

Smart Cane for Blind People Using IoT

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ABSTRACT

Blind people are liable to get in contact with whatever obstacle which pass before them during walking, subjecting them to risk of injury caused from fall and it could also cause great damage to them. The aim of this project is to develop a smart cane with distance measurement system. The system is made up of an ultrasonic sensor as input and earphone as the output. Ultrasonic sensor is used to measure distance from the obstacle. Data is then sent to National Instrument Arduino UNO microcontroller for processing which later produce voice for alerting the blind person as the output. Also the system includes the GPS live locacking system and guide the path for blind person. In general, the device will alert blind people of the obstacles through the audio output through which they can walk safely without any problem.

Keyword: *Survey and overviews, Sensors, Actuator, Harware and Software code design, Microcontroller and System level test, Sensor network,*

1. INTRODUCTION

We being normal people can see and judge all the aspects of the environment it could be hurdle, obstacles, hole or pit. This is not possible in case of physically disabled people but they are given god gifted some great sensing ability. So for this we are creating a new IoT based Smart Stick / Cane which will help the blind people to get known about the hurdles, obstacles and holes or any moving objects beside them. It will be very beneficial for them as it will alert them for each and every aspect which they are going to face in their day to day life with the help of buzzer or voice Assistant. Our system will also track the live location of blind person and Guide the person through it for walking. Our main motivation are they blind who need to suffer a lot while travelling from place to place. We noticed that normal blind canes used by blinds have certain limitations like detecting pot-holes, stairs, distant objects, above knee obstacles, etc. We feel very bad about the blind and disabled people so we came up with the idea of developing a economical sensor equipped cane capable of assisting blind to navigate easily.

2. Literature Survey

2.1 Smart Cane with Range Notification for Blind People. [1]

Published year : 2016 Author : M.F. Saaid.

In this paper Blind people are prone to sweep or knock whatever obstacle which pass before them during walking, subjecting them to risk of injury caused from fall. The aim of this project is to develop a smart cane with distance measurement system. The system comprise of an ultrasonic sensor as input and earphone as the output. Ultrasonic sensor is used to mea- sure distance from the obstacle. Data is then sent to National Instrument myRIO- 1900 controller for processing which later produce beeping sound as the output. The process was graphically programmed using LabVIEW with FPGA as the intended target. Performance of the system has been as- certained through several verification tests. In general, the device will alert blind people of the obstacles through the audio output

2.2 Iot based route assistance for visually challenged [2]

Published year : 2018 Author : P.Bhavishya In this paper, The intelligent devices have taken us to a convenient and fashionable era, however while we use a pedometer to calculate the number of steps, the blind even do not have the ability to walk independently. There is no doubt that they are eager for convenience and freedom based on this, we propose an intelligent system that assists the blind in walking. The system consists of three ultrasonic sensors (attached to a cane) which are not used to just detect the obstacles but the visually challenged will be directed in the direction (front/right/left) which has no obstacles, when other two directions are blocked by an obstacle. Or when there is an obstacle in only one direction then the distance of other two directions will be calculated and he/she will be directed to go in a direction at which the distance is longer. The MQ2 gas sensor is also appended to the system to warn the user in case he/she is too drunk and make them wary.

2.3 Assistive infrared sensor based smart stick for blind people [3]

Published year : 2018 Author : Ayat A. Nada. Blind people need some aid to feel safe while moving. Smart stick comes as a proposed solution to improve the mobility of both blind and visually impaired people. Stick solution use different technologies like ultrasonic, infrared and laser but they still have drawbacks. In this paper we propose, light weight, cheap, user friendly, fast response and low power consumption, smart stick based on infrared technology. A pair of infrared sensors can detect stair-cases and other obstacles presence in the user path, within a range of two meters. The experimental results achieve good accuracy and the stick is able to detect all of obstacles.

2.4 Smart walking stick - an electronic approach to assist visually disabled persons [4]

Published year : 2013 Author : Mohammad Hazzaz Mahmud, Rana Saha, Sayemul Islam

In this paper, The walking stick mentioned above is a stick that consists of a circuit board that contains a PIC micro controller, a LED for indication, input from micro-pager motor, inputs from sensors that are installed at proper. The walking stick mentioned above is a stick that consists of a circuit board that contains a PIC micro controller, a LED for indication, input from micro-pager motor, inputs from sensors that are installed at proper, position of the stick. Positioning of the sensors is predefined by real life application. The entire project is designed using micro-controller based upon its reliability. The micro-controller is code protected so its security bridge cannot be override except the vendor or owner. Here one micro-controller is used, that is PIC16F690. All sensors' data are taken by the micro-controller and it produces different Pulse Width Modulation (PWM) based on the sensors output to operate pager motor.

2.5 Smart Cane Assisted Mobility for the Visually Impaired [5]

Published year : 2012 Author : Jayant Sakhardande, Pratik Pattanayak, Mita Bhowmick

This paper include, The designed system has the ability to detect above-knee obstacle within 3 meters and alert the user in real-time with a combination of vibration motors mounted on the cane grip or on sweat band. A detachable unit has been developed that can be mounted on the top fold of the white cane. The device employs directional ultrasound based ranging to detect obstacles in front or above knee height within a range of 3m. The user obtains distance information through vibratory stimuli which supplement the auditory cues emanating from the environment and those produced by tapping the cane. The device vibrates in distinct patterns that vary with changing obstacle distance. The vibration frequency increases incrementally according to changing obstacle distances. The system has been designed as an independent detachable unit that the existing white cane does not have to be remodeled. An attachment mechanism has been developed so that the user can attach the device on the cane without sighted assistance. The unit can also be used as a general purpose distance estimation device. The module runs on a standard rechargeable battery. For charging the user connects n AC or USB adapter. This eliminates the inconvenience of opening the battery pack to replace batteries.

3. Proposed System

So as per the above introduction, after doing Literature survey of reference papers. Solution comes out as building a Smart Can for Blind People that will help them walking on the streets without any help. So basically our proposed system include the network of sensors, actuators, and microcontroller. This sensor network will basically detects every obstacle and alert the blind person using voice or audio output. Also our system will guide the blind person for

walking. As in suppose the obstacle detected at the right side of the stick system will detects the obstacle and alerts the person using the audio output as “There is an obstacle at your right side turn left or go straight” similarly for Left side. If there is an obstacle at all the sides of the person it will alert the person by voice output “wait till the obstacle gets clear”. This System works using Senor Network, network includes the sensors : Ultrasonic Sensors with SONAR, microcontroller : Arduino Uno microcontroller, actuator : Audio speaker

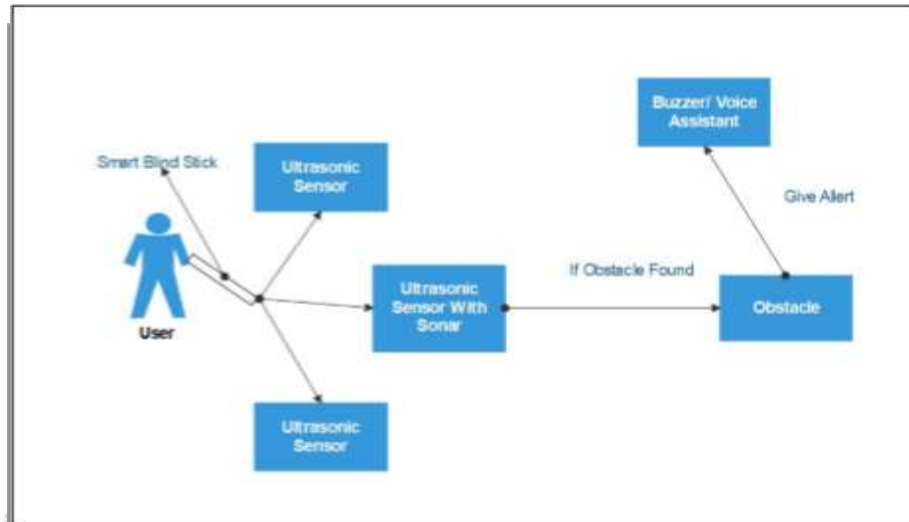


Figure 4.1: System Architecture

Fig1:-stem arch

The following are the components involved in the proposed visually challenged route assistance.

1. Arduino-Uno : The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins(of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. Arduino can send and receive the data to most devices, and can also command electronic devices through internet. The software program used to program the Arduino UNO board is simplified C++.

2. Ultrasonic Sensor: Ultrasonic sensor is a sensor that works on principle that is akin to sonar or radar. It generates high frequency sound and calculates the time interval between the sending of signal and the receiving of echo. For this reason, ultrasonic sensors can be employed for measuring the distance. Ultrasonic sensors have been used due to their high precision within a shorter distance and resistance to external disturbances such as vibration and electromagnetic interference. HC- SR04 ultrasonic sensor consists of a control module, transmitter and a receiver. The primary reasons to use Ultrasonic sensors are that they are light weight and compact, give high amount of sensitivity and accuracy in detecting objects compared to other sensors popular like the IR sensors which fail in certain cases like surfaces, light changes etc. as stated in.

3. Gas Sensor: The Grove - Gas Sensor (MQ2) module is useful for gas leakage detection (home and industry). It is suitable for detecting H₂, LPG, CH₄, CO, Alcohol, Smoke or Propane. Due to its high sensitivity and fast response time, measurement can be taken as soon as possible. The sensitivity of the sensor can be adjusted by potentiometer.

4. Audio Speaker: The Audio Speaker is used to give alerts to the user by producing voices that differ.

4. CONCLUSIONS

To sum up, this smart cane can act as a complete guide for blind people to walk with the help of a single stick without any complex hardware or software incorporated into it. This simple cane, is not used to just detect obstacles present in any direction. and alert the person , but uses the distance calculation to give the optimum direction(by

detecting obstacles) in which the person can proceed. There is only use of one buzzer for every direction that makes different sounds for left, right, front instead of using three different buzzers. A battery powers the cane. This cane not only shows the direction, but can also indicates the person if he/she is blocked on three sides. In this system it includes GPS module through which live location of the person can be traced

5. REFERENCES

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