Department of Electrical Engineering and Computer Science

EECS 2032W,2021 – Introduction to Embedded Systems

Distance Measuring and Fan Cooling LED Ultrasonic Sensor

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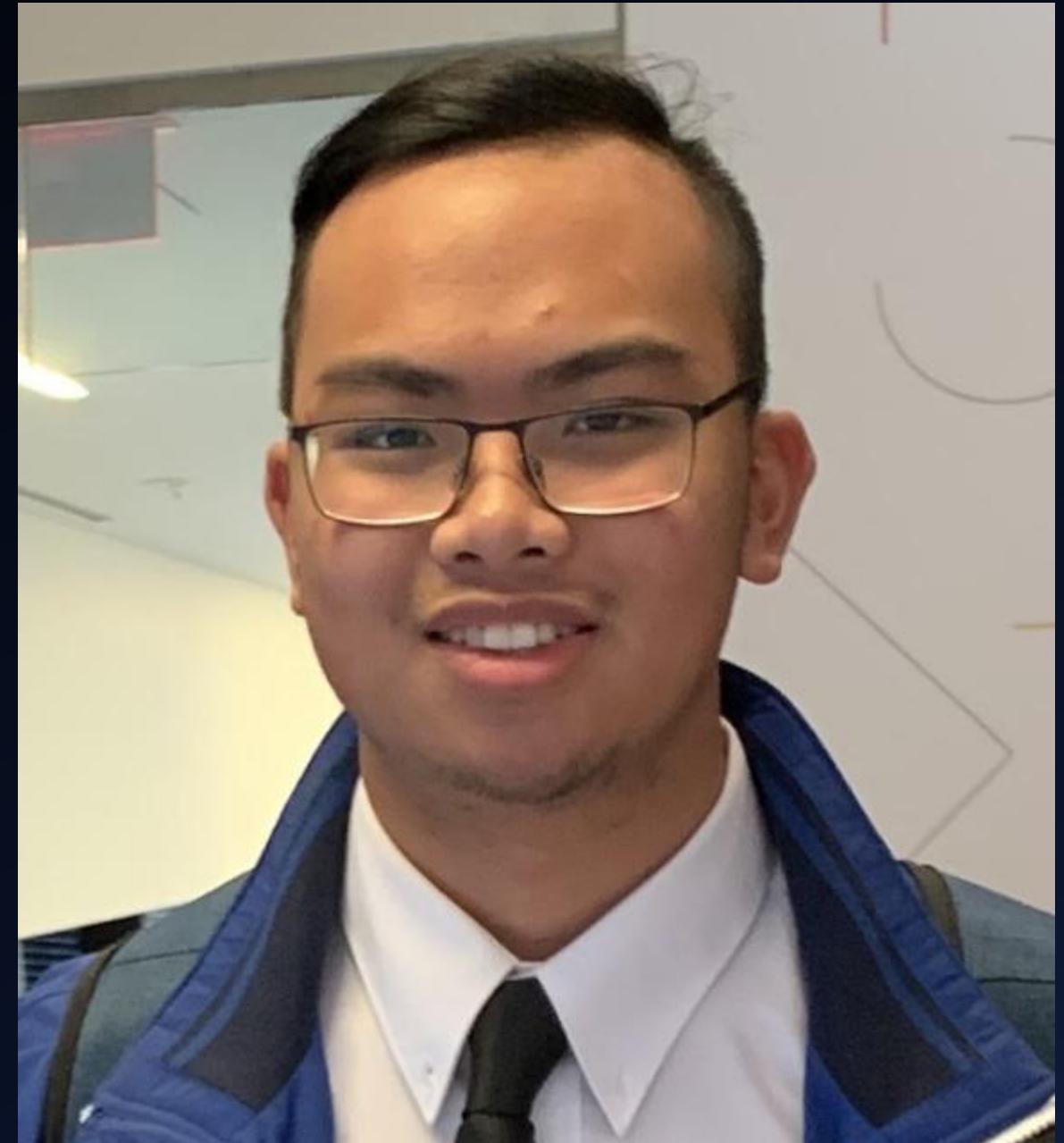
INTERVIEW

Who Am I?

- My name is Kevin Nguyen.

- I am in 2nd year Computer Engineering.

My Learning Experiences

- I have learned how to manage my project and time.

- I learned a lot more on how each of the components worked.

- I learned about making a schematic and prototyping on TINKERCAD.

- I have also learned how to code on Arduino IDE and learned about the different libraries I needed to add.

- This successful experience can help me developed a career in the future because many of the skills associated with the project such as brainstorming, rapid prototyping, design, and electronics were improved through the many smaller tasks I have completed.

GENERAL DESCRIPTION OF PROJECT

Main Objective of the Project

- The main object of the Project was to create a LED ultrasonic sensor that will measure distance and turning on the fan depending on the distance of the object from the sensor.

- This is my first time using Arduino so I am learning the basics.

- The promise feature are distance measuring, fan cooling, and LEDs indicator that indicates how close an object is.

What is Interesting in this Project?

- The interesting part in this project is being able to turn on the LEDs or fan depending on the distance of the object.

- The device can be used for distance measuring and for fan cooling.

Similar industrial or commercially available technologies /devices

- Smart light bulbs that turn on as soon as you enter a room.

- Smart/self driving cars that can detect how far an object is from the car and anti-collision safety systems.

- Automatic sliding doors in malls.

- Home security system that relies on the sensor to detect an intruder.

- Robotics for obstacle detection system.

Source of Program or Hardware
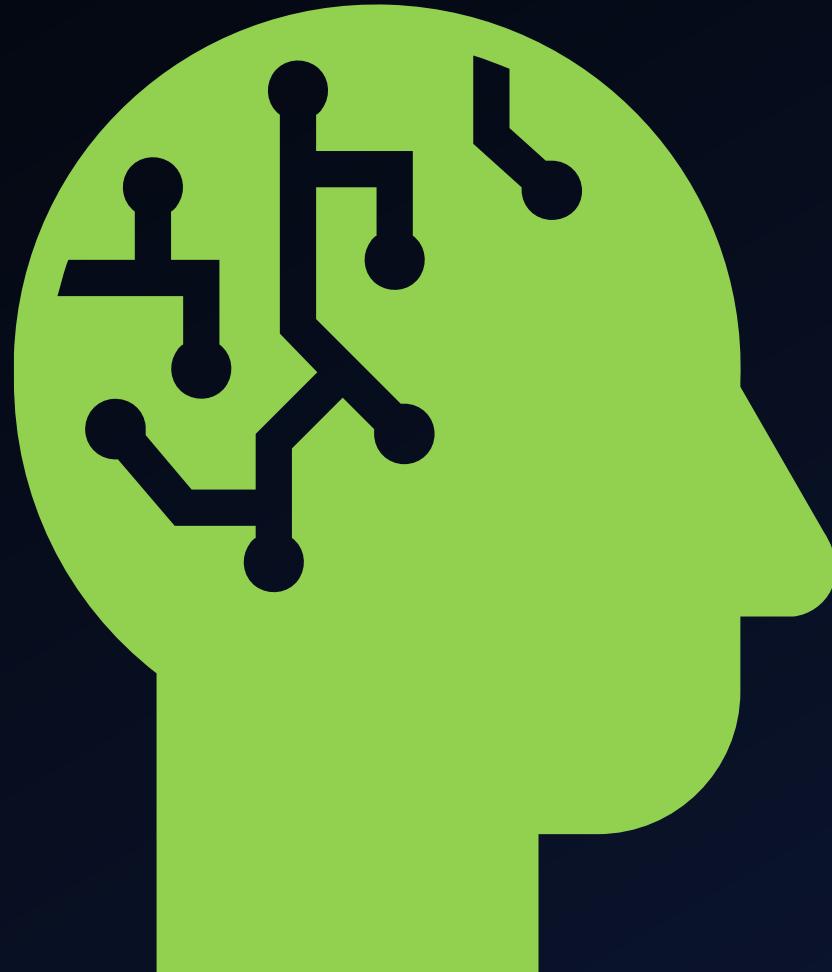
- The idea of this project came from this website below.

- https://lastminuteengineers.com/arduino-sr04-ultrasonic-sensor-tutorial/

- I wanted to do a project base on the HC-SR04 Ultrasonic distance sensor.

# What is different from the source of project?

- The difference would be where I added additional components such as the DC motor and LEDs.

- I also modify the software that will control the DC motor and LEDs base on the distance of the object.
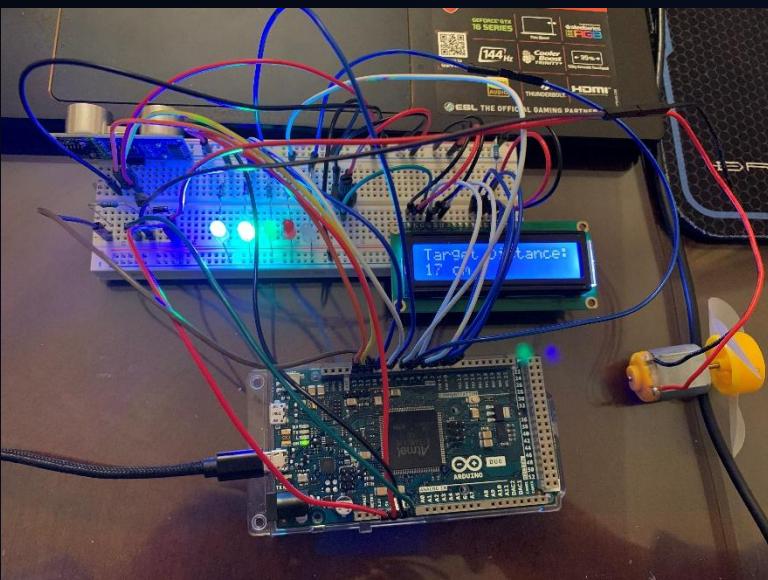
SPECIFIC DETAILS
OF PROJECT

Schismatic of Project

- The project was challenging and tough, but it wasn't impossible.

- I had to follow a set of steps to achieve the final product below.


Brainstorming

Prototyping
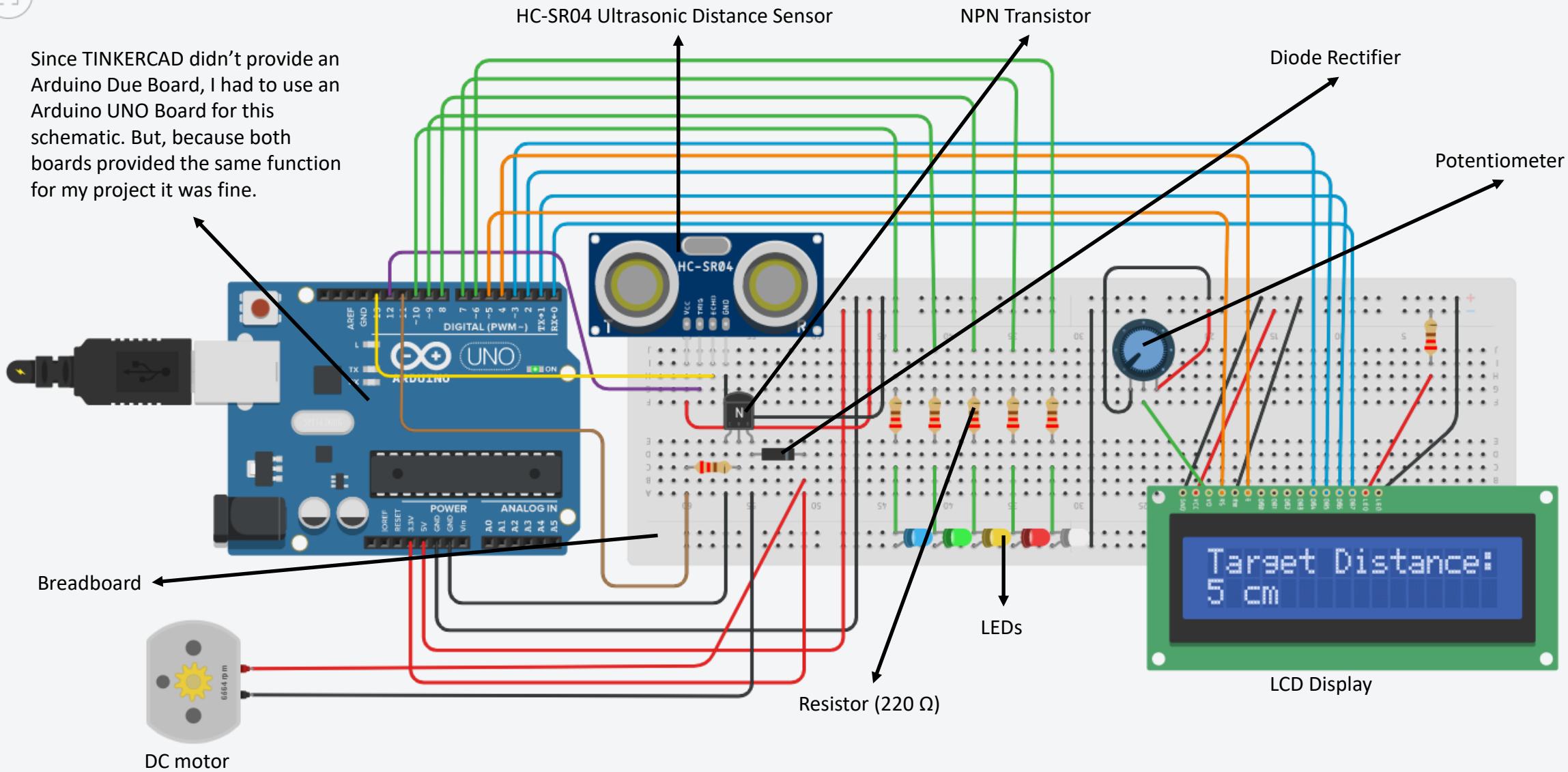
Building

Testing

Circuit Schematic & Components made through TINKERCAD
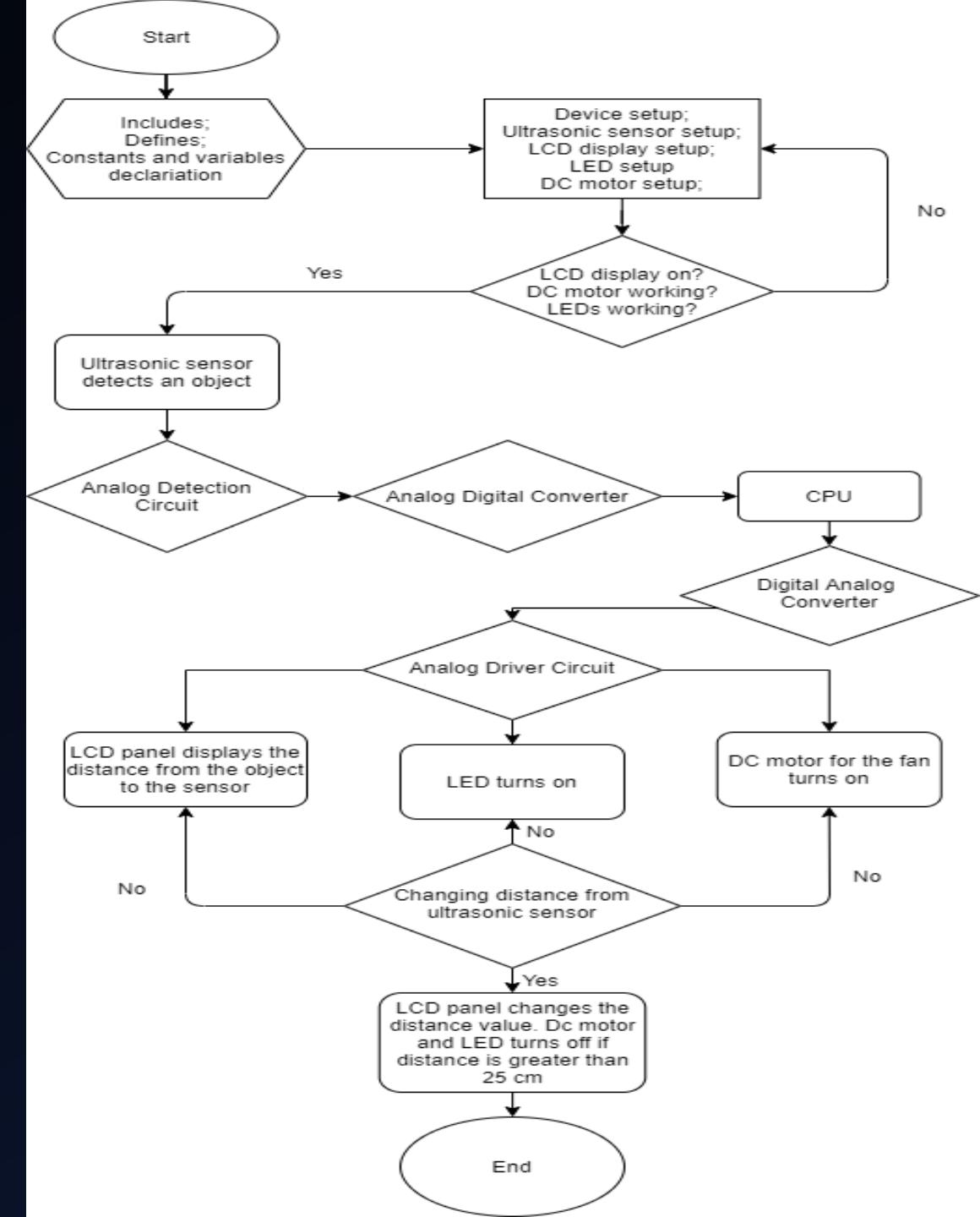
Since TINKERCAD didn't provide an Arduino Due Board, I had to use an Arduino UNO Board for this schematic. But, because both boards provided the same function for my project it was fine.

HC-SR04 Ultrasonic Distance Sensor

NPN Transistor

Diode Rectifier

Potentiometer

Breadboard

LEDs

Resistor (220 Ω)

LCD Display
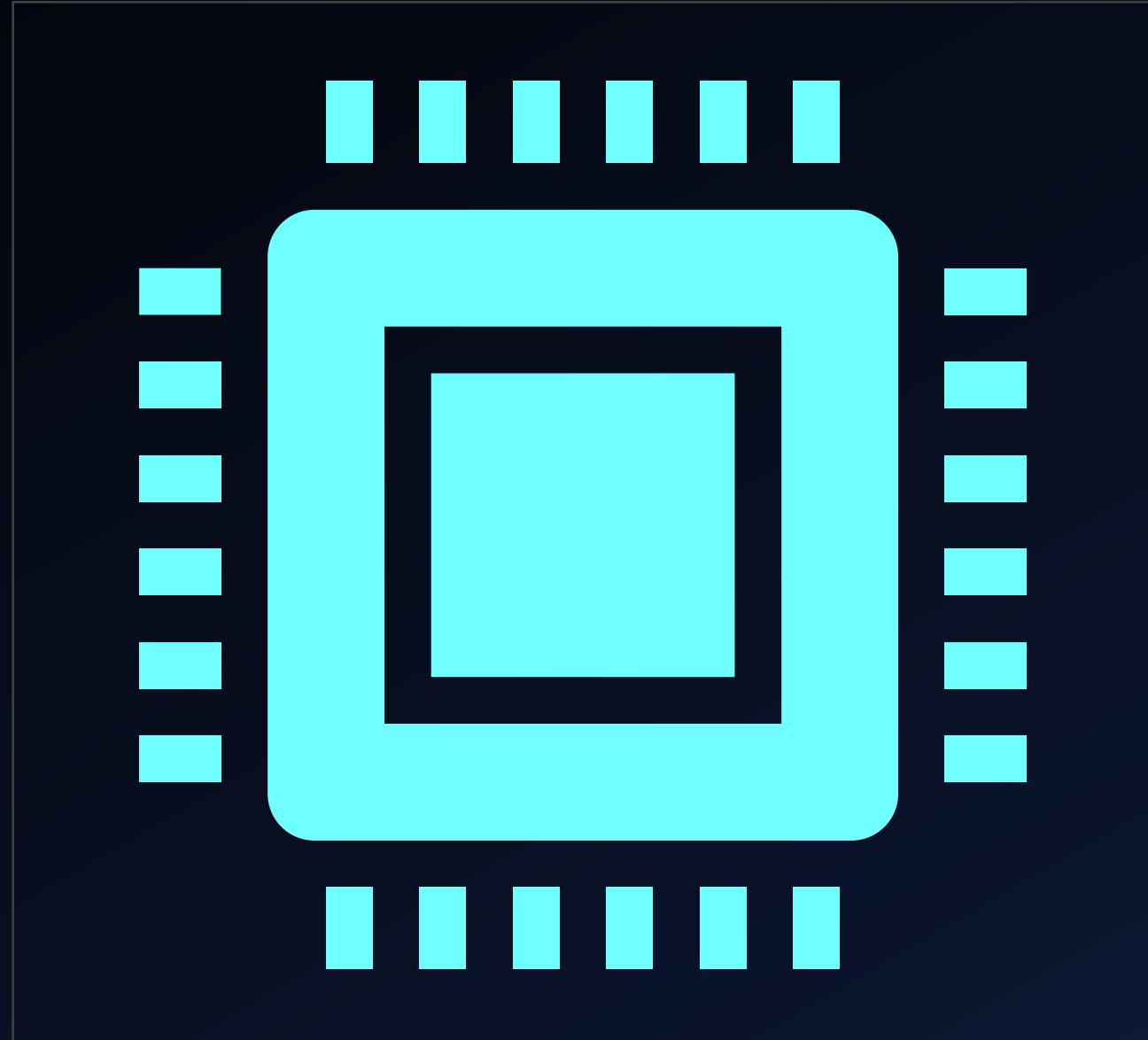
DC motor

FLOW CHART

- For the DC motor, I coded that it will only turn on when the object is 15 cm or less from the sensor.

- For the LEDs, I coded when each of them turn on depending on the distance of the object from sensor.
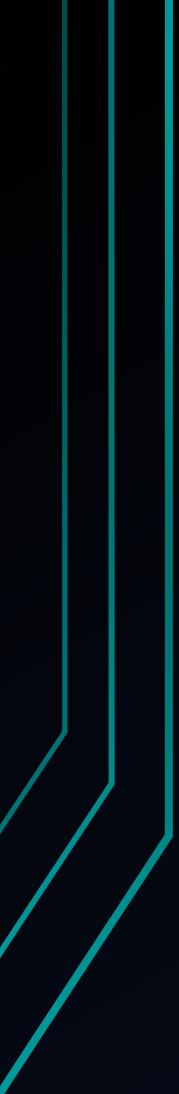
DEMONSTRATION OF FUNCTIONALITY

Demo Video

DISCUSSIONS

Technical Problems and Solutions

- A technical problems I faced in my project was sharing the 5V pin with the LCD display and DC motor because the display would glitch out and not display the values whenever I shared the 5V between them.

- My solution was using a 3.3V pin for the DC motor and the 5V pin for the LCD display.

- I also had a lack of experience working with the Ultrasonic sensor, so I would have to do more research about them.

What can be done in your project to commercialize your product?

- I would have to advertise it in some way or form that will my product appealing and important.

- The other steps could be using the ultrasonic sensor not just for measuring distance but also to detect objects for smart light bulbs, self-driving cars, home security system, or robotics.

- It has a market for anything to do with object/presence detection.

- Such as security, or diverging from dangerous obstacles.

CONCLUSION

Was my Project 100% Successful?

- Yes, I would say my project was 100% Successful because everything went according to plan and there weren't any set backs.

My statement about working in COVID-19

- Working in Covid-19 was tough, but it was doable.

- Getting the materials for the project took twice as long as expected.

- Despite all the problems I was able to mange my time and was able to think ahead.

- I would order the components before the project and would try to order extras just in case.

References and Acknowledgement

- [1] Last Minute Engineers - How HC-SR04 Ultrasonic Sensor Works & Interface It With Arduino. Retrieved April 21, 2021, from https://lastminuteengineers.com/arduino-sr04-ultrasonic-sensor-tutorial/

- [2] Simple math behind calculating distance using Ultrasonic sensor HC-SR04. Retrieved April 21, 2021, from https://medium.com/@adityavijaynarkar/simple-math-behind-calculating-distance-using-ultrasonic-sensor-hc-sr04-66ed5a6aa214