Low cost driving assistant system

Submitted By

DARSHIL SHAH (15BIC048)

IC ENGINEERING DEPARTMENT

INSTITUTE OF TECHNOLOGY

NIRMA UNIVERSITY

AHMEDABAD-382481

APRIL - 2018

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Idea Lab Project

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DARSHIL SHAH (15BIC048)

Under the mentorship of

PROF. HARSH KAPADIA

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Declaration

We do hereby declare that the technical project report submitted is original, and is the outcome of the independent investigations/research carried out by us and contains no plagiarism. The research is leading to the discovery of new facts/techniques/correlation of scientific facts already known. This work has not been submitted to or supported by any other University or funding agency.

We do hereby further declare that the text, diagrams or any other material taken from other sources (including but not limited to books, journals and web) have been acknowledged, referred and cited to the best of our knowledge and understanding.

Date: 18/04/2018
Place: AHMEDABAD

Signature of Student1	Signature of Mentor1
15BIC048	Prof. Harsh Kapadia

NIRMA UNIVERSITY

INSTITUTE OF TECHNOLOGY

IDEA LAB

IC ENGINEERING DEPARTMENT

Annual/Final Report of the work done on the Idea Lab Project.

(Report to be submitted within 3 weeks after completion of the project)

1. Idea Lab Project ID: IDEA-2017-IC-05

2. Project Title: Low cost driving assistant system

3. Period of Project: 01/04/2017 to 27/04/2018

4. (a) Name of Student (Roll No.): Darshil Shah (15BIC048)

   Department: IC engineering department

   (b) Name of Mentor: Prof. Harsh Kapadia

5. Project Start Date: 01/04/2017

6. (a) Total Amount Approved: Rs. 16,000/- (b) Total Expenditure: Rs. 15,664/-

   (c) Report of the work done:

   i. Brief objective of the project:
   Major objective of the project was to detect the drowsiness of the driver along with object detection in low-light conditions.

   ii. Work done:

   In this project we have used USB camera to detect drowsiness of the driver.

   iii. Results achieved from the work:

We have successfully developed the algorithms do detect the drowsiness of the diver using an USB camera. We have also got prominent result when we tested the algorithm while driving the car.

iv. Has all the objectives been achieved as per plan. If not, state reasons.

No, object detection in low-light condition has not been successfully completed. One of the reason in availability of camera's without IR filters. And also it is difficult to manage two real-time video processing simultaneously.

v. Please indicate the technical difficulties, if any, experienced in implementing the project

We were using Banana Pi M3 as the main processor, which is an ARM based architecture and uses Ubuntu MATE OS. It was difficult to imply the same algorithms which were developed and were running successfully on the laptop, because repositories required were different.

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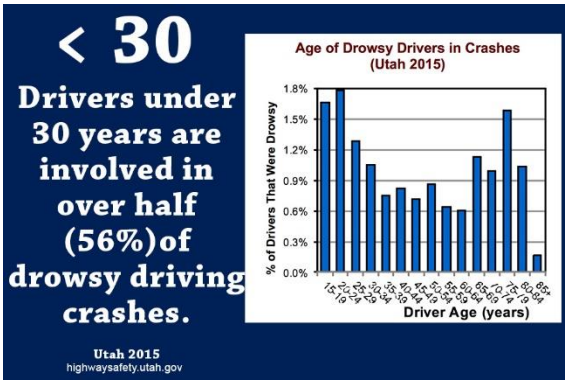
1.1 Introduction

Dizziness or drowsiness is one of the foremost reason of accident all over the world. Most of the accidents are caused due to drowsiness, which leads to death. To overcome this problem, this device would constantly monitor drowsiness of the driver i.e. whether driver is about to sleep or not. It can give an indicating alarm sound and steering vibration which in turn can prevent driver from falling asleep and further prevent any chances of accidents.

1.2 Literature Survey

Based on previous studies, researchers classified drivers as drowsy if their eyes were 80% closed or covering the pupil at least 12% of the time in the minutes before a crash. The National Highway Traffic Safety Administration estimates that drowsy driving was responsible for 72,000 crashes, 44,000 injuries, and 800 deaths in 2013. However, these numbers are underestimated and up to 6,000 fatal crashes each year may be caused by drowsy drivers.



Currently there is a device available which detects drowsiness but it is not real-time. When a driver sits in the car and starts driving, its driving behavior is analyzed for a long run. Then if there is a change in driving behavior the algorithms assumes the driver is feeling drowsy. This system is not real time. Which ultimately gave an idea of developing a real time system.

1.3 Major Objectives Proposed

1. The project is proposed to address the concern of drowsiness in automatic driver assistant system.
2. To determine the objects on the road in low light condition and display it on the screen.

1.4 Objectives Achieved

A stable system has been developed to detect the drowsiness of the driver. A camera has been used which acquires the real-time video and video processing has been done using OpenCV on python. Real-time video is acquired and it is extracted frame by frame. An algorithm is developed on Python using OpenCV which processes the frame by frame images. Facial detection technique is used to detection of the Face. On the detected face, Facial landmark technique is used to determine the eyes. After that eyes are monitored to see if driver is sleepy or not, and it gives alarm sound if driver is sleepy.

1.5 Objectives Not Achieved

Implementation of the system on embedded board. Object detection on road in low light condition has not been achieved yet.

1.6 Technical Difficulties Faced

Two cameras are used, one for drowsiness detection and second for road object detection, and both uses real-time video acquisition, which is difficult to process at a time. Drowsiness detection is completely working on a computer but there are various technical difficulty faced while implementing the same algorithm on embedded system such as Banana Pi M3.

1.7 Experimental Setup and Results

So we have used a laptop as the main controller and all the algorithms are developed on the same system. We have used a USB camera for drowsiness detection and speaker to generate the sound. We have obtained a very upright outcome. We have tested the system in the car as well.

1.8 Budget Analysis

1. Budget Sanctioned: Rs. 16,000/-
2. Budget Utilized: Rs. 15,664/-

Serial No.	Name of Product	Amount	Bill No.	Date	Consumable/ Nonconsumable	Dead Stock Number (if any)
1.	Banana Pi M3	5132.00	GR20170216	08/01/2018	Nonconsumable	N/A
2.	USB Camera	2124.00	VCA003	10/01/2018	Nonconsumable	N/A
3.	NoIR camera	2000.00	172213	10/02/2018	Nonconsumable	N/A
4.	Display screen	2900.00	172336	22/02/2018	Consumable	N/A
5.	uSD Card	750.00	737	26/01/2018	Nonconsumable	N/A
6.	Banana Pi M3 enclosure	388.00	GR20170246	24/01/2018	Consumable	N/A
7.	5V 2A SMPS	236.00	907	26/01/2018	Consumable	N/A
8.	Speakers	600.00	172357	24/02/2018	Consumable	N/A
9.	Li-Po battery	1534.00	94	26/02/2018	Nonconsumable	N/A

3. Budget Unutilized: Rs. 336/-

1.9 Conclusion and Future Work

This device is smart and efficient system to detect drowsiness. Still the project has scope of development. Deep learning algorithms can be applied to learn the facial landmark of each driver and drowsiness can be detected in much better way.

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