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MULTI FUNCTIONAL WALKING STICK FOR VISUALLY CHALLENGED PEOPLE BY USING RASPBERRY PI

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ABSTRACT

In the present work it is proposed to develop to device incorporating various features like recognition of commonly used objects, animals and in addition to these moving objects either an automobile or person etc.. different various stationary objects, wet condition with the help of these device the visually challenged person will be able to perform day to day activities individually that is without help of others.

Introduction

The proposed system provides efficient navigation and low cost for the blind, which gives a sense of artificial vision by providing information about the environmental scenario of objects around them. The device will be capable of detecting obstacles and moisture, by using ultrasonic sensors, Arduino Nano, moisture sensors and other devices that employ audio commands to alert the user of what is on the path of movement can construct better devices. According to the World Health Organization, almost 285 million people worldwide suffer from some sort of visual impairment, with 86 percent having impaired vision and 14 percent being blind. Human vision is one of the most vital senses for survival. Vision aids in establishing a connection with the environment.

The blind rely on alternative resources like the humble cane or others. They learn directions, the obstacles in their path and orient themselves in familiar environments such as inside a house. However, relying on memory to get from one place to another is not always safe for the blind. especially when they are outdoors. The blind are not always assisted and need a cane-like device to assist the blind in all aspects of life. Efficiency and cost-effectiveness are the main criteria for a case to be useful to a blind person. The Smart Blind Stick is a state-of-the-art device that allows us to help blind people find their way more easily.

Review of literature survey

Prof. Chaitrali. V. Nalawade, Sarita. J. Suryavanshi, Snehal. P. Jagtap." Visual Assistant Using Raspberry Pi for Blind People" in this work, Blind reader is an intelligent assistant based on raspberry pi using this device, it is easier for the visually impaired to detect the object. Raspberry Pi is used to implement artificial vision using python language on the Open CV platform.This system makes a better life for blind people as it will work with the latest technology and it is meant to the product the visually impaired to live life without any difficulties. [1]

Akhila. S, Divyashree. D, Disha M Rani, Varshini.S. S Dept. of ISE, Jyothy Institute of Technology, Tataguni, Kanakapura main road, Bangalore-5666666, "Smart Stick for Blind using Raspberry Pi". The system consists of ultrasonic sensors, GPS module, and the feedback is receive through audio, voice output works through TTS (text to speech). The proposed system detects an object around them and sends feedback in the form of speech, warning messages via earphone and also provides navigation to specific location through GPS. The aim of the overall system is to provide a low cost and efficient navigation and obstacle detection aid for blind which gives a sense of artificial vision by providing information about the environmental scenario of static and dynamic object around them, so that they can walk independently [2]

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mail:1vanitha@saveetha.ac.inrajiva.sriramec.edu.in, in this work There are millions of visually impaired or blind people in this world who are always in need of helping hands. The smart walking stick that we have designed will help the blind society by providing more convenient means of life and to move around independently. The stick consists of 4 ultrasonic sensors, one camera and an earphone. Out of 4 sensors 3 of them used for obstacle detection and the last one is used for pothole detection. The camera is used for text and object recognition. Thus it works as a virtual eye for blind people. The output will be from an earpiece.[3]

Prutha G, Smitha B M, Kruthi S, Sahana D P "Smart Cane for Blind People using Raspberry PI and Arduino, in this work, introducing a stick to guide blind people to move independently. It consists of raspberry pi and Arduino for monitoring the stick. Three pairs of ultrasonic sensors are used to detect obstacle in front of the users in the range of 15cm, and water sensors are used for water detection & puddles. The above sensors are interfaced in the stick. The stick can take robotic decision to move forward, backward, left and right as per obstruction detection using dc motor. Users will get alert from buzzer and vibration. Flashlight is interfaced on stick which can be noticed by others to let him pass way. Finger ring is used to give navigation using GPS. The user can maintain easily with fast response & low power consumption The main purpose of this paper is to help visually impaired people for navigating independently.[4]

Ravikumar, Krishnakumar, Karthikeyan, Balamuguran Assistant professor(Sel.G), Department of IT, SRM Valliammai Engineering College, Tamilnadu, India UG Students, Department of IT, SRM Valliammai Engineering College, Tamilnadu, India, "raspberry pi based smart walking stick for visually impaired person" in this paper The Raspberry Pi-based system is designed to give artificial vision and object identification, as well as real-time support through GPS. In this project, we'll use the Raspberry Pi to create a smart system for blind people that includes a camera module, a switch, and a GPS module. If someone is in distress, the Pi Camera recognizes the location using GPS and sends a message to that person's Whatsapp. The system is made up of a GPS module that receives feedback via audio, and the voice output is controlled by TTS (text to speech). The suggested system identifies an object in their environment and gives the form of speech, warning messages sent by earphone, and GPS navigation to a specific area. The overall goal ofthesystem is to deliver a low-cost, high-efficiency navigation andtext-to-voice aid for the blind that provides a sense of artificial vision by supplying information about the environment's static and dynamic objects.[5]

Existing System

Existing technologies, like as canes, can assist blind persons in navigating their environment by allowing them to detect obstacles in their route by touching or poking them. Smart belts, smart rings, smart canes, and other aids, in addition to the previous way, can assist users by detecting obstructions using ultrasonic or laser sensors. To warn them, these technologies emit an audio or vibration in response to the detected obstructions. Existing systems have the following limitations:

- Expensive
- Ineffective and unreliable
- Features and usefulness are severely constrained.

Proposed System

The proposed system consists of three main components. Ultrasonic sensor moisture sensor and " Image processing sensor for Raspberry Pi " is easy to understand and maintain. The system uses the Raspberry Pi, a small processing unit that works like a computer at a relatively low cost. Blind and visually challenged people find it difficult to detect obstacles when walking on the street. The system is intended to provide artificial vision and object detection, real time assistance via GPS by making use of Raspberry Pi The system consists of ultrasonic sensors, a GPS module, and the feedback is received through audio. Voice output works through TTS (text to speech). The proposed system detects an object around them and sends feedback in the form of speech such as warning

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messages via earphones and also provides navigation to specific locations through GPS. The aim of the overall system is to provide a low-cost, efficient navigation and obstacle detection aid for blind which gives a sense of artificial vision by providing information about the environmental scenario of static and dynamic objects around them, so that they can walk independently.

Block diagram

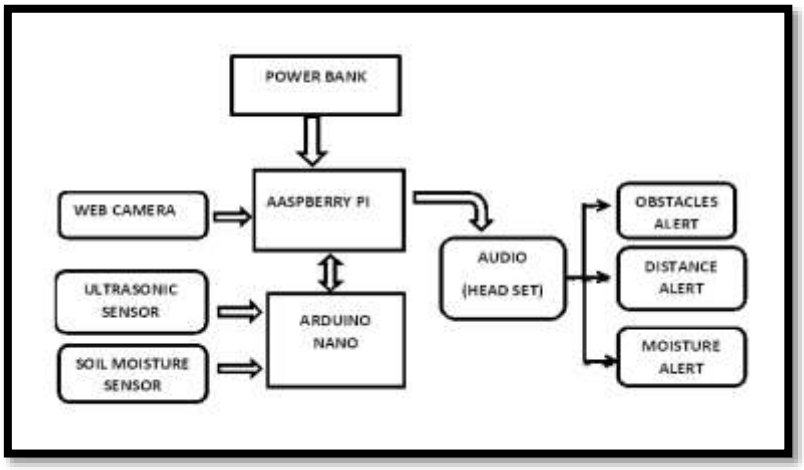

Fig 1: Block diagram of proposed system

Methodology

There is basically two sections included, the first one is hardware And second one is software.

- The hardware part has battery, raspberry pi, arduino nano, and sensors which helps to detect the obstacles.
- In software to developed a Program based on c language.
- Web cam is used to transmit pictures over the internet through the raspberry pi which helps to detect the obstacles.
- Soil moisture sensor to measure the volumetric content in soil.

Results

The smart walking stick is an electronic walking guide having two sensors one of the two sensors is used for obstacle detection where in it is tested for different stationary objects like car, bike, cycle etc. and live objects like cat, dog, and humans.it is placed on the stick.

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Fig2: Walking stick for visually challenged People

Table1: Ultrasonic sensor ranges

Objects	Ranges	Sound intensity	Action plan
Dog	100cm	45db	Stick indicates emergency walking path
	150cm	45db	Stick indicates normal walking path.
	200cm	45db	Stick indicates normal walking path
Car	100cm	45db	Stick vibrates to indicates normal walking path.
	150cm	45db	Stick indicates to normal walking path
	200cm	45db	Stick indicates to normal waling path
Human	100cm	45db	Stick vibrates to indicates emerging walking path.
	150cm	45db	Stick indicates to normal walking path
	200cm	45db	Stick indicates to normal walking path
Electric pole	100cm	45db	Stick vibrates to indicates emerging walking path.
	150cm	45db	Stick indicates to normal walking path
	200cm	45db	Stick indicates to normal walking path
Wall	100cm	45db	Stick vibrates to indicates emerging walking path.
	150cm	45db	Stick indicates to normal walking path
	200cm	45db	Stick indicates to normal walking path
Cat	100cm	45db	Stick vibrates to indicates normal walking path
	150cm	45db	Stick indicates to normal walking path
	200cm	45db	Stick indicates to normal walking path

As shown in above table is ranges of the ultrasonic sensor.
The other sensor is responsible for soil moisture detection. The sensor produces an output voltage according to the resistance.it can be tested for different soil conditions with varying moisture levels. It is placed lower side of the smart walking system.

Table2: Soil moisture in wet condition

Soil depth(cm)	Soil moisture (%)
0-10	30-40

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10-20	35-45
20-30	40-50
30-40	45-55
40-50	50-60

Table3: Soil moisture in semi wet condition

Soil depth(cm)	Soil moisture (%)
0-10	20-30
10-20	25-35
20-30	30-40
30-40	35-45
40-50	40-50

Table4: Soil moisture in liquid condition

Soil depth(cm)	Soil moisture (%)
0-10	50-60
10-20	55-65
20-30	60-70
30-40	65-75
40-50	70-80

As shown in above tables are ranges for wet, semiwet, liquid conditions.
These two sensors connected to raspberry pi. a camera is used for object identification and text identification. Finally, these sticks can help users identify specific objects or landmarks in their vicinity by scanning on objects or accessing data base. The stick can provide audio feedback to describe the object or its purpose.

Conclusions

The present work is designed, developed and fabricated to assist the visually challenged people by "multi-functional blind stick for visually challenged by using raspberry pi" the system is built using various electronic sensors to improve the efficiency of the device ultrasonic sensor range from 2-250cms and measuring range of soil moisture sensor 30cm to 120cm profound, The device is designed using Ultrasonic sensors, high resolution camera which in turn is converted to speech using TTS technology hence the user is provided with Voice command which sent via headphone to the people with blindness. Thus helping the person with blindness to navigate through any place independently. The system is a combination of electronic sensors like ultrasonic, soil moisture which tracks and provides realtime location of the user and navigation to the user from source to the destination. Thus in a nutshell the proposed system is efficient and economic which would assist the people with blindness in their day to day activities enabling them to be independent.

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