Navigator

Dionisio Samora
Pueblo Community College

Abstract

While understanding how software and hardware components interact with one another through hands on application, the purpose of team Blindside, project prototype nicknamed "Navigator," is to provide an alternative to the traditional ways of navigating while being visually impaired. While more original means of navigating typically include walking canes or service dogs, "Navigator," an anklet, will alert the wearer when they are within a specified distance of 25 centimeters through a vibration of collusion with an obstacle. After researching multiple variations of distance sensors (laser, optical, magnet, etc.) for the anklet to find distance, an ultrasonic distance sensor was implemented which sends out a soundwave and calculates the time it takes for the wave to bounce back to the sensor. From there, code was uploaded to the Arduino which converts microseconds to centimeters. To find an average ankle size for the "Navigator," multiple students and peers were measured then added to the average ankle size followed by finding the mean of the data collected, giving an average of roughly 8 centimeters. The advancement of technology has allowed individuals to have aid in everyday tasks, by continuing to "upgrade" older items, there is a possibility to potentially find a more accessible alternative to previous tools/devices. By combining tools that aid those with disabilities and IoT devices, there is an opportunity to make life easier for those who would be interested.

Methodology

After reviewing multiple different types of distance sensors, it was decided that an ultrasonic distance sensor would be best. The distance sensor was then connected to an Arduino Micro board which was programmed to take in the distance (converting the sound waves to centimeters) followed by a buzz of a Piezoelectric Buzzer when less than or equal to 25 centimeters.

Piezoelectric Buzzer
Produces a tone when within specified distance of 25 centimeters

Results

After test runs and various code alterations, the original distance sensor was not able to record any distance below 30 centimeters and was verified with multiple reviews on the retailer's site; however, the buzzer was able to work regardless of the input from the distance sensor. A 3V battery was originally not able to supply enough power through the circuit and was replaced with a 9V battery.

Conclusion

Since the complications with the distance sensor took up valuable time, in the future, further research will be implemented before purchases as well as product reviews. As for a future continuation with "Navigator," an accelerometer would handle the distance sensor tilting toward the ground allowing the buzzer to not trigger as well as any other case test scenarios.

"Under the Hood"
• Arduino Micro
Microcontroller which can receive inputs and interact through the addition of motors or other outputs

• 9V Battery
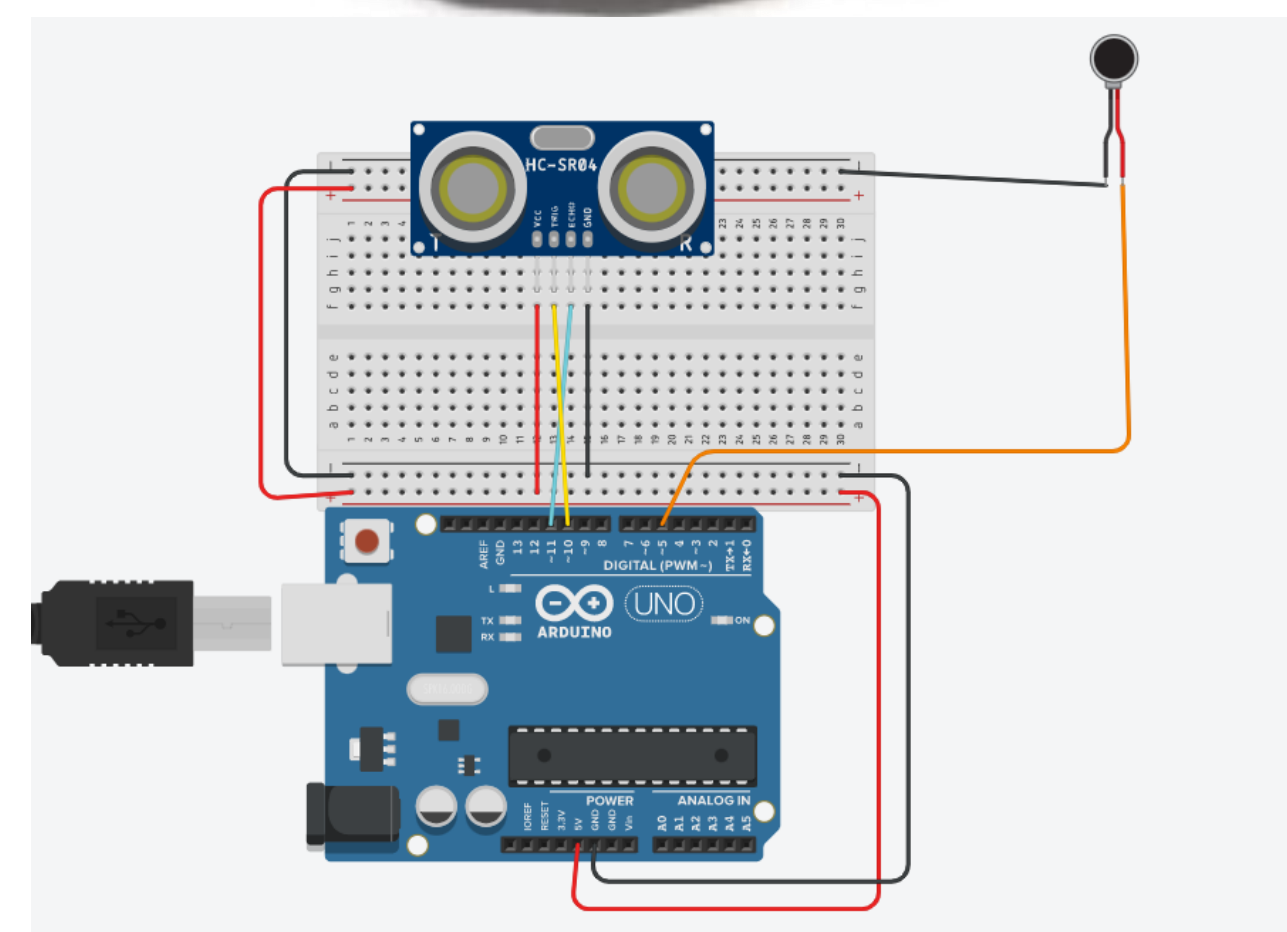
Ultra-Sonic Distance Sensor
Emits sound waves and calculates the time for the sound to be reflected back. After having the sound wave bounces back, it is then ran through a code that converts the time to centimeters

Message (Enter to send message t

24.52This is distance
23.58This is distance
23.83This is distance
24.46This is distance
23.83This is distance

Acknowledgements