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Obstacle tracer for visually impared

B. Persis Urbana Ivy[1] and S.Babu[2]

VIT University, Vellore-14, Tamil Nadu, India

General Manager, Synergy Techno Systems, Velachery, Chennai, Tamil Nadu, India.

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ABSTRACT

Being future technocrats we tossed this idea with an aim to provide service to the society. Providing an overture for the visually impaired, to make them feel self-reliant and thus raise their status in the society is the ultimate aim of our project. The proposed concept consists of a smart stick that generates voice output using the voice arrays and pre programmed microcontrollers. This tool encompasses five constructive features. The pre-eminent feature is the *Obstacle Tracer* which uses ultrasonic sensors to detect the obstacles on the person's way and redirects them appropriately using voice commands. *Area Detector* uses the GPS module to figure out the location and gives the output as voice stream. *Destination alerter* generates a voice alert to the person on reaching a landmark (such as bus stop, bank, post office etc….) In addition to these our contrivance also has the *Onboard Alerter* module that informs the person when a bus enters the boarding area. This uses the transmitters in the bus and receivers in the contrivance. The *Off Board Alerter* specifies the subsequent bus stops as soon as the person boards on the bus. Thus our appliance will help the visually impaired person to be independent in his own path.

Introduction

This project is a Mission for no Vision, which will serve as an eye for the visually impaired letting them to be independent in their own path. This contrivance will guide the visually impaired amputee to trace the obstacles on his path, locate the landmarks (bank, post office, bus stop), board a desired bus and board off the bus at the required destination.

Our project comprises of the following modules namely, Obstacle tracer, Area detector, Onboard Alerter, Off board Alerter and Destination Alerter. These modules generate voice output using the voice arrays and pre programmed microcontrollers that will help the visually impaired person to be sure about his current activity.

Our System

Our overall block includes 3 sensors for the obstacle tracer setup, a manual switch for area detector, a mode switch for On-board and Off-board alerter.

Obstacle tracer is an independent module that can be de-activated when needed. Otherwise it is mandatory. When the person encounters an obstacle, the ultrasonic sensors intimate him to choose an alternate path that is free from obstacles. The controller has 7 messages given as input to the voice chip. This helps in generating a voice output that instructs the person to change his direction in order to avoid the obstacle. This module uses a power supply (a battery) of+12v. We have considered both stationary as well as the moving obstacles while designing this module

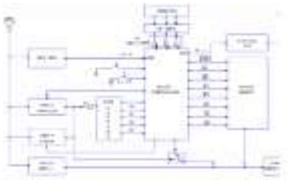

Fig 1: complete structure

When the person is unaware of the current location he can recognize the area by operating a switch. GPS module generates the co-ordinates continuously even if the switch is at off state because, GPS gets the co-ordinates from the satellite.

As soon as the person operates the switch, the last co-ordinate is sent to the controller. Digital transmitter is used for transmitting the co-ordinate from micro controller to the server. The receiver present at the server side receives the co-ordinate from the device. It compares it with the server side database. This interfacing is done using RS-232.PC contains an in-built voice, which is sent to the transmitter. The receiver present at the device side receives the voice and generates it as output through a headset or Loudspeaker. This makes the amputee to recognize his current location.

A mode switch contains 3 states. Silent mode state, Vehicle mode and Place mode.

Silent mode state: It is a non-functional state. If the person does not need any function he can select this mode.

Vehicle mode: Vehicle mode is used for the on-board alerter where the vehicle details are provided to the amputee. He will be alerted whenever the bus is within the coverage area. A transmitter is placed in every bus. When the bus enters the boarding area he will receive the voice message, which conveys him the bus number and the route of the bus. To know the vehicle approach, he needs to have the mode switch in vehicle mode only.

Place mode:

Place mode is used for the off-board alerter where the bus stop name is generated as a voice output. Each bus stop will have a transmitter that transmits the name of the stop as voice output to the headset or loud speaker. Once the person boards the bus he should change to the place mode where the transmitter and receiver of the device starts functioning and will intimate all the subsequent bus stops in voice format when

Tele: +91-9884928763

E-mail addresses: Persishpm@gmail.com, persis.b@vit.ac.in

the bus reaches its respective bus stops, so the person can get down as and when required.

Assembler (8051 IDE) and pgm 89 series flash programmer (Program up loader) are used. Ultrasonic Sensors, GPS, Decoders, Micro controllers, Voice Arrays, Transmitters, Receivers, Lead acid battery (+9v), Loud Speaker or Headset are the hardware requirements for the above design.

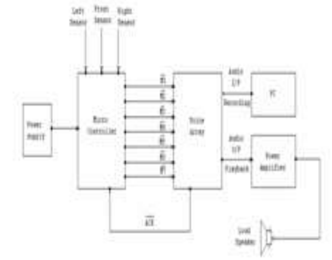

Fig2: working principles

Consider an example. The presence of an obstacle is sensed in the front sensor and the right sensor. Let this obstacle be stationary like a wall. Now in this case, first the front sensor senses the presence of an obstacle and a message “STOP” is generated and the control is shifted to the left sensor. Since there is no identification of the obstacle the control is transferred to the right sensor. Now this detects the presence of the obstacle and the control is again transferred to the front sensor. Since the obstacle is stationary, front sensor detects the obstacle and the signal is transferred to the voice chip to generate the corresponding message “MOVE LEFT” as voice output.

Consider another example that of a motile object present in the front and moves away after a few seconds. In this case the front sensor senses the presence of obstacle and plays the message “STOP”. Now the control is transferred to the left sensor and then to the right sensor to detect the object and the control is transferred back to the front sensor. Since the obstacle is motile the front sensor does not detect the presence of any obstacle and hence the messages “MOVE FRONT, LEFT OR RIGHT “is generated as voice output.

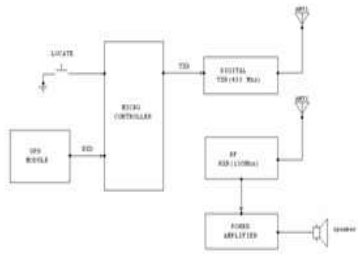

Fig 3: Transmitter and Receiver setup

GPS:

GPS technology can assist to improve independent mobility as well as to find the unknown location for the visually impaired person.

The GPS is an electronic system. it is used for location determination. It has been planned and financed by the US Army. It consists of 24 satellites orbiting the earth about 12,000 miles above the earth. These satellites produces a specific electronic signal. By using the receiver the signal from it can be received.

One can get information on his/her position on earth by using a GPS receiver. Based on the transmitters signal the position is calculated. The obtained precision can be 10 routinelyisintheorderof5tometers depending on the strength of the signals that can be received. This positional information (in geographical co-ordinates such as e.g. N 54°37,297 / E 4°39,624) can be transformed into human understandable information, using computers and map software.

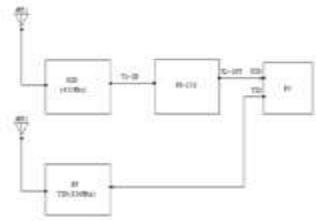

Fig 4: connection to PC

A minimal "3-wire" RS-232 connection consisting only of transmit data, receive data, and ground, is commonly used when the full facilities of RS-232 are not required. When only flow control is required, the RTS and CTS lines are added in a 5-wire version.

Initially to know the current location the switch is turned on. The last generated co-ordinate is sent to the server. This is compared with the pre-existing database present in the server. The matched area is given out as voice output. The above four steps can be continued if the person wishes.

RS-232:

In telecommunications, RS-232 (Recommended Standard 232) is a standard for serial binary data signals connecting between a DTE (Data terminal equipment) and a DCE (Data Circuit Transmitted Data (TxD) while at the time of data transfer the signals are active. When there is no data transmission, the signal is held in the mark condition (logic '1', negative voltage).

Received Data (RxD) This signal is active when the DTE device receives data from the DCE device. When no data is transmitted, the signal is held in the mark condition (logic '1', negative voltage).

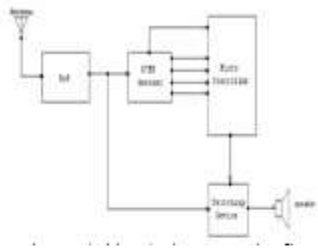

Fig 5: switching device connection flow

The above set up will be placed in all vehicles

The voice array will have 3 messages

- Mentioning the route as A to B
- Mentioning the route as B to A
- Tuning purposes
- Each message will comprise of a start bit, message and an end bit. These start and end bits are recognized by the decoder that is present in the user end. These bits are basically to avoid unnecessary noise signals.

We have two different messages for the same route so that the driver can switch over the messages when the bus operates in either of the routes.

For example, consider a bus number 5A with the route Vijay Nagar to T Nagar. This will be the first message. After the bus reaches T Nagar the same bus will be operated as 5A T Nagar to Vijay Nagar. Now this becomes second message. So the driver (provided with a switch) can play the appropriate message. These messages are given to the voice array which in turn is given to a RF transmitter that transmits the signal to the user end device using the antenna.

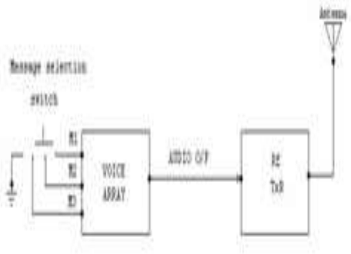

Fig 6: Message selection

DTMF decoder:

We can decode DTMF dial tones which is used in telephone lines with touch tone phones. It is very easy to use the program. Over the air in amateur radio frequency bands, DTMF Decoder is also used for receiving data transmissions.

Conclusion and future work:

Thus our proposed concept "Mission for no vision" will not only benefit the visually impaired amputee but also other outlanders who are new to a particular location with the assistance of our contrivance. As a future enhancement a motor can be attached and assembled to the same device so it can be used as a vehicle to steer the person to reach the desired destination.

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Table of DTMF Equencies (CCITT)

Symbol		Tone B [Hz]			
		1209	1336	1477	1633
Tone A [Hz]	697	1	2	3	A
	770	4	5	6	B
	852	7	8	9	C
	941	*	0	#	D