# Jacket For Visually Impaired

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**Abstract — In a world built on the ability to see also called as vision, the most dominant of our senses, is vital at every step of our lives. Visual deficit is basically a loss of basic functions of the eye and the visual system. The visually impaired can be blind or partially impaired. According to a study by the World Health Organization (WHO), our vision is one of the important senses. Yet, as the report by World health organisation shows, eye disease and vision impairment are widespread and all too often still untreated. Globally, at least 2.2 billion people have a visual impairment. In our project we came up with a productive, efficient and low-price prototype which can fit into ant cloth for visually impaired people, which will help them to detect the barrier and navigate safely. The sensors in our prototype will sense and detect the objects nearby, which will help visually impaired person to know better and act accordingly, so our project can be used in real-time for visually impaired people.**

**Index Terms—Visually Impaired jacket, Ultrasonic sensor ,Arduino**

## 1. INTRODUCTION

Anopsia falls into two basic categories. In other words, those who were born visually impaired in the sense that they were sightless from birth and those who became sightless later in life. Each group of people navigates the world differently based on the timing of vision loss. When people are visually impaired from birth, they explore the world and use their sense of smell and hearing to interact. In many cases, the sense of smell is the most important indicator to a person to know his surroundings. Based on the smell of coffee, clothing, or other odours, one could find out where he was on the trail. For those who became sightless later in life, memory is an important factor in navigating cities and neighbourhoods. They can no longer be visually seen, but their minds often make memories of the route to help them follow the path. In fact, people who become sightless later in life are less dependent on other senses, even the sound and smell are good companions to the individual. As visually impaired people always find ways to use other senses throughout the day, some resources have been created to make independence more accessible. Most societies are aware of these resources, but not everyone understands how they work. White Cane helps people with visual impairments in wide range of ways. Move the white stick back and forth to alert you to the potential obstacles along the path, such as stairs and pedestrian crossings. Guide dogs are specially trained to allow blind and visually impaired people to move around the world. These animals are good at guiding their owners around obstacles and finding entrances. It's up to the owner to teach the animals where to go, but the dog's job is to guide the owner safety. According to the human guide, this is clearly the easiest resource, as visually impaired people can provide arm and verbal instructions. This is the most convenient option for those who are invisible when in a new environment. As technology continues to advance, people are inventing more and more tools to help those who cannot or partially see. All the above-mentioned resources cannot help visually impaired all the times. So, we need to come up with other tools that can help visually impaired everlasting, easy to carry and cost effective. Our prototype is one of the technologies which helps the visually impaired people to detect the obstacle near them using sensors.

## 2. DESIGN AND ARCHITECTURE

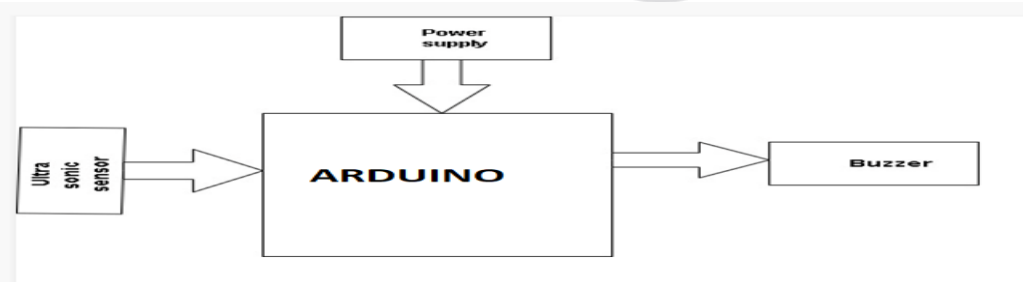


**Fig.1 Architecture Diagram**

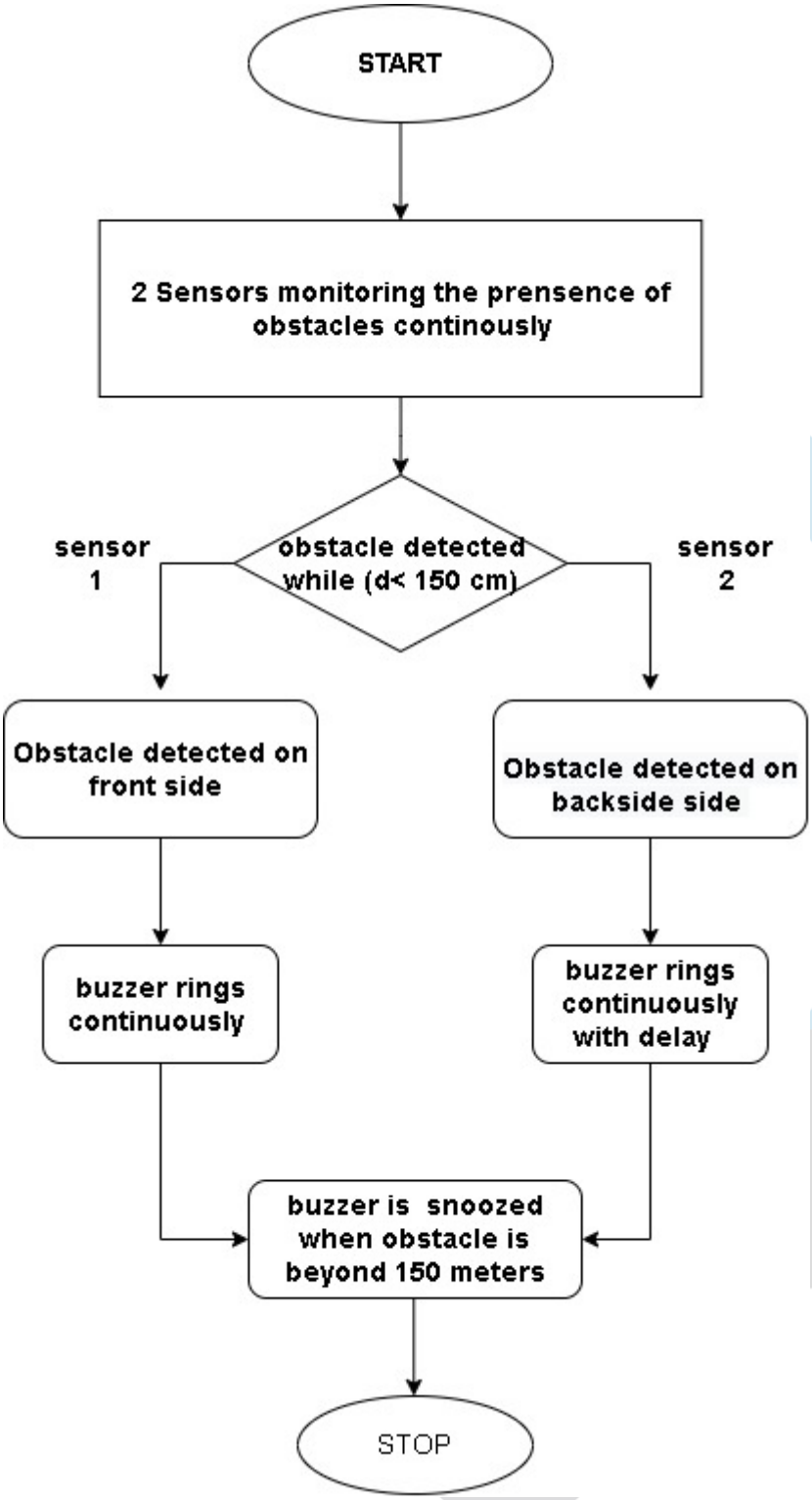


**Fig.2 Flowchart**

In this study, we designed and implemented a system with sensors attached to the vest so that visually impaired people can act independently of others and improve their quality of life. In this system, two sensors located on the chest and back of the vest alert the disabled when the distance between the visually impaired and the obstacle is less than 175 cm. The sensor rays detect the objects within the range of 150-200 cm and notify the person with the buzzer. The sensor sends a signal to the Arduino, from there the signal goes to the Arduino buzzer also called a piezo buzzer located in the direction in which the obstacle is present. The shorter the distance, the greater the buzzer sound and you can understand where direction the obstacle is going to get occurred.

## 3. SYSTEM COMPONENTS

**Arduino UNO:** Arduino is an open-source hardware and software platform that is user friendly. The Arduino board can read analogue and digital input signals from various sensors. Arduino UNO is a microcontroller board based on ATmega328P. It

has 14 digital input / output pins (6 of which can be used as PWM outputs), 6 analogue inputs, a 16 MHz ceramic resonator, a USB connector, a power connector, an ICSP header, and a reset button. It contains everything you need to support a microcontroller Arduino Uno is programmed using Arduino Software (IDE), an integrated development environment common to all boards, and runs online and offline. To get started, you can power your computer via a USB cable, AC-DC adapter, or battery. The Arduino UNO is affordable, flexible and easy-to-use open source programmable microcontroller board that can be integrated into a variety of electronic projects. This board can be connected to other Arduino boards, Arduino shields, and Raspberry Pi boards and can control relays, LEDs, servos and motors as outputs.

**TECHNICAL SPECIFICATIONS:**

1. Microcontroller: ATmega328P
2. Operating Voltage: 5V
3. Input Voltage (recommended): 7-12V
4. Input Voltage (limit): 6-20V
5. Digital I/O Pins: 14 (of which 6 provide PWM output)
6. PWM Digital I/O Pins: 6
7. Analog Input Pins: 6
8. DC Current per I/O Pin: 20 mA
9. DC current for 3.3V Pin: 50 mA
10. Flash Memory: 32 KB (ATmega328P) of which 0.5 KB used by bootloader
11. SRAM: 2 KB (ATmega328P)
12. EEPROM: 1 KB (ATmega328P)
13. Clock Speed: 16 MHz
14. LED_BUILTIN: 13
15. Length: 68.6 mm
16. Width: 58.4 mm
17. Weight: 25 g


**Fig.3 Arduino UNO**

- **Ultrasonic Sensor:** An ultrasonic sensor is an electronic device that measures the distance of a goal object by means of emitting ultrasonic sound waves, and converts the meditated sound into an electrical signal. Ultrasonic waves travel faster than the rate of audible sound (i.e. the sound that human beings can hear). Ultrasonic sensors have two principal additives: the transmitter (which emits the sound the usage of piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target). In an effort to calculate the gap between the sensor and the object, the sensor measures the time it takes among the emission of the sound with the aid of the transmitter to its contact with the receiver. The component for this calculation is D = ½ T x C

**TECHNICAL SPECIFICATIONS:**

1. Power Supply − +5V DC
2. Quiescent Current − <2mA
3. Working Current − 15mA
4. Effectual Angle − <15°
5. Ranging Distance − 2cm – 400 cm/1″ – 13ft
6. Resolution − 0.3 cm
7. Measuring Angle − 30 degree


**Fig.4 Ultrasonic sensor**

- **Buzzer:** The Arduino buzzer is also known as the piezo buzzer. It's basically a small speaker that can connect directly to your Arduino. You can set the tone to the set frequency. The buzzer makes a sound by the inverse piezoelectric effect. The buzzer makes the same loud noise regardless of voltage fluctuations. It consists of a piezo crystal between two conductors. When an electric potential is applied to these crystals, it pushes one conductor and pulls the other. This push-and-pull action produces sound waves. Most buzzers produce tones in the 1.5-3.5kHz range.

**TECHNICAL SPECIFICATIONS:**

1. Colour is black
2. The frequency range is 3,300Hz
3. Operating Temperature ranges from – 20° C to +60°C
4. Operating voltage ranges from 3V to 24V DC
5. The sound pressure level is 85dBA or 10cm
6. The supply current is below 15mA

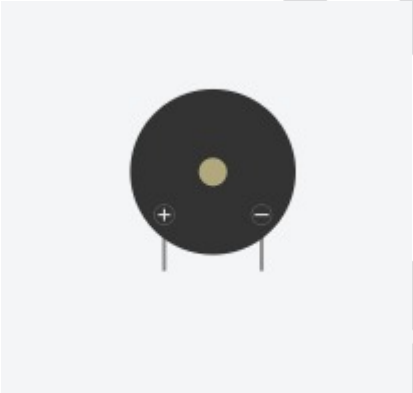

**Fig.5 Buzzer**

- **Power Supply:** The 9V DC battery and LM7805 voltage regulator act as a power supply. The ADCPIC reference voltage is set to 5V. If a USB port is also added to the circuit, you can use the bank instead of the battery.

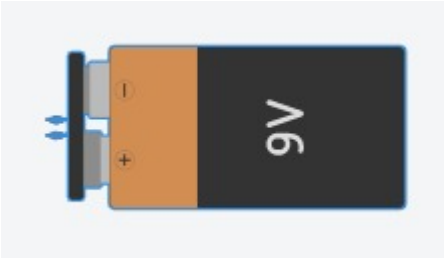


**Fig.6 9V Battery**


**Fig.7(a)**


**Fig.7(b)**
**Fig7(a) and (b) jacket with Arduino setup**

## 3. CONCLUSION

Assessment of the state of art within the area of electronics travel aid for visually impaired people was developed, implemented and tested. Electronic wearable jacket was designed to beat most of the limitation of the present devices, integrating and navigation during a single unit. The efficient design together with affordable cost makes a tool with worldwide multiple applications. The experimental results reported that system has excellent detection performance of 98% for obstacle with in 200cm. In forthcoming work focuses on developing an additional developed device that uses the advantage of wearable jacket. The system will be easily extended to support multiple applications like rate measurement for people with Heart related ailments and real time GPS tracking for people with dementia thus the system is modular with multiple applications.

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