

Solar Powered Smart Stick for Impaired People

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Abstract: Visually impaired people find difficulties detecting obstacles in front of them, during walking in the street, which makes it dangerous. The smart stick comes as a proposed solution to enable them to identify the world around. In this paper we propose a solution, represented in a smart stick with pair of ultrasonic sensors to detect any obstacles in front of the user, within a range of four meters. A wireless RF based remote is used for finding the lost stick by pressing the remote button and buzzer sounds on stick. Detects water on the ground by soil water sensor. Also indicates if any presence of harmful gasses. Speech warning messages are activated when any obstacle is detected. The blind person can also send the emergency messages to guardian, using GSM module. Finally, the power for the proposed system is fed by the solar panel which is to be placed over the stick with charging circuit.

Keywords: Sensors, GPS module, GSM module, Solar Panel, Smart Stick.

1. Introduction

According to the World Health Organisation (WHO) and National Federation of the Blind, there are around 253 million people or visually impaired out of which 36 million people are blind world-wide. Blind people find it difficult to move in this world as they get distracted by the obstacles, they may even get lost. So, in the proposed system the above-mentioned cases are taken into consideration and implementation is provided. In order to help the blind people for detecting object the proposed system make use of ultrasonic sensors. To track the person, system makes use of GPS and GSM modules to find the location. The system can easily be charged by solar panel. The main aim is to provide a better solution for the visually impaired.

2. Existing System

Existing systems which provides guidance to blind like Guide Cane, Smart vision use ultrasonic sensors or laser sensors to detect obstacles in front of the blind by transmitting the wave and reception of reflected waves. It produces either an audio or vibration in response to detected obstacles to warn blind. Systems like Sound View use single camera or stereo video cameras mounted on a wearable device to capture images. These captured images are resized, processed further and converted to speech, audio, musical sounds or vibrations. In

such systems, the frequency of warning sound signal is correlated with the orientation of pixels. Some systems like Ultra-Cane help blind people by collecting information through sensors and then transmitting recommendations through vibration or sound message to the user. The above solutions have disadvantages for instance, they can't detect obstructions that are hidden but very dangerous for the blind such as water on the ground, holes etc.

3. Proposed System

The smart stick, is basically an embedded system integrating the following: pair of ultrasonic sensors to detect obstacles in front of the blind from ground level height to head level height of the stick in the range of 400 cm ahead, water sensor for detecting puddles, smoke sensors for detecting smoke, LPG and other harmful gasses. After processing, the microcontroller invokes the right speech warning messages through a speaker or earphone. The system is powered by solar panel with charging circuit.

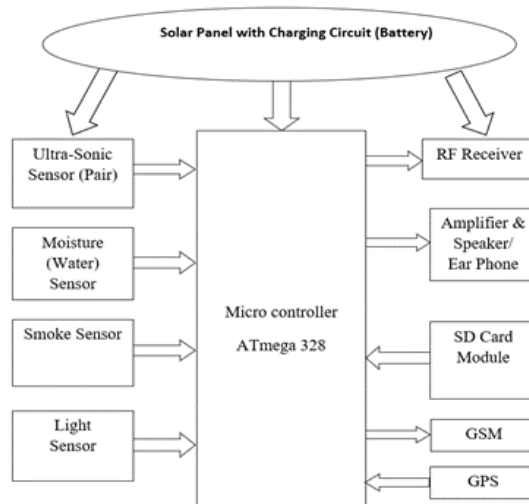


Fig. 1. Block Diagram

The RF receiver and transmitter help the blind the find his stick if misplaced. GPS and GSM module is used mainly for the security purpose, so that the blind can pass an emergency message to his guardian by a push button given to the blind.

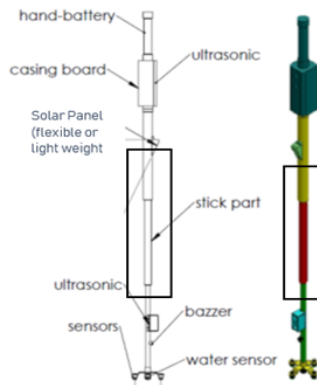


Fig. 2. Design of the smart stick

4. Implementation in the proposed approach

This device of ours utilizes the latest available sensors to aid the people with visual disability. Some important aspects of our project are:

1. *Size*: It is a decently sized stick as it has so many features, but still is practical to use and would not limit the user's movement.
2. *Power*: It utilizes a rechargeable Li-ion battery which has the ability to last for at least 12 hrs.
3. *Cost*: It is a very cost-effective product and provides all these features at a reasonable price. We have made it

considering the poor income of typical Indian families and hence it will be affordable.

5. Conclusion

This paper presents the implementation of a smart stick that assists a visually impaired person to his destination safe and secure. We make use of various sensors to detect the obstacles ahead and warn the blind person about the obstacle through warning message. We take the benefits of GPS module and GSM module, where GPS module helps to trace the blind person using the data collected by it. In case of emergencies.

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