Journal of The Gujarat Research Society
ISSN: 0374-8588
Volume 21 Issue 8, August 2019

IOT BASED SMART SHOES FOR VISUALLY IMPAIRED PERSON

Ravi Kumar S
Faculty of Engineering and Technology
Jain (Deemed-to-be University), Ramnagar District, Karnataka – 562112
Email Id- s.ravikumar@jainuniversity.ac.in

Abstract

The main objective of this project is to provide an acoustic assistance to the blind people and also to deal with the problems faced by them to walk like the normal human beings. The project is therefore aimed at creating a computer that would act as a guiding aid for them. The paper focuses on creating a device for visually impaired (or blind) individuals that will help them navigate more comfortably and independently as well. One of the greatest challenges faced by visually disabled people is while travelling because, unlike regular beings, they are not well aware of knowledge about their position and orientation when they walk indoors and outside in terms of traffic and obstacles on their way. For visual impaired persons, the technology suggested in the paper serves as a remedy. The project consists of the smart shoes and the smart cane (stick) that alerts people with visual impairments to obstacles that come in their ways and can help them walk with less collision. The main purpose of this paper is to address a secure solution that involves a cane and a shoe that could communicate with users through voice warning and pre-recorded messages.

Keywords: *Shoes, Visually impaired, Wearable, Obstacles, Sensor, Detection, Assistance, Navigation.*

I. INTRODUCTION

The Smart Shoes are a novel device designed to help blind or visually impaired users navigate safely and quickly among obstacles and other hazards. During the operation, the user is supposed to be wearing the shoes. The embedded device will notify the Android system that the user is using when the ping sensors from the Smart Shoes sense some obstacle. The user must be able to communicate actively with the application on the Android device, purely through voice recognition. Together with the software on the Android device, the Smart Shoes can allow the user to walk around independently. An estimated 15 million people in India are fully or partially visually disabled. Visual impairment makes it very difficult for people to move

around by themselves freely without any external support from another person or guide dogs. The cane is a widely used tool to help the disabled remain mobile in an independent way [1].

Most people in India face the issue of visual impairment, which prevents them from being independent. It becomes a real challenge for them to locomote when in an unknown setting. Where obstacles move away from the visually impaired person, in order for the blind to improve their sense of hearing or some guide to locate him in the new environment. Where they use movement cane, trained dog or other assistive electronics equipment. The aim of the paper is to design a visually impaired person's smart assistive shoe so that they get rid of the cane and make them more independent. In this fast-paced life-now-a-day, this will also allow them to live freely. The cane, however, requires that the person be qualified to use the cane, which can take up to 100 hours [2]. Here, we are introducing a revolutionary system known as Smart Shoes. For real time obstacle detection, a normal looking and functional pair of shoes is embedded with ping sensors and obstacle sensors interfaced with an Arduino Nano board. On an Android device, the user must be able to use the programme using only hard-coded keys and voice. The user can actively input his source to the destination path to the Google Maps service within the application using speech. The application will help him navigate and guide him from source to destination using speech and help him avoid obstacles in his path. This in turn will help the disabled person traverse freely in an independent manner [3].

II. WEARABLE OBSTACLE DETECTION SYSTEM FOR VISUALLY IMPAIRED PEOPLE

User gets alerted of the nearest obstacles in range while traveling in their environment. The system we propose detects the nearest obstacle via an ultrasonic sensor system and sends back feedback to inform blind person about its location. The system aims at increasing the mobility of visually impaired by offering new sensing abilities [4]. Wearable sensors are becoming smaller and increasingly commonly used, leading to a growing need for power supplies that are independent and lightweight. Electrochemical batteries, due to their limited energy storage capacity and possible environmental and health risks, do not satisfy the need. This has motivated the creation of wearable energy harvesters to provide sustainable and clean energy, harvesting the mechanical energy dissipated in human motion.

Mechanical energy can be directly converted into electrical energy by piezoelectric power harvesters and nano-triboelectric generators, making their architectures more compact and simpler compared to other types. For wearable harvesters, the mechanical energy dissipated in shoes may also power a device, acting as an attractive energy source [5]. This paper produces a shoe-embedded piezoelectric energy harvester that can be readily incorporated into a shoe to extract energy from human locomotion. It manufactures and tests two harvester prototypes. The first consists of a multilayer film of polyvinylidene difluoride (PVDF) and a plastic engineering frame that is positioned under the foot. The second is intended as an insole form

and is used as a standard insole, consisting of a flexible silicone rubber frame and two PVDF multilayer films [6].

Active optical is introduced since an electronic travel aid increases the mobility of blind people by using an LED and photodiode pathfinder. The safe path is optimised by the use of radiometric calculations. Typical Ultimate barrier configurations are explored: an opening, a side panel, a front panel, and a Security Zone post are suggested. The findings are often portrayed in actual configurations, such as parked vehicles, trees, and dustbins. Finally, in combination with the traditional white stick, we illustrate how the interface can be used by visually disabled people in real life.
Consumer reliance on wearable electronic devices has grown significantly in the past decade. As wearable electronic devices evolve and proliferate. When more devices are transported, the conventional approach to power delivery is clearly becoming troublesome. We are forced to either use more small batteries anywhere that need replacement or run wires to supply appliances from a central power source through our clothes [7]. The production and storage of electrical energy in the devices themselves by scavenging waste energy from human activities is a new solution that removes the issue of power cabling. A significant source of energy harvesting is the human activity of walking. The heel movement of an average (68 kg) person walking at a brisk pace is estimated to have 67 watts of power available. But only a few percentage of this energy is suitable for the alimentation of an electronic device. This problem is approached by using the energy from the weight transfer during a step to perform useful work. So this paper is focused on the development of an “easy to use” and “cheap general purpose” device for the storage and management of the harvested energy with particular applications on shoes[8].

III. ULTRASONIC SMART STICK FOR VISUALLY IMPAIRED PEOPLE

The object of this paper is to get acquainted with the work done by making the walking stick smart and more helpful. The literature related to this subject has been examined and evaluated. It is important to change these smart sticks as technology improves. The simulation results are determined using one microcontroller for the ultrasonic sensors, the water sensor and the Bluetooth model. So in this paper-wide survey, work related to this project is done and we have shortlisted some useful elements from each project. It will also assist in deciding on the concept strategy. Stick is provided to blind or visually impaired people to navigate paths. Using sticks, blind people come to know about obstacles but they need someone to navigate the path. Use of a stick is not efficient. It becomes harder for blind people for mobility. Dependency of these people has been increased. Another option is to provide the best travel aid for the blind is the guide dogs. Dogs are trained according to their owner requirement. Complex situations like cross walks, stairs, potential danger, known paths and more is detected and analyzed [9].

Various disorders caused by visual impairment and blindness have been significantly reduced, but there are many individuals at risk of visual impairment due to age. Visual knowledge is the basis for most navigational activities, but visually disabled people are at a disadvantage when necessary information about the surrounding environment is not available. In this case, the device proposes the ability to travel around in an unknown environment called Smart Vision, whose purpose is to offer a user-friendly interface to blind people, whether indoor or outdoor. This paper mainly proposes the creation of the Smart Vision system's computer vision module.

Both on the hardware and software front, with the rapid advancements in modern technology, have brought the ability to provide intelligent navigation capabilities. A lot of Electronic Travel Aids (ETA) have recently been developed and devised to assist blind people to navigate safely and independently. In order to help blind people navigate independently, high-end technical solutions have also been launched recently. In this project, an attempt has been made to enhance the system's consistency to be more beneficial to blind people. The system has been made as a part of the blind person's shoe. and in this project we are using ultrasonic sensors and speakers which provide more accuracy of object detection and give clean information to blind people respectively.

IV. CONCLUSION

The idea depicting the integration of the both modules of the protocol into a single unit overcomes almost all the limitations that were in the previous versions of the technology. Thus this technology becomes a reliable partner for the visually impaired people in every situation. This system will detect the presence of the obstacles coming in the front of the blind person and then alert them about the direction of the obstacles so that they can walk with ease. The system comprises the sensors that receive signals and then send commands to the controller which executes it further about the direction. Thus, allowing the blind person to walk independently among obstacles.

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