IOT BASED SMART STICK FOR BLIND PEOPLE

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ABSTRACT

Keyword: *- SMART STICK, Blind, IR Sensor, Visually Impaired, assistive devices, Hand-held Devices etc….*

1. INTRODUCTION

Safety and efficient mobility for blind people using SMART STICK For blinds, it is difficult to walk and know their surrounding without the help a stick. This Paper aims at assisting blind person to move around without a stick and enable to recognize important objects.

Visually impaired people are the people who can't identify smallest detail with healthy eyes. Those who have the visual acuity of 6/60 or the horizontal extent of the visual field with both eyes open less than or equal to 20 degrees, these people are considered blind . Such people are in need of aiding devices for blindness related disabilities. As described in 10% of blind have no usable eyesight at all to help them move around independently and safely. Visually defective people find difficulties detecting obstacles in front of them, during walking in the road, which makes it dangerous.

The electronic aiding devices are designed to solve such issue. The smart stick comes as a proposed solution to enable them to identify the world around. We propose a solution, represented in a smart stick with proximity sensor to identify stair-cases, obstacles and ultrasonic sensor to find any other patch holes in front of the user, within a range of 1 meters. Moreover, another sensor is placed at the bottom of the stick for the sake of avoiding puddles. Vibration motor and Speech warning messages are activated when any obstacle is detected. This proposed system uses the micro embedded system raspberry pi, vibration motor and GPRS shield to track the blind people. The stick is capable of finding all obstacles in the range 1 meter during 1s and gives a suitable respect message permit blind to move twice his normal speed because she/he feels safe. The smart stick is of low cost, fast response, low power consumption, light weight and ability to fold.

Relevant Theory:

Blind and visually defective people find it difficult to travel in unfamiliar places because they do not receive enough information about their location with respect to traffic and obstacles on the way which can be easily seen by people without visual impairment. Now a days, there are different technologies like GSM, GPRS which help the blind people to navigate. The systems which exist so far use GPS for navigation and technologies like GSM or GPRS for sending emergency alerts to the relatives about current location of the blind person. The first system under study, uses GPS for outdoor navigation and RFID tags for indoors. But this solution has proved to be inefficient. The RFID sensor is used for finding location of blind indoors and GPS is used for outdoor. For indoor navigation, the RFID sensor is attached to the walking stick of blind person and RFID tags are installed in all the areas that need to be identified. These tags deal as a landmark to the person using the cane. Each tag will be equipped with as much information as needed to clearly define the location of that precise tag (i.e. shops, names of places). The tag also contained additional information about direction and locations of other sensitive locations (i.e. Bus stops, telephone booths, subway stations, etc.). The RFID tag were covered by a protective shield to keep it safe from any harm. In outdoor the GPS is used to detect the location of the particular place. The GPS which is fixed to the walking stick of blind person will help to give location information in outdoor.

1.1 Scope:

- Navigating world map,
- Worldwide provide destination to blind people through navigate,
- Detect obstacle and alert the blind people through speech input/output

2. Literature Survey

2.1 Natural Language Processing (NLP):

The System will recognize the obstacle and convert it into human understandable commands like obstacle detected, move left, move right. , etc. Which are already programmed to the system according to situation and condition to make blind people easy and efficient to move from source to desire destination. Extract text from wav file. The main goal of an ASR system is to precisely and conveniently change a speech signal into a text message transcription of the spoken words independent of the speaker the device used to record the speech (i.e. the microphone). This process begins when a speaker decides what to say and actually speaks a sentence. (This is a sequence of words possibly with pauses, uh's, and um's.)

The software then produces a speech wave form, which embodies the words of the sentence as well as the extraneous sounds and pauses in the spoken input. Next, the software attempts to decode the speech into the best estimate of the sentence. It converts the speech signal into a sequence of vectors which are measured throughout the duration of the speech signal. Then, using a syntactic decoder it generates a valid sequence of representations.

The major goal of ASR research is to allow a computer to recognize in real-time, with 100% accuracy, all words that are intelligibly spoken by any person, independent of vocabulary size, noise, speaker characteristics or accent. Now a days , if the system is trained to learn an individual speaker's voice, then much larger vocabularies are possible and accuracy can be not be lesser than 90%.

2.2 Sensor unit:-

In these proposed device uses ultrasonic sensor & it can find any object that lies on the ground, placed a distance of certain meters from the user. The minimum size of the object that can be detected should not be less than 3 cm width (or diameter).The ultrasound will be reflected from a nearby object, if any. The sensor will then detect the presence of any object that lies within that meters by detecting the reflected sound beam. The time intervals at which the transmitter will transmit ultrasound depend on the walking speed of the user. For water indication electrodes are fitted at the bottom of the stick these electrodes are sensing water and transmit information to blind people. And for pit indication infrared sensor is used. It informs the people about the pit found in their path. This diffused photoelectric beam sensors consist of a receiver and transmitter together. These beam sensors look alike Inductive Proximity Sensors and hence also known as IR Proximity Sensors. The emitter emits Infrared rays which are reflected on the receiver through the object to be registered.

- **Ultrasonic Sensor:-**

Ultrasonic sensors (also known as transceivers when they both send and receive) work on a similar principle to sonar or radar which check out attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors measure the time interval between receiving the echo to determine the distance to an object and sending the signal .This technology can be used for calculating: speed of wind and direction (anemometer), fullness of a tank and speed through air or water. For calculating speed or direction a device uses number of detectors and calculates the speed from the relative distances to particulates in the air or water. Another applications include: humidifiers, sonar, medical ultra solography, burglar alarms and non-destructive testing. Systems use a transducer which generates large waves in the ultrasonic range, above 18,000 hertz, by turning electrical energy into sound, then upon receiving the echo turn the sound waves into electrical energy which can be measured and displayed. This technology is limited by the shapes of surfaces and the density of the material. For example foam on the surface of a fluid in a tank could misrepresent a reading.

- **Infrared Sensor:-**

In our system, two infrared sensors are used; horizontal and incline The horizontal IR sensor is located under the hand stick at height of 90 cm to scan the area in front of the blind, whereas, the inclined IR sensor is located at height of 75 cm The main concept of operation is as follow: a pulse of IR signal is transmitted by the transmitter, and then the signal travels out in the environment. In case of no obstacle, the signal is never reflected, and there is no received signal at the IR receiver but the receiver still can get a very weak noise signal from the environment. In case of finding an obstacle, the signal is reflected back to the receiver.

3. Software Requirements Specification

3.1 Introduction

It is based on the use of new technologies to improve visually impaired person's mobility. Our research focuses on obstacle detection, pit detection, water detection and finding location in order to reduce navigation difficulties for visually impaired people.

In this system we are using the Ultrasonic sensor, Pit sensor, Water sensor, GPS receiver, level convertor, Driver, Vibrator, Voice synthesizer, Keypad, speaker or headphone, Embedded system & Battery.

Ultrasonic sensors work on the principle similar to radar which evaluates attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. This Sensors calculate time interval between sending the signal and receiving the echo to determine the distance to an object. That signal is send to the embedded systems.

4. CONCLUSIONS

It is difficult for blind people to move or live in surrounding without help. So, they usually use white cane to guide them during moving. Although it might be helpful, it doesn't guarantee saving blind people from risks. These traditional ways can be used for low level obstacles detection only.

5. REFERENCES

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