

Guiding System for Blind People using Voice Recognition

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Abstract: In this paper we have developed the design of the voice based navigation system for blind using voice recognition module and GPS module implemented on arduino board. This system helps the virtually impaired person to navigate. The blind person will give the destination's address as the input to voice recognition module. GPS module continuously receives the latitude and longitude of the live location. It compares it with the destination's address in the form of latitude and longitude and altitude. The blind person receives the pronounced address which he needs to follow to reach his destination. There are a few modern technologies which are now accessible in the market to cater the needs, yet they have their own particular disadvantage, thus one of the effective solutions is to use an embedded system. The primary objective of this work is to permit virtually impaired persons to explore autonomously in the outside area. Ordinary route navigational systems in the outdoor ecosystem are expensive and its development is time consuming. Blind people are at extensive lacking as they regularly do not have the data which is required, while passing obstacles and dangers.

Keywords: Arduino, GPS, Navigation, Voice Recognition kit, Google API, Pocket sphinx, Raspberry pi, ultrasonic sensor, GPS, Geocoder, Reverse geocoder etc.

1. Introduction

At this level several devices are available for providing guidance to a remote location, but these are either very expensive or make use of Braille interface. Blind people can get knowledge from the unwilling contact with objects, persons or animals, by exploring the ecosystem and using their hands to understand the shape of an object, moreover, virtually impaired people can perceive other features of the objects as temperature, texture, weigh and though the tact has certain limits in confront of sight, it has a important function to reveal to visually impaired persons the world around them. There are many systems which are developed to help navigate the visually impaired. SWAN (System for Wearable Audio Navigation) content of a laptop, a tracking chip, GPS sensors, 4 cameras and headphones. The sensors and tracking chip transfer data to the laptop having the SWAN application which then computes the location and the direction where the visually impaired person is looking. A destination route is mapped and 3D audio cues are sent to the head phones to guide the blind person along a path to the destination. The drawback of this system is that it needs many sensors, 4 cameras that makes the system complex and expensive. Other system called SESAMONET (Secure and

Safe Mobility Network) uses RFID micro chips which are embedded in the ground. This is used to guide the blind person through a predefined area. Each micro chip sends location signals through a walking stick to the smart phone. The disadvantage of this system is that it requires more RFID microchips and it is impossible to put so many chips for long distance. Hence the system is costly. For achieving goals and objective in life, independence plays an important role. Blind person individuals find themselves hard to go out independently. There are thousands of blind people in this world who are usually in need of helping palms. For decades, the white cane has become a known attribute to blind peoples navigation and later work have been made to enhance the cane by adding a different sensor. Blind people face problem when they walk on the road or stairs using a white cane, but they have sharp hepatic sensitivity. The digital walking stick will assist the visually impaired people by supporting extra handy manner of existence. There are numerous steering structures for blind person travelers to navigate fast and completely against boundaries and different dangers faced. Basically, a visually impaired user has a white cane or a steerage canine as their mobility resource. With the advances of developed technology many distinctive kinds of devices are support mobility of visually impaired, known as Electronic Travel Aids (ETAs). The essential feature of ETA for the visually impaired person is to get statistics at the form of the street and the placement of limitations when they are in unknown area. With these facts, they have to arrive at their locations, warding off unexpected boundaries. The principle intention of this paper is to enhance our knowledge and offerings to the people of blind and disable society. There are approximately 38 millions of persons across the worldwide mainly in developing countries who are visually impaired. And blind people, over 15 million are from India. Visually impaired persons most of the time are withdrawn from the society because they feel that people and the society are prejudiced and so they may not be welcomed most of the time. The unforgettable achievement, which is the output of persistent struggle and hard work between "Anne Sullivan" the teacher and "Helen Keller" the impaired student resulted in a revolutionary method of getting knowledge and communication, which ultimately culminated in the development of Braille language. Visually impaired person do not need pity, but they require empathy, so as to mingle in the

society and be independent for their navigation chores. Hence visually impaired people need to develop device that will allow blind user to navigate freely and this requirement has become crucial.

2. Overview of paper

A. Motivation

In order to develop the quality of life for visual impaired, in this work we focused on developing new devices to help these persons to access the outdoor environment in particular like Banks, hospitals, post office, and other public utility. Thus, this work intends to play a special role in this field providing as much information as possible for visually impaired, which help them to take a comfortable navigation. To develop a prototype, we focused on users and their interests, this work deals a aims to build a system to assist people with handicraft. The device intends to help them in providing the data. In this device we are going to detect an obstacle by ultrasonic sensor. It acts as the heart of the system.

B. Literature review

The result of survey in India tell us that India is the home of the largest number of blind people. In world Out of the 37 million visually impaired people all over the globe more than 15 million people are Indian. For supporting to avoid obstruction blind people commonly use white canes or guide dogs. Guide dogs are of restricted area for finding the way to a distant locality, referred as way finding. At this stage numerous devices are available for offering guidance to a distant navigation but these are either expensive or make use of Braille interface. Visually impaired people can get data from the unwilling interaction with entities, persons or animals, by exploring the ecosystem and using their hands to recognize the shape of an object, moreover, visually impaired people can sense other features of the objects as temperature, texture, weigh and though the tact has certain limits in confront of sight, it has a very significant function to unveil to visually impaired persons the world around them. There are many devices which are designed to navigate the visually impaired.

C. Evaluation

There are different techniques to help the blind people for navigation. One of the is SWAN (System for Wearable Audio Navigation) This content of a laptop, a tracking cheap, GPS sensors, 4 cameras and headphones. The drawback of this device is that it requires more hardware. The other next system is SESAMONET (Secure and Safe Mobility Network) RFID microchips which are embedded in the ground. This is used for navigating the fixed address of area. Each micro cheap send position signals to the visually impaired people through stick. The drawback of this system is that it requires lots of RFID cheap and it is not possible to put microchips for large distance. so, for the advancement of this we are developing this new technique for visually impaired people.

3. Block diagram

In block diagram the main board is connected to the ARM7 Controller. Also an ultrasonic sensor is used to detect any obstacles if present. At the output we have a voice playback recording IC and the speaker unit, which give the directions to blind person shown in Fig.1. In this block diagram the 32-bit ARM processor (LPC2148) is used, which is the main part of this project. GPS receiver GR87 is to get the live location in the form of longitude and latitude.

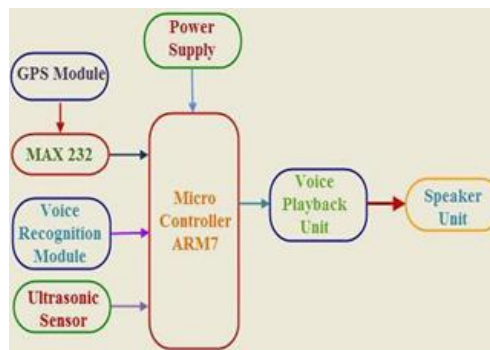


Fig. 1. Navigation System for Visually Impaired

4. Hardware

A. Global positioning system

The Global Positioning System (GPS) is a space-based satellite navigation system that tells location and time information in all weather conditions, anywhere on or near the earth where there is no obstacle in line of sight to four or more GPS satellites. The system gives critical capabilities to military, civil, and commercial users around the whole world. The USA government develop the system, maintains it, and makes it freely accessible to anyone in world with GPS receiver. The GPS is a network of 30 satellites orbiting the earth at an height of 20,000km. Whenever you are on the planet, minimum four GPS satellites are visible at a time. Each one transmits data about its position and the current time at regular intervals. These signals travelling at the speed like speed of light, are intercepted by your GPS receiver, which help to calculates how far away each satellite is based on how long it took for the message to arrive. The GPS receiver continuously receives the latitude and longitude values for each position of the system and it is interfaced with the raspberry pi. The GPS offers the capability to correctly determine location anywhere on earth within the speed, altitude, heading, and a host of other critical positioning data. The GPS receiver needs a successful lock onto at least four GPS satellites to collect an accurate signal for calculating position and velocity. The module triangulates its location with relation to three satellites, using a fourth satellite as a clock source board microcontroller solution for many DIY devices, and, in this blog, we will look at the IDE, that is used to program it! it easier to learn to program. Finally, Arduino gives a standard form factor that breaks out the functions of the micro-

controller into a large accessible package There are many other features available to consider on the IDE. But, having many different types of microcontrollers and having involved in multiple programming environments, it is shocking that how simple the Arduino and its IDE is! In less than one minutes, you can get a simple C++ program uploaded on the Arduino and have it running.



Fig. 2. GPS Module

B. Ultrasonic sensor

The human ear can hear sound in the frequency of around 20HZ ~ 20KHZ. And ultrasonic sensor is the sound wave beyond the ability of which humans being can hear is of 20KHZ and are not harmful for human being. The Ultrasonic Transmitter which will transmit a signal out into its surrounding area. The Ultrasonic Receiver will receive this signal once it bounces off from an obstacle. Ultrasonic sensors are mainly used to measure the distances between the obstacle and the sensor. The ultrasonic sensor works on the based on of Doppler Effect. It contends of an ultrasonic transmitter and a receiver. The transmitter sends the signal in one direction and this transmitted signal is then reflected back whenever there is an object and it is received by the receiver. So the total time taken by the signal to get transmitted and to received back will be used for the calculation of the distance between the ultrasonic sensor and the obstacle.



Fig. 3. Ultrasonic Sensor

5. Software details

Arduino is an open-source platform for building electronics devices. Arduino consists of both microprocessor and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, it used to write and upload computer code to the physical board. The Arduino platform has become very popular with people just starting out with electronics, and for good reason. Unlike previous programmable circuit boards,

the Arduino does not want a separate piece of hardware (called a programmer) for loading new code onto the board you may simply use a USB cable. Additionally, the Arduino IDE having a simplified version of C++, making The Arduino is a fantastic single- board microcontroller solution for many DIY devices, and, in this blog, we will look at the IDE, that is used to program it! it easier to learn to program. Finally, Arduino gives a standard form factor that breaks out the functions of the microcontroller into a large accessible package There are many other features available to consider on the IDE. But, having many different types of microcontrollers and having involved in multiple programming environments, it is shocking that how simple the Arduino and its IDE is! In less than one minutes, you can get a simple C++ program uploaded on the Arduino and have it running.



Fig. 4. Arduino uno board

6. Conclusion

India is one of the countries with largest population of blind people. Initially many visually impaired people prefer to not use electronic aids, and use only canes or guide dogs. This is because of relatively expensive and poor levels of user satisfaction associated with existing electronic systems. So we want to develop a low cost and user friendly system for blind people. This technique offers innovative solutions in order to replace the conventional methods of guiding blind person. The system consists of a GPS receiver and a voice recognition module which is interfaced to the Arduino. Arduino is programmed in a way that depending on the satellite information about the destination, the visually impaired person gets the navigation directions. We navigate the blind person using voice.

References

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