"Virtual Assistance For Visually Impaired Peoples"

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ABSTRACT:

According to the World Health Organization, around 40 million people are blind, while another 250 million have some form of visual impairment. They come across many troubles in their daily life, especially while navigating. They often depend on others for help to satisfy their day-to-day needs. So, it is quite a challenging task to implement a technological solution to assist them. Several technologies have been developed for the assistance of visually impaired people. One such attempt is that we would wish to make an Integrated Machine Learning System that allows blind victims to identify and classify real-time objects generating voice feedback and distance. Which also produces warnings whether they are very close or far away from the thing?

KEYWORDS:

Blind assistance, machine learning, assistive devices, virtually-impaired people, obstacles detection, navigation and orientation systems, obstacles avoidance, neural architectecture search(NAS).

I. INTRODUCTION

Navigation is an essential part of every person's life. People navigate for work, education, shopping, and other miscellaneous reasons. Most people would

acknowledge that vision plays a critical role in navigation since it facilitates movement from one spot to another. It is relatively easy to imagine getting around without vision in well-known environments, such as our room in the house or even our office space. However, it is difficult to navigate unfamiliar places [1]. Vision and touch are essential sensory systems for

humans to interact with the environment. For blind amputees, how to quickly and intuitively convey environmental information to them is one of the key issues for recovering their daily living ability [2]. There exist some challenges that are faced by people who are visually impaired during daily navigation. Besides,

reaching the destination safely, there are different other challenges that are usual in navigation. Some of them are identifying pit in front of the path, hanging obstacles, stairs, traffic junctions, signposts on the pavement, wet floors indoors, greased or slippery outdoor paths, etc.

MOTIVATION

Image processing of ML is getting advanced day by day. Why not use these capabilities for assisting people with disabilities. Artificial Intelligence and Machine learning technologies are contributing in every field nowadays so it inspired us to make something that will help partially and fully visually impaired people in their everyday activities.

II. RELATED WORK

X. Hu, A. Song, H. Zeng, and D. Chen, "Intuitive Environmental Perception Assistance for Blind Amputees Using Spatial Audio Rendering," in IEEE Transactions on Medical Robotics and Bionics, vol. 4, no. 1, pp. 274-284, Feb. 2022, DOI: 10.1109/TMRB.2022.3146743. Vision and touch are essential sensory systems for humans to interact with the environment. For blind amputees, how to quickly and intuitively convey environmental information to them is one of the key issues for recovering their daily living ability. Inspired by the auditory localization ability of humans, we constructed a virtual scene almost identical to reality and concurrently added a virtual sound source to the interactive object.

S. Martínez-Cruz, L. A. Morales-Hernández, G. I. Pérez-Soto, J. P. Benitez-Rangel and K. A. Camarillo-Gómez, "An Outdoor Navigation Assistance System for Visually Impaired People in Public Transportation," in IEEE Access, vol. 9, pp. 130767-130777, 2021, Doi: 10.1109/ACCESS.2021.3111544. Visually impaired and blind people (VIBP) have to face significant difficulties locating public transport vehicles and bus stops due to their vision restrictions. Over the past decade, diverse assistance systems have been developed to solve this problem.

X. Hu, A. Song, Z. Wei, and H. Zeng, "Stereo Pilot: A Wearable Target Location System for Blind and Visually Impaired Using Spatial Audio Rendering," in IEEE Transactions on Neural Systems and Rehabilitation Engineering, vol. 30, pp. 1621-1630, 2022, DOI: 10.1109/TNSRE.2022.3182661. Vision loss severely impacts object recognition and spatial cognition for limited vision individuals. It is a challenge to compensate for this using other sensory modalities, such as touch or hearing. This paper introduces Stereo Pilot, a wearable target location system to facilitate the spatial cognition of BVI. Through wearing a head-mounted RGB-D camera, the 3D spatial information of the environment is measured and processed into navigation cues.

R. R. Varghese, P. M. Jacob, M. Shaji, A. R, E. S. John, and S. B. Philip, "An Intelligent Voice Assistance System for Visually Impaired using Deep Learning," 2022 International Conference on Decision Aid Sciences and Applications (DASA), 2022, pp. 449-453,

DOI:10.1109/DASA54658.2022.9765171. Unassisted navigation, object recognition, obstacle avoidance, and reading activities are extremely

difficult for people who are completely blind. For those who are visually impaired, we present a new form of assistive technology. Raspberry Pi 3 Model B+ was selected to illustrate the proposed prototype's capability because of its inexpensive price, compact size, and ease of integration. Incorporated within the design is a camera, sensors for obstacle avoidance, and powerful image-processing algorithms for detecting and classifying objects.

B. Chaudary, I. Paajala, L. Arhippainen, and P. Pulli, "Studying the Navigation Assistance System for the Visually Impaired and Blind Persons and ICT use by their Caretakers," 2021 28th Conference of Open Innovations Association (FRUCT), 2021, pp. 55-66, DOI: 10.23919/FRUCT50888.2021.9347650.

Telecare solutions have been seen as a potential means of addressing the future care needs of aging societies. With the growing proportion of dependent people (aging, disabled users), Teleassistance and telemonitoring platforms will play a significant role to provide efficient and less- costly remote care and support. It will allow aged and disabled persons to maintain their independence and lessen the burden and cost of caregiving.

CONCLUSION

The main motive of the proposed system is to assist visually impaired persons by providing the perception of the environment, which helps them in avoiding obstacles or barriers and in moving from one place to another. The goal to provide a simple, user-friendly, and handy solution is achieved. The proposed system is capable of detecting the objects present in the surrounding environment with good speed and accuracy. It detects objects effectively in both outdoor and indoor environments. The system is able to successfully detect the multiple objects present in the surrounding environment and communicate the same to the user in audio through headphones or speakers. The proposed system is tested in detecting objects in an indoor environment, outdoor environment, and objects which are more than 10 m from the camera. The system is capable of detecting objects in the surrounding environment and providing audio output to the user.

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