Nayan: Hope for Blind

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Abstract: NAYAN architecture is for visually impaired person to help for navigation .As well known, all visually impaired people desperately requires special requirements even to access services like the public transportation. This prototype system is a portable device; it is so easy to carry in any conduction to travel through familiar and unfamiliar environment. The system consists of GPS receiver and it can get NEMA data through the satellite and it is provided to user's Smartphone through Arduino board. This application uses two vibrotactile feedbacks that will be placed in left and right shoulder for vibration feedback, which gives information about the current location. Ultrasonic sensor is used for obstacle detection which is found in front of visually impaired person. The Bluetooth modules connected with Ardunio board is to send information to the user's mobile phone which it receives from GPS.

Keywords: Vibrotactile, Ardunio, GPS, NEMA

INTRODUCTION

According to the survey it is estimated that in India approximately 125 crores people are living but more than 15% of the people are blind. The blind person generally uses white canes or some external help for navigation. At present many devices are available for providing guidance to reach the destination from anywhere. Many technologies are introduced but for common people it is most expensive to acquire.

Blind people can get information through his/her sense either through contact with objects, or take external help from others in day today life, by exploring the environment and using their hands to understand the shape of an object, moreover, blind people can become aware of other features of the objects such as temperature, texture, weight and etc,.

Generally the blind people use the white cane techniques to move independently from one place to another without taking help from others. In order to lead easy, comfort and joyful life, one of the most significant requirements is the ability to move independently without taking any external help for mobility. So to help blinds for convenient navigation we developed a versatile device. Due to the wide popularity and availability of Wireless Sensor Network (WSN), it is used in different domains starting from Military, Healthcare, logistics and transportation, structural health monitoring, agriculture, smart homes related work etc., hence the same is used

in our device for transmitting the information without any hindrance from anywhere. The Ardunio board remains very popular as the general purpose microcontrollers and it is a self-contained system with a processor and memory, and even it arrives in a low cost. In this project we have developed a prototype for the blind people. This prototype has been designed to help the blind people to navigate everywhere and anywhere very easily. The low cost affordable microcontroller /processors, embedded systems, communication standards and other allied technologies contribute the exponential growth of WSN technology. NAYAN has been designed to help blind person to familiarize them in known and unknown environment. Smart phones with GPS enabled devices are mainly used to provide navigation information to visually impaired person. We have used the Bluetooth module to connect the mobile through the Aurdino board. The mobile phone gets connected with Bluetooth modules through Bluetooth interface. With the help of GPS module the current location information are collected and communicated to the physically impaired person through smart phone with GPS enabled using Ardunio Uno board. Ultrasonic sensor has been used to detect obstacle present in front of the walking path and if any obstacle detected it send voice message to the physically impaired person to take alternate path. Vibrotactile system helps the blind person to move either left or right direction according to the vibration detected in the respective shoulder.

There are several system that has been designed to assist visually impaired person on daily task. Our proposed system consists of eight vibration motor shad arranged around the visually impaired person's waist. Vibrotactile provide sensory vibration effective coding scheme that does not require any training. All this approach used for tracking with help of specialized hardware. [2] Generally the system is linked with GPS GSM modules which will pin point the location of blind person through GSM GPS modules and send SMS Message of current location which was configured and preprogrammed already in module which make call to cell phone and provide information from the GPS satellite [3]. The Author propose to use sensory contact speakers on the users back to indicate the direction of the next waypoint. The authors concluded that, a combination of sensing and voice based information provide reliable and deliverable to user and greatest number of visually impaired people are covered in this conduction. Some of the related works are used to tactile belts demonstrated GPS- based waypoint navigation using a single [4] .For sensing of immediate environment of the blind people to travel with the help of GPS and navigate to the remote destination. [5]Azenkot and Ladner resort to just one tractor to provide turn-by-turn instructions to people with visual impairments. Three methods have been evaluated for giving blind and low-vision people with help of mobile phone. Results demonstrate that one impulse is a viable means of communicating directional information without demanding the user's auditory attention or requiring special hardware. [6]ANDHA ASTHRA in their paper presented that, through the ultrasonic sensor also called as obstacles sensor. An ultrasonic pulse is generated in particular direction if there is an object in the path pulse, part or all the pulse are reflected back to sensor as an echo and provide the navigation to the visually impaired person. [7] Implementation a wearable zig bee based guidance system in which a microcontroller collects ultrasound and GPS signals for sensor attached to sub controller and provide the appropriate direction for blind person.

PROPOSED SYSTEM

Our proposed system classified as an assistive technology for blind people. This system provides a software and hardware prototype that guides them in any environment. As we know blind person can help themselves for obstacles .By using simple assistive technologies like white cane and even they rely on their own sense. Proposed system consists of three major components each component linked with each other and communicates with each other as shown in Figure 1.

(A) Navigation Component

Navigations system is the base for this prototype .It is responsible to determine the navigation of the visually impaired person through the help of smart phone and GPS modules. The Vibro tactile which act as sensing

device helps for the blind to know the path route. The Two tactile devices which have been placed on their each shoulder will vibrate and provide alert to move in which direction either left or right.

1. GPS Modules

The GPS module gets current information about the locality and provide through the Ardunio board. As we know GPS work accordingly NEMA data .when latitude and longitude provide information to microcontroller and microcontroller connects to computer.

- about roads or paths available

- traffic congestion and alternative routes

- select the road which the destination

- if some roads are busy now or historically the best route to take

- Shortest route between the two locations.

2. Ultrasonic sensor

Ultrasonic sensors are defined as electronic devices that will measure the distance it can used sound to accurately detected and measured its distance upper range of human hearing called the audible range, between 20 hertz and 20 kilohertz – and determine the distance between The sensor and an object based on the time it takes to send the signal and receive the echo**.** The ultrasonic sensor can provide information about the obstacle in the visually impaired person

3. Ardunio Uno

The Uno is a microcontroller board based on the ATmega328P.It contains everything needed to support the microcontroller; that will be easily user friendly compare to another microcontroller.

(B) Communication Component

1. Bluetooth module

HC-05 Wireless Bluetooth RF Transceiver Module Serial/TTL/RS232 for Ardunio. The Ardunio BT is a microcontroller board.

Originally was based on the ATmega168, but now is supplied with the 328It supports Wireless serial communication over Bluetooth. We have need of an android device with Bluetooth and connect through the Ardunio board. The Bluetooth modules are comes preprogrammed.

2. TTS (Text to Speech)

Text to Speech Component: It is responsible for speech synthesis, i.e. it converts text to speech. The system will use one of the text to speech engines that are supported by Android OS. Use the android application to convert the information get from the board.

3. Interface Component

The system will use voice based interface since it is most suitable for the blinds.
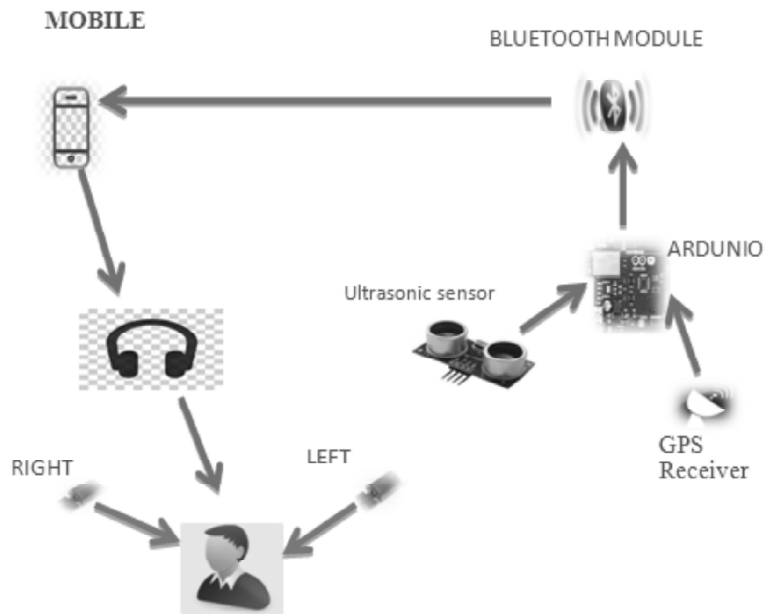
5. PROPOSED SYSTEM

Figure 1: Proposed system architecture
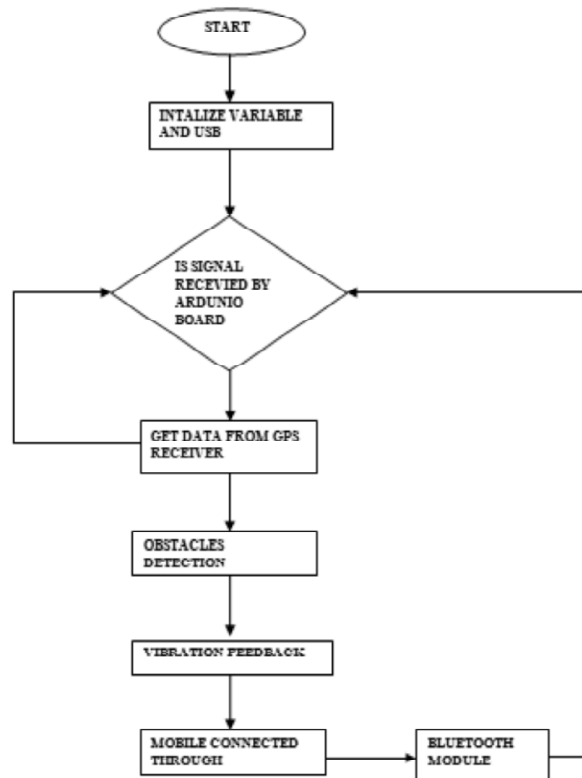
DATAFLOW DIAGRAM

Figure 2: Application flowchart

CONCULSION AND FUTURE WORK

Blind people are facing many problems in day to day life. Thus, with the intention to promote the Integration of blind people in society; we proposed a prototype with new approach based on mobile phone and GPS and vibrotactile feedback. With the help of android phone information about the navigation provided to visually impaired person. The navigation prototype is shown the navigation system"NAYAN". In future aspect design will be simplified and implemented in the real time setup for visually impaired person, and in the place of GPS module we will use mobile GPS system for navigation .The navigation system is more user friendly to operate for the blinds and even the illiterates.

Real time interface of the Global Positioning System (GPS) module helps in tracking the person at each and every time instantly for the visually impaired person in his life. In future version for the visually impaired person we are going to give marketing information in the user's application, allowing blind users to easily beware of recent promotions and products. This additional feature may bring commercial relevance to brands and store owners since it enables publicity of services and products to a wide audience.

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