Smart cane for visually impaired people

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ABSTRACT

The visually impaired people are the ones who can't see even the smallest detail with healthy eyes. They are in need of aiding devices for blindness related disabilities. Around, 15% of visually impaired people have no usable eyesight at all to help them move around independently and safely. The electronic aiding devices are designed to solve such issues. Ultrasonic sensors are used to calculate distance of the obstacles around the blind person to guide the user to their destination. The output is in the form of vibration through vibrating motor and also a buzzer is used. In our project we are also using water sensor which will let the blind person know about the puddles or if there is water on the floor. For this the person will be alerted by the different vibration also the buzzer will be played differently. Also, we are using IR-PD sensor to know about the depth i.e. to let the blind person know about staircases and potholes.

Keywords*: Smart Cane, Ultrasonic sensor, Depth sensor, Water sensor, RFID card sensor, Vibrating Motor, Buzzer.*

1. INTRODUCTION

Smart cane is an innovative stick designed for visually disabled people for improved navigation. We here propose an advanced blind stick that allows visually challenged people to navigate with ease using advanced technology. The blind stick is integrated with ultrasonic sensor along with light and water sensing. On sensing obstacles, the sensor passes this data to the microcontroller. The microcontroller then processes this data and calculates if the obstacle is close enough. If the obstacle is not that close the circuit does nothing. If the obstacle is close the microcontroller sends a signal to sound a buzzer. It also detects and sounds a different buzzer if it detects water and alerts the blind. One more feature is that it allows the blind to detect if there is light or darkness in the room. The system has one more advanced feature integrated to help the blind find their stick if they forget where they kept it. A wireless RF based remote is used for this purpose. Pressing the remote button sounds a buzzer on the stick which helps the blind person to find their stick. Thus, this system allows for obstacle detection as well as finding stick if misplaced by visually disabled people.

2. SIGNIFICANCE OF THIS WORK

The significance of this project is to help the visually impaired people with appropriate sound notification that is played through the speaker. The ultrasonic sensor will detect the obstacle in front of the blind person from a certain distance and speaker will declare how far it is and in which side it is situated of the blind person or partially sighted people.

3. METHODOLOGIES

The sensor-based circuitry consisting of sensors Ultrasonic sensor is used to detect ranges from obstacles. Ultrasonic Obstacle sensor is applied to the voice stick. The microcontroller reads these sensors and drives a buzzer, a vibrating motor. An audio output is designed by a buzzer alarm. The output indications provided by the microcontroller are distinctive as per sensor. Based on the strength of the beeping of the buzzer or the vibration embedded with the stick a disabled person may determine if they are walking towards a manhole or an edge or a large opening at nearby bottom or something similar [8]. At the same time, they may get the sense of their distance from nearby objects and if they can walk in a wet or muddy or potentially slippery terrain.

4. SYSTEM DESIGN

The proposed design for smart cane stick distinctly consists of three units:

a) The Obstacle Detecting Unit, Moisture detecting unit, Depth detecting unit.
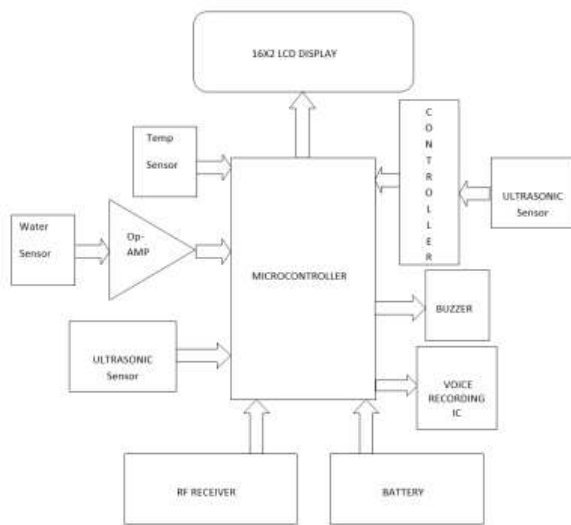b) Vibrating Unit.
c) Buzzing Unit

Figure-1: System Design

4. ALGORITHMS

4.1 Algorithm 1: -

Step 1: - Start

Step 2: - Scan nearby obstacle, moisture, depth.

Step 3: - Vibrate & Buzz when obstacle is detected.

Step 4: - Vibrate & Buzz when moisture is detected.

Step 5: - Vibrate & Buzz when depth is detected.

Step 6: - Stop.

4.2 Algorithm 2: -

The basic algorithm in distance measuring, Moisture detecting, Depth detecting using the sensors: -

Step 1: Start

Step 2: Initialization of LCD, Port Values, Ultrasonic Sensor, Moisture Sensor, Depth Sensor.

Step 3: If the obstacle is detected by the ultrasonic sensor then buzzer is sounds & vibrating motor is vibrated.

Step 4: If there is moisture is detected by the moisture sensor then buzzer is sounds & vibrating motor is vibrated.

Step 5: If depth is detected by the IR-PD sensor then buzzer produces beep sounds & vibrating motor vibrates.

Step 6: Stop.

5. IMPLEMENTATION

Our project blind person stick detector mainly aims to provide smart electronic aid for blind people. It consists of microcontroller through which water sensor, ultrasonic sensor, depth sensor, buzzer, vibrator, recorder i.e. LCD display and RF Receiver are interfaced.

Figure-2: Smart Cane with ATMEGA16 microcontroller

Figure-3: Smart Cane with Ultrasonic Sensor

Figure-4: Testing Output of Ultrasonic Sensor
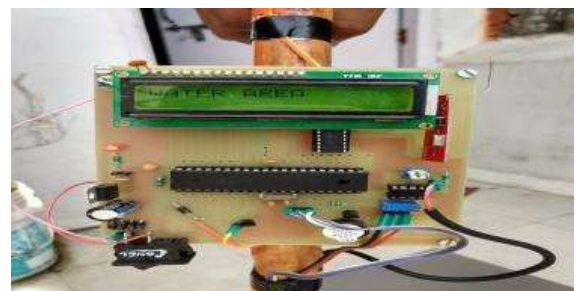

Figure-5: Implementation of water sensor
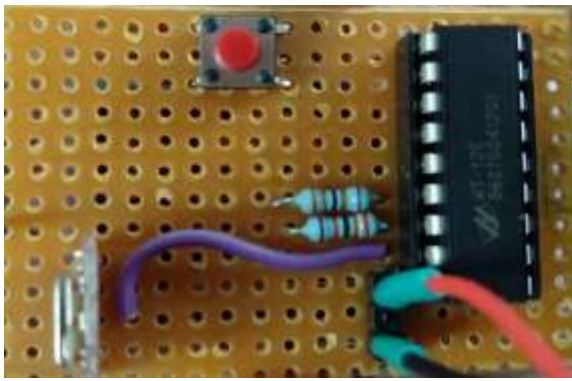

Figure-6: Testing output of Water Sensor

Figure-7: Remote consisting of RF - Transmitter

Table-1: Components

Components	Use
Ultrasonic Sensor	Detect nearby obstacle within 50 cm of range
Moisture Sensor	Detect presence of water in area
IR – PD Sensor	Detect depth of ground
RF - ID	Used for locating cane nearby
Buzzer	Produce beep sound as per the instructions provided by microcontroller
Vibrating Motor	Produce vibrations sound as per the instructions provided by microcontroller

6. CONCLUSION

In order to fulfill the needs of blind people our project on smart cane will be of great help to the community and we look forward to contribute our support for the same. This cane will act as a major support to them.

The analyzed the existing electronic aids for blind people and does not discuss any implementation results. Based on the limitations in existing aids, this project proposes an enhanced assisting electronic aid using latest technology like Ultrasonic waves, moisture sensor and light detector for the visually impaired people, in addition to that, we have used IR and rfid sensors to locate the stick in a nearby area by producing a buzzing sound by the remote control.

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