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Complete Specification

Claims:1. This is a navigation system having two webcams mounted on spectacles, an ARM processor development board, a simple wireless earphone and a power source.

2. It can be implemented in android platform using the processor of the smart-phone as it is also an ARM processor, so we do not need to carry any extra processor with the spectacles.

3. It is independent of GPS (Global Positioning System) and Internet. The invention is free from network interference.

4. Only two simple Cameras are used for capturing image to be processed further later.

5. The Invention is a self contained package and is portable.

6. The Invention is economically feasible.

7. No other Sensor is used other than an imaging device, i.e. camera.

8. The invention can detect any kind of obstacles in its way.

9. It can easily detect doors and staircases, both upwards and downwards and human beings.

10. The program generates speech signals as output which is fed out to the user via earphones.

11. The program is a Guided navigation system.

12. The invention can be used for robotics navigation.

13. It is Power Efficient. When idle it consumes 1.15W, and when all cores are being utilized power consumption goes up to 4W. Using a 5000mAH battery will last for about 5 hours

14. It is pollution free.

15. The process of communication of the output to the user is Painless and user friendly

16. Single installation of the device is sufficient.

17. The device works efficiently in almost all light conditions, i.e. low of day light. , Description:The Key motivation for the invention is a need in prior art. In previous arts many components were used in terms of hardware. So it becomes unreliable if any hardware starts malfunctioning thus making the complete set

worthless. So the challenge was accepted to make an embedded system with less hardware component and high portability. Image Processing is a fast growing field with various emerging algorithms thus making it a great tool for several technical fields. The present invention that is being worked upon is also based on some image processing algorithms those are implemented using a dedicated hardware [Fig.4].

To start utilizing the benefits of the invention one will have to power on the device and let the OS boot up for the first time, Application starts after the boot up process is complete, for the first time software needs to be calibrated according to height of the user so as to identify possible interested regions within a captured frame e.g. identifying amount of ground area to be present for subsequent movement. Once calibrated the hardware works independently and starts taking snaps of the environment continuously and processes the snaps and get to a conclusion whether the path in front is safe or not, if not then finding the direction where a most probable safe path can exist depending on the clearance in front of user. The invention doesn't classify all the objects in front but does classify some special cases which seems to play important role in navigation of a visually impaired person e.g. Doors, Staircases, Human and Ground. The feedback provided to the user is based on speech signals. According to previous medical research, for any visually impaired person the ears are the next powerful sense-organs and it is quite reliable to use voice feedback. But keeping ears busy all the time with the speech output will not be a great advantage in hand rather it will interfere with the natural navigation system of human body. Whenever a major change in environment is observed, this information is given to user in the form of speech signals. Major change in environment includes the appearing of a staircase or door, which doesn't allow a natural flow of walk, thus enabling the user to know about the obstacles beforehand.

The flow of the task that is performed is as follows [Fig.7]:
1. Acquire Image from the Camera.
2. Send the digital image to the device via USB Cable or Bluetooth.
3. Followed by Object Segmentation using Modified K-Means Segmentation algorithm (Histogram based).
4. The present Segmentation Algorithm is sufficient to extract out the colored clusters of similar kind thus grouping the pixels into same class of objects.
5. After the classes of objects are segregated out, the next task is to extract the features out of them based on some predefined criteria.
6. The features so extracted form the base for classification of the particular object into Door, Staircase, Human or Open Ground.
7. Once the classification is done a judgment algorithm is run so as to decide whether a major change has been observed in the environment or not. If Observed, user is made aware of the change in the form of a suitable phrase in a language he has selected while installation of the system.
8. The previous steps are followed repeatedly until the device is switched of or the battery has been drained out.

The main advantage of the art is that it's a standalone package and platform independent. The software is compatible with any Debian version OS.

Further modifications for future implementation are Android Based product for more accessibility and portability than the current version, as well as implementation in a wheelchair for usage in hospitals where at least one nurse has to be present with each patient to move him in wards. So our invention will be helpful in a way that the source and destination can be fed by the doctor personnel and the wheelchair will certainly take the patient to correct destination.

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