

Intelligent Stick for Visually Challenged

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Abstract: In day to day life, we come across many challenges which vary from person to person depending upon his/her status such as physical, mental. Generally, challenges faced by visually impaired are quiet more in numbers and hazardous, especially while crossing roads. Here, it is an attempt to design electronic device that can guide/assist visually challenged to overcome these challenges and cross roads safely without expecting any kind of help from others. The visually challenged is alerted through vibrator and/or buzzer if any hazardous condition/inconvenience is detected.

Keywords: intelligent stick, ultrasonic sensor, fire sensor, water sensor, raspberry pi3

I. INTRODUCTION

There exists around 285 million visually challenged across the globe in which 39 million are blind and rest have severe or moderate visual impairment (refer in [1]). In India, there are about 15 million blinds (refer in [2]). A article on research in vision and ophthalmology says blinds are least accurate in making street crossing decisions which many times is responsible for severe accidents (refer in [3]). Its our highest responsibility and priority to make them self dependents to safeguard themselves on roads. The advancing tech world attempts to solve major real world problems through its unique technological approaches. But still when it comes to this problem, we find least number of approaches and/or devices designed for visually challenged to assist them to cross roads. Here, it is an approach to help both moderate visually impaired and blinds to make accurate street crossing decisions.

II. MAJOR REQUIREMENTS

A. Raspberry Pi3

Raspberry Pi3 is a light-weight, portable electronic device. The basic functionalities are similar to CPU and hence known as portable computer. It has found its importance in many of the IoT based applications.

B. Ultrasonic Sensor

Ultrasonic sensor is an electronic device/sensor that is capable of detecting obstacles within its range. The sensor is widely used in obstacle detection systems/robots.

C. Fire Sensor

Fire sensor is an electronic device/sensor that is capable of detecting fire within its range. Usually, the modules are made of IR sensor and comparator to detect fire in the range of 1 meter (variable).

D. Water Sensor

Water sensor is an electronic device/sensor that is capable of detecting water within its range.

E. Coding Language (Software)

Python is suggested if one wish to have minimum code lines and ease in programming. However, C++, Java, etc... are also used for coding.

III. TECHNICAL PARTS

A. Architecture of device

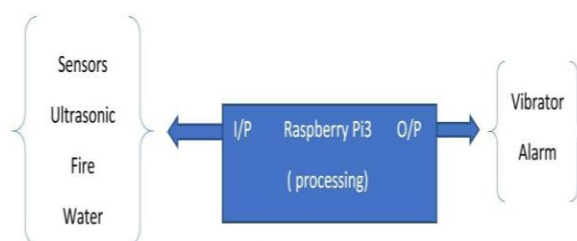


Fig.1. Architectural View

B. The intelligent stick comprises of three main sensors viz. ultrasonic, water and fire. These sensors are responsible for updating input to the raspberry pi3. As per given set of instructions (or code), the output is derived depending upon the input status. The output is received through vibrator and/or alarm which indicates warning to the blind.

C. Operation

Whenever an obstacle or any danger is detected on the way while blind is walking with the intelligent stick, the corresponding alert is given. This will assist the blind person during the walk and alerts if any hurdle is detected within the range. The very reliable and effective Intelligent Stick is with multiple input and output features (refer architectural view). When a visually challenged person is walking on the road, s/he may face several problems on the way such as obstacles, water and fire and many others which can create problems like accident or injuries to him/her even if s/he is holding a conventional stick. If the person is holding this electronic intelligent stick while walking, it will help him/her to protect himself/herself from these hurdles as s/he will be assisted through vibrator/alarm. Depending upon the sensor status, the processor will update its input and derives the relevant output based on given set of instructions/code. Suppose a blind encounters the fire on the way, then processor input is updated and as a result corresponding alert is given to the blind through vibrator/alarm (output).

D. Block diagram

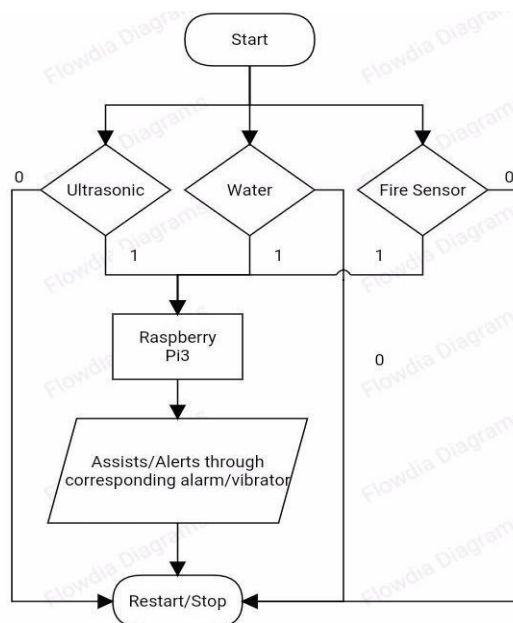


Fig.2. Operation Flowchart

The block diagram represented in Fig.2. conveys the entire operation process in brief.

IV. FUTURE SCOPE

The relevancy in the solution to the real world problem promises the scope for it. Since it is an IoT based solution with cost effectiveness and unique features & functionalities, it attracts the demand. The similar model can be used for control and monitoring where continuous safety is required. It can also be further improved to increase its ability of decision making with incorporation of advanced techniques such as image processing and sensors in the system that will increase the demand and the area of application.

V. CONCLUSION

The solution approach attempts to fill the gap present in the life of visually challenged by building the strength and confidence of self dependency in them. The solution is an electronically designed IoT based smart guiding device which works during day and night as well. The sensors act as eyes for blind thereby guiding the blind on the way while walking and keep alarming the person if any sign of danger or inconvenience is detected.



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BIOGRAPHIES

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