International Journal For Advanced Research In Science & Technology
A peer reviewed international journal
www.ijarst.in
ISSN: 2457-0362

# Smart Detection of Helmet Using IoT and Image Processing

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**Abstract**
This Project "SMART DETECTION OF HELMET USING IOT AND IMAGE PROCESSING" Nowadays, in road accidents the death rate is increasing day by day because the riders are not using the helmet so most of the countries are enforcing their citizen to wear helmets while riding the bike, but still rules are being violated. The annual average road accident is estimated to be about 7,00,000 of which 10% occur in India. The annual statistics revealed by the World Health Organization (WHO) in its Global status report on road safety says that around 80,000 people are killed on Indian roads due to rush driving and less usage of helmets. To overcome this problem, helmet is mandatory for all the riders so that the death rate will be decreased. By implementing this project, we are using some IOT microcontroller and image processing algorithms to detect whether the helmet is present or not in the human head. Based on the output of these algorithms, the IoT microcontroller is used to start or stop the bike. In Existing System, in existing model only IOT sensors are used to implement the system so that only particular helmet is used by the rider. Some people are scared to wear helmet because it consists of sensors and batteries in helmet. In Proposed System we use camera and IOT microcontroller to implement the system. The live video of the rider head is captured by the camera throughout the ride. Yolov5 algorithm is used for helmet detection from the live video. Based on the output of yolo v5 algorithm, raspberry pi 4 model b is used to stop/permission to start/continue on start mode of the bike.

## Introduction

This Project "SMART DETECTION OF HELMET USING IOT AND IMAGE PROCESSING". Every year, road accidents is one of the major problems all over the world. The annual average road accident is estimated to be about 7,00,000 of which 10% occur in India. The annual statistics revealed by the World Health Organization (WHO) in its Global status report on road safety says that around 80,000 people are killed on Indian roads due to rush driving and less usage of helmets. The thought of developing this project comes from social responsibility towards the society. As we can see many accidents occurring around us, there is a lot of loss of life. According to a survey, around "750" people die in road accidents occurring due to bike crashes per year. The reasons for the accidents may be many such as no proper driving knowledge, damaged bikes, rash driving etc. But the major reason was found to be the absence of helmet.

**Existing System** In the previous studies, there they have primarily concentrated on IOT sensors to detect whether the person wear helmet or not. With the help of eye-blink sensor, driving without helmet can be avoided. The microcontroller is used to start or stop the bike based on the output of the eye-blink sensor.

Problems in the Existing System ¬ Only particular helmet is used by the user. ¬

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Some people are scared to wear helmet because it consists of sensors. ¬ Batteries are used in helmet to work eye-blink sensor, it may harm to human. Smart detection of helmet using IOT and Image processing.

PROPOSED SYSTEM In Proposed System we use camera and IOT microcontroller to implement the system. The live video of the rider head is captured by the camera throughout the ride. Yolov5 algorithm is used for helmet detection from the live video. Based on the output of yolo v5 algorithm, raspberry pi 4 model b is used to stop/permission to start/continue on start mode of the bike.

Advantages in the Proposed System

- Any helmet is used by the user.
- Cost effective

We don't use any sensors in the helmets, so there is no effect for user.

**Review of Literature**

Helmet Detection Using IOT and ML

[1] M. V. D. Prasad, S.V.N. P VAMSI KRISHNA, M. SANTOSH KUMAR, P. Sri HARSHA: This paper is about detecting motorbike riders without a helmet with the assistance of machine learning and IoT. Motorcycle accidents are increasing day by day in many countries. The helmet is that the primary safety equipment of Bike riders, however many drivers don't use it. The primary objective of a helmet is to protect the driver's or pillion rider head just in case of an accident or fall from bike.

Development of Smart Helmet based on IoT Technology

[2] C. Lekha1 Divyanshu Bhardwaj Ravi Ranjan Kumar Sanjeev Kumar Yadav: This paper explains the working of the GPS and GSM MODULE to locate the position andwill get message if met an accident. This safety system technology can further be enhanced into four wheelers also by replacing the helmet with seat belt. It can be tracked easily and less power consuming safety system. It can be used real time safety system.

Helmet Detection using Machine Learning and Automatic License Plate Recognition

[3] Lokesh Allamki, Manjunath Panchakshari, Ashish Sateesha, KS Pratheek: This paper says that the YOLOv3 model to detect whether the person is wearing helmet or not. the annotated images are given as input to

YOLOv3 model to train for the custom classes. The weights generated after training are used to load the model. Once this is done, an image is given as input. The model detects all the five classes trained. From this we obtain the information regarding person riding motorbike. If the person is not wearing a helmet, then we can easily extract the other class information of the rider. This can be used to extract the license plate.

Design and Implementation of IOT Based Smart Helmet for Road Accident Detection

[4] Mohammad Ehsanul Alim, Sarosh Ahmad: This Paper included two different microcontrollers which are used in this project. Each unit has used a separate microcontroller, for bike unit we use Arduino Mega-2560 and for helmet unit we use Arduino Nano. The smart helmet will have sharp IR sensor which will be used to detect if the rider

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has worn the helmet or not.
Design and Implementation of Intelligent Helmet to Prevent Bike Accident in India

[5] Amitava Das, Soumitra Goswami: The helmet that has been described in this paper is based on only one single idea which is to make it somehow mandatory for the rider to wear it while riding a motorbike. This helmet in practice acts as a second key to the vehicle and in turn increases security. Moreover, as the rider can neither starts nor run the vehicle without wearing the helmet it ensures that rider has to wear the helmet at all times while riding the vehicle. For this they use wireless switching, helmet, digital relay, 28 transmitters, receiver, GPS.
Smart helmet for safe driving

[6] Keesari Shravya, Yamini Mandapati: This Paper included the first step is to identify whether the helmet is worn or not. If helmet is worn then ignition will start otherwise it remains off. For this, Force Sensing Sensor (FSR) sensor is used. The second step is alcohol detection. Alcohol sensor is used as breath analyzer which detects the presence of alcohol in rider's breath and if it exceeds permissible limit ignition cannot start.It will send message to the number saying that "Rider is drunk and

is trying to ride the bike". MQ-3 sensor is used for this purpose. When these twoconditions are satisfied then only ignition starts. The third main issue is accident and late medical help. If the rider has met with an accident, he may not receive medical help instantly, whichis one of the main reasons for death. Every second people die due to delay in medical help,or in the case where the place of accident is unmanned. In fall detection, we place accelerometer in the bike unit. By this mechanism accidents can be detected.

**MODULES**

**Module Description**

1. Camera
2. Object Detection
3. Micro Controller

Camera

Camera is fixed to the bike and it capture the live video of the rider throughout the ride.

**Object Detection**

YOLO is an abbreviation for the term 'You Only Look Once'. This is an algorithm that detects and recognizes various objects in a picture (in real-time). Object detection in YOLO is done as a regression problem and provides the class probabilities of the detectedimages. The YOLO algorithm consists of various variants. Some of the commonones include tiny YOLO and YOLOv5.

Yolo v5(Image Processing Algorithm) is a real time object detection andclassificationalgorithm used to detect the helmet for the rider from the live video. CV2 module is used to capture live video and divide it into frames based on that YOLOV5 is used to detect thehelmet.

**Micro Controller**

Raspberry Pi is a small single board computer. By connecting peripherals like Keyboard, mouse, display to the Raspberry Pi, it will act as a mini personal computer. Raspberry Pi is popularly used for real time Image/Video Processing, IoT based applications and Robotics applications. Raspberry Pi is slower than laptop or desktop but is still

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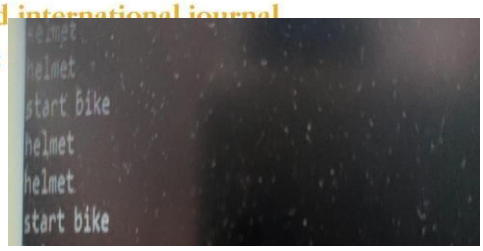
a computer which can provide all the expected features or abilities, at a low power consumption.

Raspberry Pi Foundation officially provides Debian based Raspbian OS. Also, theyprovide NOOBS OS for Raspberry Pi. We can install several Third-Party versions ofOS like Ubuntu, Arch Linux, RISC OS, Windows 10 IOT Core, etc.

Raspbian OS is official Operating System available for free to use. This OS is efficiently optimized to use with Raspberry Pi. Raspbian have GUI which includes tools for Browsing, Python programming, office, games, etc. We should use SD card (minimum8 GB recommended) to store the OS (operating System). Raspberry Pi is more than computer as it provides access to the on-chip hardware i.e. GPIOs for developing an application. By accessing GPIO, we can connect devices like LED, motors, sensors, etc. and can control them too.
Raspberry pi is a powerful palm size micro-Controller integrated with RASPIAN OS; it is used in the project to stop/permission to start/continue on start mode of the bike based on the output of YOLOV5 algorithm.

**Results and Discussion**
**Helmet Detection output**


Non-Helmet Detection




**Conclusion**


By implementing this system, a safe two-wheeler journey is possible which would decrease the head injuries during accidents and also reduce the accident rate due to driving bike by wearing helmet. The proposed approach makes it mandatory for the rider to use the protective guard(helmet) in order to drive a two-wheeler vehicle and ensuresthe safety to the human brain and there for reduces the risks of brain injuries and death in case of an accident.

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