ISSN: 2278 – 909X
International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE)
Volume 5, Issue 7, July 2016

Smart vision for the blind people

R.Mohanapriya,U.Nirmala,C.Pearlin Priscilla

***Abstract*-The spread of visual impairment is a very sensitive issue worldwide. Blind people have to play in the everyday actions of different difficulties. These include the difficulties of moving in complete autonomy and the ability to seek and recognise objects. Until a decade ago, the only aid that a blind person has used are sticks, guide dogs accompanying persons or to move. In the last decade, electronic devices have been introduced into the world of the blind in order to facilitate the lives of these people.**

***Index terms*- feature matching, object detection, surfing, template, traffic recognition.**

I.INTRODUCTION

Various techniques are there which a visionless person commonly uses such as white cane or walking cane for navigation. But still the blind people cannot cross the road on their own and depend on others to cross the road. So, on taking this into account we decided to design a product which would help the blind people specifically cross the road as in [3]. This project involves helping the blind to recognise traffic signal pattern as well as obstacles around and to cross the road without depending on others.

The project also aims at implementing GPS module to direct the user to nearby destined places. The system consists of a glass with camera and sensors, an hardware and an audio system. It uses the MATLAB software to detect obstacles around as well as traffic signal pattern. The technique involved behind this is image acquisition, feature extraction, feature matching, pattern recognition and template matching. This helps the blind people to detect the obstacles as well as the traffic signal and to cross the road.

II. LITERATURE SURVEY

The paper as in [2] by G. Balakrishnan et al, (2007) describes about theVisually impaired to find their navigation as they often lack the needed information for by passing obstacles and hazards. Electronic Travel Aids (ETAs) are devices that use sensor technology to assist and improve the blind user's mobility in terms of safety and speed.

The paper as in [6] (Peter B.L.Meijer et al, 1992) says about the arrival of fast and cheap digital electronics and sensory devices opens new pathways to the development of sophisticated equipment to overcome limitations of the human senses. This paper addresses the technical feasibility of replacing human vision by human hearing through equipment that translates images into sounds, which could one day become relevant for the visually impaired.

The paper as in [7] by F.Hongand, A.Chekima, (2001) says about the goal of Blind Aid project to develop navigational assistance technology for the blind or visually impaired. Specifically, it seeks to develop a portable Electronic Travel Aid (ETA) for visually impaired users, along with the accompanying radio frequency identification (RFID) localization infrastructure used to equip buildings.

The paper discussed by NazliMohajeri et al, (2015) describes about how blind people face several problems in their life, one of the most important one is detecting the obstacles when they are walking. In this research, we suggested a system with two cameras placed on blind person's glasses which takes images from different sides. By

comparing these two images, the obstacles would be detected.

The paper as in [5] (Massimo Bertozzi and Alberto Broggi ,1998) describes about a stereo vision-based hardware and software architecture to be used on moving vehicles to increment road safety. Based on the systems parallel hardware, it allows to detect both generic obstacles (without constraints on symmetry or shape) and the lane position in a structured environment (with painted lane markings) at a rate of 10 Hz.

The paper (Kirubakaran.S, 2001) as in [1] describes a smart system for visually impaired, that make use of ultrasonic sensor and RF transceiver as assistive devices. Visually impaired individuals find navigation difficult as they struggle everyday in performing actions for passing obstacles and hurdles in their path. In order to help blind people navigate safely and quickly this system is proposed. This system is based on embedded technology.

III. Basic Block Diagram

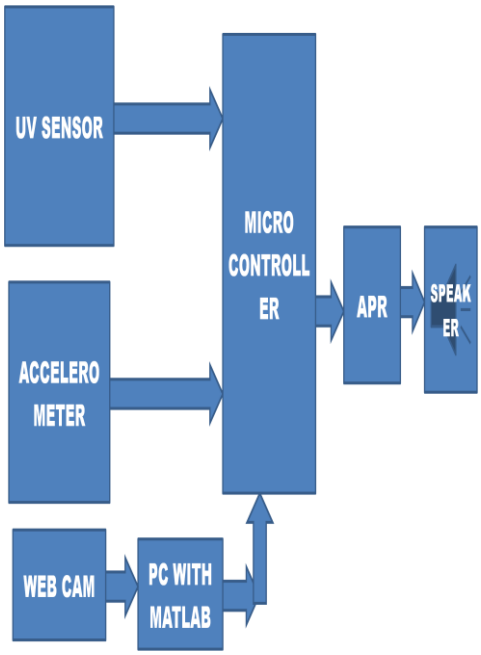


Fig (a) block diagram

The microcontroller used is AT89C51. The kit includes MAX232 for serial communication. The pc with MATLAB software is connected to the microcontroller part. The output from MATLAB is given to the microcontroller. The microcontroller is programmed to stimulate the output in the form of audio commands using the audio playback and record circuit. The ultrasonic sensors are used to detect the distance between moving vehicles and to intimate them.

IV. Implementation Method

A prototype was done where a model traffic scene with a car and a bus was created. Templates are separately created in the MATLAB. The camera was connected to the MATLAB from which a live video was captured and snapshots were taken from that live video. The snapshot is converted from RGB to gray scale image.

Then that snapshot was compared with templates stored using the concept of template matching. Template matching is a technique which is used in digital image processing. It will identify small parts of the target image which matches with the template image stored in MATLAB.Then features of the template were surfed and circles were plotted. This was based on feature extraction method in MATLAB. Feature extraction is a special form of dimensionality reduction. The main aim of feature extraction is to get the most relevant information from the original data and represent that information in a lower dimensionality space.Initial matches are done with the entire scene image. Finally filtered matches are made which exactly matches the template with the scene. Once the matching is made, a message box is displayed indicating that the obstacle is detected. The MATLAB output was sent to the microcontroller kit with max232 serially through a serial cable.

Themicrocontroller (AT89C51) was programmed using keil-c software. For serial communication a Baud rate of 9600 was fixed and the clock frequency was set to 11.0592 Hz. The microcontroller on receiving output from

MATLAB in turn gives commands to the APR33A3 kit. The APR consists of eight channels and three modes of operation. The audio playback and record kit gives audio commands to the user.

V. Simulation Outputs

The fig (b) displays the target bus which is extracted from the scene image. This target bus is saved as a template in the MATLAB. The fig (c) shows the model of traffic scene image which was captured from the live video. The scene was created using a model car and model bus. The snapshot of this image is used as the target image. The fig (d) describes the process of surfing the features of the bus. The circles are plotted on the bus. The fig (e) displays the initial matches. The circles which are plotted on the bus will be matched with the traffic scene image. The fig (f) shows the process of final matching. In this final matching only the particular template will be matched with the scene image. After the template has been matched with the scene image a dialog box will appear showing that the particular template is detected. The fig (g) shows the message box indicating the detected template.

Fig (b) bus template

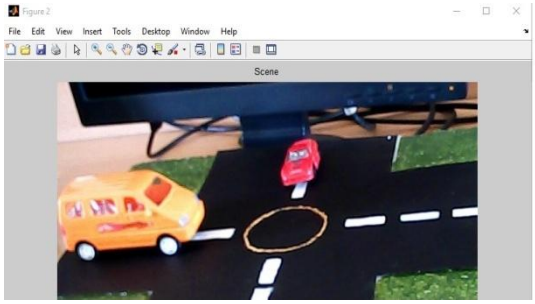


Fig (c) scene image

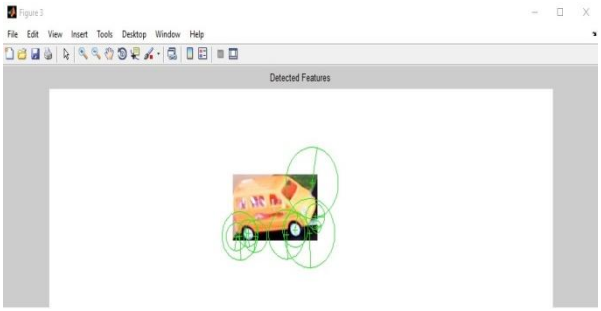


Fig (d) surfing features of template

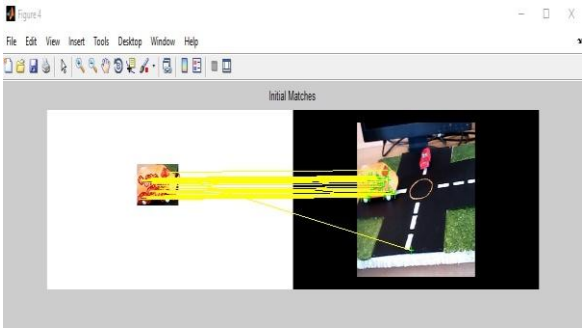


Fig (e) initial matches

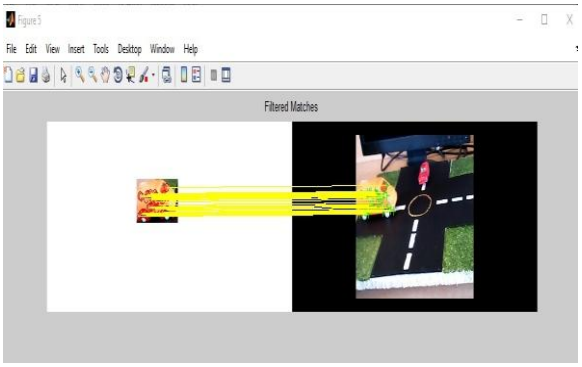


Fig (f) final matches

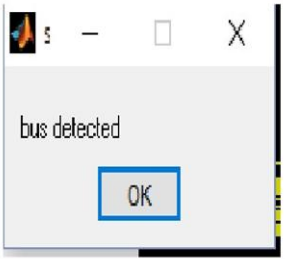
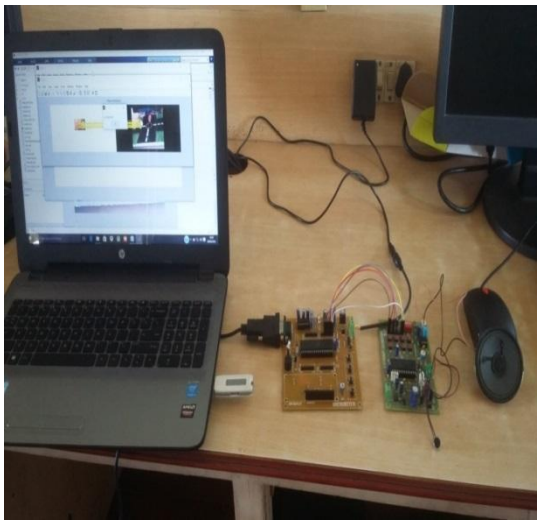


Fig (g) message box

VI. Prototype Of Working Model

The working model consists of the MATLAB software, AT89C51 microcontroller and audio playback/ recorder. The image processing technique is used in MATLAB. The simulated output is sent into the microcontroller. The microcontroller development kit consists of MAX232 which is used as a level converter. Keil micro vision is used for loading the serial communication program into the microcontroller. When the simulated output sends a character from the MATLAB it will be sent to the microcontroller through serial communication. For serial communication the registers TMOD, SCON, TH and TR are set. Then microcontroller gives commands to the audio playback/recorder. In APR voice is recorded in different channels. According to the output received from controller it gives audio commands. Fig(h) shows the prototype of the working model.



Fig(h) prototype of working model

VII. Conclusion

With the proposed system, if developed with more accuracy, the blind people will able to move from one place to another place without others help. If such a system is developed, it will act as a platform for the generation of much more features later. The developed prototype gives good result in detecting moving vehicles on the road and traffic signal and intimating the user in the form of audio commands. The future expansion would be implementing GPS module in the system so that if the user tells the destination , using voice recognition it would detect the place and give commands to the destined places.

References

[1]. S.Kirubakaran,smart guidance for blind people(2011),current trends in information technology.

[2]. G.Balakrishnan, G.Sainarayanan, wearable stereo vision for blindly impaired people(2012), mechatronics& automation(ICMA) international conference.

[3]. J.Choi, crosswalk and traffic light(2013)frontier of computer vision workshop.

[4]. Nazilmohajeri, Roozbehraste, obstacle detection (2007),proceedings of world conference vol 1:2007,P687.

[5]. Massimo Bertozzi,AlbertBroggi, a parallel real time system for generic obstacle and lane(2001), IEEE transactions on image processing

[6]. B.L.Meijer. experimental system for auditory image representation (1992), IEEE transaction on biomedical engineering.

[7]. F.Hong, A.Chekima, ETA for visually impaired(2011), international journal of disaster recovery and business connectivity, IEEE a new vision vol.3,aug.

R.Mohanapriya, Department of ECE, S.A.Engineeringcollege, Chennai, India, 8608028808.

U.Nirmala, Department of ECE, S.A.Engineeringcollege, Chennai, India, 9840988863.

C.Pearlin Priscilla, Department of ECE, S.A.Engineeringcollege, Chennai, India, 9003166368.