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Object Detection System for Blind People

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ABSTRACT: Visual impairment and blindness caused by various diseases has been hugely reduced, but there are many people who are at risk of age-related visual impairment. Visual information is the basis for most navigational tasks, so visually impaired people are at disadvantage because necessary information about the surrounding environment is not available. With the recent advances in inclusive technology it is possible to extend the support given to people with visual impairment during their mobility. In this context we propose a system, named Smart Vision, whose objective is to give blind users the ability to move around in unfamiliar environment, whether indoor or outdoor, through a user friendly interface. This paper is focused mainly in the development of the computer vision module of the Smart Vision system.

KEYWORDS:Obstacle Detection, Blind People, Camera, Voice Circuit

I. INTRODUCTION

Blind people face several problems in their life, one of these problems that is the most important one is detection the obstacles when they are walking. In this research, we suggested a system with two cameras placed on blind person's glasses that their duty is taking images from different sides. By comparing these two images, we will be able to find the obstacles. In this method, first we investigate the probability of existence an object by use of special points that then we will call them "Equivalent points", then we utilize binary method, standardize and normalized cross-correlation for verifying this probability. This system was tested under three different conditions and the estimated error is acceptable range.

Blindness is a state of lacking the visual perception due to neurological or physiological factors. Thepartial blindness represents the lack of integration in the growth of the optic visual or nerve centre of theeye, and total blindness is the full absence of the visual light perception. In this work, cheap, a simplefriendly user, smart blind guidance system is designed and implemented to improve the mobility of bothblind and visually impaired people in a specific area. The proposed work includes a wearable equipmentconsists of light weight blind stick and sensor based obstacle detection circuit is developed to help the blindperson to navigate alone safely and to avoid any obstacles that may be encountered, whether fixed ormobile, to prevent any possible accident. The main component of this system is the infrared sensor which isused to scan a predetermined area around blind by emitting-reflecting waves.

The main objective of this project is to develop an application for blind people to detect the objects invarious directions, detecting pits and manholes on the ground to make free to walkDetecting objects using image processing can be used in multiple industrial as well as social application. This project is proposing to use object detection for blind people and give them audio/ vocal information about it. We are detecting an object using the mobile camera and giving voice instructions about the direction of an object. User must have to train the system first about the object information .We are then doing feature extraction to search for objects in the camera view. We are taking help of angle where object is placed to give direction about the object.

II. EXISTING SYSTEM

The work they present in this system is based on the use of new technologies to improve visually impair people mobility. Our research is on obstacle detection in order to reduce navigation difficulties for visually impaired people. Moving through an unknown environment becomes a real challenge when we can't rely on our own eyes. Since dynamic obstacles usually produce noise while moving, blind people develop the ability of hearing to localize them. However they are reduced to their sense of touch when the matter is to determine where an inanimate object exactly is. The common way for navigating of visionless person is using a walking stick cane or walking cane.

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The walking cane is a simple and mechanical device dedicated to detect static obstacles on theground, uneven surfaces, and holes via simple tactile-force feedback. This device is light, portable,but range limited and it is not usable for the protection from obstacles near to head area.Another option that provides the best travel aid for the blind is the guide dogs. Based on thesymbiosis between the disabled owner and his dog, the training and the relationship to the animalare the keys to success for this method. The dog is able to detect and analyse complex situations:cross walks, stairs, potential danger, know paths and more. Most of the information is passingthrough tactile feedback by the handle fixed on the animal. The user is able to feel the attitude of hisdog, analyse the situation and also give him appropriate orders. But guide dogs are still farfrom being affordable, around the price of a nice car, and their average working time is limited,an average of 7 years.

III. PROPOSED SYSTEM

Normally, a blind person uses cane as a guide of him to protect him from obstacles. Most of area of surrounding is covered by the cane, especially the area near to his legs like stairs etc. But certain areas such as near to his head, especially when he is entering or leaving the door which is short in height. This system is specially designed to protect the area near to his head. The product is designed to provide full navigation to user into the environment. It guides the user about obstacles as well as also provides information about appropriate or obstacle free path. We are using buzzer and vibrator, two output modes to user.

Logical structure:

The logical structure of our system is shown in following fig 1. The can be divided into threemain parts: the user control, sensor control, and the output to the user.

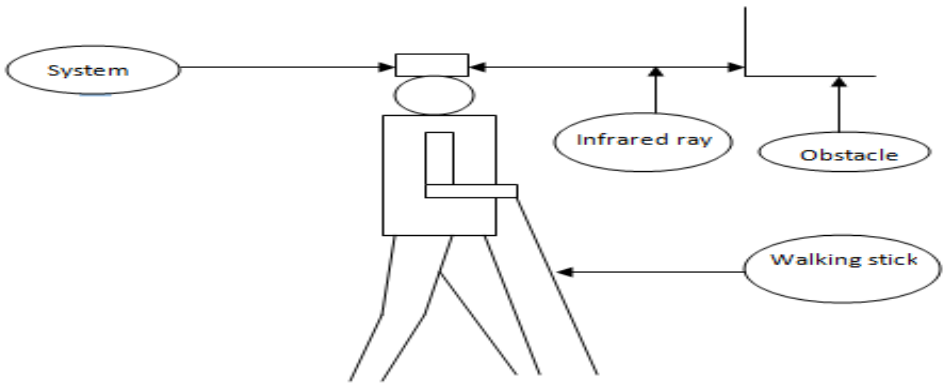

Fig 1. Logical Structure

The user control includes the switches that allow the user to choose project's mode of operation.There are basically two modes of operation, Buzzer mode and Vibration mode. These modes areprovided to user for taking output on his portability. Sometimes, he is not comfortable in gettingthe output in one mode. Vibration mode always not comfortable, can irritate him. Similarly, whenthere is a lot of noise in environment the buzzer mode is not portable. Another switch is controlled by the user, called initializing switch. The initializing switch is pressed when the user wants to stop the system. Sensor control determines when to tell the sensor to take a measurement and receives the output from the sensor and normalizes it to control value for the sensors. Basically, we are designing a sensor module. We are using proximity IR sensor for detection and it is mounted on a stepper motor. Stepper motor rotates continuously with an angle of 90 degree. The 90 degree angle is divided into three 30 degree portions. Two 30 degree areas are for indicating left direction or right direction obstacles, and third 30 degree area is for indication front obstacles. The main thing isour system is based on protecting the near head area because walking cane does not protect this area.

Output to the user includes the indication of obstacles to user. Basically we are using two output modes, vibration mode and buzzer mode. User can select any of the two modes in accordance tohis convenience. Sometimes vibration mode is

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portable for him, especially when there is a lot ofnoise into the environment. Buzzer mode is generally used when the environmental noise is lowand sometimes vibration can create irritation to the user.

Architecture:

The system architecture diagram of our project is given in following Fig 3. There are certain functions accomplished by these blocks. The description of blocks is as following Fig 3.

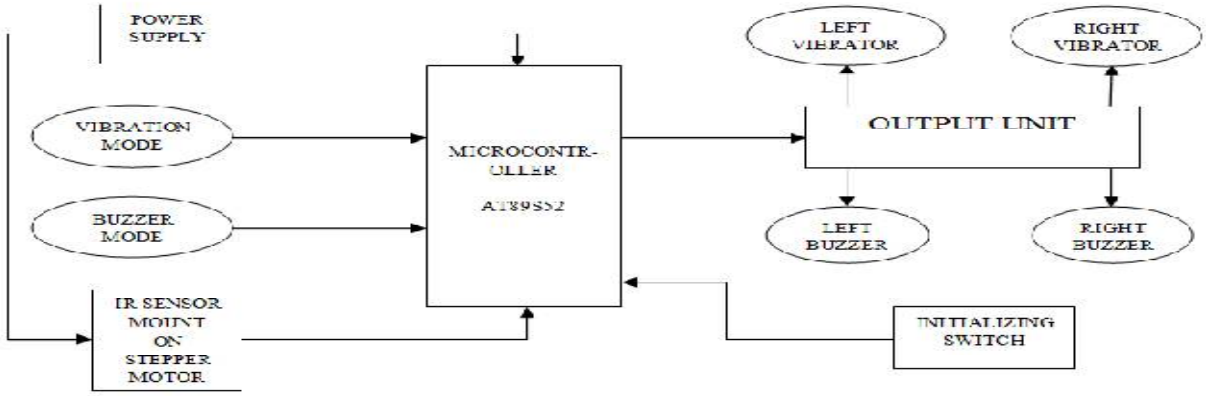

Fig 3. Block Diagram

As per our propose application blind person taking video of the path where he was walking the application will give voice message to that blind person and it will help to that person for identifying he's path . The object gets detected by the key matching technique which is used in the algorithm. And match that object with the database images to confirm the obstacle that comes into the way. When object is matched with database objects the application gives the voice instruction by using the Speech synthesizer. So, Blind user gets the direction from the application.

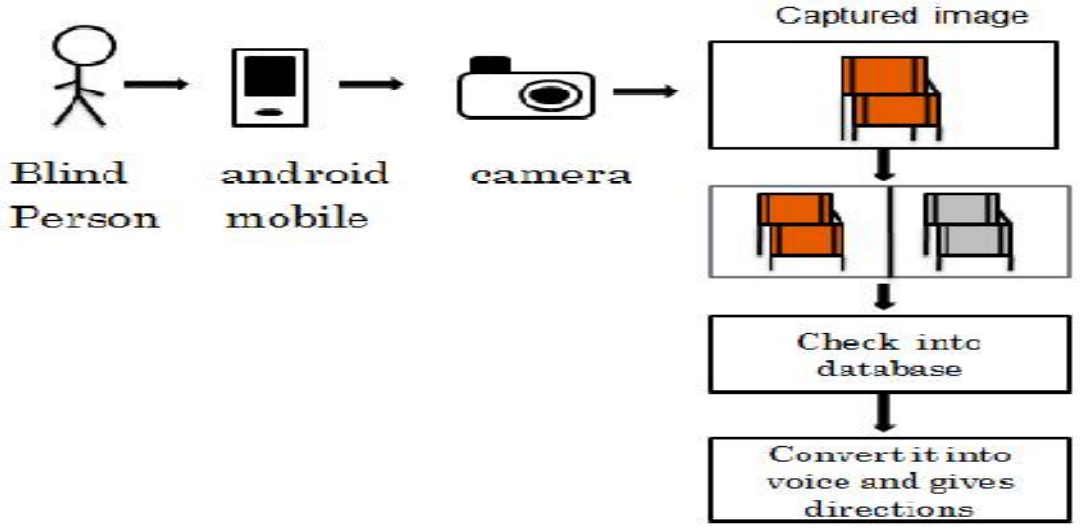

Fig 3. System Architecture

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IV. MERITS AND DEMERITS

Reliable:

This type of technology Provides good video quality. Difference between various objects like chair and table etc. can be easily differentiated and exact path can will be detected for visually impaired people.

Scalable:

This application can be run on various operating system. object will not be stationary so it will captured the ongoing video and process all the developing steps for detection and placement of object. This feature highlights the merit.

Efficient cost:

The cost will be depend on the smart phones.

Open Source:

Android application is an open source utility command which is Linux based and released under apache software. It has many versions with extending features and properties.(e.g. lollipop, jellybean, kit Kat etc.)

This application is mostly useful for blind person. No need to carry walking stick.

V. CONCLUSION

Here we have successfully modelled the Object Detection. The tests will went smoothly and had no problems. This report introduced two environmentally-friendly designs for a blind people. We presented information about the Blind people application. This application will be more effective for blind people. It is important to develop this application for the future. The system is used by Blind peoples but the normal people also can use. In future we are going to detect the potholes which are coming across the camera video

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