

Guide Cane for Dim Sighted People Using Ultrasonic Sensors

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ABSTRACT

Blind and visually impaired people can use guide cane which is an Robotics based obstacle avoidance system that help them to move from their source to destination without any body help. The user can sense the obstacle and take the change over the direction required. A lots of papers are taken for the survey and its advantages and disadvantages are discussed

Keywords:- Guide cane, Ultrasonic sensors, Obstacle detection

I. INTRODUCTION

Guide cane is a navigation designed to help impaired peoples to navigate quickly It is a mobile robotics based device which uses obstacle avoidance technology to determine a safe path for travel and to guide the user along that path. Guide cane is efficient, fast and suitable in practice to full walking speeds. The major advantage of the guide cane is that it can be used in crowded areas. [1] Most independent mobility of people who have no useful travel vision, especially when in unfamiliar territory, is achieved through use of some mobility aid It consists of a joystick which helps the user to change the direction as well as sense the change in direction caused by the sensors due to the obstacles. A servo motor, operating under the control of the built in computer, can steer the wheels left and right relative to the cane. Both wheels are equipped with encoders to determine their relative motion.

For obstacle detection, the guide cane is equipped with 10 ultrasonic sensors. To specify a desired direction of motion, the user operates a mini joystick located at the handle. Based on the user input and the sensor data form its sonar's and encoders, the computer decides where to head next and turns the wheels accordingly.

Visually impaired people typically depend on a white cane or a guide dog whilst walking outdoors. Although a white cane is a simple and robust device, it has a disadvantage that it can only

detect obstacles through making contact with them: its range is very short. A guide dog performs well for important tasks such as avoiding obstacles and basic navigation. However, it is arduous to train guide dogs, and they can be challenging and inconvenient for a visually impaired person to look after it. [3]The most successful and widely used travel aid for the blind is the white cane. It is used to detect obstacles on the ground, uneven surfaces, holes, steps, and puddles To solve these problems, researchers have devised a variety of methods and systems to help visually impaired people. Once the wheels begin to steer sideways to avoid the obstacle, the user feels the resulting horizontal rotation of the cane.

In a fully intuitive responds, requiring virtually no training time, the traveler changes his/her orientation to align him/her with the cane at the "normal" angle. In practice, the users walking trajectory follows the trajectory of the guide cane, similar to the way her trailer follows the truck. Because of the handle's short length, the user's trajectory is very close to the guide cane's trajectory. Once the obstacle is cleared the wheels steer back to the original desired direction of travel, although the new line of travel will be offset to the original lien travel.[8]Usually, the visually impaired use white cane or receive guidance of guide dog when they do outdoor walk Depending on the circumstances, the traveler may wish to continue walking along this new line of travel



Fig 1 View of the guide cane

The above fig 1 tells about the view of the guide cane in which it contains a mini joystick to control the moment of directions i.e left, right, straight. The ultrasonic sensors detects the moments of the path. It also contains incremental encoders.

II. DIFFERENT CANES

1) LONG CANE

It is designed primarily as a mobility tool used to detect objects in the path of a user

2) IDENTIFICATION CANE

The ID cane is used primarily to alert others as to the bearer's visual impairment. It is often lighter and shorter than the long cane, and has no use as a mobility tool.

3) SUPPORT CANE

The white support cane is designed primarily to offer physical stability to a visually impaired user. By virtue of its colour, the cane also works as a means of identification.

4) KIDDIE CANE

This version works the same as an adult's Long Cane but is designed for use by children

5) GREEN CANE

Used in some countries to designate that the user has low vision while the white cane designates that a user is blind

III. TO MODEL A ROBOTIC ASSISTANT PATH

- Detects obstacles in the walk path.
- Find alternate path in case of obstacle.
- User is guided along the new path .
- Start and Stop the system as required by the user

GUIDANCE SIGNAL

The guide cane first analyses the environment and then computes the momentary optimal direction of travel. The resulting guidance signal is a single piece of information- a direction-which means that the bandwidth of the information is much smaller. Consequently, it is far easier and safer to follow the low bandwidth guidance signal of the guide cane than to follow the high bandwidth information of other existing systems. A smart walking stick that uses sonar to detect obstacles. , it can be able to navigate into the narrow gateway independently

HARDWARE TOOLS:

The Guide cane consists of housing, a wheelbase, and a handle. The housing contains and protects most of the electronic components. The current prototype is equipped with ten Polaroid ultrasonic sensors that are located around the housing. Eight of the sonar's are located in the front in a semicircular fashion with an angular spacing of 15°, thereby “covering” a 120° sector ahead of the guide cane.

IV. ADVANTAGES

- High torque to inertia ratio
- Speed control
- High efficiency
- No need for driver circuit

V. CONCLUSION

Hence, In this paper we present a robotics based obstacle avoidance system that helps the blind and visually impaired people to move from one place to another. Finally, “A Study on the Sound-Imaging

Algorithm of Obstacle Information for the Visually Impaired” gives a better outcome of these survey.

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