NAVIGATOR FOR VISUALLY IMPAIRED

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***Abstract*—**It has always been a challenge and struggle for the visually impaired people to navigate from one place to another. Many electronic aids are developed for visually impaired people, but very few of these were partially successful in addressing the requirements of blind individuals to navigate safely, comfortably and independently. Here we propose a system which uses combined effort of sensors and Image processing to provide an alert about the obstacle user is about to face and guide the user to navigate independently and safely.

Keywords *Ultrasonic sensors; 3D reconstruction technique; Kinect camera; Tensorflow;*

INTRODUCTION

Visually impaired face a major problem of navigating independently through real world, throughout an average day a typical person will encounter many obstacles. Some typical obstacles encountered might include: tables, chairs, lamps, stairs and many other objects. A visually impaired uses typical walking stick is used by moving the stick from one side to side and detecting object through feel but to do so a person has to be trained in its use to actively scan the small area ahead of them. Guide dogs are trained to lead their owners around obstacles but they require an extensive training and are partially color blind and visually impaired find it difficult to care appropriately for another living being and many other methods are expensive to afford.

At present day there is more demand for cheaper solution of a system that can help blind people to travel with increased independence, safety and confidence among obstacle's and other hazards faced by blind person, providing a vocal alert to the person about the obstacle and guide him turn by turn navigation to travel with increased independency and safety.

PROPOSED SYSTEM

In order to overcome the imperfection of the existing electronic and mechanical travel aids, a solution is proposed to constantly monitor a blind person environment to detect the obstacles even when he is not conscious about it, by intimating the person with vocal alert that can help blind people to travel with increased independency, safety and confidence. The system provides a turn by turn navigation by identifying the obstacles and deciding him to take a right or left inclination.

Ultrasonic sensors

The proposed paper utilizes ultrasonic sensors. As the name indicates, ultrasonic sensors measure distance by using ultrasonic waves. The sensor head emits an ultrasonic wave and receives the wave reflected back from the target. Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception. Ultrasonic sensing is one of the best ways to sense proximity and detect levels with high reliability.

An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an objects proximity. High-frequency sound waves reflect from boundaries to produce distinct echo patterns. Ultrasonic sensors can handle collision avoidance for a robot, and being moved often, as long as it isn't too fast.

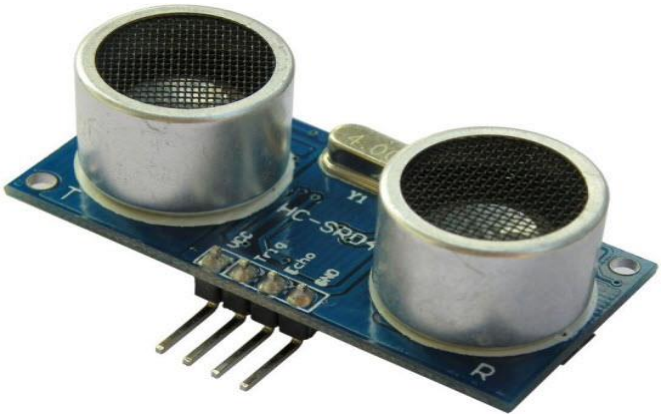

Fig 2.1 - Ultrasonic Sensors

Kinect camera

Kinect was developed by Microsoft Corporation for Xbox 360 had combined Microsoft built software and hardware. The hardware included a range chipset technology which was developed on a system consisting of an infrared projector and camera and a special microchip that generates a grid from which the location of a nearby object in 3 dimensions can be detected.

This 3D scanner system called Light Coding employs a variant of image-based 3D reconstruction. The device consists of an RGB camera and depth sensor running proprietary software which provides 3D motion capture and facial recognition capabilities. The depth sensor consists of an infrared laser projector combined with a monochrome CMOS sensor, which captures video data in 3D under any ambient light conditions. The sensing range of the depth sensor is adjustable, and Kinect software is capable of automatically calibrating the sensor based on gameplay and the player's physical environment, accommodating for the presence of furniture or other obstacles.

Fig2.2:Kinect Camera

3D Reconstruction

3D Reconstruction is a technique where image is captured from kinect camera and reconstructed on RGB based rules using image processing.

Fig 2.3 - Test Image

Using image processing algorithm we can reconstruct the same image as a 3D image which can precisely identify the position of the object and the free space available on the image using this data we can precisely identify the object in front of him guiding him to move around the obstacles.

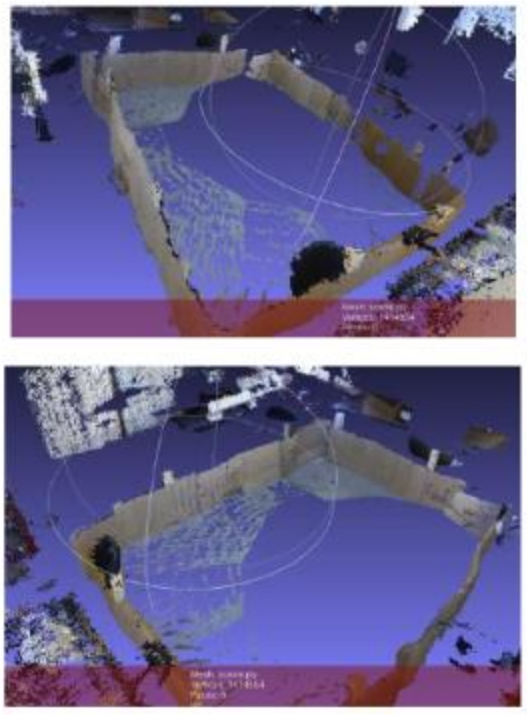

Fig 2.4 - Result Image.

Integrating all the above components to work as a single entity so the ultrasonic sensors detect the obstacles and instruct the user which is the type of obstacle that he is about to encounter over a voice alert in turn the kinect camera maps a 3D structure of the floor rectifying the free path available for the user to take and guiding him over the free path available.

ACKNOWLEDGMENT

It gives us immense pleasure to bring our paper entitled **"Navigator for Visually Imaired"** in the Eighth Semester Engineering Course. We are thankful to **Dr. B.G. Naresh Kumar**, **Principal, MIT** for having supported us in our academic endeavors. We deeply acknowledge **Mr. Dr. Sharath Kumar Y.H, Associate Prof and Head of Dept. of Information Science and Engineering,** MIT for providing us timely suggestions, encouragement and support to complete this work. We would like to sincerely thank our mentor **Dr Pushpa D,** Associate Professor in Dept. of Information Science and Engineering for providing relevant information, valuable guidance and encouragement to complete this paper.
We would also like to thank all our teaching and non-teaching staff members of the Department for their support. We are always thankful to our parents and friends for their valuable support and guidance in every step. We express our deepest gratitude and indebted thanks to MIT which has provided us an opportunity in fulfilling our most cherished desire of reaching our goal.

REFERENCES

1. COManlises, A Nyumang, MMMarcelo, AJBAdrianol, JRVReyesl Indoor Navigation System Based on Computer Vision using CAM Shift and D* Algorithm for Visually Impaire,2016.
2. A. Aladren, G. Lopez-Nicolas, Luis Puig, and Josechu J. Guerrero Navigation Assistance for the Visually Impaired Using RGB-D Sensor With Range Expansion,2014
3. .N. Sathya Mala, S. SushmiThushara, Sankari Subbiah Navigation Gadget for Visually Impaired Based on IoT, 2017.
4. N.G. Bourbakis and D. Kavraki, An Intelligent Assistant For Navigation Of Visually Impaired People, 2015.
5. Fernandes, Costa, Filipe, Hadjileontiadis, Barroso, Proximity Sensors In Blind Navigation Assistance .
6. Jinqiang Bai, Shiguo Lian, Zhaoxiang Liu, Kai Wang, Dijun Liu, Smart Guiding Glasses for Visually Impaired People in Indoor Environment, 2017
7. .Md. Mazidul Alam, Sayed Erfan Arefin, Miraj Al Alim, Samiul Islam Adib, Md. Abdur Rahman, Indoor localization System for Assisting Visually Impaired People, 2017.
8. 8Sakmongkon Chumkamon, Peranitti Tuvaphanthaphiphat, Phongsak Keeratiwintakorn, A Blind Navigation System Using RFID for Indoor Environments, 2014.
9. N.Mahmud,R.K.Saha,Zafar,M.B.H.Bhuian,S.S.Sarwar, Vibration and Voice Operated Navigation System for Visually Impaired, 2014.
10. Michel Owayjan, Ali Hayek, Hassan Nasrallah, Mohammad Eldor, Smart assistive Navigation System for Blind and Visually Impaired Individuals, 2015.
11. Chaitali Kishor Lakde , Dr. Prakash S. Prasad, Navigation System for Visually Impaired People , 2015.
12. K. Gopala Krishnan, C. M. Porkodi, K. Kanimozhi, Image recognition for visually impaired people by sound, 2013.
13. Jie Xu, Zhi Gang Fang, Dan Huang Dong, Feng Zhou, An Outdoor Navigation Aid System for the visually Impaired, 2010.
14. iMa Mehmet Celenk andDavid Chelberg, Object Detection And Recognition Via Deformable Illumination And Deformable Shape, 2016.
15. Po-Han Lee, 3D Model Reconstruction Based on Multiple View Image Capture, 2017.