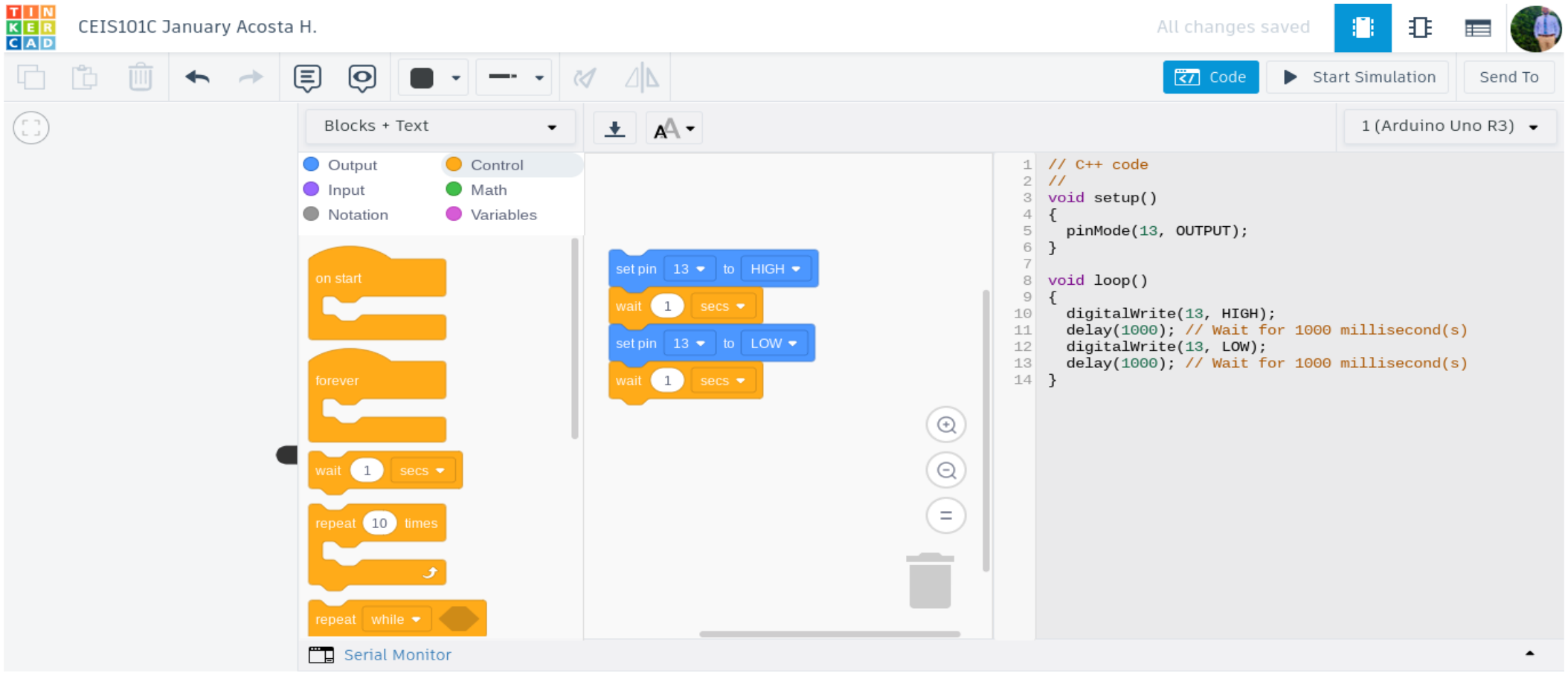
Code



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Module 2 Objective

- The objective of this module is to introduce the concept of simulation using a virtual emulator, familiarize myself with the hardware components required to build a physical system, understand programming logic and design of hardware, and learn about error handling principles in operating systems.

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Module 3

Inventory of Parts, Circuit Building, and Displaying Messages

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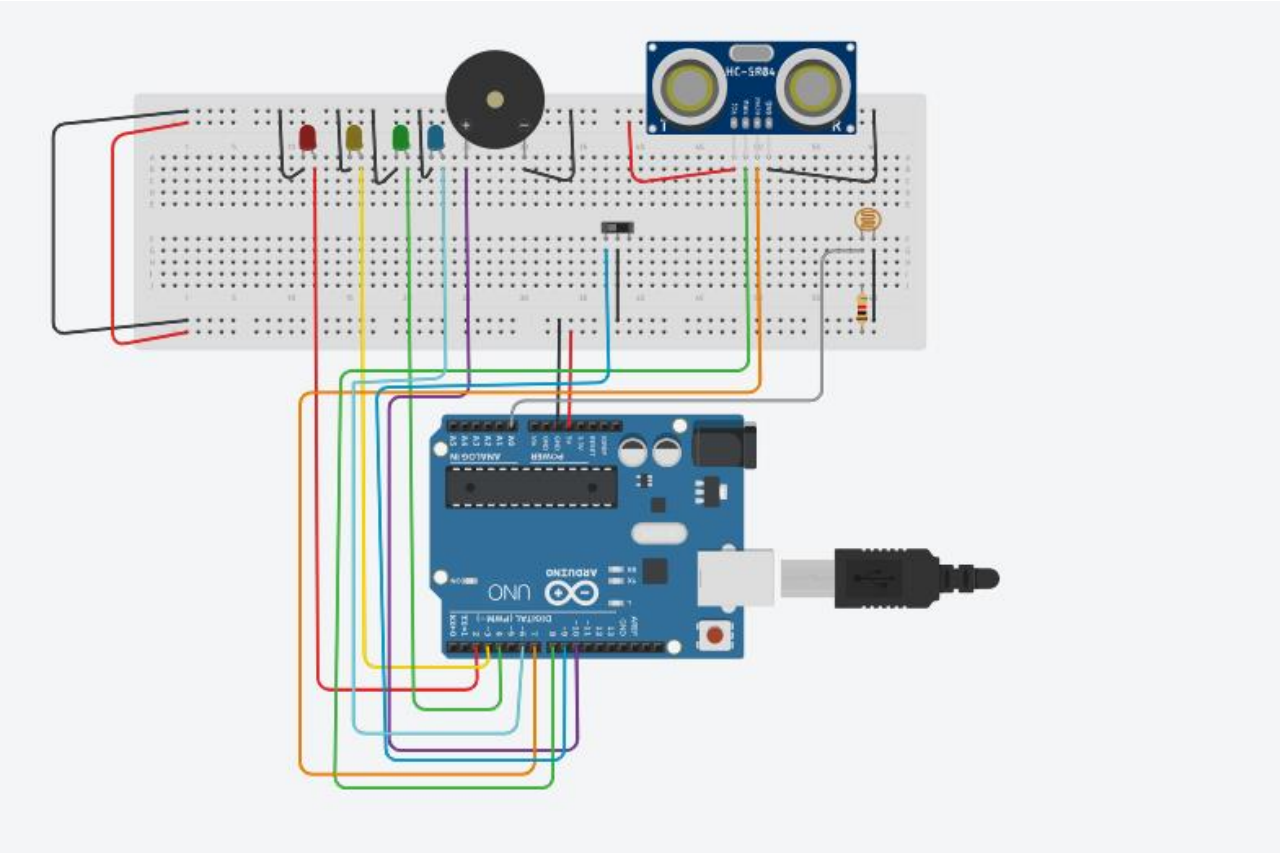
Organization of Project Components

- Arduino Uno
- Breadboard
- Resistor 10kΩ
- LEDs
- Ultrasonic Sensor
- Active Buzzer
- Photoresistor
- Wires



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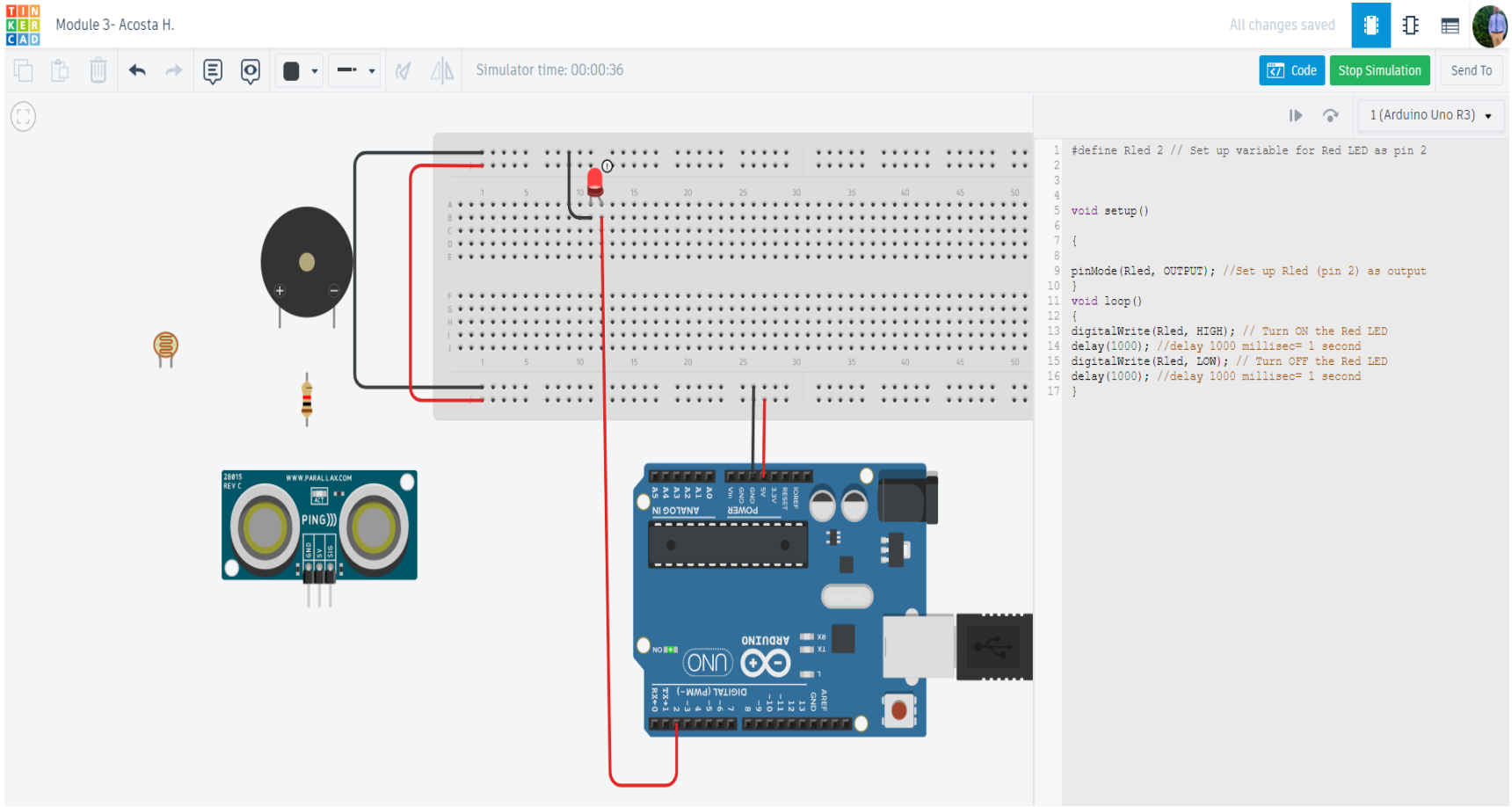
Circuit with red LED on



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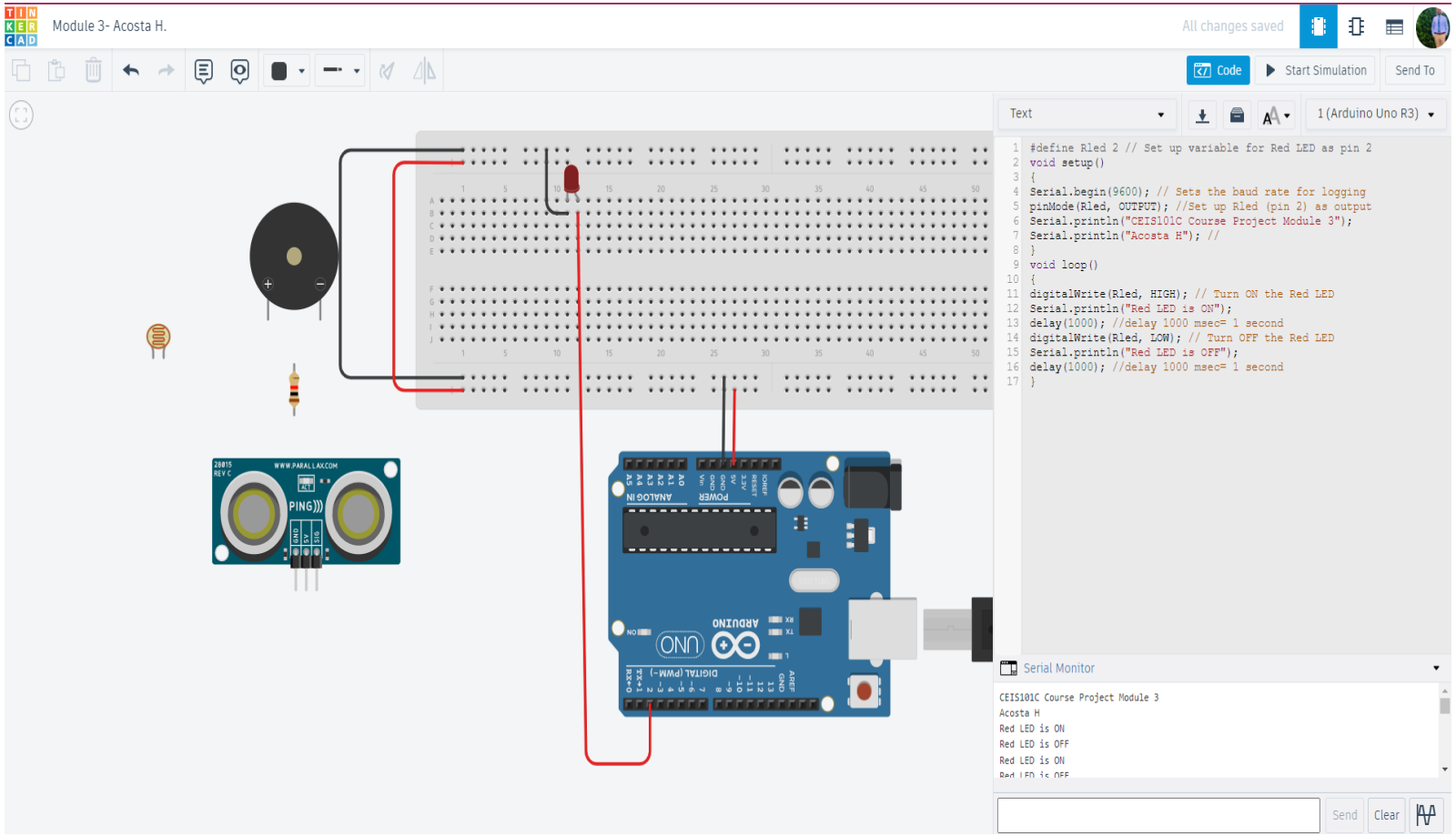
Serial Monitor



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Module 3 Objective

- The objective of this module is to acquaint myself with the hardware components required for the project, to gain knowledge of building circuits with LEDs (Light Emitting Diode), program LEDs, initialize the Serial Monitor, and send messages to it.

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Module 4

Adding Door Sensor to Smart Home System

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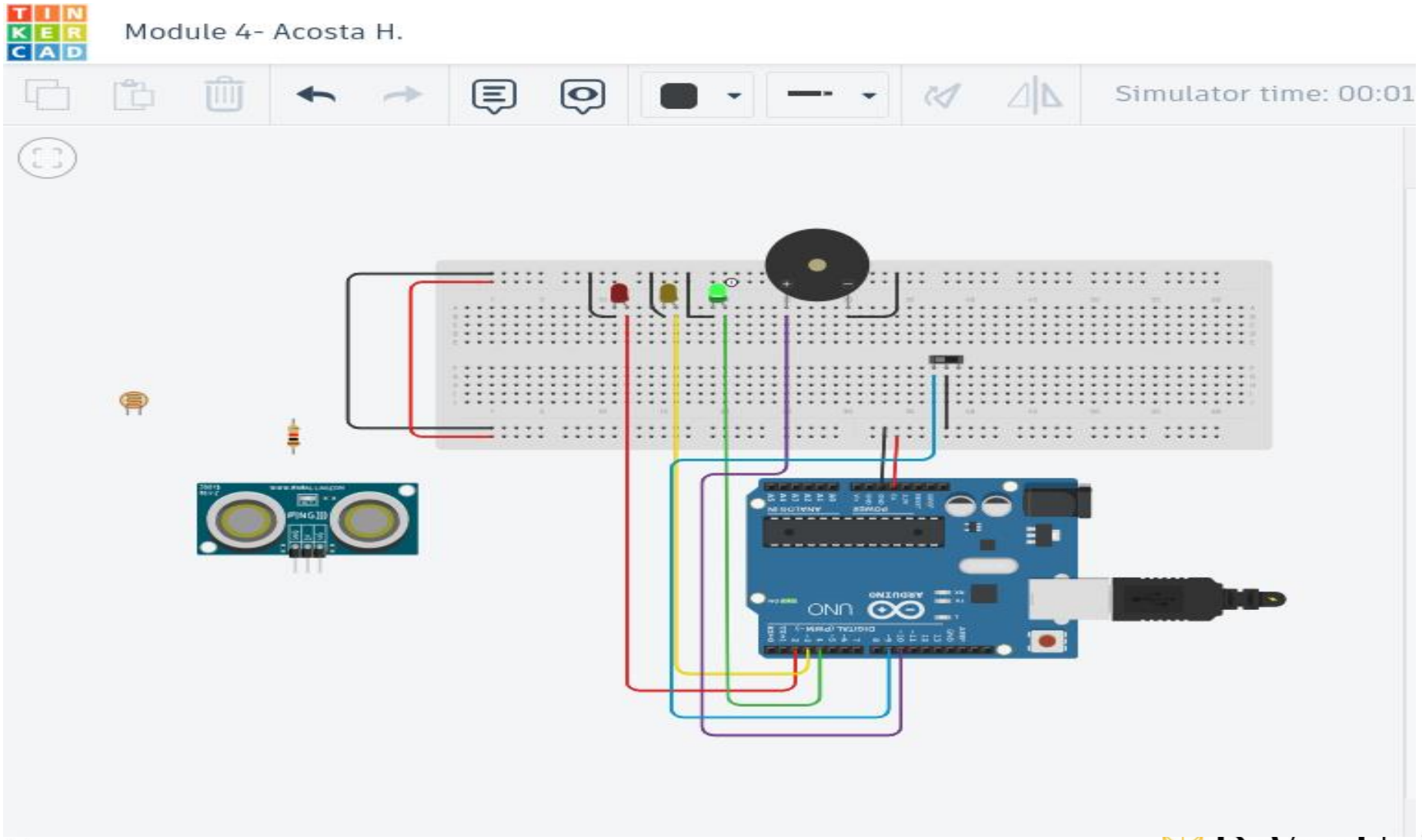
Circuit of door closed with Green LED ON



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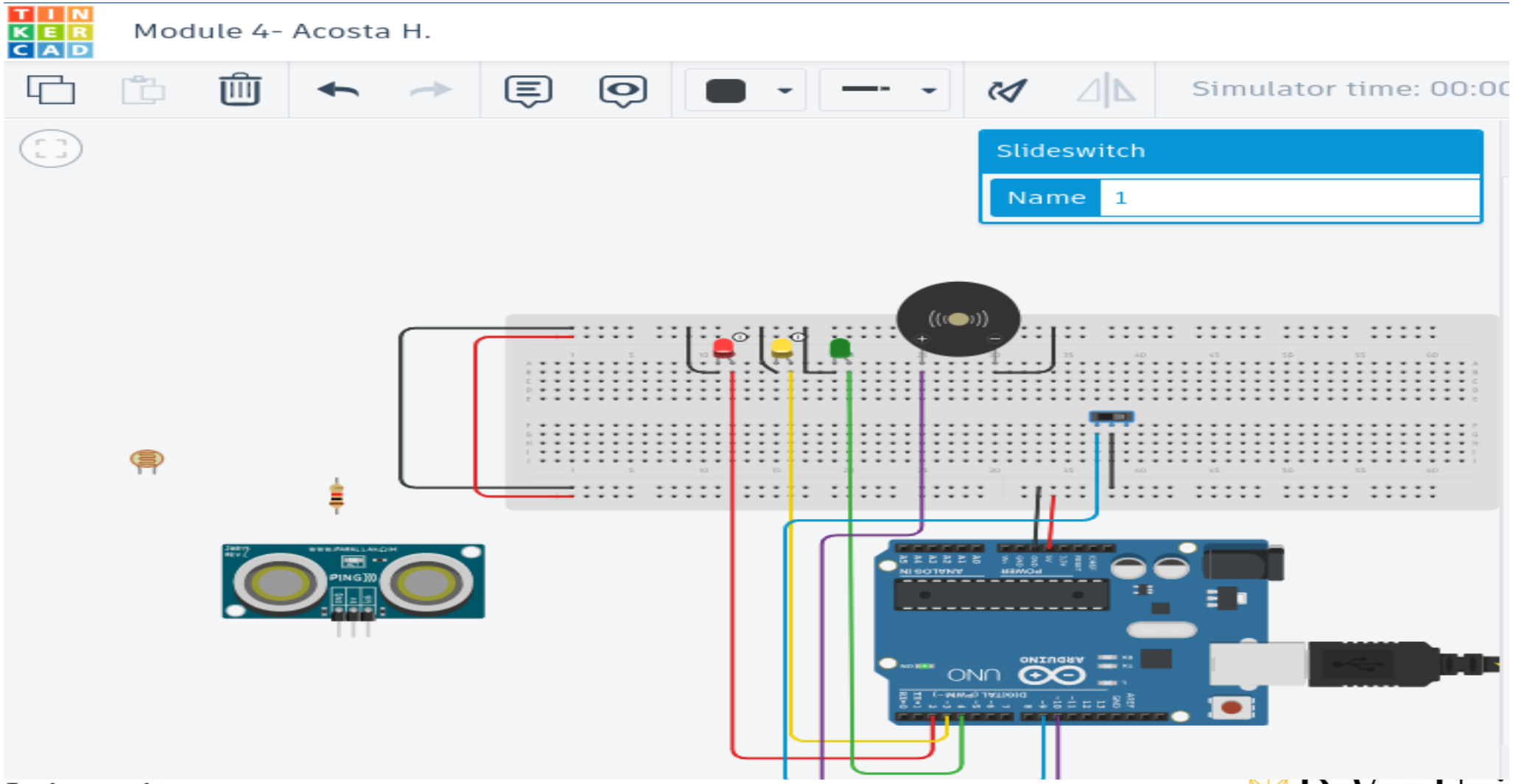
Circuit of door open with Green LED OFF



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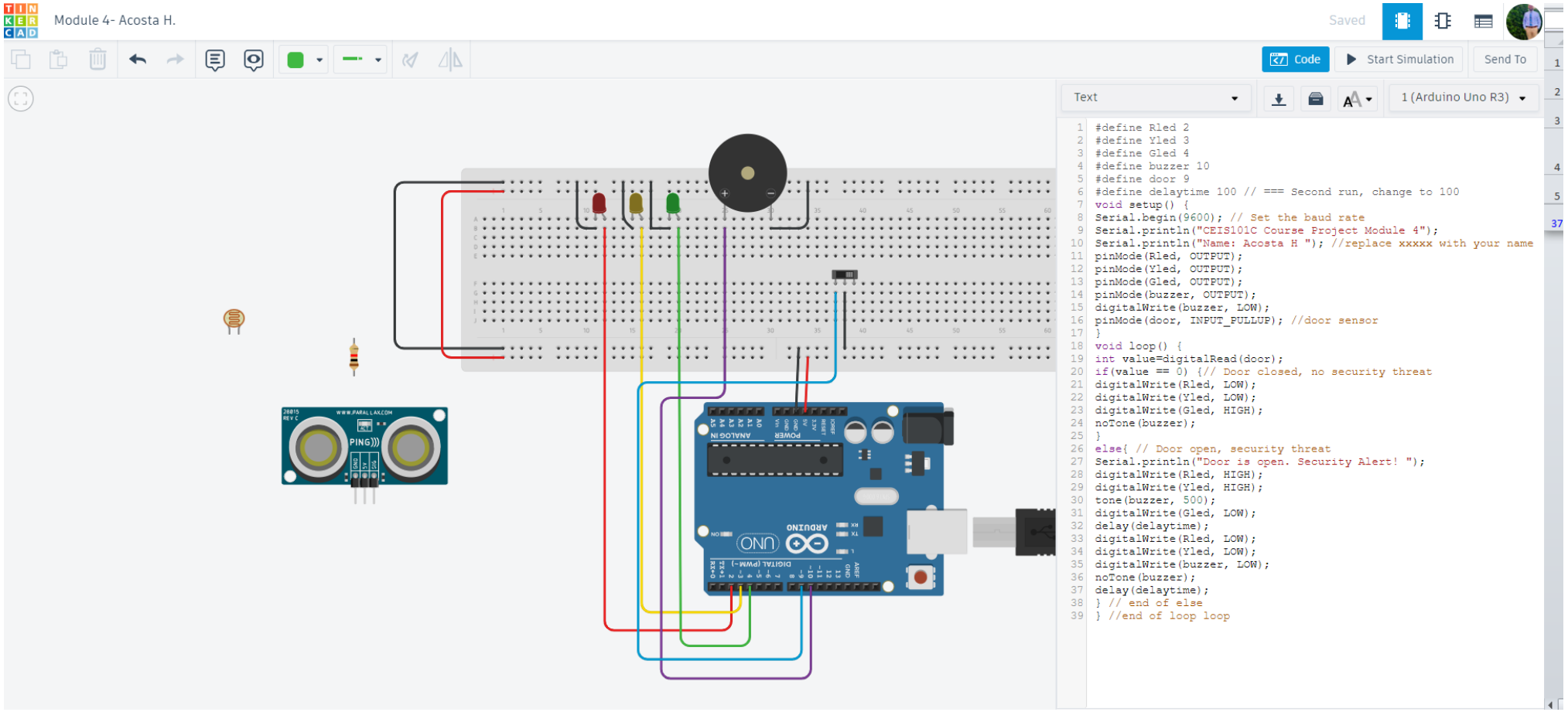
Arduino Code



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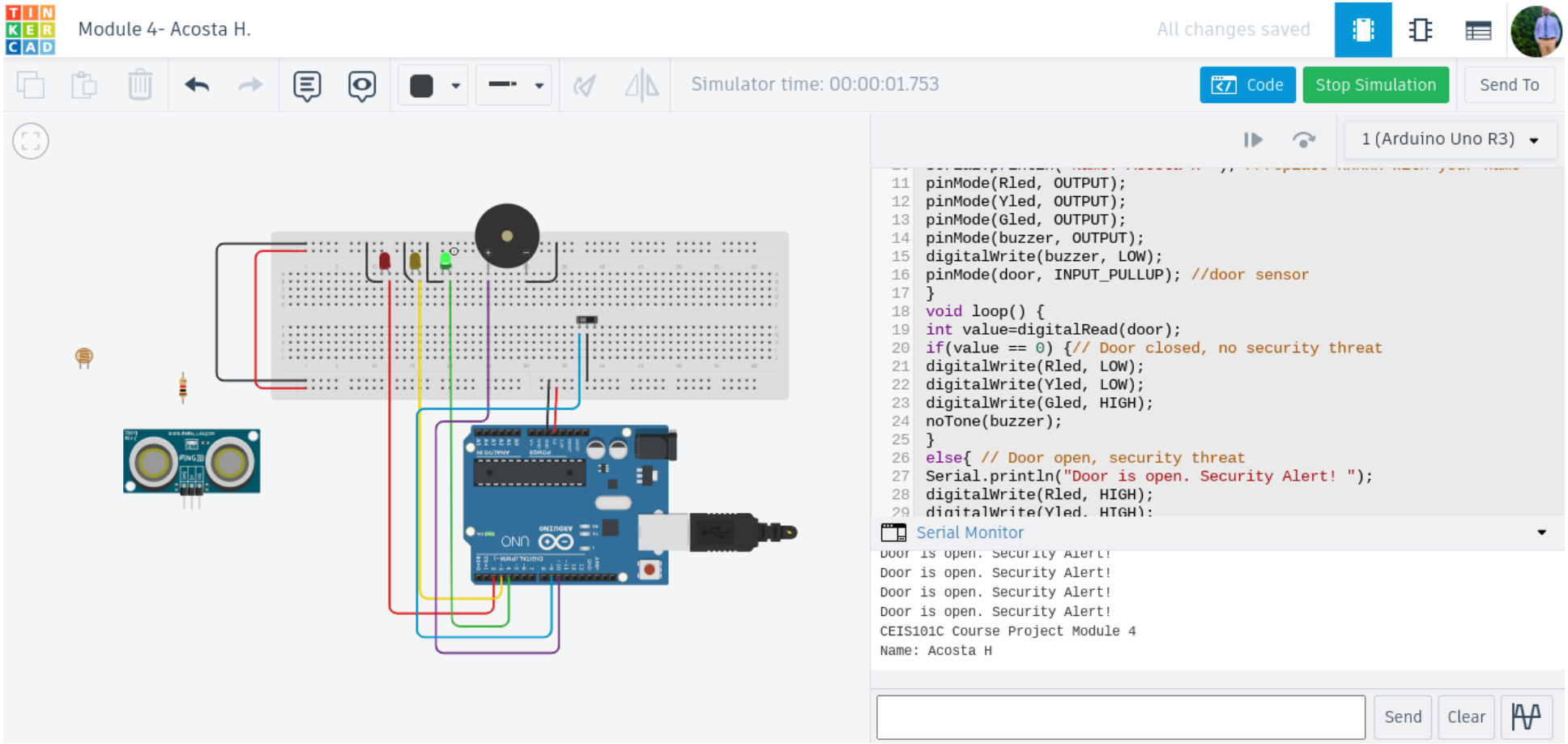
Serial Monitor



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Module 4 Objective

- The objective of this module is to connect multiple LEDs to the Arduino board, connect a buzzer to it, and a wire to simulate an open or closed door, integrate an alarm into a security system to become dramatically more effective and It's important to become familiar with conditional programming instructions. Conditional statements in Programming, also known as decision-making statements, allow a program to perform different actions based on whether a certain condition is true or false.

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Module 5

Adding Distance Sensor to Smart Home System

and Conducting Data Analysis

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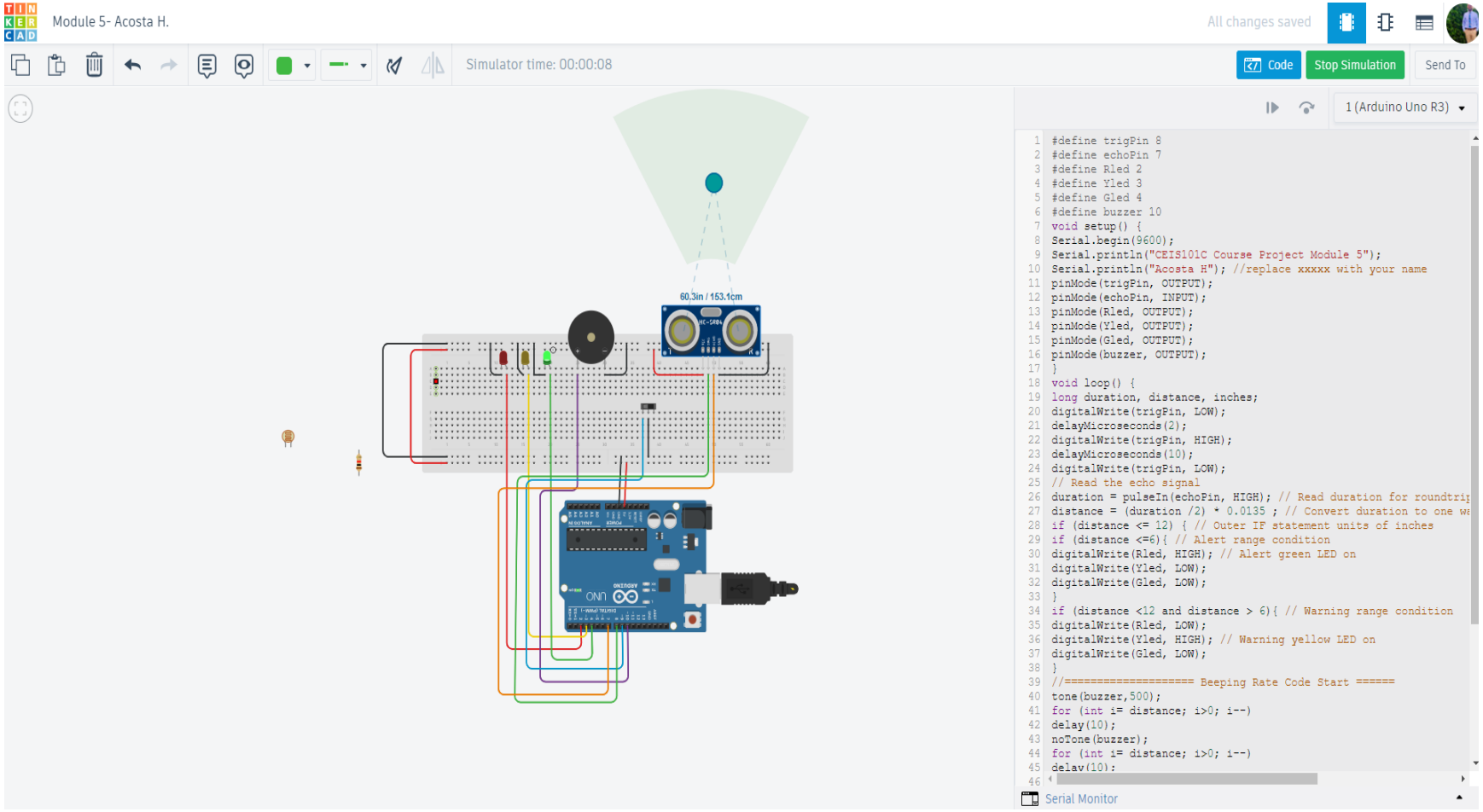
Circuit with green LED on



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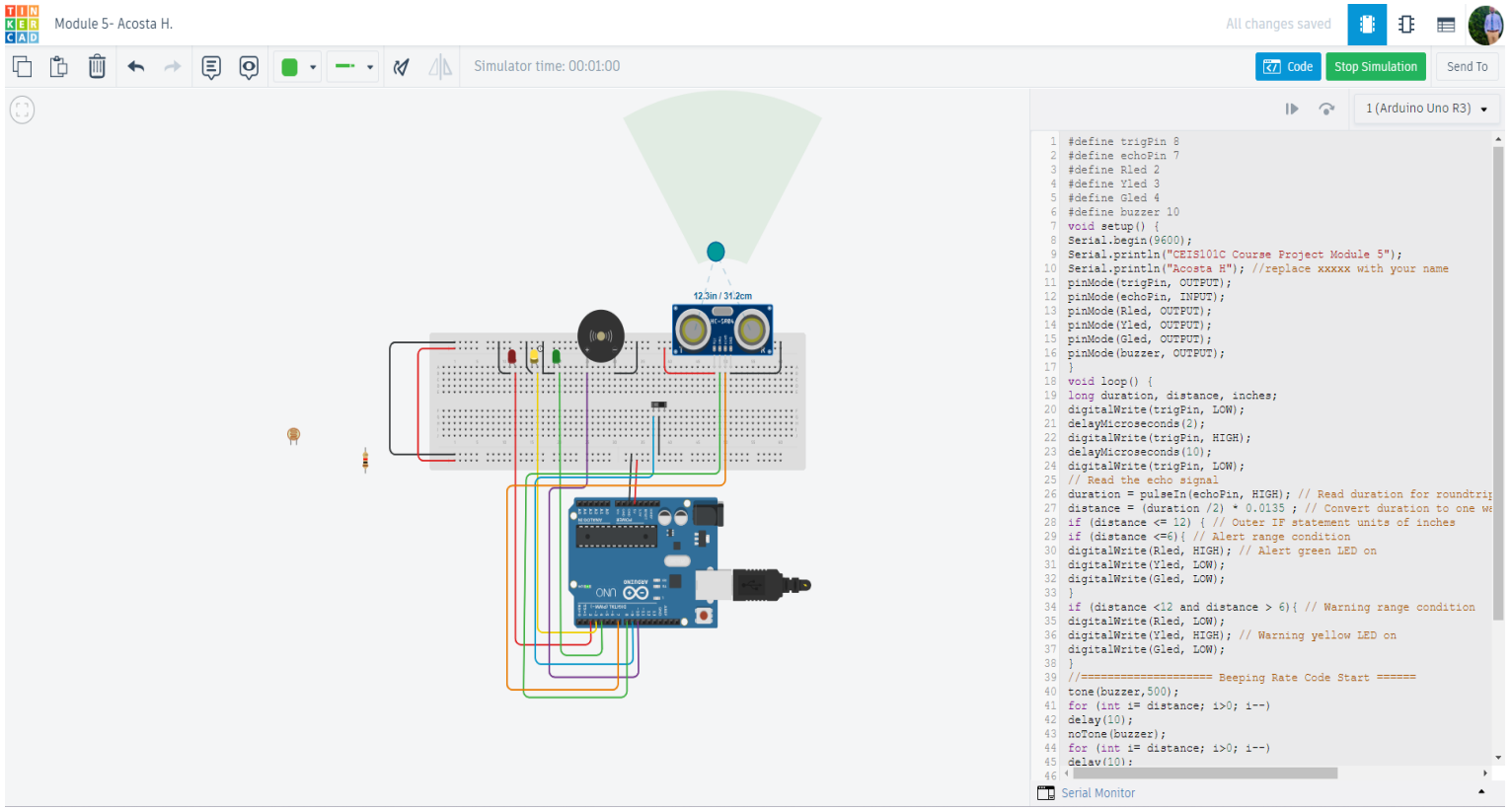
Circuit with yellow LED on



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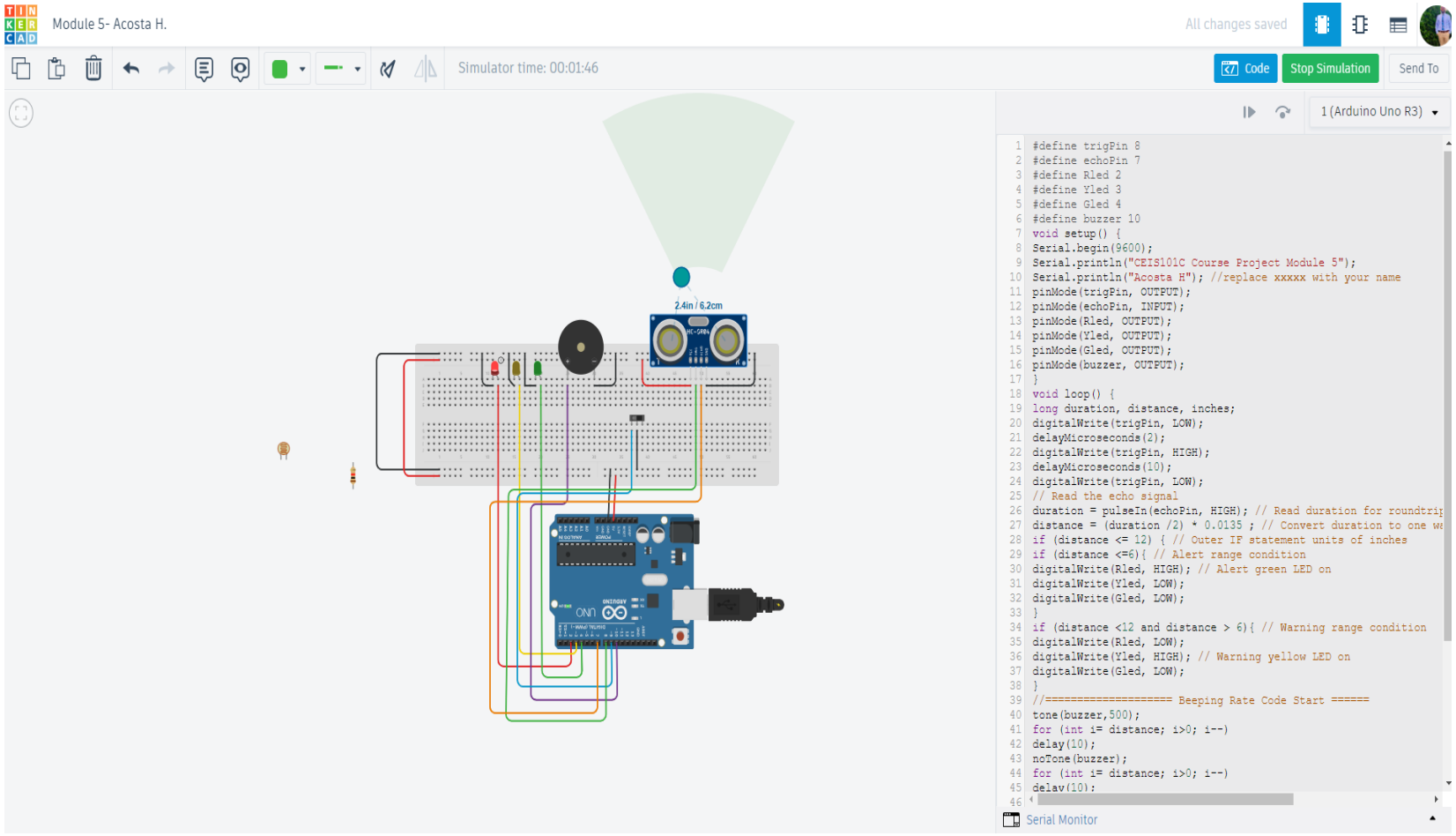
Circuit with red LED on



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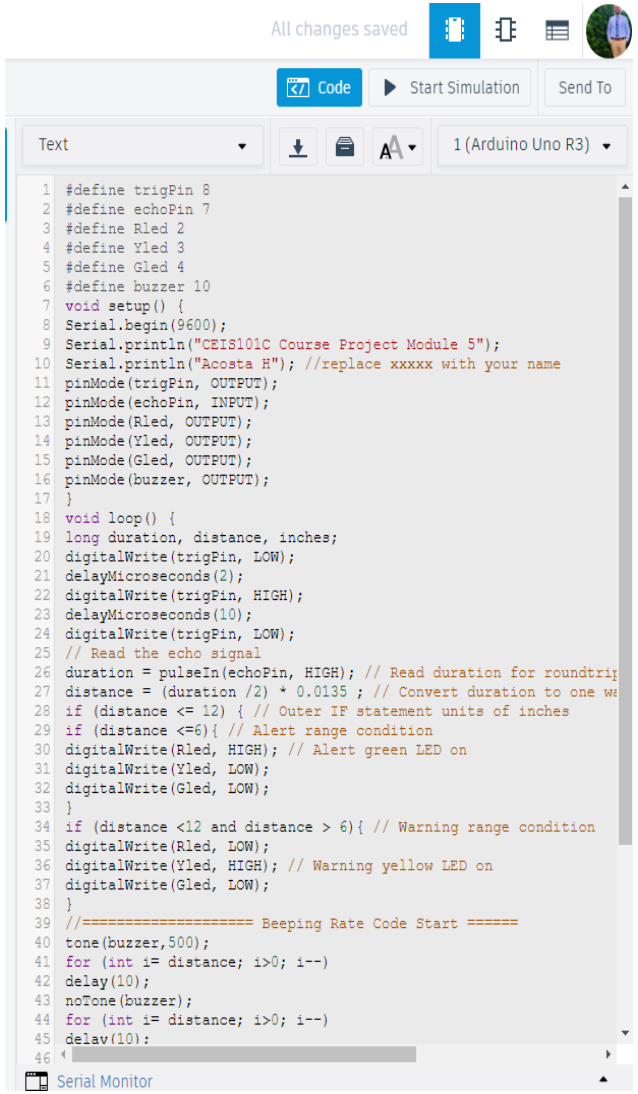
Arduino Code



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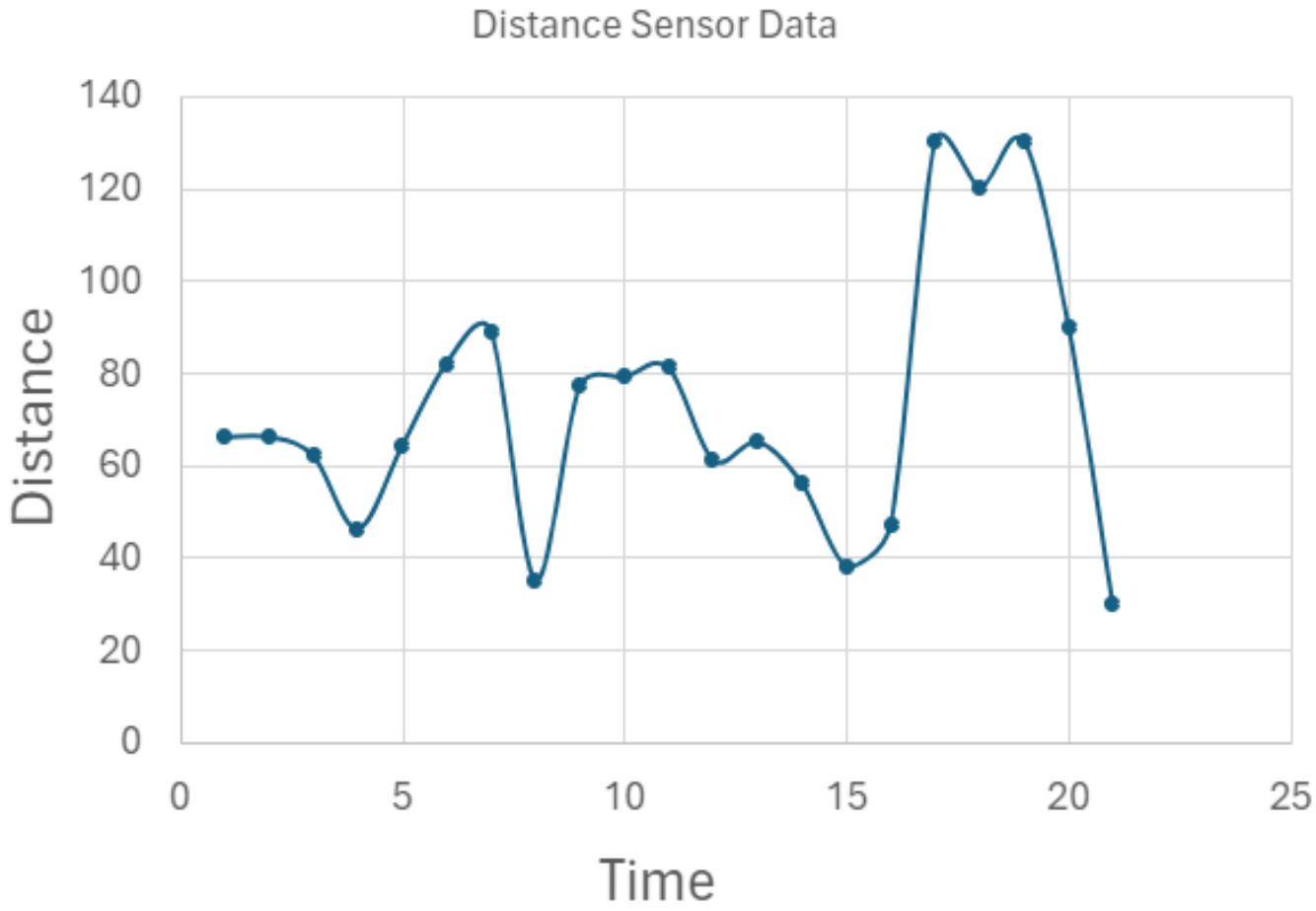
Plot of data



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Module 5 Objective

- The objective of this module was to connect an ultrasonic range finder to the Arduino board and write code that utilizes the ultrasonic range finder, You can use them to find the distance to an object, or to detect when something is near the sensor like a motion detector, make the buzzer produce sounds through code when the distance is too close, display data to the Toggle plotter, and analyze data generated by sensors.

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Module 6

Adding Automated Light to Smart Home System

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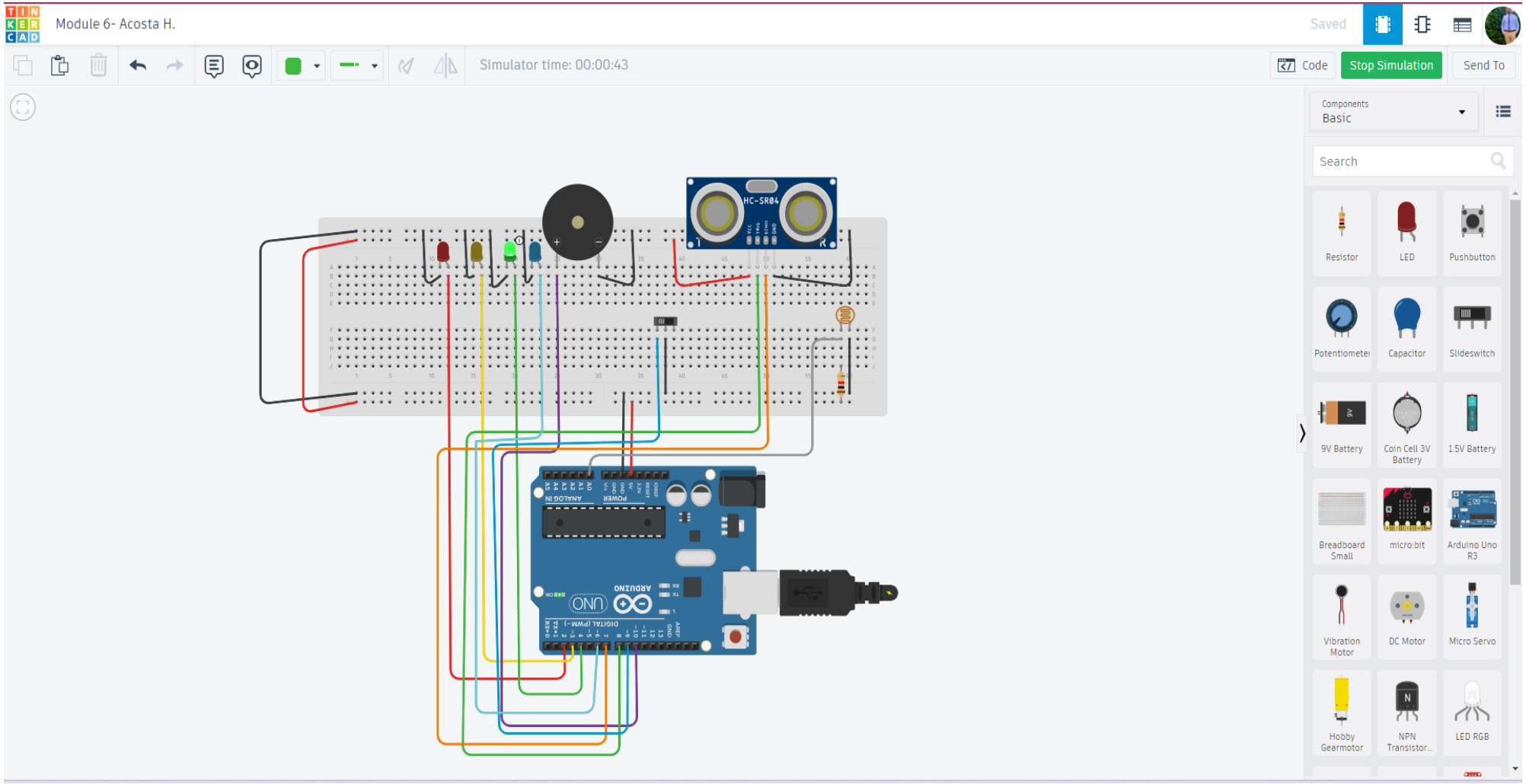
Circuit with automated LED off



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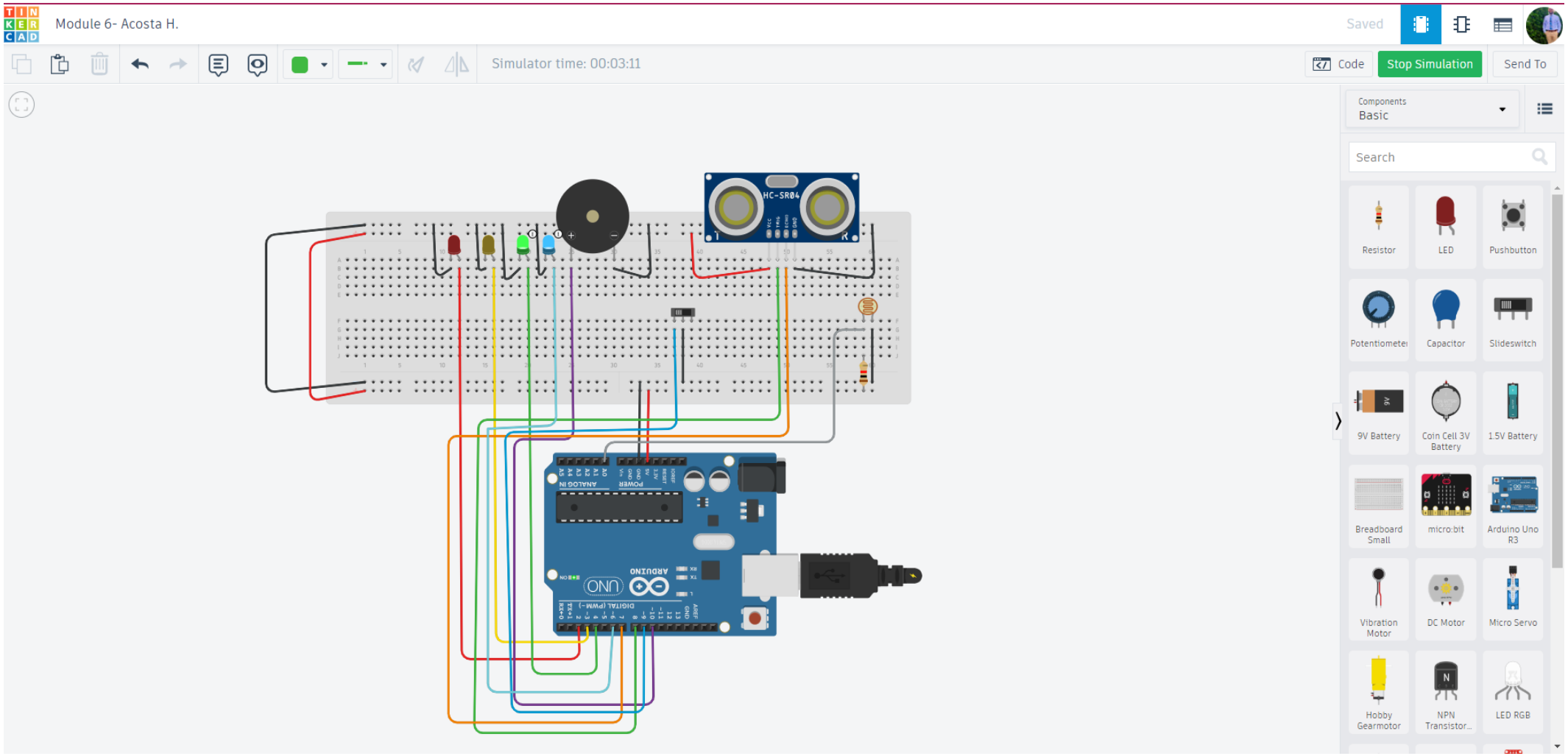
Circuit with automated LED on



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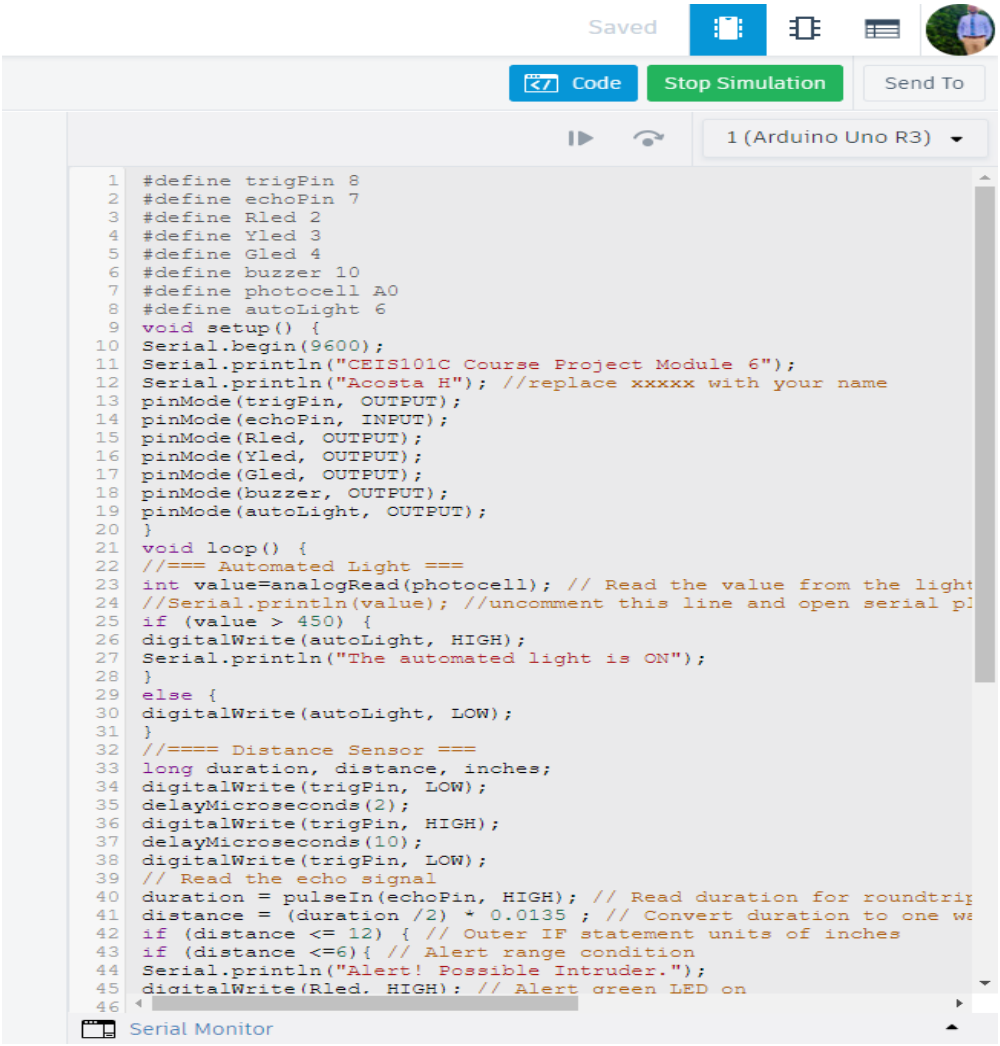
Arduino Code



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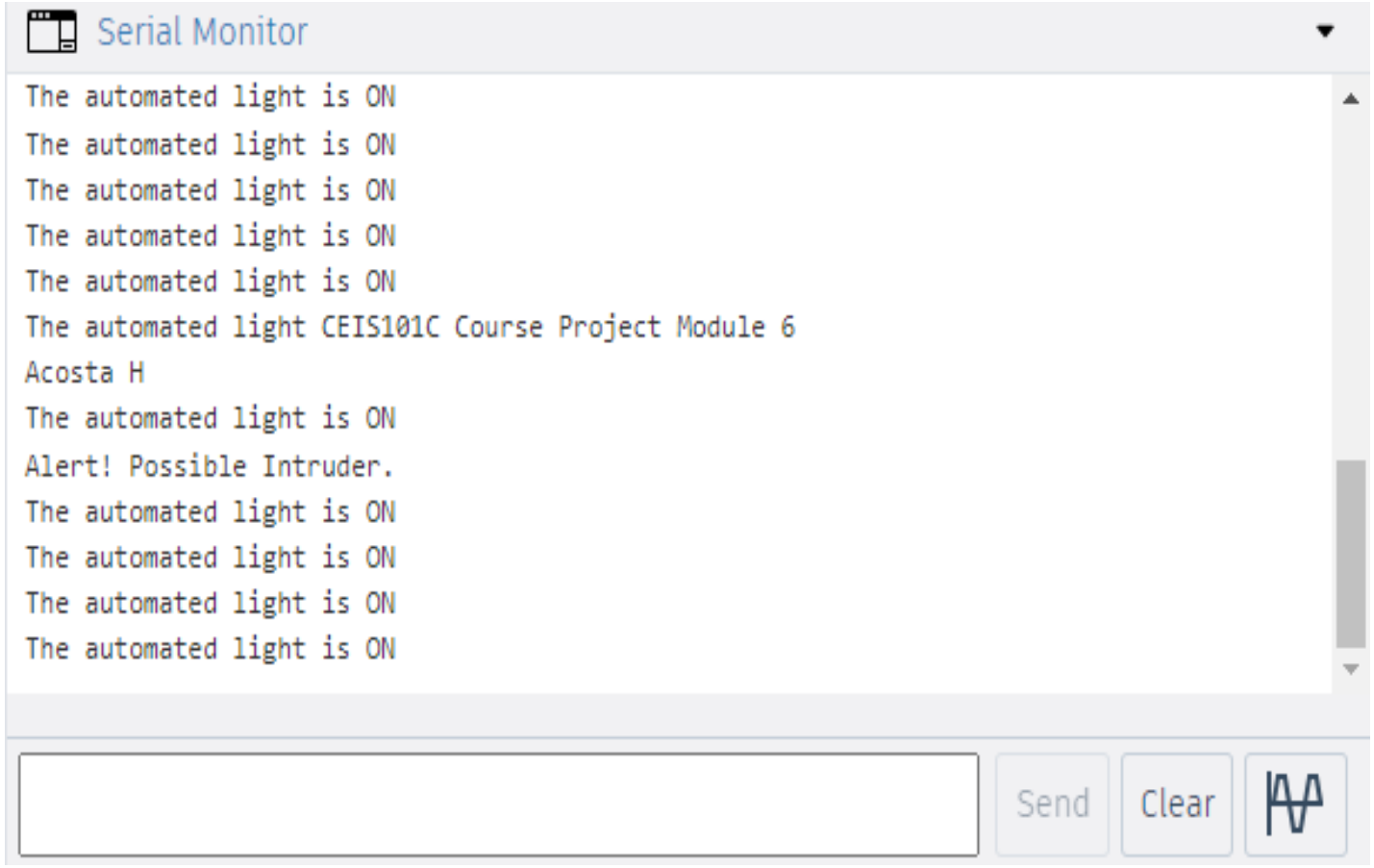
Serial Monitor



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Module 6 Objective

- The objective of this module was to connect a light sensor to an Arduino board and develop a code that communicates with the sensor causing the lights to turn on based on the sensor reading.

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Challenges/Lessons Learned

- While working on module 4 to add an automated light switch to the smart home system, I faced a challenge with my code. I encountered two alarms on lines 22 and 31 which prevented me from running the program. Due to this issue, I was unable to see the LED lights turn on.
- To overcome these challenges, I followed a systematic approach. Firstly, I observed others who encountered similar problems. Then, I carefully analyzed my code to identify any errors such as typos. Recently, I encountered a similar problem with an LED light function. Upon monitoring the code, I realized that the comments were placed on the wrong lines. I revised the comments and placed them on the correct lines, I re-ran the code, and the LED light function worked as expected.
- The lesson I learned is that it's important to pay close attention to details, especially when working with code. Learn the commands well.

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Career Skills

The skills I develop to benefit my career in this project are the following:

- Programming
- Circuit Design
- Troubleshooting
- Connect cables
- Change the color to LED lights
- Sensor reading

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Career Skills

The competencies that I gain in this project to advance in my career are the following:

- Project design
- Project solving
- Data analysis
- Organization
- Analytical skills
- Adaptability

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Conclusion

In this project, I have designed a smart home automation and security system using Tinkercad and the Arduino IDE. This project has helped me gain knowledge in circuit design, programming, and the Arduino IDE. By creating a visual chart of the system, I developed my analytical thinking, which is essential for the project's success. This project aims to help others secure their homes, feel peace of mind, and avoid feeling vulnerable to the dangers they may face within their own homes.

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References

- I have been using the training and classes provided by Professor LaQuata Sumter at DeVry University.

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