A RASPBERRY PI BASED ASSISTIVE AID FOR VISUALLY IMPAIRED USERS

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ABSTRACT

According to who fact sheet of 2013, 39 million people are blind and 246 million have low vision. With 82% of blind population being 50 years old or above, there are many who have lived majority of their lives with an inability to do tasks like read, write or walk without help. This paper describes the implementation of Raspberry based assistive aid for visually impaired users using speeded up robust feature (SURF) algorithm. The proposed method develops a progressive work for developing an assistive aid for visually impaired, which will help them in colour identification, currency denomination recognition, obstacle detection as well as reading newspapers and books. The main advantage of using SURF method is its high speed and also ability to compare and recognize feature points of currency notes during payments. A prototype at the low cost is developed to the problems being faced by the visually impaired while interacting with their environment.

Keyword : **Raspberry pi, Speeded-up Robust Feature algorithm, Color Identification, Currency denomination, Low cost solution.**

INTRODUCTION :

According to the most recent Investigations Report, two-thirds of all blind-persons are facing difficulty for their day-to-day navigation and other incidents. The visually impaired user generally uses a hand-held device with geo-magnetic effects that detects magnetic obstacles in their pathway during navigation. The system capable of localizing and reading aloud text embedded in natural scene images can be very helpful for blind and visually impaired persons - providing information useful in everyday life, it increases their confidence and autonomy. Even though the currently available optical character recognition (OCR) programs are fast and accurate, most of them fail to recognize text embedded in natural scene images. The goal of the algorithm described in this paper is to localize text-like image regions and pre-process those in a way that will make OCR work more reliably. The approach described in the paper is based on colour image segmentation and segment shape analysis. Preliminary tests have shown that the proposed algorithm offers satisfactory detection rate and is pretty robust to typical text distortions, such as slant, tilt and bend.

The multimodal neighbourhood signature (MNS) algorithm represents local object appearance by stable colour-based invariants efficiently computed from image neighbourhoods with multimodal colour density function. This paper is an effort to minimize the dependence of the user on the people around him while carrying out chores on a daily basis. The concept of a wearable device, which supports the general human tendency of pointing at objects to interact with the environment.

2. PROPOSED SYSTEM:

For people who lost the optical ability to interpret their surroundings, way-finding that requires the person to navigate indoor or outdoor to the destination is often a daunting task. Recent advances in personal mobile devices capable of computing, communication and control, digital imaging, and global Positioning, which are widely available at affordable cost and offer potentials to enhance the global perception of the user's Surrounds. However, these technologies are generally ineffective for uses by blind people, particularly in close-range navigation. Thus, Inspired by the ability of some biological organisms to detect geomagnetic(earth magnetic) fields as an orientation cue during migration or homing, this paper explores the use of geomagnetic field effects to extend the capability of personal devices to help blind people overcome some problems encountered in daily way-finding.

In this project, four major issues are being addressed by the prototype. Initially, the inability to gauge the concept of colors of objects present around the user. The object colours are identifying using camera module. Then, the restrictions in identifying various currency notes while making payments. And fake currency can also be detected in this module. Lack of access to reading resources because of unavailability of reading material. Finally, Problem in avoiding obstacles present in path while walking indoors. In operation, the MTS communicates with a laptop PC through an inter-integrated circuit (I2C) bus and a USB adaptor, where the MTS output signals are filtered using 1-D median filter to remove noise.

SURF ALGORITHM:

SURF(Speeded-Up Robust Feature) algorithm is for object recognition and to compare features in a query image to similar ones found in images within a database. Thus, by matching images to other images, our system can detect both the object identity, as well as the image orientation. This SURF Algorithm is comprised of a feature detector based on a Gaussian second derivative mask, and a feature descriptor that relies on local Haar wavelet responses. This framework shares many conceptual similarities with the most widely used feature detector in the computer vision community, called the Scale-Invariant Feature Transform.

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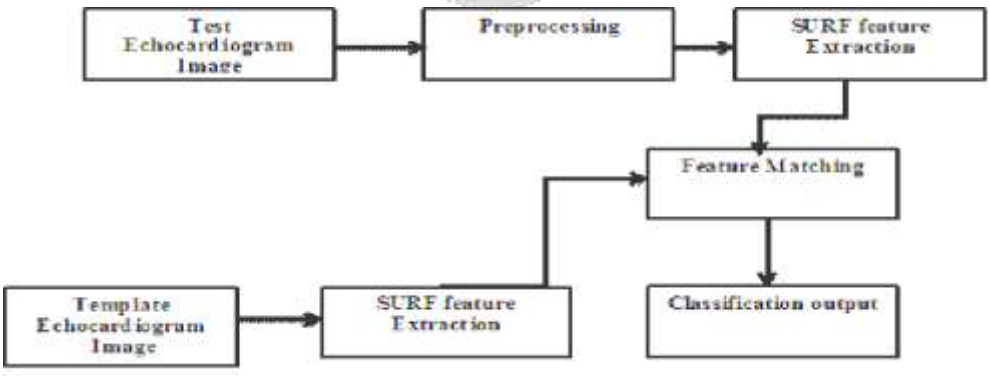

Figure 1: Implementation of surf algorithm

BLOCK DIAGRAM

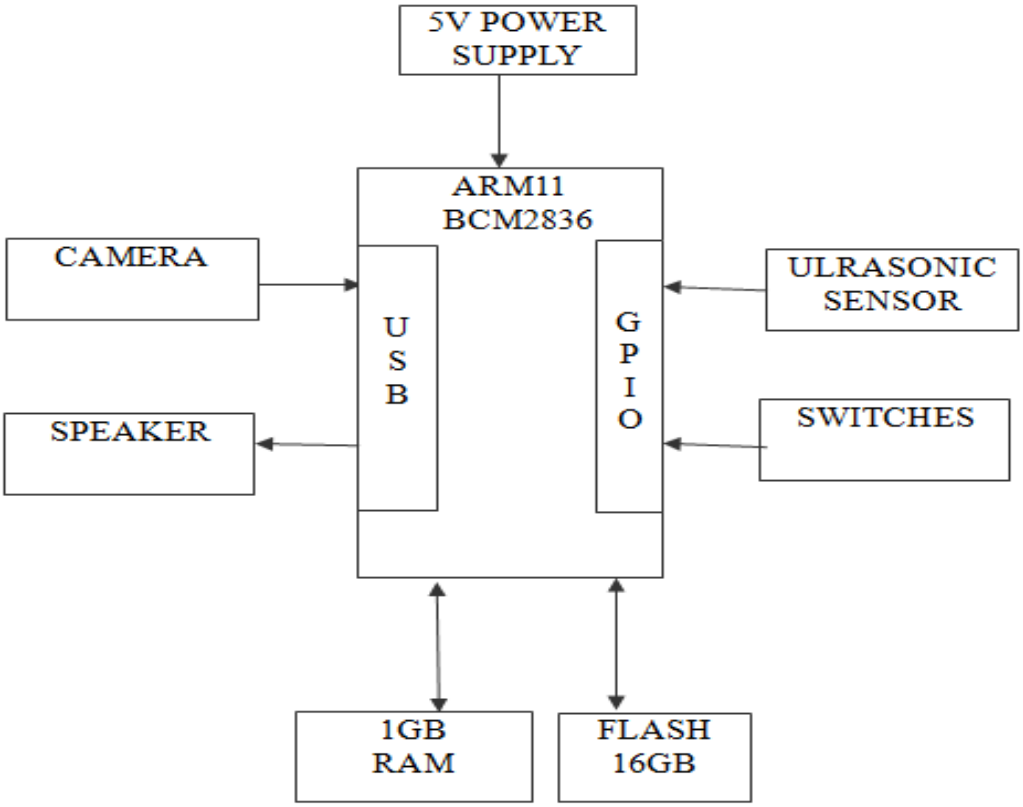

Figure 2: Block diagram of proposed system

FLOW DIAGRAM FOR CURRENCY DENOMINATION:

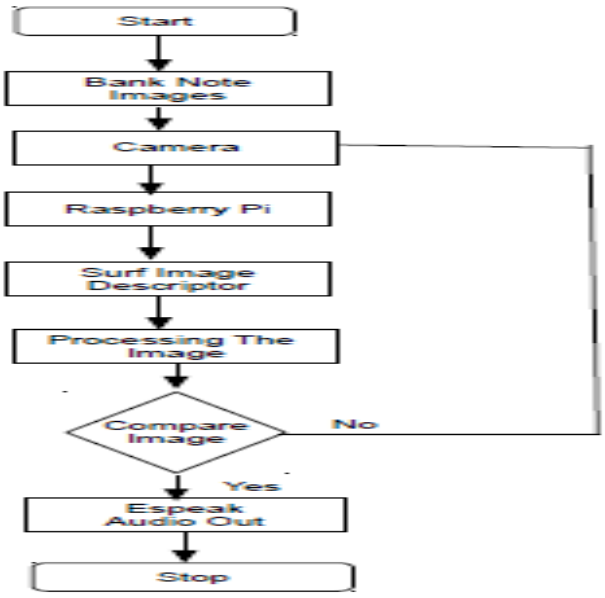

Figure 3: Flow diagram for currency denomination

Advantages of this proposed work:

- *Inexpensive and efficient system,*
- *lightweight and small,*
- *It can reliably detect sufficiently large obstacles,*
- *low-cost.*

Application:

a) Various currency notes can be detected while making payments.

b) The stationary obstacles can be avoided during navigation.

c) The rapidly developing (internet, GPS, digital video imaging, and computing) technologies can also be implemented.

d) It is used for street crossing at locations with no traffic lights and used during text reading.

RESULT AND DISCUSSIONS

RESULT OBTAINED,

Text Detection Output

Figure 3.Opencv Input Image and Simulation Output

Colour Detection Output

Figure 4.Contour Image and Simulation Output

4.CONCLUSION

Thus the proposed system is able to robustly detect important Magnetic and Non-Magnetic components with high accuracy and efficiency based on visual, location, DMI, and contextual information during navigation of visually impaired users. Quantitative analysis performed on a large image data set captured with different path and text context and currency notes during payments has demonstrated very encouraging performance.

The main challenge of the proposed work is an effort to minimize the dependence of the user on the people around him while carrying out chores ona daily basis. The concept of a wearable device, which supports the general human tendency of pointing at objects to interact with the environment. A prototype to a low cost solution to the problems faced by the visually impaired while interacting with their environment.

5.REFERENCES

1. *Ando. B. 'A smart multi sensor approach to assist blind people in specific urban navigation tasks', IEEE Trans. Neural Syst. Rehab. Eng., vol. 16, no. 6, pp. 592–594, Dec. 2008.*

2. *Ando. B. and Baglio. S. 'A haptic solution to assist visually impaired in mobility tasks', IEEE Trans. Human–Mach.Syst., vol. 45, no.5, pp. 635–640, Oct. 2015.*

3. *Balakrishnan. H and Chakraborty 'The cricket location-support Network', Boston, Massachusetts, USA, Aug. 2000, pp. 3243. System in Proc. 6th Annu. Int. Conf. Mobile Computing.*

4. *Borenstein. J and Ulrich.I. 'The guide cane-applying mobile robot technologies to assist the visually impaired', IEEE Trans. Syst., Man, vol. 31, no. 2, pp. 131–135, Mar. 2001.*

5. *Bourbakis. N. N. G and D. Dakopoulos 'Wearable obstacle avoidance electronic travel aids for blind: A survey', IEEE Trans. Syst., Man, Cybern.C, Appl. Rev., vol. 40, no. 1, pp. 25–35, Jan. 2010.*

6. *Dempster. A. G. and Lim. S. 'Indoor localization using FM radio signals: A fingerprinting approach', in Proc. Int. Conf. Indoor Position. Indoor Navig., Sep. 21–23, 2011, pp. 1–7.*

7. *Dempster. A, Lee. H. K,Li. B, Rizos. C and Wang. Y, 'Method for yielding a database of location fingerprints in WLAN',IEE Proc.-Commun.,vol. 152, pp. 580–586, 2005.*

8. *Falcao. V, Gibbons. J. and Want. R. 'The active badge location System', ACM Trans. Inf. Syst. vol.10, pp. 91–102, 1992.*

9. *Gezici et al. S. 'Localization via ultra-wideband radios: A look at positioning aspects for future sensor networks', IEEE Signal Process. Mag.,vol. 22, no. 4, pp. 70–84, Jul. 2005.*

10. *Hauschildt.D. and Kirchoff. N. 'Improving indoor position estimation by combining active TDOA ultrasound and passive thermal infrared localization', in Proc. 8th Workshop Position. Navig.Commun., Apr. 7–8, 2011,pp. 94–99.*

11. *Hong. S, Tamjidi. A and YE. C. '6-DOF pose estimation of a robotic navigation aid by tracking visual and geometric features', IEEE Trans. Autom. Sci. Eng., vol. 12, no. 4, pp. 1169–1180, Oct. 2015.*

12. Kaluwahandi. S. and Tadokoro. Y. 'Portable traveling support system using image processing for the visually impaired', in Proc. Int. Conf. Imag.Process.,2001, vol. 1, pp. 337–340.

13. Li. Q, Mao. Q, Tu. W, Zhang. X and Zhou. B. 'Activity sequence-based indoor pedestrian localization using smartphones', IEEE Trans. Human Mach. Syst., vol. 45, no. 5, pp. 562–574, Oct. 2015.

14. Liu. R and Wang. Y. X. 'Auditory feedback and sensory substitution durin tele operated navigation', IEEE/ASME Trans. Mechatronics, vol. 17, no. 4, pp. 680–686, Aug. 2012.