

# Detection of motorcyclists without helmet



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## Introduction

Motorcycles are the most hazardous form of motor vehicle transportation. They do not provide the structural protection that a car does. When crashes occur, motorcyclists need adequate head protection to prevent one of the leading causes of death and disability — head injuries.

## Business Requirement

India has one of the highest rates of motorcycle injuries. Laws requiring all motorcyclists to wear helmets are the only strategy proved to be effective in reducing motorcyclist fatalities. Human surveillance to make sure that the law is followed proves ineffective. Pearl aims to automate this process to eliminate human intervention.

# FATAL ERRORS

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■ Killed ■ Greviously Injured

Not wearing helmet



*2017 Data*

## Current System

At present we are manually finding bike-riders without helmet in order to penalise them. In general, such systems are infeasible due to involvement of humans, whose efficiency decreases over long duration. Automation of this process is highly desirable for reliable and robust monitoring of these violations as well as it also significantly reduces the amount of human resources needed. Also, many countries are adopting systems involving surveillance cameras at public places.

## Proposed System

The AI system is to be used for real-time detection of motorcyclists without helmet and to penalise them.

It works in three phases:

- First phase: Identify the motorcyclists without helmet.
- Second phase: Extract the number plate of the bikes whose riders do not have a helmet
- Third phase: Enter the details such as time, vehicle registration number and the captured image (as an evidence) in the database.

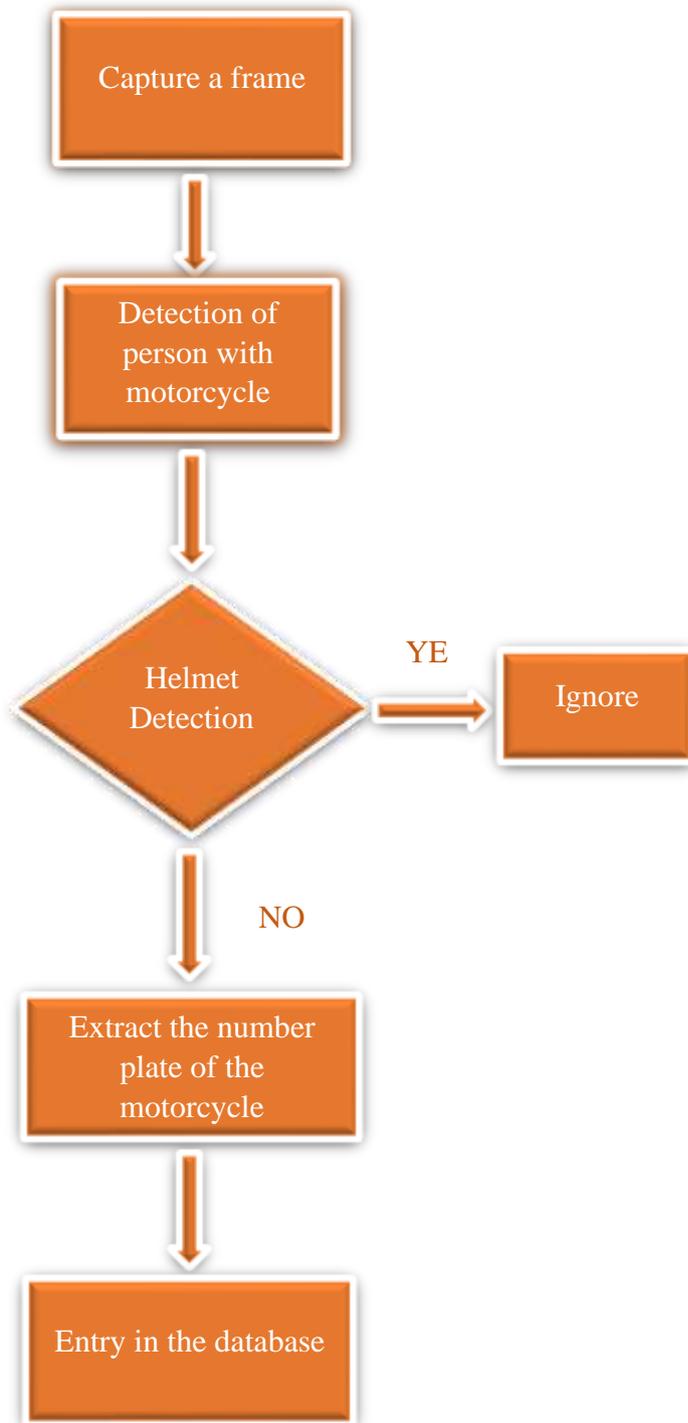
This system helps the concerned authorities detect traffic rule violators who ride motorcycles without wearing a helmet.



Pearl aims to help the concerned authorities identify motorcyclists without helmet. A video camera installed on the road provides input to the system. The helmet detection system does the following:

- ✓ Frame extraction: Each frame is extracted from the video and all the motorcycles and motorcyclists in a particular frame are identified and extracted. This is done by customising a **pre-trained model for object detection**.
- ✓ Helmet detection: It is performed for each motorcyclist using a **deep learning model** which has been trained on a large dataset.
- ✓ Number plate recognition: If the helmet is not detected on a motorcyclist, the corresponding motorcycle is identified and its number plate along with the time and the captured image is noted so that he can be penalised with proof. **Python-tesseract** which is an OCR tool for python is used to read the number plate.

The live video input continuously goes through the following steps:



## **Technologies Used**

Use of the following open source and free technologies make the software relatively less expensive

- Python
- AI and Deep learning
- TensorFlow
- OpenCV
- Tesseract

## **Risks and Challenges**

- Real-time implementation
- Changes in weather and lighting conditions
- Occlusion
- Quality of video feed

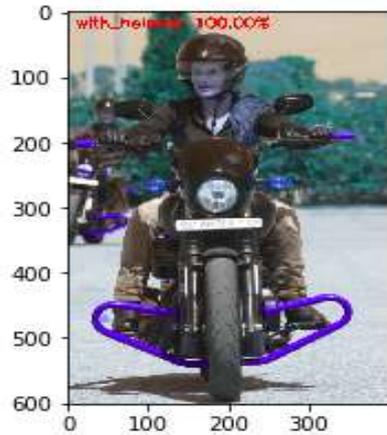
## **Results/ Output**

The two main accomplishments of the helmet detection system are:

- Law enforcement
- Social awareness and impact

It also gives an idea of the number of traffic offenders in an area.

A database of all the motorcycle riders driving without wearing a helmet is generated and the traffic rule violators are fined automatically without much human interference. This way Pearl helps the authorities and the public in reducing motorcycle fatalities.



## **Conclusion**

Hence the development of a system using image processing and deep convolutional neural networks (CNNs) for finding motorcyclists who are violating helmet laws.

## **Future Enhancements**

The development of this model prompts the investigation of new areas of automation of traffic monitoring. The more accurate feature design and more robust detection method explore will be executed in future. Smart bike can also be proposed which in turn fails to start without wearing helmet. We can extend this system to find out the number of traffic offenders in an area.