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Sensor Stick walking aid for the blinds

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Abstract: *In this paper, few methods of aiding and guiding visually impaired persons are presented. They are analyzed and studied thoroughly. Some commercially available systems help in aiding people with disabilities of seeing and give information refereeing to the location of the users. We propose an intelligent" stick equipped with an ultrasonic sensor that takes information about the environment. This information is processed and is delivered to the handle stick and thus can be interpreted by the users. The stick will produce beeping sound with varying speed according to the distances of obstacles. This stick will provide assists to visually impaired persons by providing informations related to obstacles distances. This device was tested with blind persons and results are presented.*

I. Introduction

Many with visual impairments can travel independently, using a wide range of tools and techniques. Blind people are faced with many problems such as independent and graceful travel. A long cane is used to extend the user's range of touch sensation. It is usually swung in a low sweeping motion, across the intended path of travel, to detect obstacles. However, techniques for cane travel can vary depending on the user. It is well known that visually impaired people use their hearing sense to compensate for their reduced eyesight. For instance, they can recognize sound sources. This project focuses on the multi function sensor stick helps blind people traveling by themselves using a pair of ultrasonic sensor mounted on a walking stick.

Stick's Profile

Sensor stick is composed of a pair of transducers, one transmitter that transmits echo locating signal and a receiver mounted on the walking stick. Inaudible ultrasound echoes captured at the receivers are converted into audible sound induced by the user during his movement from a static object in a range of 15 cm. The resulting audible signal is conveyed to the user. Whenever an obstacle is found, a beep sound is produced. There is lesser time lag between the signal transmitted and reception

II. Methodology

Hardware:

i. Arduino
ii. IR LED receiver
iii. IR LED emitters
iv. Buzzer
v. 100K resistor (brown black yellow)
vi. Battery 9volt battery

Software:

i. PIC KIT 2
ii. MPLAB IDE
iii. PROTEUS 7
iv. LiveWire

III. Flow Chart

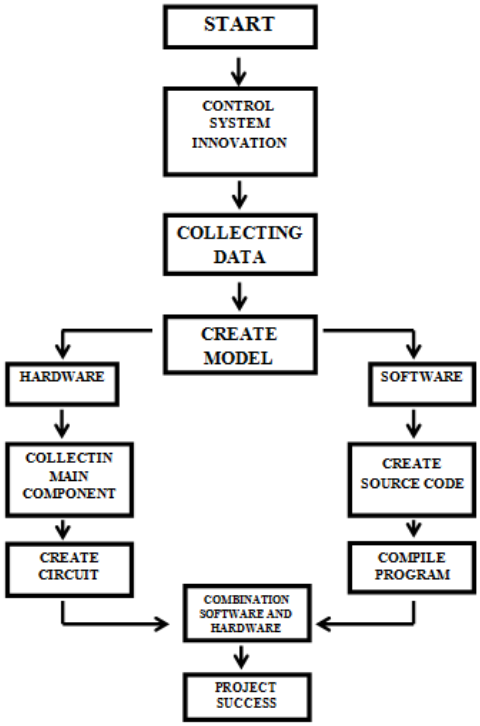

Figure 1: Project Flowchart

IV. Result & Analysis

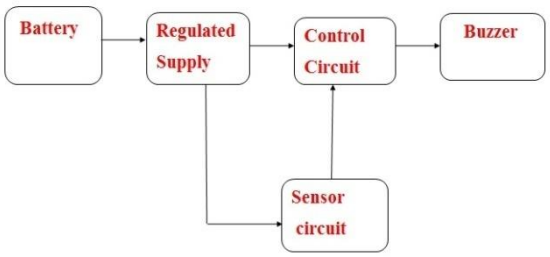

Figure 2: Operation of the Stick

An IR proximity sensor works by applying a voltage to a pair of IR light emitting diodes (LED's) which in turn, emit infrared light. This light propagates through the air and once it hits an object it is reflected back towards the sensor. If the object is close, the reflected light will be stronger than if the object is further away. The sensing unit (for this experiment a Sharp IS471FE will be used), in the form of an integrated circuit (IC), detects the reflected infrared light, and if its intensity is strong enough, the circuit becomes active. When the sensing unit becomes active, it sends a corresponding signal to the output terminal which can then be used to activate any number of devices.

It will introduces an obstacles avoidance alternative by using an electronic stick that serves as a tool for blind people in walking. It employs an infrared sensor for detecting obstacles along the pathway. [1]

Stick's Testing and Application

The Sensor Stick which was developed was tested and applied for the blinds. The respondents were selected from J Foot Reflexology Centre, Tuaran, Sabah. Three blind respondents were selected to test the stick for around 30 minutes and their feedbacks and recommendations were recorded.

Most respondents describe the stick as quite helpful but feel that the device still not satisfying. According to respondents, the stick only produces warning sound (buzzer) if it get too close to an object. This stick however needs a lot of improvements. All respondents are looking forward to test the stick in the near future should the stick gets its upgrades.

V. Conclusion

Most of blind people use white cane stick to find the obstacles in their path but this cannot help the blind people to sense the obstacle the object and provide any precautions. Therefore electronic blind mobility aid is able to detect almost all obstacles such furniture, metallic objects etc, also helps in climbing steps. For future enhancements, sensor stick could be further enhanced with the range can be improved using better transducer. Better transducer will result in better range of obstacle detection. On the other hand, pre-recorded messages can be implemented. Pre-recorded messages can be more user friendly with messages ranging from simple warning to more serious warning messages.

Sensor stick also can be further upgraded by utilizing a mechanical input. [2] It is worth considering mechanical imput since camera devices cannot sense the street surface in the absence of sufficient light. Electronic travelling aid with haptic perception for the blind person which fabricated using ultrasonic sensors and vibrator motor scheme. User can interpret the distance information as a tactile sensation. Distance is felt in terms of the vibration intensity change.[3]

By incorporating another circuit or applications, GPS locator and RFID can be implemented to produce advanced stick.

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