STUDENT PROJECT PROPOSAL FOR ENGINEERING AND TECHNOLOGY

By

V.DHILIP KANNA (B.E.ECE Final Yr).
S.ASWIN AMITHARAJ (B.E.ECE Final Yr.)

UNDER THE GUIDANCE

Of

Dr.V.THULASI BAI
Professor& Dean / ECE Dept

DEPARTMENT OF ELECTRICAL AND COMMUNICATION ENGINEERING

SRIRAM ENGINEERING COLLEGE
PERUMALPATTU-602024

TO

IEEE MADRAS SECTION
CHENNAI

PROJECT PROPOSAL 2010-2011

1. Name of the applicant(s) : V.Dhilip Kanna,
S.Aswin Amirthraj.

2. a. Address including email and mobile number

i) Institutional : Sriram Engineering College
Perumalpattu,
Chennai –602024,
Tamilnadu, India.
sriraminfo@yahoo.com
+91 44 2768 9364

ii) Residential : No.187,Union Carbide colony ,Kodungaiyur,
Chennai – 600118
dhilipthegreat@gmail.com
+91 9789089084

b. IEEE Membership details : V.Dhilip Kanna (90935393)
S.Aswin Amitharaj (90935386)

3. (a)Your present academic programme : B.E. Electronics and Communication Engineering

(b) The discipline in which your Proposal is to be considered : Engineering

4. Percentage of Marks Scored up to Previous semester : 71.1%, 70.4%

5. Are you an aspirant for research career? If so, : Yes

a) Are you planning to sit for UGC/CSIR-NET/GATE Please provide full particulars : Yes

b) Are you ambitious of publishing in a science journal? If so are you willing to continue with your supervisor until the manuscript of the paper is communicated. : Yes

6. Whether your Department/College/ University is recognized by the UGC/NAAC/ICAR/AICTE/ICMR : Yes (AICTE)

7.	a) Name of the guide with Designation	: Dr.V.THULASI BAI Prof & Dean / ECE Dept
	b) Institutional address Phone No and Mobile No.	: Sriram Engineering College Perumalpattu,Vepampattu R.S Thiruvallur Dt. Pin:602 02 9840834086
8.	Title of the proposed work	: Digital Eye for Visually Talented
9.	Attach 3 Copies of work containing 1. Introduction 2. Objectives 3. Methodology 4. Work Plan 5. Budget 6. Other details	: Enclosed 3 Copies
10.	Are you widow/differently abled? If so, provide copies of necessary certificate	: No
11.	If you belong to SC/ST communities, Provide copies of necessary certificate	: No
12.	Any other particular that you wish to include.	: No

SRIRAM ENGINEERING COLLEGE

(A unit of Sriram Educational Trust)

Approved by AICTE, Affiliated to Anna University Chennai.
Accredited by NBA, AICTE, New Delhi
Perumalpattu, Veppampattu R.S., Thiruvallur District - 602 024.
TamilNadu. Phone : 044-27689364
E-mail : sriraminfo@yahoo.com / info@sriramtrust.org.

BONAFIDE CERTIFICTE

This is certify that **Mr. V.DHILIP KANNA** (IEEE Mem. No-**90935393**) , **Mr. S.ASWIN AMIRTHARAJ** (IEEE Mem. No-**90935386**) is a bonafide final year U.G. students. It is also certified that 15 page final project report along with utilization certificate signed by the project guide & Principal is sent to the IEEE Madras section in the PDF format through e-mail on 31st March 2011.

Signature of the Guide

Dr. V. THULASI BAI, B.E., M.S., Ph.D.
Professor & Dean
Dept. of ECE
Sriram Engineering College
Perumalpattu, Veppampattu R.S.
Thiruvallur Dist - 602 024

Signature of the HOD

Signature of the Principal/
Head of the Institution

PRINCIPAL
Sriram Engineering College
PERUMALPATTU,
VEPPAMPATTU R.S
PIN CODE-602 024

SRI RAM ENGINEERING COLLEGE * PERUMALPATTU

ABSTRACT

Visually challenged people suffer from lots of problems each and every day in their miserable life. Many of them have even lost their lives due to this inability. Almost all of them need someone to assist their progress in each and every step.

This project mainly focuses on these visually challenged people in making them fully independent in all aspects. This system is based on “Sensor and FPGA” which serves as an electronic eye that transmits and receives information from the outside world through a user friendly model. The information is received through the sensors and cameras placed in the legs and on the caps over the head respectively. From the information received from the sensors and cameras the processing is done in FPGA that in turn replicates the movement through sound processing units. Thus the person can receive the information through the headset and direct his way easily.

INTRODUCTION

This project focuses on helping the visually challenged people to become a fully independent individual in all aspects. Sense of sight is the most essential of all others, visually impaired living creatures suffer a lot. And considering humans they lead a very miserable life. Many of them have lost their hope to live because of their inability, as they are entirely or eventually dependent on someone's help to assist their day to day activities. The assisting devices available today are not sufficient for assisting them in proceeding without others help. In order to overcome the drawbacks in present trend we have designed a system which would be of immense advantage to blind people. This proposed system is based on "FPGA (field programmable gate array), cameras, Sensors and locators".

OBJECTIVES

This project focuses on helping the visually challenged people to become a fully independent individual in all aspects. These people are suffering a lot to survive, they seek help from others to do their work. At present walking sticks and obstacle detector are the assisting devices for them. through these they are not able to live easily . walking sticks are only for detecting their path in a slow and it's a tedious process. Obstacle detector only finds the path out but not so highly helpful to them in knowing the happenings around them. They are not so advantageous, hence we have designed new system, which system is based on FPGA (field programmable gate array) connected to cameras and Sensors and locators. This project has features which help in knowing happenings around them and also enable them to walk like normal humans without any different assisting devices with them which are odd. The person can move independently to any location he likes without even asking the travelling route from others. All these things which are being done by normal humans can also be done by differently talented people too. This projects when implemented can change the life of the needy.

MODEL

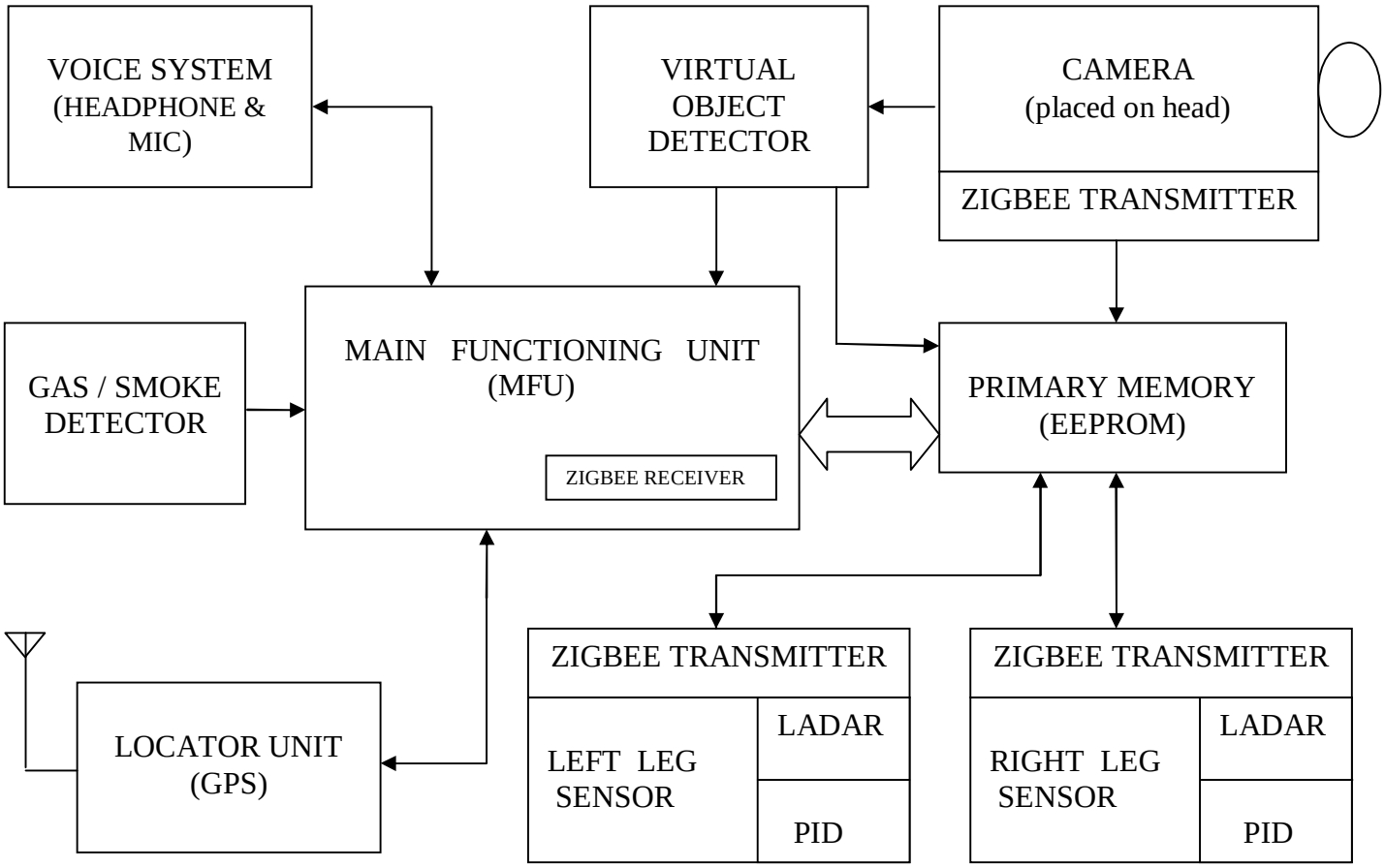


fig no - 1

METHODS AND MATERIALS

This model is designed in a PCB of size 4'*3'. The inputs are Camera and Sensors placed in legs. Camera is placed over the head since the angle of coverage is best. These cameras are chosen with a pixel value of 8-10. Image resolution required for this module is moderate because only variations in image are considered. Sensors are placed on both the legs so that distance can be measured easily using ladar technology, and low frequency infrared waves are measured using PID. Virtual object detector(VOD) is used for real time object detection. This virtual detection is done using user supporting softwares that are available.

FPGA is the main functional unit (MFU). Its functions as heart of the system. It is programmed using application softwares to process the input obtained from camera and sensors. Entire computation is processed within 0.7 sec(approx). Thus providing less delay when compared to other computing architectures.

The entire data transmission takes place through wireless network. Among various wireless technologies Zigbee (IEEE 802.15) is chosen due to its high efficiency.

The gas/smoke sensors are placed in FPGA units to detect smoke and gas leakages. Global positioning system is used for identifying the user's location. FPGA is programmed to interact with locator unit to fix his/her destination.

Entire happening in the surrounding environment is converted to digitized signal. This signal is converted to voice format which is easily recognizable by the user. This signal is given to the user by headphone. Mic is used to provide input to the FPGA .

WORKING

The important functioning in this project is the processing of image and signals acquired from camera and sensors. Among these visual input is considered to be most important. Image acquired at first is assumed as input 1 (I1) and is being saved in the memory, denoted as 'M', the succeeding input of I1 is termed as I2.

Manipulation at FPGA,

$$I1\text{-}I2 = X \begin{cases} \text{If } X=0, \text{ if no movement Detected} \\ \text{If } X = 0, \text{ movements detected} \end{cases}$$

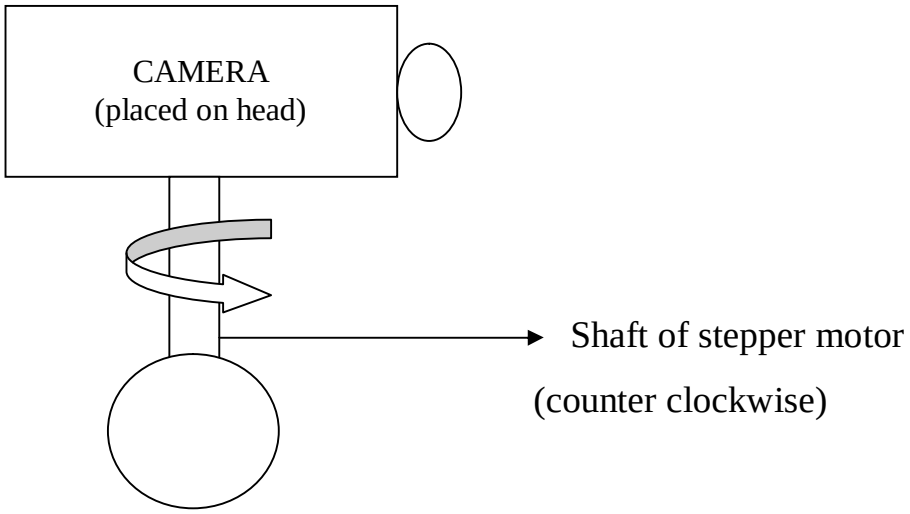
Representation of image,

let $$I = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$$

The variation in the value of ' X' specifies the change in location of object in the surrounding. The direction of the camera it is clearly intimated to the user through voice system. The camera functions continuously and analog signals are generated, by which it constantly receives images. In FPGA, on video processing the input I1 and I2 are compared, i.e. an image is denoted in a matrix form. The process of estimation is done in FPGA after storing the value initially in memory. The FPGA manipulating unit compares the value of X with pre-defined specification. By monitoring the variation in the values of matrix the movement of object can be detected. A normal camera of 8-10 pixels is being used.

CAMERA MECHANISM:

In order to obtain the entire information about the surrounding the camera is placed on the shaft of a stepper motor which helps in tracing the whole area. The DC motor is programmed by using suitable microcontroller, so that the camera rotates to view the images behind. This process is done only when the signal obtained from the MFU that is the sensors at leg give an output that the person can proceed for five steps or more. The signal from MFU serves as the control signal for the micro controller.



Signal from camera is given as input to VOD. The virtual object detector (VOD) identifies the object in front of it by means of specific user friendly application software and reports it to the MFU. The VOD (Virtual Object Detector) unit obtains input from camera, recognizes the objects focused under the digital device and generates speech signals by voice system fused on MFU, details of objects are got from online resources. It also checks the image from camera by checking with previously stored images and also searches for data online. If the

persons image is stored already then the camera detects it by VOD and intimates it to FPGA, where the required data is transferred to the client in default voice.

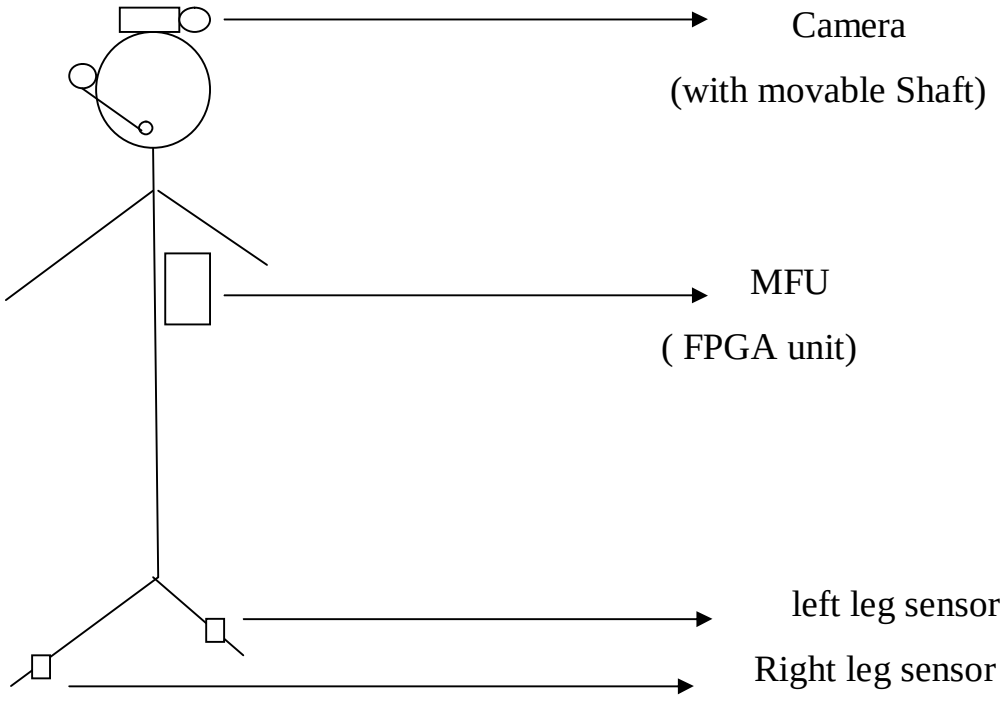
The sensors in leg function based on ladar and PID systems by which they exactly determine the distance to move freely and presence of objects even during night. Ladar is the technique of using laser for measurement of distance from the object it has been reflected back. Passive Infrared Detector is a sensitive device used to find the movement of humans even in darkness as they emit infrared waves of very low frequency. On beside the sensors located in leg will be monitoring for the obstacles in path by using laser ,this phenomenon of using light for distance measurement and obstacle detection is termed as LADAR (Laser Detection and Ranging) . Eye-safety is often a requirement for most applications using laser.

A common alternative 1550 nm lasers are eye-safe at much higher power levels since this wavelength is not focused by the eye. These data's are transmitted to the MFU (FPGA unit) by zigbee transmitters. FPGA manipulates the data perceived from high resolution cameras, LADAR and PID Sensors for path detection. The gas/ smoke sensors help in detecting any leak of LPG gas and the presence of any smoke caused by fire accident. The sensors for gas/smoke detect the presence of any toxic gases, fire and indicate by alarms. This sensor if detects anything sends signal to MFU which is programmed to call emergency numbers immediately and also instructs the person to vacate from that area by giving commands for exit.

The locator unit comprises of a GPS device by which the user can identify his present location and also fix his destination. The GPS device helps the client in locating the state of his position, in case he needs to go to a specific place he can

give input to MFU unit so that the instructions for his travel is provided by connecting to online resources. In case of emergencies like theft, medical aid, fire accidents he/she can contact the concerned authorities by using voice commands. The inter connectivity between every unit is linked by zigbee technology for high speed data transmission.

LAYOUT:



CONCLUSION:

This proposed model enables the visually talented to function independently like normal humans. The main aim of serving the mankind is achieved by providing sense of sight to the needy. This project is devised on basis of an efficient scale, superfast computations and minimized device modules. This design articulates the user to behave casually and individually without any restriction. The hardware devices used in this project does not cause any harmful radiations providing a user friendly module.

FUTURE ENHANCEMENT:

- FPGA unit can be added with a Bluetooth transceiver enabling device control in an automated area.
- Nanotechnology can be used to minimize the dimensions of the module.
- Medical monitoring system (ECG, BP, Sugar level,) may be added to assist the visually talented .

REFERENCE

- Xiao-yi Feng, Li-ping Yang, Zhi Dang and Matti Pietikäinen, **Eyes Location Using a Neural Network,** Advances in Neural Networks - ISNN 2006 ,Lecture Notes in Computer Science, 2006, Volume 3972/2006, 474-479,.

- Andreas Bulling, Jamie A. Ward, Hans Gellersen, Gerhard Tröster, "Eye Movement Analysis for Activity Recognition Using Electrooculography," IEEE Transactions on Pattern Analysis and Machine Intelligence, 30 Mar. 2010. IEEE computer Society Digital Library. IEEE Computer Society, http://doi.ieeecomputersociety.org/10.1109/TPAMI.2010.86

- Leslie Cromwell, Fred J Wiebell, Erich A Pfeiffer," Biomedical Instrumentation" **Edition Number:** 2

- Wijesoma, W.S.; Kodagoda, K.R.S.; Balasuriya, A.P, Sch. of Electr. & Electron. Eng., Nanyang Technol. Univ., Singapore , Robotics and Automation, 20 Issue:3, June 2004

- Chang-hong Hu; Snook, K.A.; Xiao-chen Xu; Yen, J.T.; Shung, K.K.; Pie-jie Cao; Dept. of Biomed. Eng., Univ. of Southern California, Los Angeles, CA, USA , Ultrasonics Symposium, 2004 IEEE, 23-27 Aug. 2004.

- Wood, R.A.; Han, C.J.; Kruse, P.W.; Honeywell Inc., Sensor & System Dev. Center, Bloomington, MN , Solid-State Sensor and Actuator Workshop, 1992. 5th Technical Digest., IEEE, 22-25 Jun 1992

WORKPLAN

3 months – Camera and sensor module

3months – MFU programming

2 months – Interfacing of modules

BUDGET

For software – Rs 7000/-

For hardware – Rs 15,000/-

For Database Creation – Rs 3000/-

Miscellaneous – Rs 2000/-

Total – Rs 27,000/-