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SMART BLIND WALKING STICK

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ABSTRACT

This modern blind stick has several features that can help the blind to navigate routes and detect an obstacle. This research project's main purpose is to construct an Arduino microcontroller hardware that can corroborate a blind person to detect obstacles in front of him/her instantly. The hardware consists of an Arduino microcontroller incorporated with an ultrasonic sensor, water sensor, piezo buzzer and other additional equipment. The casing box and water sensor slot were made out of PLA by using 3D printing process and are used to protect the Arduino board and breadboard while allowing easy accessibility. Furthermore, the water sensor slot helps to keep the sensor's pins from getting wet and causing it to malfunction. Aside from that, this section strengthens the stick's structure at the end. The final result for this project is that all the sensors in the smart blind walking stick can operate according to their functions.

Keywords: smart blind walking blind stick, Arduino microcontroller, ultrasonic sensor, water sensor

1. INTRODUCTION

Smart walking sticks are an electronic approach assist visually disabled persons. This tool has a microcontroller board that provides the circuitry necessary control of the task. Numerous types of microcontroller boards can be used in the smart walking stick. For instance, a PIC microcontroller reads all the sensors (Mahmud et al., 2013). This microcontroller is made by Microchip Technology and derived from the PIC1650. Besides that, the Arduino Nano board also can be used as the microcontroller for smart walking sticks (Srinivas et al., 2019). Arduino Nano is a small, complete, and breadboard friendly board based on the ATmega328. Although it lacks only a DC power jack, it works with a Mini-B USB cable instead of a standard one. Above all, most smart walking sticks use the Arduino UNO R3 board microcontroller which can provide efficient calculations with great accuracy (Dhanuja et al, 2018).

The main objective of this device is to help blind people detect any type of obstacle in front of them. To accomplish this, sensors are needed. Each obstacle needs different types of sensors. One of them is an ultrasonic sensor. An ultrasonic sensor, also known as an ultrasonic transducer, is based on a transmitter and receiver, and is mainly used to determine the distance from the target object with a wavelength of about 20kHz- 20 MHz. This sensor can detect an obstacle in the range of 2 cm to 400 cm (Romadhon & Husein, 2020). Moreover, the sensor used to detect water levels inside tanks is called a water sensor (Radhika et al., 2016). When

the wires meet water, the circuit is shorted, the microcontroller is interrupted, and the piezo buzzer emits a beep sound to alert the blind person about the puddle.

2. METHODOLOGY

The technique for this project was divided into three sections. The first step was to use the Arduino Integrated Development Environment (IDE) Software to sketch out the code. The next step was to design and produce the project's components. The final step was to put all of the pieces and components together. Figure 1 (a) shows the schematic diagram and (b) shows the circuit connection used in this project.

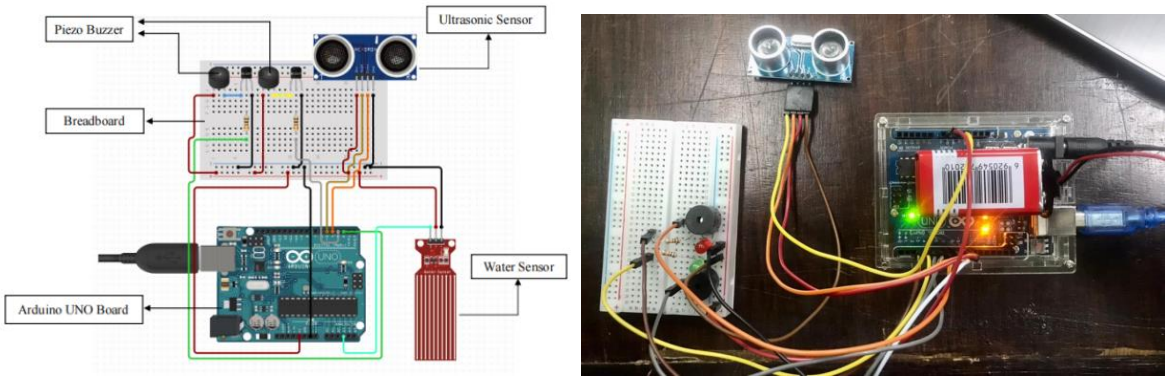

Figure 1 (a) Schematic Diagram and (b) Circuit Connection

In this project, two separate parts were designed for the smart blind walking stick as shown in Figure 2 and Figure 3. The Arduino board and breadboard were placed in the first part, which would be a casing box. The second part includes a slot for the water sensor. Solid Works was the software that was used to design both pieces. The boards were placed inside the casing box for a few reasons, one of which was to make the stick appear nicer. Aside from that, having the case made it easier for the user to do maintenance on the Arduino board or the motherboard, for instance, to replace the battery or jumper wires.

Figure 2 (a) Casing Box Design and (b) Actual Casing Box

Figure 3 (a) Design of The Water Sensor Slot and (b) Actual Water Sensor Slot

3. FINDINGS

The smart blind walking stick are shown in Figure 4. The ultrasonic sensor detects any kind of obstacles within 96 cm. This range is the most suitable distance for the stick to detect obstacles. When the sensor senses an obstacle, the piezo buzzer will beep. For the water sensor, it is located along with the prepared slot at the end of the stick. When the sensor detects any puddle, the line one the sensor will detect the presence of water and will start beeping. When the blind hears the buzzer, they will automatically avoid the obstacle.

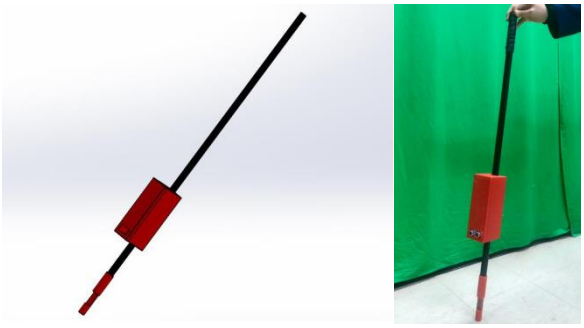

Figure 4 (a) Assemble Part Design and (b) Smart Blind Walking Stick

4. CONCLUSION

The focus of this project was to develop the smart blind walking stick using Arduino microcontroller and to evaluate the performance of the smart blind walking Stick. The form of the stick optimizes the functionality of both sensors. The casing box protects the Arduino board and breadboard while allowing easy accessibility. The water sensor slot helps to keep the sensor's pins from getting wet and causing it to malfunction. This section also strengthens the stick's structure at the end.

REFERENCES

Dhanuja, R., Farhana, F., & Savitha, G. (2018). Smart blind stick using Arduino. *International Research Journal of Engineering and Technology (IRJET)*, *5*(03).

Mahmud, M. H., Saha, R., & Islam, S. (2013). Smart walking stick-an electronic approach to assist visually disabled persons. *International Journal of Scientific & Engineering Research*, *4*(10), 111-114.

Radhika, R., Pai, P. G., Rakshitha, S., & Srinath, R. (2016). Implementation of smart stick for obstacle detection and navigation. *International Journal of Latest Research in Engineering and Technology*, *2*(5), 45-50.

Romadhon, A. S., & Husein, A. K. (2020, July). Smart stick for the blind using Arduino. In *Journal of Physics: Conference Series* (Vol. 1569, No. 3, p. 032088). IOP Publishing.

Srinivas, G., Raju, G. M., Ramesh, D., & Sivaram, S. (2019). Smart Blind stick connected system using Arduino. *IJRAR-International Journal of Research and Analytical Reviews*, *6*(2), 934-939.

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