Walk Assistance For Outwardly Challenged People

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Abstract. The blind’s competency is to navigate to a particular place and to commence their daily activities is of decisive importance for their prosperity. It is estimated about one billion people are blind out of 285 million people visually impaired of all ages, according to the statistics of World Health Organization. This work includes an affordable and more efficient navigation aid for the blind which provides artificial vision by providing knowledge about an environmental scenario of static and dynamic characteristics of objects around them. This system induces a smart cane with ultrasonic sensors placed to intimate the intermediaries to their acknowledgment through Bluetooth. ZIGBEE used in this project so as to met the sensor and control device communication standards for navigation for the blind with the smart cane via Google maps their destination.

Keywords: Ultrasonic sensor, Arduino microcontroller, Navigation aid, Zigbee receiver, Smart cane

1. Introduction

A person who believes that it is difficult to discern the smallest particles with strong eyes is a visually challenged person. These people are viewed as outwardly disabled. An examination by World Health Organization worldwide the amount of people of all ages ostensibly blocked is evaluated to be 285 million, of whom 39 are outwardly disabled. The rule issue with ostensibly weakened people is the best approach to cross their way to deal with any spot they need to go. Such people need assistance from others with extraordinary visual insight. This assessment proposes a method to set up a clever stick to help visually challenged people. The standard course helps for individuals with visual weaknesses are the walking stick and guide canine which request various defects. Passing most essential sickness of these aides include principal capacities and getting ready stage, the extent of development, and outstandingly unimportant correspondence. Our increment adjusted this stick for certain devices sections like sensors and some electronic devices. The ultrasonic sensors, water sensors, and ZIGBEE record information about the presence of obstructions in transit. Clamminess drops water significance distinguishing proof sensor which encounters if there is water in the method of the customer. Most outwardly impeded bearing structures use ultrasound since it is protected from
the natural noise. With the speedy advances of current development both in gear and programming, it has gotten safe to cross through the customers. Development both in gear and programming it has gotten safe to cross through the customers.

2. Literature Survey

Nowadays, wearable technologies are evolving but it cannot be adopted by all people in an efficient manner especially by the visually impaired people. Few systems adopted by us it discussed below. The wearable and affordable smart cane system guides the people and detects static and dynamic objects around them via sensors like infrared for scanning the predetermined area around them by emitting the reflecting waves. These waves indicate the direction and distance from distant objects around them. The central theme of this paper is to provide traverse aid and detection of mediators to make them wearable with upgraded technology. The purpose of this arrangement is to establish an application that enables visually impaired individuals to identify many static and dynamic obstacles in an unexpected way, identifying pits on the ground to allow walking. The various sensors' features are to perceive the obstacle for sway avoiding and to recognize a lot all things toward every way. To perceive pits on the ground, the position sensor is placed close to the bottom tip of the walking stick. The detection of these perceived pits is the headset microphone and chip are playing. The hardware components used in the design are the ZIGBEE receiver, sensors, power supply unit, voice record, playback device, Bluetooth speaker. It is an affordable, configurable, Intelligent guidance system that is reliable and easy to manage. In order to get recharged, it would be more beneficial beforehand.

3. Proposed System

The Ultrasonic sensor, infrared sensor, and dampness sensor connected to the microcontroller codes with the Arduino, and the actual sensor was connected to the microcontroller. Our proposed device consists of an Ultrasonic sensor. It has 14 advanced yield and information pins, 6 of which can be used as PMW yields, 6 basic data sources, a 16 MHz quartz gem, a USB association, a force jack, a reset button for an ICSP. The humidity sensor consists of two wire tests that rely on water interference to detect its consistency when a touch occurs. The ZIGBEE transmitter was attached to the microcontroller as Arduino sketch codes were composed and the microcontroller was awarded the ZIGBEE. Physical and MAC layers claim it, while this convention finished by aggregating the own organization and application layers of Zigbee.

The framework can show obstructions that exist on the ground during strolls indoor and open-air crossing. The shrewd stick is basically an installed system integrating the accompanying: pair of ultrasonic sensors to detect leaps from ground level tallness to head level stature in the region of 400 cm per head before the visually impaired. Continuous information is taken and sent to the microcontroller by ultrasonic sensors and water sensors. After handling this information, the microcontroller incites the signal. Water on the ground complicated by the water sensor and the battery used to power the circuits. The savvy stick is just an inserted framework that integrates the corresponding pair of ultrasonic sensors to detect deterrents in the range of 400 cm per head level tallness before the visually impaired from ground level stature to head level tallness. Continous information is taken and sent to the microcontroller by ultrasonic sensors and water sensors. After preparing microcontroller actuates the bell. On the field, the water sensor detects water, and the battery is used to power the circuits. As Arduino sketch codes were developed, the ZIGBEE transmitter was interfaced with the microcontroller and the ZIGBEE was related to the microcontroller. The structure will ready the careless to uninhibitedly investigate to their optimal goal. It is moreover straightforward and more direct. It is convincing and traditionalist and subsequently can be mass conveyed for use of the apparently tried people. The system can recognize blocks that exist on the ground during walks indoor and outside intersection. The splendid stick is feasibly an introduced structure consolidating the going with pair of ultrasonic sensors to versatile obstacles before the outwardly impeded from ground level height to head level stature in the extent of 400 cm a head. Ultrasonic sensors and water sensors
take steady data and send it to the microcontroller. The microcontroller starts the signal after setting up this data. From 400 cm ahead. Continuous data are taken and sent to the microcontroller by ultrasonic sensors and water sensors. In the wake of getting ready, the sign affects the microcontroller.

![Block diagram](image)

Fig.1. Block diagram

**A. Block diagram operation**
- In this block diagram figure.1 shown portrays regarding various sensors and receiver signal which is interfaced microcontroller.
- Here the various sensors which demand various signals through Zig-Bee receiver which interfaced with Arduino UNO.
- The ultrasonic, Infrared, and Moisture depth water sensor whose code is dumped in Arduino and gets executes the code accordingly in which Ultrasonic sensors which intimate the user about intermediate objects around them and also water pits or water logs, the darkness of the light by moisture depth water sensor and infrared sensor respectively.
- This gets operated by cane through the switch provided and all other signals like the tracking part are internally linked via Zig-bee a layer which also communicates the signals which are also interfaced by code in ARDUINO sketch.
- Here the power supply is through a battery which is regulated by Voltage Regulator.
- This gets operated manually by switch which is attached to smart cane.
B. Flow chart operation

- Here this flowchart gets operated when the power of the circuit gets initialized.
- This starts the process by scanning the obstacles if it is detected intimates the signal sent to the receiver and also same done by the infrared sensor detection and the same gets indicated and intimates the signal which is sent to the receiver.
- Finally, the waterlogs or pits that are recognized also get intricate, and these signals get sent to the receiver which is interfaced by the microcontroller, and these operations get completed.
- This operation gets executed manually by switch operation located in the smart cane.

C. Circuit diagram Operation

The smart cane recognizes the voice through voice recognizer and the signal which gets transmitted to Zig-bee receiver where physical layer contacts the smart cane. The sensors used here are the Ultrasonic, Moisture depth water sensor, and infrared sensor in order to intricate the mediatory objects. In order to verify their efficiency and know if they function according to the specification, testing of each part of the smart cane performed.

Ultrasonic Sensor: the ultrasonic sensor was tried, and the framework worked by determining a good way off not very a long way from the client. The bell was demanding the obstructions in transit of the user. Water Detection Sensor: In the water holder, the dampness sensor was drenched, and a blaring sound was heard that was not the same as the signal seen from the recognition of obstacles. The yield for water recognition keeps the client from initiating into static water in the climate.
whatever point the stick is embedded inside any profound water, the semiconductors will make the caution framework aware of switch ON. The aftereffect of our test with dampness is portrayed.

As ultrasonic sensors deal with the standard of resonation, research its appearance on changed obstacles is fundamental. The assessment cycle begins with the microcontroller sending the high-level heartbeat to the sensor trigger pin to start going, then the sensor awards ultrasonic sign with 40 kHz and 450µs and thereafter clutch address the rising edge yield by resonance port from 150µs to 25ms, dependent upon assessed stretch If an occurrence with no deterrent (no indication reflected) should occur, it holds it together for a few milliseconds until restarting transmission. To detect an obstacle, the ultrasonic distance sensor uses duration of the flight (TOF) - the yield is a modernized beat that takes the amount of time for the sound to arrive at the quarry and return before they hear the sign. By demanding impediments of up to 50 m, the contraction was constant. The moistness significance water pointer began with two wires what when interfaced with water would flag. They should contact the water before they can recognize the water, which is the explanation they were set under the stick. The Zig-Bee helps as the battery power is checked as it's worked in different modes. Data speed of 250kbps proper for irregular similarly as center two-course transmissions of data. Energy usage even at lower bandwidth. It covers 10 to 100 meters inside a scope as Bluetooth and Wi-Fi.

Fig.3. Hardware walk assistance stick

Table 1: Ultrasonic Sensor Test Result

| S/No | Distance (Meters) | Alarm |
|------|-------------------|-------|
| 1    | 0.5055            | ON    |
| 2    | 0.6036            | ON    |
| 3    | 1.1780            | ON    |
| 4    | 1.5732            | ON    |
| 5    | 1.8288            | ON    |
| 6    | 1.9700            | ON    |
| 7    | 2.0076            | ON    |
| 8    | 2.8850            | ON    |
| 9    | 3.0550            | OFF   |
| 10   | 3.7400            | OFF   |

Table 2: Water Detection Test Result
4. **Experiment Result**

Ultrasonic sensors act on the reverberation law, focusing their presence on a modified deterrent is very necessary. The estimation cycle starts as soon as the microcontroller communicates. The 10μs increased heart beat level given as a input to the trigger pin of the sensor to start running (T1), at that point, the sensor illustrate 40 kHz and 450μs (T2) ultrasonic signals and then hold back to capture the reverberation port (T3) rising edge yield of 150μs.:25ms, depending on the estimated distance as shown in Figure 3. If no impediment (no sign reflected) occurs, it holds up to 38ms before it restarts transmission. To recognize snag, the ultrasonic distance sensor uses the season of flight (TOF) - the yield is a computerized beat that takes the amount of time for the sound to hit the target and return before the signal is heard. With deterrent identification of up to 2 m, the gadget was accurate. The water identifier, which consists of two wires that would signal when interacting with water. Before they can recognize the water, they must contact the water, which is the reason they have been placed under the stick. Invisible people use the Google map to advance by voice command to select the destination, so without the assistance of others, the path they take is much easier.

5. **Conclusion**

It is useful and complex now that this review finds that the arrangement and execution of a sharp walking stick has been accomplished for the apparently tried individuals. The Brilliant stick is likely to be a fundamental assertion for the refreshing age of extra supporting contraptions to help outwardly challenged individuals to explore both inside and away safely. This structure is convincing and desirable. This system offers a simple, strong, flexible, low power usage and enthusiastic response for exploring with the obvious short response time. Regardless of the way that the structure is hard-set up with sensors and various parts, it's more modest. Through distant accessibility between the structure components, the farther angle of this system can be redesigned, thus extending the scope of the ultrasonic sensor and executing a development to deal with the speed of prevention proceedings. Apparently weakened and ostensibly tried individuals were on top of our needs in all developing countries while upgrading a particularly empowering course of action. In this work, the constructed device is simply fit for perceiving impediments and moisture. Thusly, using ultrasonic sensors, Arduino Uno, and various devices, a dominant contraption can be manufactured. For ease of use and solace, a vibrator may also be added. In the upgrade, further changes will be added to improve the system's implementation. The power source can be given from sun situated energy through battery-fueled batteries. These include an overall arrangement procedure to find the customer's territory using the GPS and GSM modules to link the region to a relative or gatekeeper using Google map methods. It should moreover help wide fluctuating holds for adaptable usage. The system with sensors and different portions is hard-set up, it's more modest. Farther pieces of this structure can be begun through distant organization between the system portions, likewise, Extend the scope of the ultrasonic sensor and complete progress in choosing the speed at which obstacles are pushed. While developing a particularly empowering game plan, in all horticultural countries, apparently impaired and ostensibly tried individuals were on top of our needs. In this work, the device created is simply fit for perceiving obstructions and sogginess. Thus, using ultrasonic sensors, Arduino Uno, and different devices, an unparalleled device can be assembled. For ease of use and comfort, a vibrator may similarly be added. Later, further improvements will be added to enhance the system's display.
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