

Image Processing based Smart Walking Stick

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Abstract

This paper is on GPS Image Processing Based Smart Walking Stick. The main objective is to provide more mobility and independency to blind people. Main components used are ultra-sonic proximity sensors, Image Processor. Presently the blind use their stick to identify the obstacles and seek help from others when moving from one place to another. In the proposed system the stick will use ultrasonic proximity sensors sense the obstacles on their way. It also include small wheels at the end of the stick which will use image processing to guide the person from one place to another. The processing is done with the aid of raspberry and arduino board. The system will revolutionise the lives of the blind people.

Keyword- Processor, Ultrasonic Proximity Sensor, Arduino

I. INTRODUCTION

Nowadays blind people use their conventional stick to identify the obstacles in front of them. They use the stick to touch and feel the obstacle, unevenness of pathway, staircase. These are difficult on a daily basis and hinders their mobility. They also have to seek help from bystanders when moving from place to place or while crossing road. The GPS -GSM aided walking stick for blind people aims to help the differently abled in a revolutionary way. Presently the blind use their sticks to touch and identify obstacles and seek help from others while moving from place to place. In the proposed system, the stick will have proximity sensors that have a range of 5m and the signals will be transmitted to a receiver which relays it as commands to an earpiece in the user's ear. The person will receive messages like "take two steps to the right" etc. to avoid an obstacle that the sensors have detected. The system will be powered by a rechargeable battery in both the stick and the receiver transmitter parts. The system will also be equipped with a GPS GSM system which in the later stages of development can map a location and aid the person to navigate in and around the place. For example if a person has to move from the main block to the canteen of our institute, the system will identify a path that has to be taken and guides the user to the canteen by communicating through the earpiece. Be there any obstacle the system can guide the person to the specified location. The stick will also consist of a controlled roller which will use the mapped data of a location to guide the person to a specified point within the area. The rollers would steer the stick at the turnings and also when there is an obstacle making it more convenient for the user. This project would be socially relevant to a target number of users and can be improved in multiple ways in the due course of time. The receiver can also be turned into a mobile app and linked to the Google assistant which will improve its scope. By linking to Google assistant or similar app based system, costs can be saved as the modern day phones already have both GPS-GSM receivers.

II. METHODOLOGY

In the proposed system, the ultrasonic sensor is used to sense the obstacle distance from the user. This reference distance can be used to decide whether the user can move or not. The ultrasonic sensors work on the basis of sound. The sound waves are transmitted ahead from the sensors towards the obstacle which can sense the distance up to a distance of 12 feet with a resolution of 0.3cm. The sensors are placed in five locations in order to cover maximum sides possible with minimum usage of the sensors. The sensors are placed in left, right, middle left, middle right and bottom respectively. Generally, the blind person cannot see the objects present on the ground. So the bottom sensor keeps track of the ground clearance providing necessary security measures. The proposed system tries to provide vision to the user so we need to consider and process the image ahead as well. The image is detected using image sensors (camera). The image manipulation here is done in order to detect the obstacles present ahead and also to detect the indoor objects. Raspberry pi keeps the image dataset which consists of lot of collected samples of the different obstacles. The images which were sent from the camera are compared with the images stored in the dataset using the image processing.

The main advantage of the system is that it helps the blind people in both indoor and outdoor, care-free navigation. The devices placed in the stick makes it comfortable and easy to handle. The smart stick helps in detecting obstacles placed at a distance in front of the user. The system is suitable for both indoor and outdoor environment. The information regarding obstacles is given through voice alerts, eliminates the difficulty of understanding vibration patterns which was used in earlier systems. The system is a moderate budget mobile navigational aid for the visually impaired.

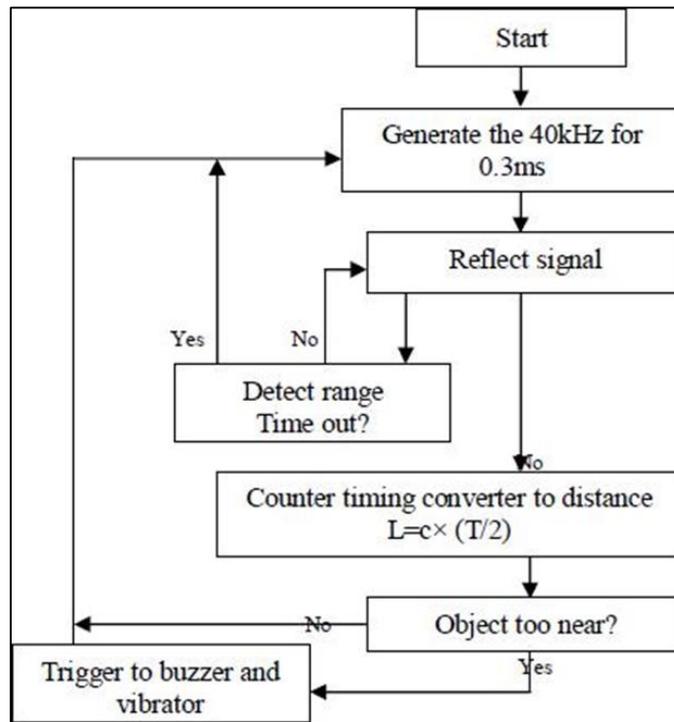


Fig. 1: Flow chart of ultrasonic sensor

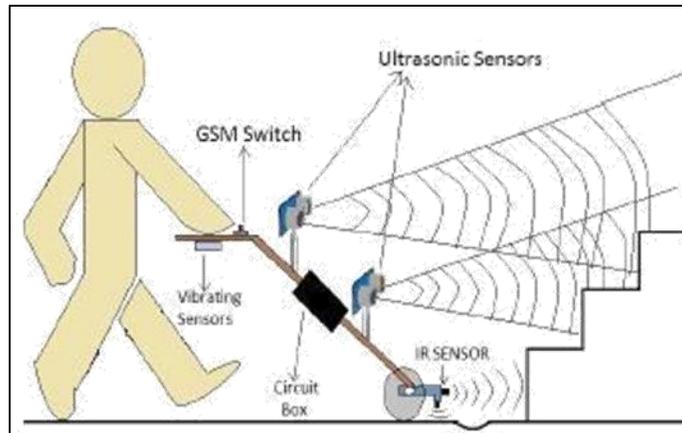


Fig. 2: Schematic of proposed system

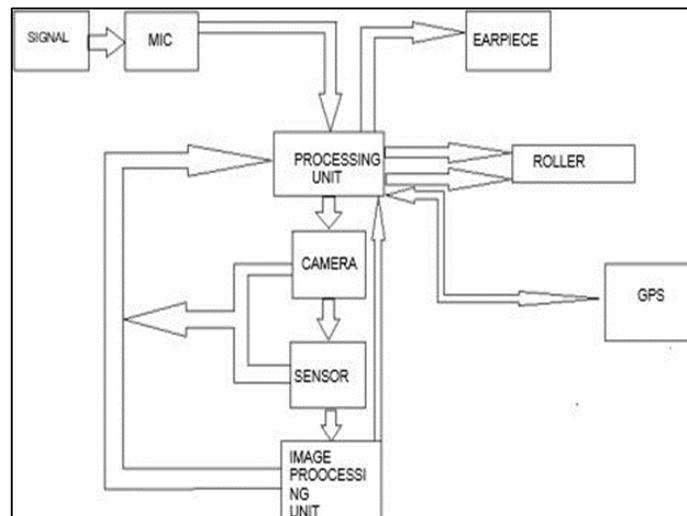


Fig. 3: Block diagram of system

III. PROSPECTS AND MARKET

- The project would be socially relevant and target a number of blinds providing them with more independency.
- It will be more useful for people if they decide to come for employment in a firm/MNC/institution.
- Additional developments can be improvised to make it more user-friendly.

IV. CONCLUSION

The proposed project is a smart walking stick based on the image processing and using the GPS technique. It's very relevant and useful for the blind people who are working in a firm or for a normal blind person. The system is having special features like obstacle monitoring and picture scanning which enhances the person's daily routines much easier. Now a days the blind people are seeking help from other's for their activities. By using this proposed system it's much easier for them to do their activities and can easily go anywhere with the help of GPS connectivity. It's very cost effective because of the components used in the system and the user can recharge the battery and use it for a full day. So by implementing this system the blind people could be more independent and also increases the satisfaction of the user.

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