

Smart Cane for Visually Impaired Person by Using Arduino

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Abstract: God gives best gift to human being. In which important aspect in our life is vision. But there are some people who lag this ability of visualizing these things. Global estimate of the number of visually impaired people according to World Health Organization survey made in year 2015 is 285 million people are visually impaired worldwide. The white cane is a widely used for mobility which helps visually impaired people navigates the surroundings only. Similar to a white cane guide cane also helps to blind person for detecting obstacles with one more feature that is indoor navigation. Indoor navigation is done with the help of RFID sensors. But then also Visually Impaired people face many challenges when moving in unfamiliar public places or while moving outdoor. so we are going to design a smart cane to overcome these problems. In this smart cane with ultrasonic sensor handheld will benefit the blind. This smart cane gives vibrating and voice alert to blind person when sensor detects the obstacle. With alert it gives and direction of the obstacle which avoids the major accidents of blind person. In this we are added the feature of outdoor navigation, Fall detection, tracking blind person. The device is linked with a GPS to identify the location of the blind person. Moreover, for emergency contact with family member, personal doctor and panic text message we are provide 3 buttons. In emergency with one click blind person can communicate with family member or doctor.

I. INTRODUCTION

Blindness or visual impairment is a condition that affects many people around the world. This condition leads to the loss of the valuable sense of vision. Worldwide 285 million people are visually impaired. The need for assistive device was and will be continuous. The blind person truly requirements and identifying objects.

A. Objective

The paper main objective is to provide a talkative assistance to blind people. We are going to develop a intelligent system that works efficiently good in outdoor. Current navigation device for the visually impaired focus on travelling from one location to another but only in indoor. This focuses on designing a device for visually impaired people that help them to travelling independently also it must be comfortable to use. The proposed device is used for guiding individuals who are blind or partially sighted. Moreover, it provides the voice alert to avoid obstacles based on ultrasonic sensors. An emergency button is also added to the system. The whole device is designed to be small and is used in conjunction with the white cane. It also added a feature known as fall detection. In this feature we detects the blind persons status after blind person gets fall the alert system will be sends the messages to the relatives with blind person's location. And he can also track that person by its location gets by that alert system. An alert system for fall detection using common commercially available electronic devices to both detect the fall and alert authorities. We use a common Android-based smart phone with an integrated triaxial accelerometer. Data from the accelerometer is evaluated with several threshold based algorithms and position data to determine a fall. And when fall detection is detected the system alerts prespecified, social contacts with an informational message via SMS.

B. Scope of the paper

The scope of this system is to develop a low-cost system that assist the blind and visually impaired without the help of sighted person. The system is a GSM-GPS based so that it takes the advantage of the GSM network such as the popularity and cost-effectiveness. Additionally, GSM-GPS module have been used in different areas of human activity, such as the navigation of vehicles and navigation aids to guide visually impaired pedestrian and let them to avoid obstacles and reach their destination. RFID is used in indoor to assist the blind people

since GPS cannot be used efficiently in indoor. Also we use GSM to send a alert message to the relative of that blind person. If blind person feels any emergency and need to talk to family member imegeately then he can talk to them by just pressing a single button only. If there is any medical emergency then also blind person can talk to their respective doctors using only one button. And if any situation occurs in which he is in very panic condition and cant able to speak also then after pressing the third button he can sends the panic message to respective person with the location. By this location the relative can be able to track the person and he gets easy to reach to that blind person.

C. Problem definition

The main aim of our paper is to develop a system that helps the blind people to move independently in the unfamiliar environment and safety of the blind person. There are several methods and devices used to guide visually impaired persons.

II. LITERATURE SURVEY

Blind and visually impaired people are at a disadvantage when they travel because they do not receive enough information about their location and orientation with respect to obstacles on the way

and things that can easily be seen by people without visual disabilities. In early days blind persons uses a human guide in which A blind person walks hand in hand with a sighted guide.

Advantage/Disadvantage: The most obvious, but in practice not a permanent solution for aiding the blind in mobility and navigation. A blind lacks privacy and can have a feeling of being a burden to his or her guide. After that the conventional ways is guide dog which only helps to avoid obstacles not to know what they are. Researchers put in their effort and designed a number of Electronic Travel Aids (ETA). This section contains a review on devices developed so far. White can is regarded as world's most widely used navigation aid for blinds. White cane can detect obstacles present on the ground, pits, puddles, uneven surfaces and also steps [1]. White canes are made up of very light materials and provide an ease of carrying it as it is foldable and easily fits into ones pocket [2]. As a result, the initial cost for white cane is very less. Apart from this device several other devices have been developed over the years and are still developed for a better support to the blind people. Few of the devices are discussed below.

A. C-5 Laser Cane

It was introduced in 1973 by Benjamin [5]. It is based on optical triangulation with three laser diodes and three photodiodes. as receivers.

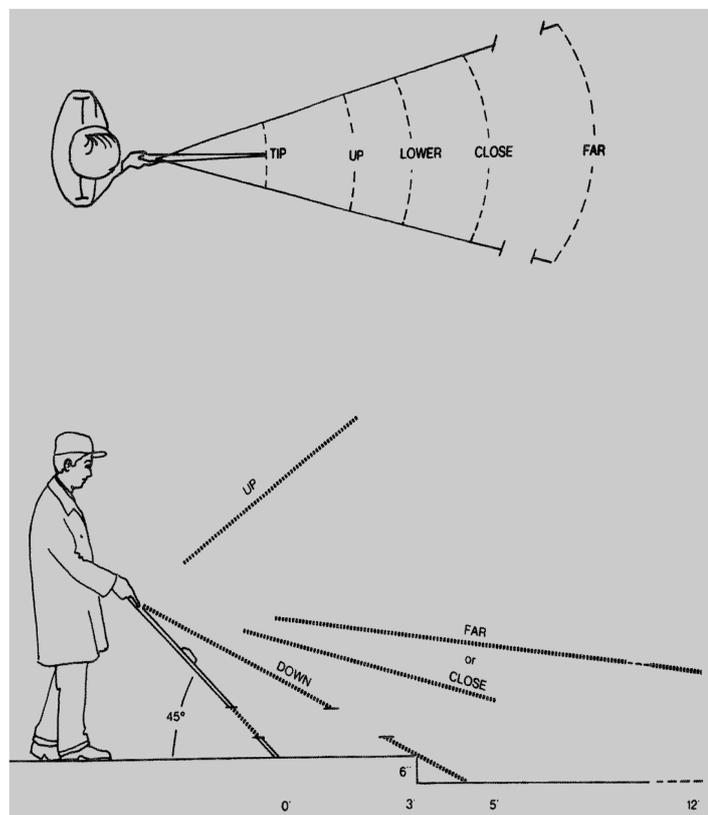


Fig.1 Protection zones of C5 Cane[5]

The Laser Cane can detect obstacles at head-height, drop-offs in front of the user, and obstacles up to a range of 1.5 m or 3.5 m ahead of the user. There are several disadvantages attached with use of a laser cane [7]. The use of laser cane can be harmful if proper precautions are not taken and can affect the eyes of an individual without any proper eye wear. The photodiodes used at the receiving ends are most likely to respond to various ambient sources, the sun light etc. Moreover, in hot and smoky areas the efficiency of the cane droops drastically [1].

B. Sonic Torch

It is a battery operated hand held device basically operates by transmitting the ultrasound in the forward direction and receiving the reflected sound beam from the nearest object [4].

C. Mowat Sensor

It is a commercially available hand-held ultrasonic-based device that informs the user of the distance to detected objects by means of tactile vibrations [4]-[5]. The frequency of the vibration is inversely proportional to the distance between the sensor and the object.

D. Sonic Path Finder

It alarms the blind when detecting the obstacle by the acoustic difference. However, it does not provide the accurate path and the position of an obstacle [4]-[5].

E. Meldog

It uses the artificial intelligence, unlike in the sonic pathfinder[6]. It can provide the accurate position of an obstacle using the ultrasound and laser sensors [3].But, in general, it is relatively large and heavy.

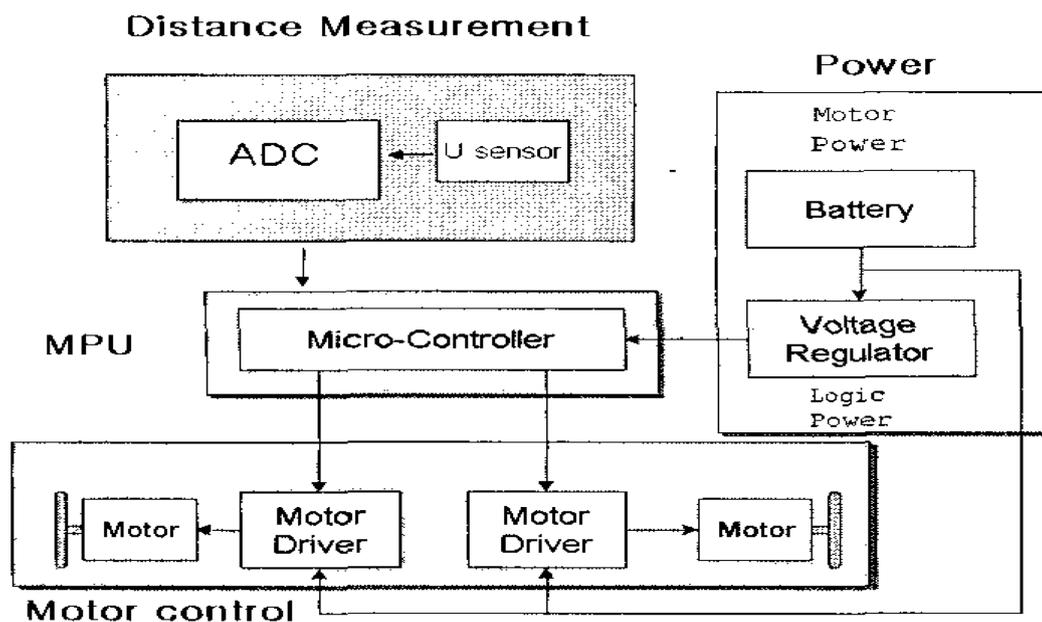


Fig 2. Configuration of the actively controlled guide stick

F. Navbelt (1989)

It is a portable device equipped with ultrasonic sensors and a computer. It produced a 120o-wide view of the obstacles ahead of the user (similar to a radar screen image). This image was then translated into a series of directional (stereophonic) audio cues through which the user could determine which directions were blocked by obstacles.

CONCLUSION

As per above survey we find so many disadvantages like safety freedom to move outdoor places which is not familiar to that person etc. in existing systems to guide visually impaired persons. We are going to design system for visual impaired person in order to increase safety as well

as freedom to move outdoor without help of sighted person. As the future work we are going to develop

cane more smart which provides the more security than traditional canes.

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