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OBSTACLE DETECTION AND ELECTRONIC NAVIGATION SYSTEM FOR VISUALLY IMPAIRED PERSONS

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Abstract- In This Paper we present a real time domain obstacle detection system for the visually impaired persons to improve their mobility in daily life with the help of obstacle detection sensor installed in their walking stick .System is having a lower cost so it is easily purchasable so it can have a major significance in life of visually impaired persons. This Paper proposes a system to detect any object attached to the floor regardless to their height [1]. Obstacle on the floor in the front of user can be reliably detected in real time using the proposed system implemented by the IR sensor installed on the walk stick of the visually impaired person. Project also contains a navigation system for visually impaired persons to make the life of such persons easier up to some extent. This project is suited for the area where the possibility of blind person is high (like blind school, college)[6]. For transport facility of blind we have first decided the common bus roots of blind then we have placed RF tag to all those buses with unique code. At the second side we have placed RF reader, microcontroller and voice processor. The RF reader receive unique code, microcontroller process this code with defined code, if match found, voice processor get activated and starts speaking bus name, initial destination and final destination. The obstacle detection is also included in the project with voice. The system aims at increasing the mobility of visually impaired people by offering new sensing abilities.

Keywords *- Obstacle detection, visually impaired; real-time, Infra Red Rays (I.R. Rays),Radio Frequency(R.F.),HT 12d(Holtec Series decoder),HT12e (Holtec Series Encoder).*

I. INTRODUCTION

The work we present in this paper is based on the use of new technologies to improve visually impair people mobility. Our research focuses on obstacle detection in order to reduce navigation difficulties for visually impaired people .Moving through an unknown environment becomes a real challenge when we can't rely on the our eyes The common way for navigating of visionless person is using a white cane or walking cane. The walking cane is a simple and purely mechanical device dedicated to detect static obstacles on the ground, uneven surfaces, holes and steps via simple tactile-force feedback [2]. This device is light, portable, but range limited to its own size and it is not usable for dynamic obstacles detection neither than obstacles not located on the floor. Another option that provides the best travel aid for the blind is the guide dogs.[5] Based on the symbiosis between the disabled owner and his dog, the training and the relationship to the animal are the keys to success. A human guide is the most intelligent assistant, but is not always readily available [2]. On the other hand a white cane is the most readily available mobility tool but is very intrusive and makes the blind person highly conspicuous some blind people develop the echolocation ability to gain a measure of self-sufficiency in their mobility. Echolocation is the ability to sense objects by listening for echoes - i.e. human based sonar. However, echolocation is a difficult skill to master and is not able to detect small objects.

II. RELATED WORK:

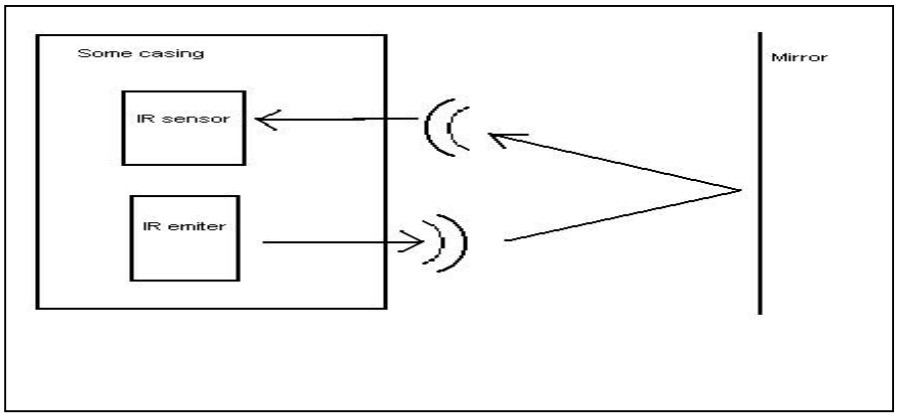
A deal of research has been performed to improve autonomy of visually impaired people and specially their ability to explore the environment. Wearable systems have been developed based on new technologies: laser, sonar or stereo camera vision for environment sensing and using audio or tactile stimuli for user feedback Some early examples about those systems can be illustrated by the C-5 Laser Cane based on optical triangulation to detect obstacles up to a range of 3.5 m ahead [5]. This system developed in the 70's is the precursor of a large series of devices trying to remove the cane of the blind user [2]. More recent development using stereoscopic cameras coupled with a laser and audio system have been developed at the University of Verona. One of the main interests here consists in the translation of the 3D visual information into relevant stereoscopic audio stimuli. The sound generated on ear phones simulates a distant noise source according to the position of the obstacle [7]. This system has been designed to be implemented on wearable device, like a pair of sun glasses equipped with two micro cameras. Using audio signals may perturb the user's hearing, which is the main sense that let visually impaired people to perceive the dynamic distant environment. As a Camera vision based system, it can

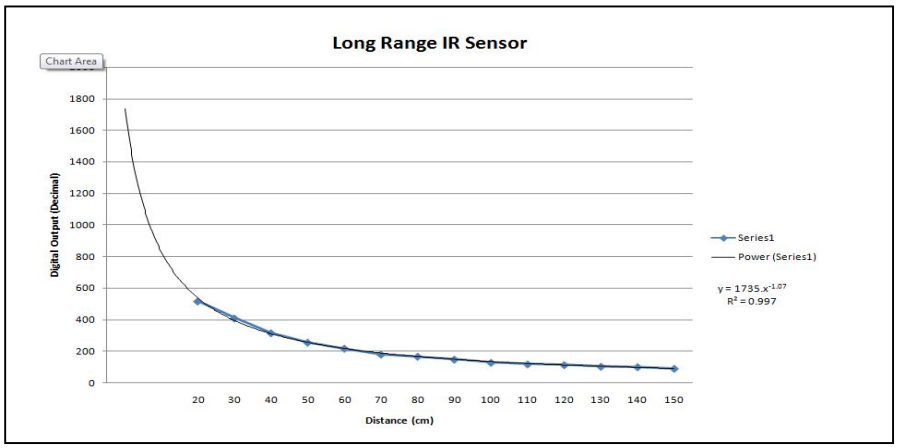
recover more information than only distance to the obstacle.

III. SYSTEM ARCHITECTURE:

1. Obstacle detection System for Blinds:

Obstacle detection system has a very simple architecture. IR Sensors is installed in the Walk Stick of person which will detect the obstacle and further send a signal to microcontroller of presence of obstacle which will alarm a buzzer installed in stick. Various height range obstacle can also detected by the system by using 2 pair of IR Sensors .one is installed near the ground and other at the middle of stick .by combination of these two sensors we can measure the height of various obstacle having different shape and heights. By using this combination we can also get the information about the nature of obstacle. IR emitter continuously emits the Infra red Rays if there will be no obstacle in front of the sensor then Rays will travel ahead and in case if there is an obstacle in the path of the rays then rays will reflect from the obstacle and will travel to the receiver which will receive the rays and send the confirmation signal of receiving the ray, if microcontroller will get the confirmation signal then it will drive a buzzer to horn. That will confirm the existence of obstacle in the path of visually impaired person.





2. Navigation System For Blind:

The research comprises three aspects: obstacle detection, navigation and information feedback. The detection system should cover small and low obstacles (stones, steps,) but also larger objects (a passer-by, walls, trees) and passages (doorway, gate). With the navigation system the blind should be able to find particular bus in an unknown area, for instance the post office, the railway station and bus stops. This part of the system could be realized using RF signal.

Finally, all this information should be passed to the blind person in the form of voice using advance voice processing IC.This project is suited for the area where the possibility of blind person is high (like blind school, College). For transport facility of blind we have first decided the common bus roots of blind then we have placed RF tag to all those buses with unique code. At the second side we have placed RF reader, microcontroller and voice processor.

IV. APPLICATION RELEVANCE:

With maximum power consumption below the Watt, our system can run for hours out of a single battery supply. By its structural architecture, it allows positioning by telling the user from which side an obstacle is placed. Each part is small enough to be fixed on the walk stick and hand which ensures the

whole system is easily installable. It also does not need too much expertise.

V. CONCLUSION & PERSPECTIVE:

One main limitation of such system is due to the principle of measurement. We are in fact measuring the distance to the "closest" obstacle in range, which could be an inconvenience when we are trying to map the environment. The problem becomes obvious when the system is used to sense the entrance to a room. We still have obstacle from both the left and the right and it can be interpreted as a continuous wall.

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