ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 3, March 2015

On-Board Camera Based on Pedestrian Detection system

Dr. Y.PadmaSai[1], V. Naveen Kumar[2], N. Mohan Krishna[3]

Professor & Head of the Department, Dept. of ECE, VNRVJIET, Hyderabad, Telangana, India [1]

Project Engineer at Research and Consultancy Center, VNRVJIET, Hyderabad, Telangana, India [2]

PG Student [ES], Dept. of ECE, VNRVJIET, Hyderabad, Telangana, India [3]

ABSTRACT: Situational awareness for industrial vehicles is crucial to ensure safety of personnel and equipment. While human drivers and onboard sensors are able to detect obstacles and pedestrians within line-of-sight, in complex environments, initially occluded or obscured dynamic objects can unpredictably enter the path of a vehicle. Right now the driver will continuously observe the pedestrian present while driving. If the driver is in drowsiness may leads to accidents. The main disadvantage in the existing method is driver will continuously observe the pedestrian through manually and the sensors will not give accurate information. The project aims at designing a system which automatically detects the presence of any pedestrians near to the vehicles and controls the vehicle motors and also alerts the pedestrians through buzzer alarm and also using ARM Cortex-A8 Beagle Bone Black processor with USB camera interfaced. We propose a system that integrates a vision-based off board pedestrian tracking subsystem with an onboard localization and navigation subsystem.

KEYWORDS: Beagle bone Black Processor, Pedestrian Detection, web camera.

I.INTRODUCTION

Pedestrian detection has been a major research subject in computer vision in the last decade. We are developing vision-based systems for driver assistance on-board vehicles Safety and ease-of-use of vehicles are the two central themes in this line of work. This paper focuses on the safety aspect and presents a prototype system for the detection of the most vulnerable traffic participant's pedestrians. To illustrate the magnitude of the problem, consider the numbers for Germany more than 60.000 pedestrians were injured in 1998 alone due to collisions with vehicles Of these, more than 3000 were fatal injuries. Our long-term goal is to develop systems which, if not avoid these accidents altogether, at least reduce their severity by employing protective measures in case of upcoming collisions.Here focusing on industrial environments, we propose a novel system which integrates the detection from these independent sources on-board cameras. With increasing accuracy and dropping price of sensors, self-driving autonomous vehicles are becoming more popular, especially in industrial environments. Since the embedded system is dedicated to specific tasks, design engineers can optimize it to reduce the size and cost of the product and increase the reliability and performance. Some embedded systems are mass-produced, benefiting from economies of scale. Producing a custom-made chip to handle a particular task or set of tasks costs far more time and money. Many embedded computers even come with extensive libraries, so that "writing your own software" becomes a very trivial task indeed. From an implementation viewpoint, there is a major difference between a computer and an embedded system. Embedded systems often reside in machines that are expected to run continuously for years without errors and in some cases recover by them if an error occurs. While many of these are useful for enhancing driver awareness, some also provide driver feedback through proximity displays, steering-wheel force feedback or vibrations, or audio/visual cues. Extending the information from these systems further, certain aspects of driving are becoming automated such as reverse and parallel parking, automatic lane adjustment, and automatic braking when encroaching upon a vehicle or pedestrian. The goal of these systems is to improve safety by increased perception and automation. Our Research is motivated by this goal and focused upon pedestrian safety in industrial environments. Rules for vehicles and pedestrians in industrial environments are typically different than the rules for driving on public roads. Traffic light and gate systems are also used to increase awareness of the potential for vehicle–pedestrian collisions. Sound systems such as vehicle reversing beeps or rules requiring a driver to sound their horne when entering/exiting a shed are typical along with strobe lights. To overcome this problem here introducing the beagle bone black Processor. This processor takes responsibility to check the pedestrian is there in

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 3, March 2015

front of the vehicle. Once the pedestrian is detected, automatically the vehicle gets stopped. The system gives alert through buzzer alarm whenever it detects pedestrians in front of the vehicle. To perform this task, Beagle Bone Black processor is programming using in embedded Linux. The project which captures the image of pedestrian and it will gives alert to the driver using buzzer alarm and the vehicle automatically get stopped.

II. RELATED WORK

Previously work on pedestrian detection has taken a learning-based approach, bypassing a pose recovery step altogether and describing human face in terms of simple low-level features from a region of interest. Research has also been done on people and car detection from a moving vehicle through an urban area, using a stereo camera configuration as well as from a fixed camera observing areas like a pedestrian crossing. Given the depth information, many false positives can be filtered out however, additional computational power is needed to obtain a depth map and stereo camera hardware costs significantly more compared to monocular cameras. Results have shown that occlusions are common with 70% of pedestrians being occluded in at least one frame and a solution using motion estimation of the person is not effective when the camera is mounted on the moving vehicle. Detection rates varied from 70% when the pedestrian is in close proximity to the vehicle to only 20% success at a medium distance, pointing out a major drawback even with the most advanced people detection algorithms currently available**.**

III. PROPOSED SYSTEM

This project makes use of an onboard camera, which is commonly termed as Beagle Bone Black processor. This onboard camera can efficiently communicate with the output and input modules. The project aims at designing a system which automatically detects the presence of any pedestrians near to the vehicles and controls the vehicle motors and alerts the pedestrians through buzzer alarm and also using ARM Cortex-A8 Beagle Bone Black processor with USB camera interfaced.

Web Camera

Camera is a video camera that feeds its images in real time to a computer or computer network. An camera a wired USB camera is generally connected by a USB cable, similar cable**.** Cameras are known for their low manufacturing cost and flexibility**.**

DC motor

DC motor uses electrical energy to produce mechanical energy, very typically through the interaction of magnetic fields and current-carrying conductors. In any electric motor, operation is based on simple electromagnetism. A current carrying conductor generates a magnetic field

Buzzer

Buzzer is an audio signalling device, which may be mechanical**,** electromechanical, or electronics.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 3, March 2015

IV. HARDWARE IMPLEMENTATION

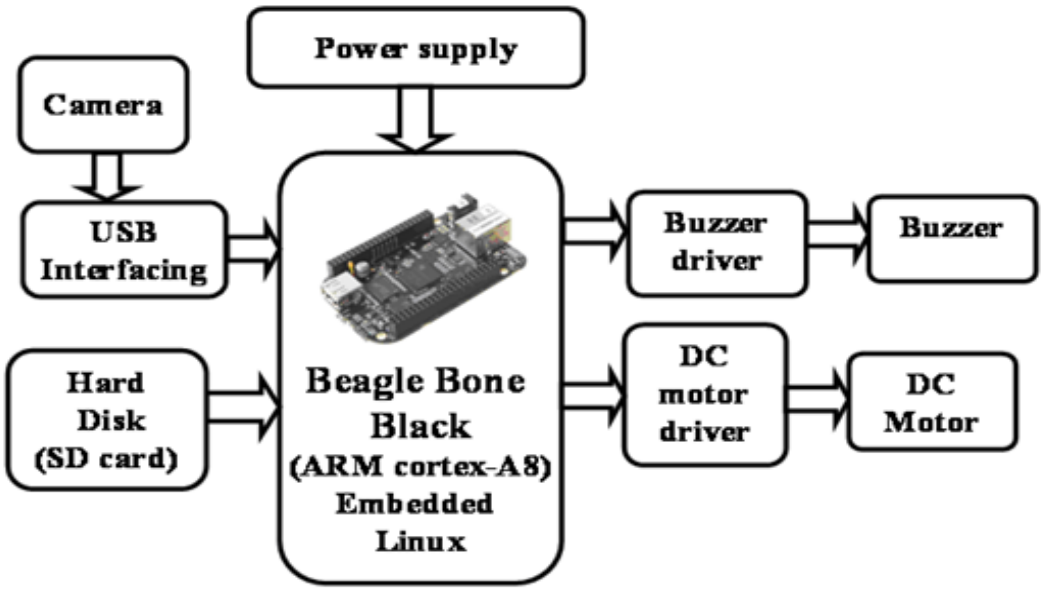

Fig: 1 Block diagram of pedestrian Safety using Beagle bone

4.1 Beagle Bone Black

The board was developed by a small team of engineers as an educational board that could be used in colleges around the world to teach open source hardware and open source software capabilities. The Beagle Bone Black is the newest member of the Beagle Board family. It is a lower-cost high-expansion focused Beagle Bone using a low cost Sitara AM3359 Cortex A8 ARM processor from Texas Instruments. It is similar to the Beagle bone, but with some features removed and some features added. By utilizing comprehensive expansion connectors, the Beagle Bone is highly extensible to add many features and interfaces via Add on boards or Capes. Capes refer to the shape of the add-on boards and are discussed later in this document. The Beagle Bone was also designed with open source software development in mind, and as a way of demonstrating the Texas Instruments. The design supports 128MB or 256MB of memory. The standard configuration is 256MB at 400MHz. A 128MB version may be built later, but there are no definite plans for this. A single 32KB EEPROM is provided on I2C0 that holds the board information.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 3, March 2015

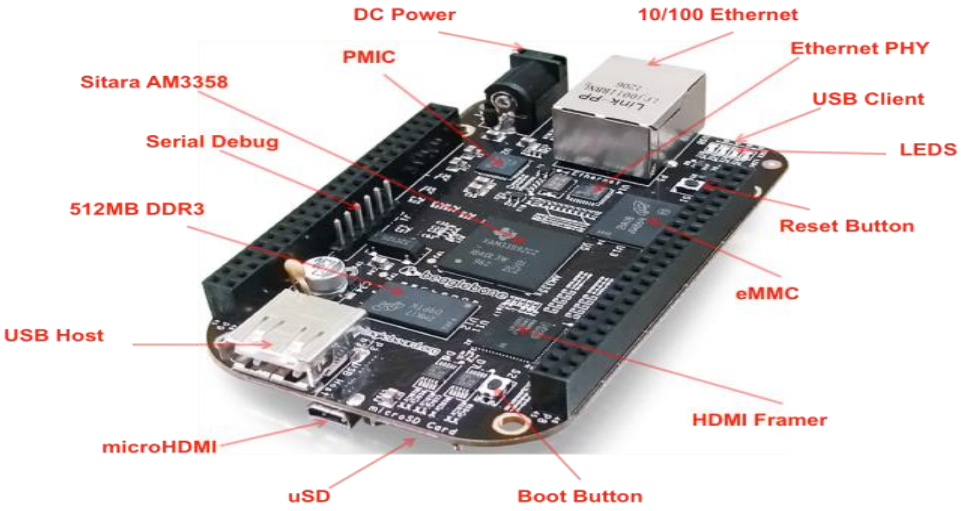

Fig 2: Beagle Bone Black

4.2 Web Camera

A webcam is a video camera that feeds its image in real time to a computer or computer network. Unlike an IP camera (which uses a direct connection using Ethernet or Wi-Fi), a webcam is generally connected by a USB cable, FireWire cable, or similar cable. Their most popular use is the establishment of video links, permitting computers to act as videophones or videoconference stations. The common use as a video camera for the World Wide Web gave the webcam its name. Other popular uses include security surveillance, computer vision, video broadcasting, and for recording social videos. Webcams are known for their low manufacturing cost and flexibility, making them the lowest cost form of video telephony.

Fig: 3 USB Web Cam Interfaced with the beagle bone Black

If you have your own web server and Web site, you already have a way to post your Webcam images on the Web. At its most basic, a Web server is simply a piece of hardware that has the ability to deliver Web-based content to a Web browser. For some people, their home computer serves as their Web server. If that's the case, a camera, a piece of software and your PC are all that you need.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 3, March 2015

V. ALOGORITHM

Haar-like features are digital image features used in object recognition. They owe their name to their intuitive similarity with Haar wavelets and were used in the first real-time face detector. The advantage of a Haar-like feature over most other features is its calculation speed. Due to the use of integral images, a Haar-like feature of any size can be calculated in constant time. Here we will work with face detection. Initially, the algorithm needs a lot of positive images (images of faces) and negative images (images without faces) to train the classifier. Then we need to extract features from it. For this, Haar features shown in below image are used. They are just like our convolution kernel. Each feature is a single value obtained by subtracting sum of pixels under white rectangle from sum of pixels under black rectangle.

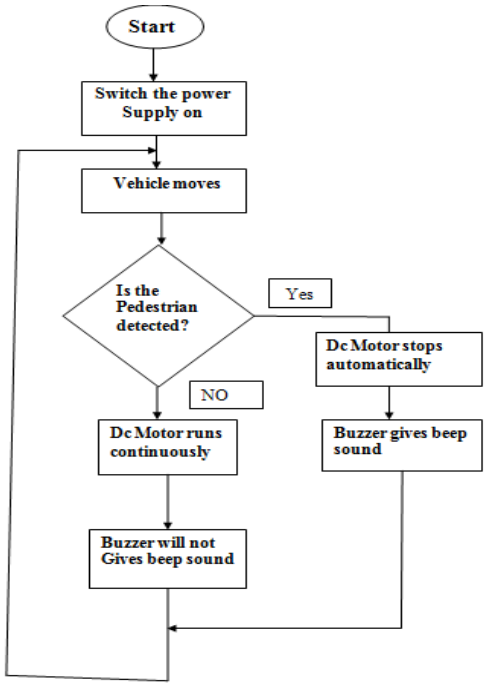

Fig 4: Flow Chart

VI. EXPERIMENTAL RESULTS

Design and Implementation of "On-Board Camera Based Pedestrian Safety" was implemented successfully.
Indicates the total hard ware setup of the project

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 3, March 2015

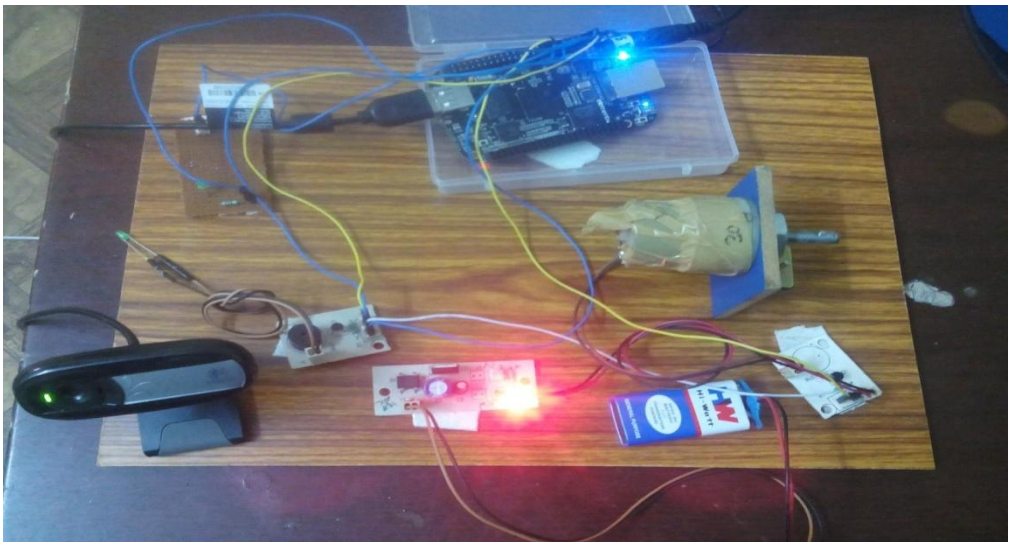

Fig 5: Hardware setup

Show the command is given GCC Complier for the output

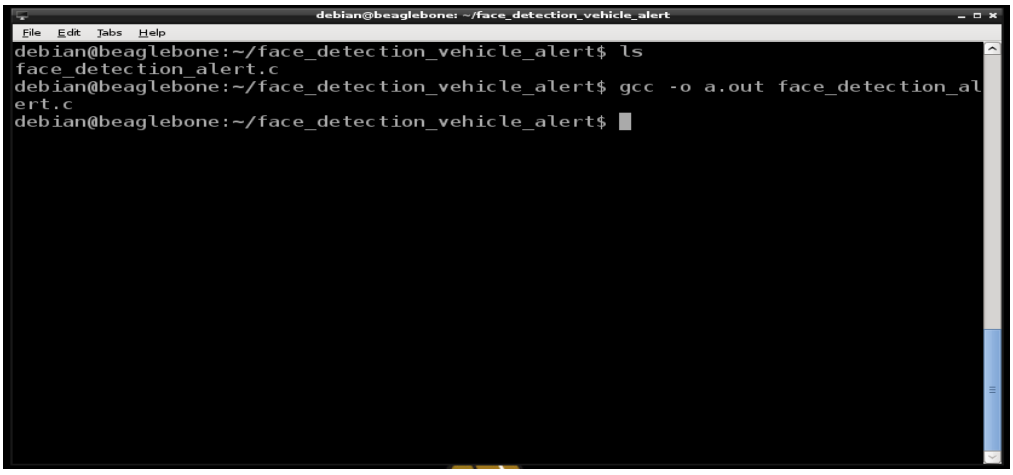

Fig 6: face_detection_alert_3 shows the command to compile c file using gcc compiler.

Here the shows the output of the face detection Where -o for output file name. The compiled output will be stored in a. Out (executable file).

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 3, March 2015

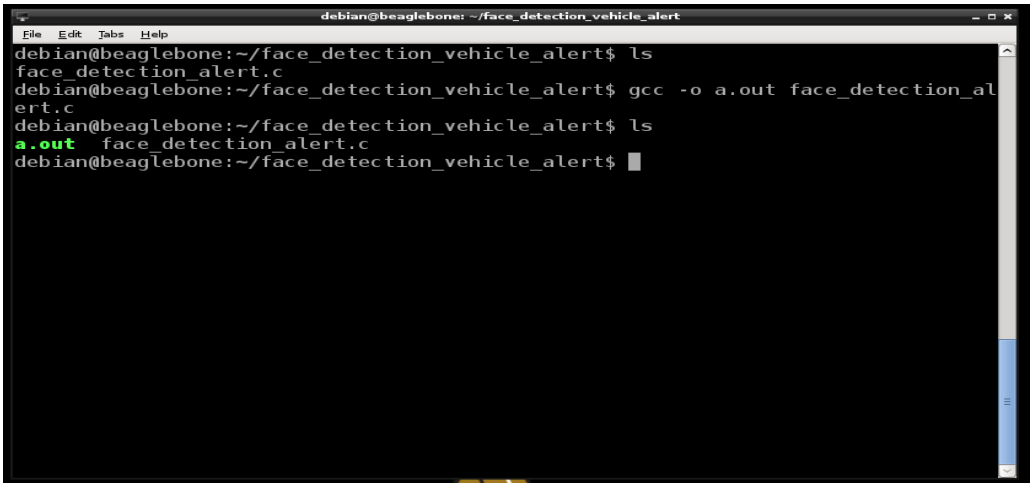

Fig 7: face_detection_alert_4 shows the compilation output file generation "a. out

VI.CONCLUSION& FUTURE SCOPE

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested. This project is mainly intended to design a system which captures the images of pedestrian using Beagle Bone Black processor and the system also alert through camera using buzzer alarm system. The project was designed such that the system captures the images of pedestrians and gives the buzzer indication to driver using Beagle bone black processor. When the USB camera detects the pedestrian in front of the vehicle, the vehicle automatically get stopped.

The system can be extended by interfacing wireless technologies like Bluetooth, WI-Fi, GSM etc. By interfacing Bluetooth or wireless Wi-Fi the human presence can be displayed on mobile phone along with location using GPS module If pedestrian arrivals towards the vehicle suddenly. So using this system, it prevents the accidents and it will secure human lives.

REFERENCES

[1] A. Gandhi and M. Trivedi, "Pedestrian protection systems: Issues, survey,and challenges," *IEEE Trans. Intell. Transp. Syst.*, vol. 8, no. 3, pp. 413–430, Sep. 2007.
[2] A. Ran, I. Weiss, Q. Zheng, and L. S. Davis, "Pedestrian detection via periodic motion analysis," *Int. J. Comput. Vis.*, vol. 71, no. 2, pp. 143–160, Feb. 2007.
[3] D. Senior, A. Hampapur, Y. L. Tian, L. Brown, S. Pankanti, and R. Bolle,"Appearance models for occlusion handling," *Image Vis. Comput.*, vol. 24,no. 1, pp. 1233–1243, Nov. 2006.
[4] D. Comaniciu and P.Meer, "Mean shift: A robust approach toward feature space analysis," *IEEE Trans. Pattern Anal. Mach. Intell.*, vol. 24, no. 5, pp. 603–619, May 2002.
[5] E. Johnsen and A. Tews, "Real-time object tracking and classification using a static camera," in *Proc. Workshop Pedestrian Detect. Track, IEEE Int. Conf. Robot. Autom.*, 2009.
[6] E.Dalal and B. Triggs, "Histograms of oriented gradients for human detection," in *Proc. IEEE Int. Conf. Comput. Vis. Pattern Recognit.*, 2005,
[7] N.Wang, K. Ma, G. Ng, andW. Grimson, "Trajectory analysis and semantic region modeling using nonparametric hierarchical bayesian models,"*Int. J. Comput. Vis.*, vol. 95, no. 3, pp. 287–312, Dec. 201.
[8] S.Gavrila and S. Munder, "Multi-cue pedestrian detection and tracking from a moving vehicle," *Int. J. Comput. Vis.*, vol. 73, no. 1, pp. 41–59, Jun. 2007.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 3, March 2015

BIOGRAPHY

Dr. Y Padma Sai, works as Lecturer in the Department of ECE in Deccan College of Engineering and Tech, Hyderabad and Later joined as an Assistant Professor in ECE at VNRVJIET in July 1999.Atpresent she is Professor and Head of the department of ECE .Her main objective is to impart quality education and learn New technologies and the scope is to fill gap between industry and academics.

V. Naveen Kumar is working as Project Engineer at Research and Consultancy Center (RCC) in VNR Vignana Jyothi College of Engineering & Technology, Hyderabad, Telangana. He Completed M. Tech in Embedded systems from VNRVJIET and B. Tech in Electronic & Communication Engineering from AZCET, JNTU Hyderabad. He has five years of research experience. His interests include Wireless sensor networks, Embedded Systems, RFID, Microprocessors & controllers, signal processing. He has two patents in wireless stream and five international papers.

N Mohan Krishna received the B.E degree in electronics and communication engineering from I.F.E.T College, affiliated Anna University, Villupuram, T.N, in 2012.He is pursuing the M.Tech in Embedded systems at VNR Vignana Jyothi Institute of Engineering & Technology, Bachupally, Hyderabad, Telangana. His research interests include Embedded Systems