Elite Navigation System For Visually Impaired People

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Abstract.

Blind people face extreme difficulty to navigate in and around their surroundings, they need external assistance to help them to get from one place to another. They also face security threats; our main goal is to help blind people to be independent and move wherever they need with ease without facing any danger. A major goal of this paper is to help with movement and safety of blind people. In this paper, we propose object detection with voice feedback with the help of the YOLO V5 algorithm and image reorganization using OpenCV to help identify the kith and kin of the user and to store the images of strangers. Moreover, we use language translation to change Voice Feedback to the desired language (Hindi). Furthermore, we also have distance estimation using ultrasonic sensors

Keywords— Object Detection, Image Recognition, YOLO V5, OpenCV, Language translation, Distance Estimation.

1. INTRODUCTION

Sight is a wonderful present that gives us the ability to perceive things. It allows each person to take a glimpse and understand all scenes. In the illustrated activity, the visual eye is constructed and made realistic to enhance your flexibility for blind and handicapped people outside the area. This paper presents a project that can help impaired people to match their world using their ability to listen. It is an optical-based project that combines key parts with effective internet technology. Project input will be photo/video, the picture is clicked and observed and then connected to IoT innovations. The entity is then acquired, and voice data is transmitted to the handicapped person via gadgets. The program is aimed to create a finer life as it is a new technology that has many advantages and has an intention to help the blind person.

Sight defect is an unusual case that is deficient in optical identification because of neuro components. Based on a recent survey, millions of people are optically impaired, and billions are partially to completely affected. Vision plays an important role in every individual life. Loss of sight has enormously affected people both physically and mentally.

2. LITERATURE REVIEW

[1] The SOS Navigation System is built into the Smart Walking Stick for the Blind. the year 2018— Saurav Mohapatra is ranked first, followed by Subham Rout, Varun Tripathi, Tanish Saxena, and Yepuganti Karuna.

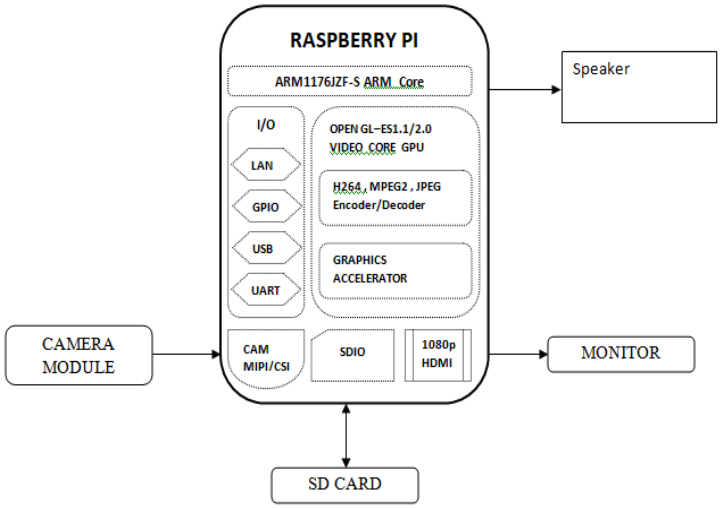
[2] A Voice-Activated Blind Stick with an Emergency Trigger the year 2021— Priyanka Abhang (1st), Shambhavi Rege (2nd), Shrishti Kaushik (3rd), Shriya Akella (4th), and Manish Parmar (5th).

[3] Ultrasonic Blind Stick Designed To Help Completely Blind People Avoid Obstacles : Arnesh Sen, Kaustav Sen, and Jayoti Das are the candidates for 2020.

[4] Fall Detection System Based on Smartphone with Accelerometer and Gyroscope Year: 2015 — 2Lukito Edi Nugrohoi, 3Widyawani, 4Kurnianingsihi.

[5] The OneNET Internet of Things development platform was used to design and implement an intelligent walking stick. Year:2019— 1 Bo Wanga, 2 Wei Xianga, 3 Yu Quan Mu1d, 4 Zheng Wu1e

3. METHODOLOGY



Projects consist of mainly Raspberry Pi , Camera , Speaker
Mainly Project contains two modules

1. Fall detection using accelerometer
2. Object Detection and Recognition
3. Open CV for face recognition

Module 1:

Fall detection using accelerometer:

This system uses an accelerometer that is tri-axis and has a gyroscope in the smart gadgets. The fall noting system makes use of several ways used by past researchers. This mainly used line acceleration in axes 'X', 'Y', and 'Z'. The gyroscope sensor has three parts- roll, tone, and yawn. These are defined as (gX), (gX) and (gZ).).

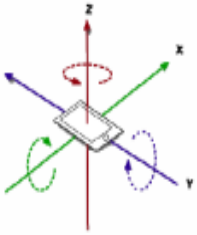


Fig. 1. Axis of the gyroscope ond accelerometer

Based on these results from the accelerometer, the magnitude of the axis is defined as:

$$AT_t = \sqrt{aX_t{}^2 + aY_t{}^2 + aZ_t{}^2}$$

Meanwhile, the gyroscope uses the formula :

$$GT_t = \sqrt{gX_t{}^2 + gY_t{}^2 + gZ_t{}^2}$$

After finding the size of the gadgets and the sensor, it is important to enter the extremes of the sensor. Below is the formula for finding the maximum and minimum values:

$$\text{MAX}[AT_t..AT_{t-n}] \text{ dan MIN } [AT_t..AT_{t-n}]$$
$$\text{MAX}[GT_t..GT_{t-n}] \text{ dan MIN } [GT_t..GT_{t-n}]$$

Once we get the extremes of the sensor, below is the formula to get the value sought:

$$angle_{(x,y,z)} = \arccos\frac{acc(x,y,z)}{g} x180$$

The fall detection method is split into several sections.. It works based on the user's first movement It then differentiates between extreme value and finally by a particular limit. Next, a specific angle is considered to estimate if a person is falling or standing (suppose falling to be low) . This is used to estimate if a user has really fallen. If the result meets the condition, the threshold value is calculated further. This is then used to direct if a person has encountered unexpected acceleration. Finally, after the completion of all the points, the last thing to look at will be the direction of fall. Here is the flowchart of the application made.

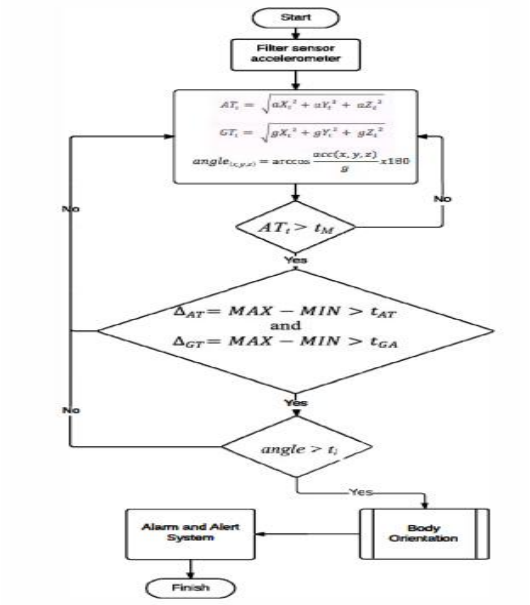
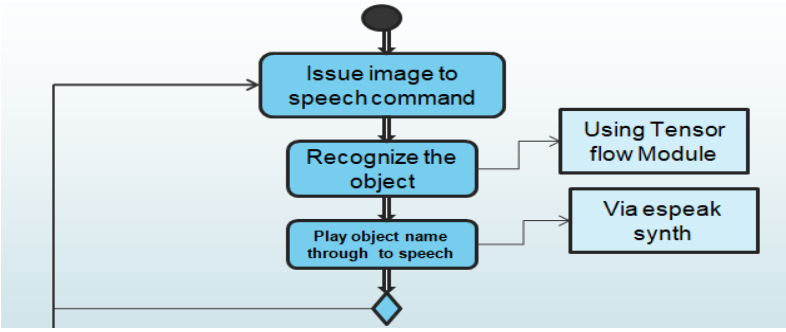


Fig. 2. Flowchart of the Falling Detection Algorithm

Module 2:

Object Discovery and Release:

Video monitoring is a method to analyze video sequence. It is an active agent of computer vision. It provides a massive data storage and display facilities. There are three video surveillance services. Video monitoring actions can be personal, independent or fully independent. Personal video surveillance means analyzing the video by a person. Automatic video surveillance consist of video processing with a significant amount of human intervention. Make finding simple movements. Only if there is a significant movement the video is recorded then sent for analysis. With a completely independent system [10], the only inclusion is a monitored video.



Module 3:

Open a CV for facial expressions:

OpenCV is a database of highly targeted editing tasks to detect real-time computing. It was founded by Intel, later funded by the Willow Garage and Itseez. It is a free to use

library under the BSD license. OpenCV provides in-depth learning frameworks, TensorFlow and Cafe.

It makes use of C ++, Python and MATLAB connections and supports Windows, Linux, Android and Mac OS. With the help of MMX and SSE commands, OpenCV depends on real-time vision applications. CUDA and OpenCL are in the process of fully being integrated. This is supported by over 500 algorithms and 10 duplicate functions. OpenCV is originally written in C ++ and has STL containers interaction.

OpenCV began as an Intel Research project to create deep CPU systems, real-time ray tracking and 3D display walls are a part of the project. OpenCV project objectives were defined as:

- The development of vision theory provides open codes and also has basic vision infrastructure. No renaming the wheel.
- Publicize vision to provide same infrastructure for developers to build and transfer the code easily.

Improve vision-based applications making it portable, and open source – No license needed for code to be released.

4. CONCLUSION

The Elite Navigation System is a game-changing innovation in navigational and rehabilitation technology for the blind and visually impaired. Its goal is to increase blind and visually impaired people's confidence and engagement in the world, allowing them to live as active and self-independent lives. They may move around without any body assistance. This is a navigational package tool built for visually impaired person this guide system can be improved with devices which will be available even smaller as this kit .

Further we have improved to detect the faces of the person which the user knows, which helps the blind in field.

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