Smart Cane for Blind Person Assisted with Android Application and Save Our Souls Transmission

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ABSTRACT

Today technology is improving daily in different aspects in order to provide flexible proposes Smart Cane (Stick) for blind person. But there is no such kind of good system to navigate a blind person and help in emergency situation. In this paper, user friendly device is proposed that can identify the obstacles in the path using ultrasonic sensors. In this system blind person will navigated through a cane interfaced with an android application. A blind person can establish voice call or SMS to a predefined number just by pressing the emergency button on cane using GSM module. In addition, people will get notified as Facebook status updated with emergency alert. This system develop an android application which is smart and user-friendly. While walking in public place during night time, the blind person can use cane as a flashlight which illuminates automatically.

Keywords— Ultrasonic sensor, Android application, GSM, Bluetooth, LDR, PIC 16F877A, Facebook Server

I. INTRODUCTION

Blindness is a very common disability among the peoples throughout the world. According to the World Health Organization (WHO), 253 million people are visually impaired worldwide, 36 million are blind and 217 million have moderate or severe distance vision impairment. About 89% of vision impaired people live in low and middle income countries. Recent survey source uncovered that India has now become the country with world’s largest number of blind people. There are 36 million blind people across the globe, over them 8.8 million people in India were found to be in 2015.

The blind travelers depend on other guides like blind cane, people information, trained dogs, etc. When a visually impaired person is walking in the street, he may encounter several problems in the way such as obstacles like human, animal or wall, pit or staircase, muddy surface, fire and many others which can create troubles like accident or injuries to him even after holding conventional sticks. If the person is holding this electronic intelligent voice stick while walking it will help him to protect himself from these hurdles.

The scope of this project is to develop a low-cost system that assist blind and visually impaired without the help of sighted people. They need help to walk outside and all other daily essential works. Navigation system caters needs of the blind people who are not able to move from one place to another without the help of others. The usage of the blind navigation system is very less and efficient in India.

Navigating a blind person is a great challenge as blind person has to rely on other. The simplest and most widely used travelling aid used by all blinds is the white cane. It has provided those people with a better way to reach destination and detect obstacles on ground, but it cannot give them a high guarantee to protect themselves from all level of obstacles [1]. Sometimes it happens that blind people are lost and their guardians are in tension about them. There has been many efforts but even now, it is not easy for the blind people to move independently from one place to another. Walking in a public place during night time is one of the challenging task for visually
impaired peoples because other people will not notice that the person is blind and in rush they may accidently clash with them.

To solve this great problem it has been studied by many researches about support instruments for eye-sight. So the project glows a system that tries to remove the curse of blindness and make them self- dependent to do their daily chores. This system design and develop a portable unit (stick) for the blind people for easy use and navigation in public places through sensors [2]. Also this system provides emergency alert by making call or SMS to the predefined emergency phone number. Additionally people will get notified as face book status updated with emergency alert. This system works in both night and day and it is very reliable and effective.

II. EXISTING METHODOLOGY

God gifted sense of vision to the human being is an important aspect of our life. But there are number of blind people in the society, who are suffering while exercising the basic things of daily life and that could put lives at risk while travelling. There is a necessity these days to provide security and safety to blind people. There have been few devices designed so far to help the blind. Blindness or visual impairment is a condition that affects many people around the world. The usage of the blind navigation system is very less and is not efficient. The blind traveler is dependent on other guide like white cane, information given by the people, trained dogs etc. Many virtually impaired people use walking sticks or guide dogs to move from place to place. A guide dog is trained for guiding its users to avoid the accidents from objects and barriers over a fixed path or in a fixed area. When a visually impaired person uses a walking stick, he waves his stick and finds the obstacle by striking the obstacles in his way.

III. DESIGN OF THE SYSTEM

SYSTEM BLOCK DIAGRAM

The system block diagram to assist with an android app and SOS transmission for blind Person as shown in Fig.1. This embedded system consists of various sensors used for range finder and Pit detection along with Vibrator, speaker or headphone, Bluetooth, microcontroller, LDR, LED and Battery.

SYSTEM OPERATION

In this Ultrasonic sensor is interfacing with PIC16F877A. Ultrasonic sensor is used to detect objects in front and pit as well. This sensor works on the principle of radar or sonar. This Ultrasonic sensors generate high frequency sound waves in the ultrasonic range by converting electrical signals to sound signals and evaluate the echo to determine distance to an object. If no obstacles are present, these waves pass without reflection. Once the object is detected in front, this signal is send to respective port of system. Cane controller processes the output and consequently drives the vibration motor using Motor driver. Blind person can sense this vibration to avoid obstacle in front [1, 2].

Similarly this ultrasonic sensor is used as a pit sensor for pit detection. Pit sensor is used to analyze any dent or pit along the path. If pit is detected, signal is given to controller. Controller process the output and drives the vibration motor. In this way blind person will sense two senses like vibration and sound [3].

Cane controller is interfaced with Bluetooth Module HC-05. This module is used to communicate with the android cell phone of the blind person.

When the blind person get notified that an obstacle in front or pit along the path by getting senses like vibration on cane. This wireless signal will be transmitted to PIC controller using Bluetooth module [4]. The Android Application will get this data and converts it into speech. So that blind can hear audio message alert like “STOP”. In emergency situation by pressing a single button on cane, blind person can send emergency message to a predefined number [5, 6]. For this Android Application is used. Also using this Application Facebook status of emergency contact numbers will be updated with emergency alert.
Light Dependent Resistor (LDR) gives the output in form of change in resistance which can be converted into voltage by using signal conditioner circuit and same can be given to the controller. During night because of high resistance (M Ohm) path, no current pass through Light emitting Diode (LED). LED which is connected on cane. Due to the flowing of current, LED get on and cane will illuminates brightly. So this cane Blind person can be used as Flashlight which can be noticed by others [7].

IV. HARDWARE IMPLEMENTATION

![Project Model](image1)

This project is developed and tested with respect to actual parameters of System. I have implemented the device such a way that the sensors are mounted on middle and lower part of the cane. As a result the sensors mounted on cane detect the obstacle position in front of the upper front side in the walking path and the lower sensor mounted on cane detects the pit in the ground. The Fig. 2 shows Project model.

Fig. 3 shows hardware circuit model consists of:
1. PIC16F877A Microcontroller
2. Bluetooth Module HC-05
3. Ultrasonic Sensors
4. Relay driver circuit
5. Output Devices :Vibrator Motor, LED
6. Android Mobile phone.

The connection has made up between the PIC 16F877A microcontroller, Bluetooth module, sensor, relay driver circuit also connected with vibrator motor .The 5V DC supply provided to microcontroller and other hardware model.

V. SOFTWARE IMPLEMENTATION

The flowchart shown in Fig.4 represents the algorithm for the PIC16F877A microcontroller which processes the data and sends it to the android application via HC-05 Bluetooth module. Since this system used the ultrasonic sound to measure the distance it is affected by several types of noise and the obtained distance is deviated from the actual distance so it is an important issue to find the best result. If any object is detected in front by the sensors situated on the stick, vibrate the motor and then send feedback to the application. Also it shows Emergency alert to predefined number by sending SMS.
VI. RESULT ANALYSIS

In Fig.5 First line is displayed on LCD indicates that distance from object. If the distance between stick and object is <100 cm, then motor will vibrate and will alert to blind person by saying “STOP” message through android app. Second line is displayed on LCD indicates that distance between stick and pit. If it is >50 cm, then blind person can alert by sensing vibration of motor.

Fig.4: Flowchart of System

Fig.5: Object Detection using ultrasonic Sensor

Fig.6: Bluetooth Disconnectivity

Fig.7: Bluetooth Connectivity
Fig. 8: Emergency Alert

Fig. 6 and Fig. 7 shows Bluetooth connectivity of android mobile using android application. Fig. 8 shows in emergency situation blind person have sent emergency alert message to predefined number. Also Facebook status is updated.

V. CONCLUSION

In this paper, I have implemented a system for blind navigation. In this project some of very efficient and accurate electronics are used to make the blind navigator simple to use and effective for the blind person. The system has been tested through several test cases.

In this system ultrasonic sensors are interfaced with an android application to detect the obstacles. The system also provides emergency alert to ensure their safety. The emergency switch on the cane helps user to communicate with his/her relatives in case of emergency. The blind assistive device with Blind android application is very useful for a blind person to move without the help of other and the user can seek emergency help through voice call. Also during night blind person can be protected whenever needed which will ensure additional safety. This system tried to eliminate the flaws in the previous system. It aims to solve the problems faced by the blind people in their daily life. This method is more efficient, accurate and more convenient to use.

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