VISVESVARAYA TECHNOLOGICAL UNIVERSITY
BELGAUM-590018

A Final Year-Project Report

On

"Smart Helmet"

A Final Year-project report was submitted in partial fulfillment of the requirements for the award of the degree of ***Bachelor of Engineering in Computer Science and Engineering*** *of Visvesvaraya Technological University,Belgaum.*

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2021-2022

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

CERTIFICATE

This is to certify that the Final Year project work entitled "**SMART HELMET**" has been successfully carried out by **AMAN HARIS (1AM18CS013), AKSHAY KUMAR H S (1AM18CS016),** and **A R SREE HARISH (1AM18CS192), DEVRAJ R(1AM18CS049),** is the Bonafide students of **AMC Engineering College** in partial fulfillment of the requirements for the award of degree in **Bachelor of Engineering in Computer Science and Engineering of Visvesvaraya Technological University, Belgaum** during the academic year 2021-2022. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The Final Year project report has been approved as it satisfies the academic requirements in respect of project work for the said degree.

Guide:

Mr. Doddegowda,	**Dr. Anantha Padmanabha K,**	**Dr. Girisha ,**
Associate Prof, Dept. of CSE	**HOD, Dept. of CSE**	**Principal**
AMCEC	**AMCEC**	**AMCEC**

Examiners: **Signature with Date**

1. _____ _____

2. _____ _____

DECLARATION

We the undersigned students of the 7th semester Department of Computer Science & Engineering, AMC Engineering College, declare that our project work entitled “SMART HELMET” is a bonafide work of ours. Our project is neither a copy nor by means a modification of any other engineering project.

We also declare that this project was not entitled to submit to any other university in the past and shall remain the only submission made and will not be submitted by us to any other university in the future.

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We sincerely acknowledge the guidance and constant encouragement of our Final Year project guide**, Mr.Doddegowda, Associate Prof., Dept. Of Computer Science Engineering.**

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ABSTRACT

Seeing and being seen are the fundamental prerequisites for the safety of all road vehicles. The entitled project "**Smart Helmet**" is made keeping in mind this prerequisites to ensure the safety of motorbike riders during bad weather and lighting conditions. The System allows the user to identify the various objects on the road, which is usually hard during bad weather conditions and lighting conditions.

The motive is to make such a system to ensure the safety of motorbike riders and reduce the accidents that occur due to low visibility. There wouldn't be any need for any training, and the person who does not have much knowledge of using smart technology can also use our helmet just like using a regular simple helmet.

CONTENTS

INTRODUCTION

Poor roads, faulty helmets and lax license rules combine to make toll one of the worst in the world

As two-wheelers become more popular in the absence of public transport, the number of road accidents involving these is also growing. More than a third (37%) of those killed in road accidents in 2019 were two-wheeler riders, noted a Ministry of Road Transport and Highways' report

More crashes and deaths are resulting from faulty licensing laws, no training, poor roads and unsafe helmets. Just correct helmet use could reduce the risk of fatal injuries by 42% and head injuries by 69%, a World Health Organization report said.

India needs stricter licensing laws and must ensure use of proper helmets through effective communication and fines, experts told IndiaSpend.

While 37% road accident deaths (56,136)--or six every hour, on average--involved two-wheelers, pedestrians made up 17% and cyclists 3%. There were 449,002 road accidents leading to 151,113 deaths, making Indian roads the deadliest in the world, the report noted. India accounts for 11% of the global road accident fatalities.

1.1 AIM AND OBJECTIVES

To develop a **Smart Helmet** using the latest technology available in the market to improve visibility during bad weather and lighting conditions so that motorbike riders can ride safely, which can help reduce the accidents and death that happens due to low visibility.

“Our goal is to serve users by making their regular helmet smart using latest technology which can help reduce the accidents and death that occurs due to lack of visibility”.

1.2 EXISTING SYSTEM

There are no existing systems in the market which are capable of doing what we propose to do. A company called LiveMap is currently developing a similar product, but it's still under research phase and the estimated cost is around 18 lakhs. There are other companies which sell HUD helmets but none of them include the features to improve visibility.

We've chosen to build this project as this is an area where our project can significantly impact and revolutionize the entire helmet industry. Traditional helmets have just one feature that is to protect the rider's head after any external damage. While this is an important and necessary feature, we believe that when everything is becoming "Smart" using various latest technology, even a regular helmet which is the most essential protective gear for a rider, can be made "Smart".

1.3 PROBLEM STATEMENT

In India alone 6, 2 wheelers die every hour on the road . That is 37% of the total road accident deaths that occur. There are various reasons why these occur, but the one major reason is lack of visibility while driving.

1.4 PROPOSED SYSTEM/SOLUTION

"**Smart Helmet**" possesses some added positive features of the existing system and has overcome some of the drawbacks of the pre-existing regular helmets.

Here we would be using technologies like-
Object detection algorithm: YOLOR
Display Unit: HUD display
Camera: RGB and IR sensors

LITERATURE SURVEY

Literature References:

1. Color-to-Grayscale: Does the Method Matter in Image Recognition? by Christopher Kanan ,Garrison W. Cottrell

Abstract: In image recognition it is often assumed the method used to convert color images to grayscale has little impact on recognition performance. We compare thirteen different grayscale algorithms with four types of image descriptors and demonstrate that this assumption is wrong: not all color-to-grayscale algorithms work equally well, even when using descriptors that are robust to changes in illumination. These methods are tested using a modern descriptor-based image recognition framework, on face, object, and texture datasets, with relatively few training instances. We identify a simple method that generally works best for face and object recognition, and two that work well for recognizing textures.

2. Apparent Greyscale: A Simple and Fast Conversion to Perceptually Accurate Images and Video by Kaleigh Smith,Pierre-Edouard Landes,Joëlle Thollot,Karol Myszkowski

Abstract: This paper presents a quick and simple method for converting complex images and video to perceptually accurate greyscale versions. We use a two-step approach first to globally assign grey values and determine colour ordering, then second, to locally enhance the greyscale to reproduce the original contrast. Our global mapping is image independent and incorporates the Helmholtz-Kohlrausch colour appearance effect for predicting differences between isoluminant colours. Our multiscale local contrast enhancement reintroduces lost discontinuities only in regions that insufficiently represent original chromatic contrast. All operations are restricted so that they preserve the overall image appearance, lightness range and differences, colour ordering, and spatial details, resulting in perceptually accurate achromatic reproductions of the colour original.

3. Real-time object detection and tracking on a moving camera platform by Cheng-Ming Huang; Yi-Ru Chen; Li-Chen Fu

Abstract: This paper presents a real-time tracking system to detect and track multiple moving objects on a controlled pan-tilt camera platform. In order to describe the relationship between the targets and camera in this tracking system, the input/output hidden Markov model (HMM) is applied here in the well-defined spherical camera coordinate. Since the detection and tracking for different targets are performed at the same time on a moving camera platform, the detection

and tracking processes must be fast and effective. A hybrid detection algorithm which combines the target's color and optical flow information is proposed here. A two layer tracking architecture is then utilized for tracking the detected target. The bottom level utilizes the Kanade-Lucas-Tomasi (KLT) feature point tracker which identifies the local point correspondence across image frames. The particle filter at top level, which maintains the relation between target and feature points, estimates the tracked target state. The overall performance has been validated in the experiments.

4. You Only Learn One Representation: Unified Network for Multiple Tasks by Chien-Yao Wang, I-Hau Yeh, Hong-Yuan Mark Liao

Abstract: People "understand" the world via vision, hearing, tactile, and also the past experience. Human experience can be learned through normal learning (we call it explicit knowledge), or subconsciously (we call it implicit knowledge).
These experiences learned through normal learning or subconsciously will be encoded and stored in the brain. Using these abundant experience as a huge database, human beings can effectively process data, even they were unseen beforehand. In this paper, we propose a unified network to encode implicit knowledge and explicit knowledge together, just like the human brain can learn knowledge from normal learning as well as subconsciousness learning. The unified network can generate a unified representation to simultaneously serve various tasks. We can perform kernel space alignment, prediction refinement, and multi-task learning in a convolutional neural network. The results demonstrate that when implicit knowledge is introduced into the neural network, it benefits the performance of all tasks. We further analyze the implicit representation learnt from the proposed unified network, and it shows great capability on catching the physical meaning of different tasks.

SYSTEM REQUIREMENT SPECIFICATIONS

3.1 HARDWARE REQUIREMENTS

Raspberry PI
Camera(RGB, IR)
Helmet
HUD display

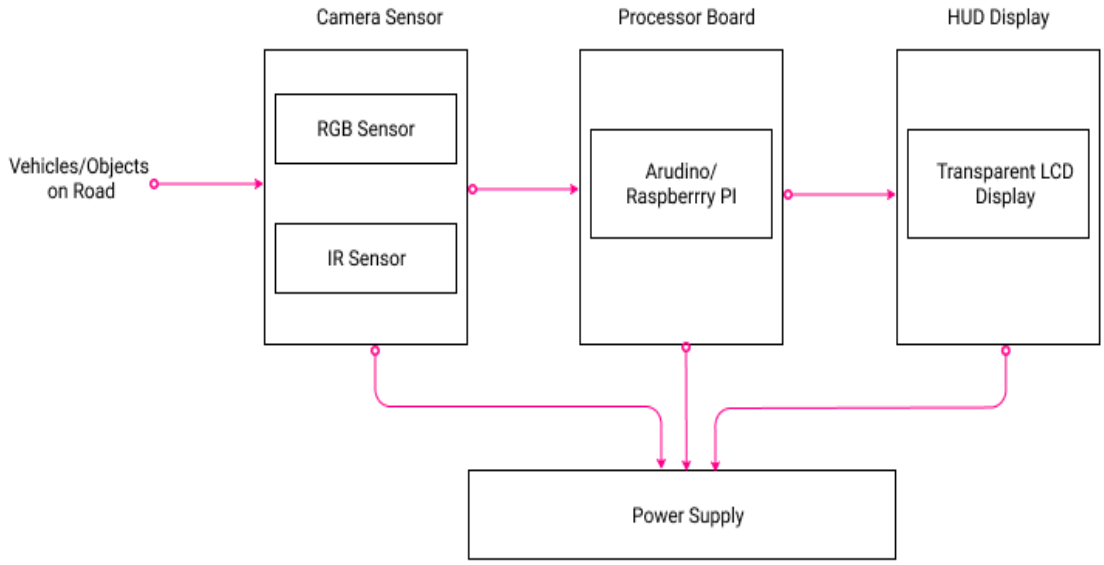
3.2 SOFTWARE REQUIREMENTS

Operating System: Cross-Platform, 64-bits
Coding Platform: Anaconda
Language: Python
Algorithm: OpenCV, YOLOR, Deep Sort

SYSTEM DESIGN AND ARCHITECTURE

4.1 DESIGN

4.1.1 ARCHITECTURE DESIGN



Capture the traffic using RGB and IR camera sensors.
Convert RGB camera feed to grayscale format and merge it with the IR camera feed to get a single output.
Input this data to the YOLOR object detection algorithm for vehicle/obstacle/object detection on the road. Output the detected object as symbols on the transparent screen for the user to understand what is on the road during bad weather conditions.

CONCLUSION

We would like to conclude by saying that ours is a unique and innovative method.
Combining various latest technologies to create a useful safety product, with the successful implementation of this project, we are sure that it'll help reduce most of the accidents that occurs due to weather conditions.

REFERENCES

[1] Color-to-Grayscale: Does the Method Matter in Image Recognition? by Christopher Kanan ,Garrison W. Cottrell

[2] Apparent Greyscale: A Simple and Fast Conversion to Perceptually Accurate Images and Video by Kaleigh Smith,Pierre-Edouard Landes,Joëlle Thollot,Karol Myszkowski

[3] Real-time object detection and tracking on a moving camera platform by Cheng-Ming Huang; Yi-Ru Chen; Li-Chen Fu

[4] You Only Learn One Representation: Unified Network for Multiple Tasks by Chien-Yao Wang, I-Hau Yeh, Hong-Yuan Mark Liao

[5] Real – Time Object detection tracking by Hammad naeem, Jawad ahmad and Muhammad tayyab, HITEC University Taxila cantta, Pakistan.

[6] Youtube Videos

[7] Wikipedia