***Ultrasonic Sensor: Smart Glasses for Blind***

A black background with a black square

Description automatically generated with medium confidence

Submitted in partial fulfillment of the requirements in

GE 103 Contemporary World

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**INTRODUCTION**

**Background of the Project**

This project focuses on developing system device for visually impaired people. It is initiated because of the numerous blind people in the Philippines who cannot afford expensive equipment for their everyday navigation. In this situation, the project providing a solution to vision related issues is necessary to help them become active in their lives. This is especially to those who completely lost their vision because of the error in eye refraction and other kinds of eye disease. The components used during the development are extensively cheap and affordable for people who cannot invest in equipment form other competitors.

The glass is built using an Arduino nano with sensors and buzzers. The glass warns the user by making noise with the buzzer when he/she walks in front of an obstacle. The walking cane is a portable mechanical device to detect static obstacles only within a specified range. The device range is very limited, and it is not flexible for protection from obstacles near to head area.

Using this wearable technology, the work becomes easier, and the following result or output is displayed faster. The main objective of our present work is to provide a reliable, cost effective, low power solution for a blind people which would help them to move almost like any other normal pedestrian.

**Significance of the Project**

The significance of this project is to provide a reliable, cost effective, low power solution for a blind people which would help them move almost like any other normal pedestrian. The cost of this system makes it affordable for the majority of the society which in turn an effective device for them to spend on, just for once and assures wonderful travel guidance for them.

In this project, the system aims to provide confidence and safety. Their incapability to navigate freely limits their ability to perform everyday activities. This system will serve as the guide and assistant for them to walk independently in small areas, allowing them to be active and make them more confident.

Furthermore, this project aids this following:

Obstacle Detector: for blind people is a new method to resolve their problems. A less complex portable, cost efficient, easy to manage an effective system with many more amazing properties and advantages are proposed to provide support for the blind.

Object Sensor: The system will be very easy to find the distance between the objects and the sensor. It can detect the objects in every direction the blind person. Without the help of others, the blind person can move from one place to other and lead their regular lives independently.

**RELATED PROJECT**

**A pair of glasses with a pair of lenses

Description automatically generatedPictures and Examination of function or use**

*Figure 1: System Product*

Ultrasonic Sensor: Smart Glasses for Blind is a system device includes a pair of glasses and an obstacle detection module fitted in it in the center, a processing unit, an output device a beeping component, and a power supply the ultrasonic sensors can detect the obstacle and alert the user with a vibration. With the press of a button, the user can perform various functionalities. The user can perceive any written information with the press of a button. The proposed model is easy to wear and use and can be used as a portable model for visually impaired people.

**Definition of Terms**

**Arduino nano** Arduino Nano is Arduino's classic breadboard friendly designed board with the smallest dimensions. The Arduino Nano comes with pin headers that allow for an easy attachment onto a breadboard and features a Mini-B USB connector.

**Buzzer** or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers, train, and confirmation of user input such as a mouse click or keystroke.

**Jumper wires** are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboard and other prototyping tools in order to make it easy to change a circuit as needed.

**Ultrasonic Sensor** is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves and converts the reflected sound into an electrical signal.

**DEVELOPMENT OF THE PROJECT**

**Schematic Diagram**

**A diagram of a circuit board

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*Figure 2: Schematic Diagram*

**Prototype using Fritzing and BreadboardA computer screen shot of a circuit board

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*Figure 3: Prototype using Fritzing and Breadboard*

**Sketch Program**

**A diagram of a smart stick

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*Figure 4: Sketch Program*

**Tools, Materials and Equipment**

Sunglasses

A blue sunglasses with grey lenses

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*Figure 5: Sunglasses*

Sunglasses may help maximize what they can see by cutting down glare. A glare that only takes up a small portion of a seeing person’s visual field may take up nearly all of the visual field of a person with blindness.

Stick Glue

A close-up of white rods

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*Figure 6: Stick Glue*

Are solid and hard adhesive in twist or push-up tubes. Users can apply glue by holding the open tube to keep their fingers clean and rubbing the exposed stick against a surface.

9 - Volt Battery

A black and silver battery

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*Figure 7: battery*

The modern world is dependent on these portable sources of energy, which are found in everything from mobile devices to hearing aids to cars.

Lafvin Arduino Super Starter Kit

A group of electronic components

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*Figure 8: Lafvin Arduino Super Starter Kit*

Arduino Starter Kit is the best way to start with coding, electronics and Arduino itself. Arduino Starter Kit is a perfect way to dive into electronics as you get all the essential components in a single package that are required to start working with Arduino.

A blue and white electronic device

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Lafvin Arduino Nano V3

*Figure 9: Lafvin Arduino Nano V3*

The classic Nano is the oldest member of the Arduino Nano family boards. It is similar to the Arduino Duemilanove but made for the use of a breadboard and has no dedicated power jack. Successors of the classic Nano are for example the Nano 33 IoT featuring a WiFi module or the Nano 33 BLE Sense featuring Bluetooth® Low Energy and several environment sensors.

Soldering Iron

A soldering iron with a wire

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*Figure 10: Soldering Iron*

It supplies heat to melt solder so that it can flow into the joint between two workpieces.

**Project Cost**

9- volt battery - 98

Arduino nano – 199

Lafvin Arduino Super Kit – 1649

Stick glue - 20

Soldering Iron – 0

Total Cost: 1963

**Picture while making the Project**

**A child working on a robot

Description automatically generatedA child working on a device

Description automatically generated**

**A child fixing sunglasses on a table

Description automatically generatedA person working on a device

Description automatically generated**

**PROJECT TESTING AND EVALUATION**

**Testing and Troubleshooting**

Testing showed that the Arduino Nano Glasses are functional and easy to use. However, wearing them causes mild ear discomfort due to the buzzer's beeping. Also, any disruption in the wiring to the Nano results in a loss of functionality, causing the glasses to stop working.

**Fine Tuning / Evaluation**

The Arduino Nano Glasses are fully functional and easy to use, but adjustments are needed for improvement. The buzzer's volume should be fine-tuned to reduce ear discomfort during use. The wiring also requires better reinforcement to prevent disruptions that cause the glasses to lose functionality. The sensor's effective range is currently limited to 45 cm. When set to 50 cm or beyond, the buzzer fails to stop beeping and the glasses lose functionality. Optimizing the sensor's accuracy and range will significantly improve the device's reliability and usability. These refinements aim to enhance the performance and overall user experience of the glasses, ensuring they effectively assist blind individuals.

**Recommendations**

Optimizing the sensor's accuracy and range will significantly improve the device's reliability and usability. These refinements aim to enhance the performance and overall user experience of the glasses, ensuring they effectively assist blind individuals. Moreover, the volume level should be lessen depending on the user’s hearing sensitivity.