# Thesis Progress/Update Report

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**Tentative Titles:**

Title 1: Traffic Rules Violation Detection using YOLOv5 and OpenCV.

Title 2: Traffic Rules Violation Detection System using YOLOv5 and OpenCV approach.

Title 3: A novel approach to detect Traffic Rules Violation using YOLOv5 and OpenCV.
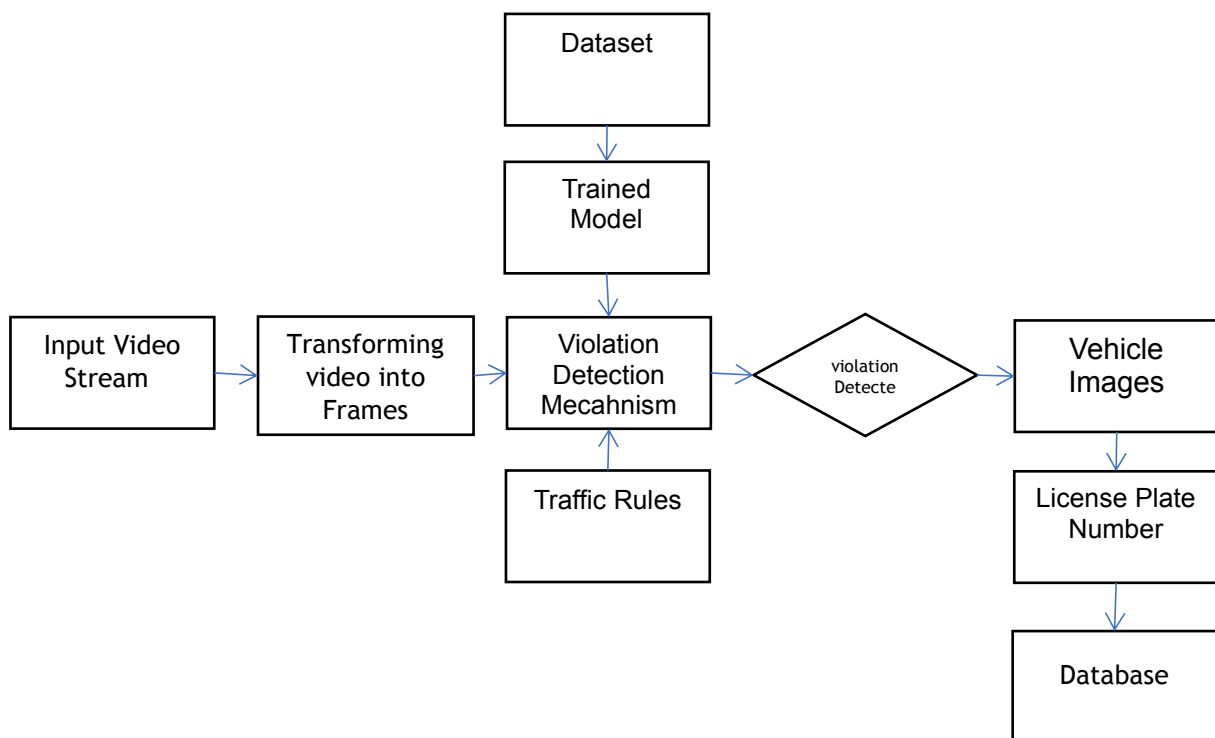
**A. Proposed Methodology with Graphical Representation:**



Fig1: Methodology for Traffic Rules Violation Detection

**Novelty or Significant Points of The Proposed Model:**

1) Frame extrations from video stream

2) Detecting non permitted vehicles

3) Speed limit violation

4) Crosswalk violation

5) Helmet Detection

6) Lane Jump detection

7) Missing car detection

**C. List of related Good Quality Articles in Solving the Same or Similar Problem with different methods.**

| Sl. | Ref. and Year [Inverse] | Article Title | Method Name | Name of the Journal | Volume, Issue and Page |
|---|---|---|---|---|---|
| 1 | Tonge et al. 2020[1] | Traffic Rules Violation Detection using Deep Learning | | IEEE | |
| 2 | Franklin et al. 2020[2] | Traffic Signal Violation Detection using Artificial Intelligence and Deep Learning | | IEEE | |
| 3 | Zhaoyang et al. 2020[3] | A motion based object detection method | | IEEE | |
| 4 | Hou et al. 2020[4] | Video road vehicle detection and tracking based on OpenCV | | IEEE | |
| 5 | Kulkarni et al. 2020[5] | Real Time Vehicle Detection, Tracking and Counting Using Raspberry-Pi | | IEEE | |
| 6 | Yanyong Guo et al. 2016[6] | Automated analysis of pedestrian walking behaviour at a signalised intersection in China | | IET | |
| 7 | Zehang Sun et al. 2006[7] | On-Road Vehicle Detection: A Review | | IEEE | |
| 8 | Jitendra Sharma et al. 2014[8] | A Hybrid Technique for License Plate Recognition Based on Feature Selection of Wavelet Transform and Artificial Neural Network | | IEEE | |
| 9 | Koneti Sandeep et al. [2017] | Novel drunken driving detection and prevention models using Internet of things | | IEEE | |
| 10 | Suparna Sahabiswas et al. [2016] | Drunken driving detection and prevention models using Internet of things | | IEEE | |

**D. List and Notes of Articles Closely Related to Our Method**

| Sl. | Ref. and Year | Article Title | Method Name | Name of the Journal | Volume, Issue and Page |
|---|---|---|---|---|---|
| R1 | Tonge et al. 2020[1] | Traffic Rules Violation Detection using Deep Learning | | IEEE | |
| R2 | Franklin et al. 2020[2] | Traffic Signal Violation Detection using Artificial Intelligence and Deep Learning | | IEEE | |
| R3 | Yanyong Guo et al. 2016[6] | Automated analysis of pedestrian walking behaviour at a signalised intersection in China | | IET | |
| R4 | Jitendra Sharma et al. 2014[8] | A Hybrid Technique for License Plate Recognition Based on Feature Selection of Wavelet Transform and Artificial Neural Network | | IEEE | |

**Identification of difference or significance of our method comparing with individual ones:**

Comparison and Construct with respect to R1:

In this paper, the two types of violation detection method is done. And the process of the whole method is to

* Detect vehicle

* Helmet classification

* Crosswalk violation

* License plate recognition

The differences between our model with this paper's approach are that :

l.   On the paper, they used the YOLO model with pretrained weights. But where we trained our model with YOLOv5 architecture which is an updated version of YOLO, with

Bangladeshi vehicle images. For this reason, the recognition of vehicles is much better than the pre-trained weights.

II. For license plate recognition in this paper, the model used is based on a YOLO-based trained model to detect license plates and then use OCR to detect letters from the license plate image. But we are using an OpenCV approach for detecting license plates by finding contours in the images. Our approach could be better than the trained model approach. We are currently working on a training model with license plate images to find out.

III. This paper only proposed detecting two types of violations. Our proposed model will work on detecting 5 types of traffic rule violations.

IV. We are planning to work on both helmet classification and crosswalk violation with a different approach using OpenCV.

V. Dataset used for testing is around 1000 images. We are planned to perform testing of more than 1000 images to find out a better evaluation of our method.

Comparison and Construct with respect to R2:

In this paper, a method of speed violation detection and lane jump detection is shown. The model used in this paper is YOLOv3.

We are planned to implement the same features using the OpenCV approach by using a motion detection technique. Because of this approach, our model will be able to detect violation of the speed limit and lane jump in various vehicle classes.

Comparison and construct with respect to R3:

A method microscopic-level analysis such as Gait parameters analysis is shown in this paper which allows the estimation of walking mechanism parameters such as step frequency and length for different pedestrian groups. By analysing the walking speed and step frequency the system can predict if the pedestrian is violation the crosswalk rules.

We have planned to use this methodolgy to detect crosswalk violation with the aid of OpenCV.

Comparison and construct with respect to R4:

In this paper, a method was shown to detect licence plate number of vehicles using RBNN and Wavelet Transform. The main idea of this paper is to binarize the image with low frequency using Wavelet transform and exctract the character and recognize the license plate number with the help of RBNN.

In our work, the license plate number detection is yet to be done. We are working on it and planned to use some OpenCV approach with the idea of the referenced paper.

**References:**

[1]     Aniruddha Tonge, Shashank Chandak, Renuka Khiste, Usman Khan, "Traffic Rules Violation Detection using Deep Learning", IEEE Xplore, doi:10.1109/ICECA49313.2020.9297495

[2]     Ruben J Franklin, Mohana, "Traffic Signal Violation Detection using Artificial Intelligence and Deep Learning", IEEE Xplore, doi:10.1109/ICCES48766.2020.9137873

[3]     Chen Zhaoyang, Gao Haolin, Wang Kun, "A motion based object detection method", IEEE Xplore, doi:10.1109/ITCA52113.2020.00067

[4]     Wei Hou, Dongsheng Xia, Hoekyung Jung, "Video road vehicle detection and tracking based on OpenCV", IEEE Xplore, doi: 10.1109/ICISE51755.2020.00076

[5]     Apeksha P Kulkarni, Vishwanath P Baligar, "Real Time Vehicle Detection, Tracking and Counting Using Raspberry-Pi", IEEE Xplore, doi: 10.1109/ICIMIA48430.2020.9074944

[6]     Yanyong Guo, Tarek Sayed, Mohamed H. Zaki,  "Automated analysis of pedestrian walking behaviour at a signalised intersection in China", IEEE Xplore, doi: 10.1049/iet-its.2016.0090 www.ietdl.org

[7]     Zehang Sun, George Bebis, Ronal Miller,  "On-Road Vehicle Detection: A Review", IEEE Xplore, doi: 10.1109/ICIMIA48430.2020.9074944

[8]     Jitendra Sharma, Amit Mishra, Khushboo Saxena, Shiv Kumar,  "A Hybrid Technique for License Plate  Recognition Based on Feature Selection of  Wavelet Transform and Artificial Neural Network", IEEE Xplore, doi: 10.1109/ICROIT.2014.6798352

[9]     Koneti Sandeep, Poonam Ravikumar, Sura Ranjith,  "Novel drunken driving detection and prevention  models using Internet of things", IEEE Xplore, doi: https://dx.doi.org/10.1109/ICRTEECT.2017.38

[10]     Suparna Sabiswas, Saurav Saha,  "Drunken driving detection and prevention models  using Internet of things", IEEE Xplore, doi: 10.1109/IEMCON.2016.7746364