iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** IV **Month of publication:** April 2023

DOI: https://doi.org/10.22214/ijraset.2023.50285

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue IV Apr 2023- Available at www.ijraset.com

Fastag Fraud Detection: A Literature Survey

Vipul Bhavar[1], Vishakha Borkar[2], Tanvi Hirave[3], Harsh Vishwanathan[4], Ranjita Asati[5]
[1, 2, 3, 4]*Students,* [5]*Assistant professor At Atharva College of Engineering, Mumbai*

Abstract: ***National Payments Corporation of India (NPCI) has developed the National Electronic Toll Collection (NETC) program to meet the electronic tolling requirements of the Indian market. The use of FASTag is prevalent in modern society. However, it is clear that the number of FASTag frauds in the global integration and existing protection system is constantly increasing. This is why the issue of FASTag fraud detection is very important. Various FASTag frauds occur and there is no means to detect or prevent them. Among the many frauds, we will try to reduce the fraud where drivers of heavy vehicles issue and use FASTags that are intended for light vehicles. In this way, drivers of heavy vehicles are exempted from paying the higher tolls that are set for heavy vehicles. FASTag fraud detection is used to solve this problem. The system will be able to identify the type of vehicle and the FASTag amount paid. Using this system, FASTag fraud detects if any anomaly has occurred and alerts the system accordingly.***

Index Terms: FASTag, RFID, NPCI, NETC.

I. INTRODUCTION

Fastag fraud detection is a technique by which we can detect the vehicles type by using object detection and the FASTag applied on it by using Deep Learning Algorithms. This technique helps the government to get proper toll without any loss and makes effective FASTag system.

In our work we found that the term FASTag is misused by many heavy vehicle drivers in India by interchanging the lightweight FASTag to the heavy vehicle and the less toll has been paid by the fraudster.

FASTag is a device that employs Radio Frequency Identification (RFID) technology for making toll payments directly while the vehicle is in motion. FASTag (RFID Tag) is affixed on the windscreen of the vehicle and enables a customer to make the toll payments directly from the account which is linked to FASTag. FASTag offers the convenience of cashless payment along with benefits like - savings on fuel and time as the customer does not has to stop at the toll plaza. But this facility is misused by few drivers by sticking lightweight vehicles stickers which has less toll fee. Thus, in this project we are addressing this issue.

II. LITERATURE REVIEW

1) *Toll collection system using image processing.2021-22, Malvik Patel, Bharavi Joshi, Kajal Bhagat and Hetakshi Desai*

The conventional toll collection system is time consuming, results in traffic jams and is inefficient. This paper provides solution to this problem by automating the process of toll collection.

The system provides fast toll collection and automatically controls the vehicle movements at toll plaza through Image Processing. There are RFID and FASTag which requires a smart device or smart tag to be attached with the car. Here we propose such a system, so that neither anything needs to be installed at toll plaza nor anything needs to be attached with car, as the processing can be done from the video received through CCTV installed at toll plaza. In this system we eliminate waiting time at toll plazas and make the entire process automated.

2) *"Effectiveness of Mandating the FASTag in National Highways & Cross Border Toll Collection Centres", Researchgate July 2021, Shantanu Paul; Guru Aradhya; Shreya Anand; K.s.Lakshmi*

This paper highlights the effectiveness of mandating FASTag in National Highway and Cross Border Toll Collection Centres and brings out the actual scenario of how people are facing the new technology and how the people serving this service is going through the chores of their work. A slit change in the collection of toll tax through the RFID system on the toll plaza has given a very good response to the FASTag service. This paper will take you to the working process of radiofrequency in FASTag, the use of Sun Pass and Eazee Pass, and its advantages and disadvantages. FASTag service has become so mandatory that people are knee to adapt it and experience the new advanced technology. The prior good thing that a person can observe is the change in pollution control. This has almost changed the working of a long process of toll collection and it has become very much easier for the public as well as for staff. As you will read the whole paper you will get to know more about FASTag.

©IJRASET: All Rights are Reserved

3) Vehicle Detection Using Image Processing.2020, S. S. Kalyan, V. Pratyusha, N. Nishitha and T. K. Ramesh.

This paper highlights the effectiveness of mandating FASTag in National Highway and Cross Border Toll Collection Centres and brings out the actual scenario of how people are facing the new technology and how the people serving this service is going through the chores of their work. A slit change in the collection of toll tax through the RFID system on the toll plaza has given a very good response to the FASTag service. This paper will take you to the working process of radiofrequency in FASTag, the use of Sun Pass and Eazee Pass, and its advantages and disadvantages. FASTag service has become so mandatory that people are knee to adapt it and experience the new advanced technology. The prior good thing that a person can observe is the change in pollution control. This has almost changed the working of a long process of toll collection and it has become very much easier for the public as well as for staff. As you will read the whole paper you will get to know more about FASTag.

4) "Effectiveness of FASTag System for Toll Payment in India" IEEE Sept 2021, Chintaman Bari; Akash Kumawat; Ashish Dhamaniya

This paper describes Introduction of electronic toll collection (ETC) system, commonly called FASTag in India, aims to decrease service time, delay, and vehicular emissions. The present study attempted to evaluate the success of FASTag over manual toll collection (MTC) under mixed lane traffic while considering service time as a measure of effectiveness. The results showed that the service time for FASTag lane varies from 0.12 second (s) to 13.12 s while for MTC lane 2.36 s to 45.36 s. It is also observed that there is significant difference in service time with vehicle class in case of MTC and FASTag lane.

Service time is minimum for a small car (SC) and maximum for the trailer when the vehicle passes through MTC lane. Further, the study revealed that with the use of FASTag lane, the average service time decreases by 77 percent. This ultimately reveals that a reduction in service time increases the throughput. The average increase in capacity is observed as about by 318 percent due to FASTag implementation.

Further, the service time-based tollbooth equivalency factors (STEF) are developed in the present study for the conversion of the different vehicle class into a standard vehicle, i.e., standard car. The STEF value ranges between 0.89 and 1.43 for the MTC lane and from 0.78 to 1.06 for the FASTag lane. Thus, the present study output will be used to check the capacity, level-of-service and pollution level at toll plazas due to implementation of FASTag system.

*5) **"**Image Processing Based Vehicle Detection and Tracking: A Comparative Study", V and S. P. Kulkarni*

With increasing economic development and urban population, the number of vehicles on the roads and thus the traffic also increases. There is a need to reduce road congestion caused by car traffic.

Among the many vehicle detection and tracking techniques, this paper deals with image processing based methods simulated using MATLAB Simulink. Few such methods are Background Subtraction with Gaussian and Kalman Filter, Blob Analysis, Horn-Schunck, Particle Filter and Monte Carlo method. Background subtraction is the most well-known nowadays, followed by morphological operations. It depends on certain parameters like accuracy, processing time, segmentation and complexity. Various traffic parameters such as car speed, number and its tracking are calculated using its threshold values in some detection methods. The proposed work is performed in real time using challenging examples. The stated results shed light on the sensuality of the proposed study.

6) "Deep Learning Based Object Detection and Recognition of Unmanned Aerial Vehicles" IEEE, Erdem Bayhan, Zehra Ozkan, Mustafa Namdar, Arif Basgumus

In this study, the methods of deep learning-based detection and recognition of the threats, evaluated in terms of military and defense industry, by unmanned aerial vehicles (UAV) are presented. In the proposed approach, firstly, the training for machine learning on the objects is carried out using convolutional neural networks, which is one of the deep learning algorithms. By choosing the Faster-RCNN and YoloV4 architectures of the deep learning method, it is aimed to compare the achievements of the accuracy in the training process.

In order to be used in the training and testing stages of the recommended methods, data sets containing images selected from different weather, land conditions and different time periods of the day are determined. The model for the detection and recognition of the threatening elements is trained, using 2595 images.

The method of detecting and recognizing the objects is tested with military operation images and records taken by the UAVs. While an accuracy rate of 93% has been achieved in the Faster-RCNN architecture in object detection and recognition, this rate has been observed as 88% in the YoloV4 architecture.

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |

7) *"A Research on Machine Learning Methods and Its Applications" Researchgate September 2018 Journal of Educational Technology and Online Learning , Özer Çelik*

In this study , this research includes the history of machine learning and its application field and also transmit deep knowledge on machine learning and tells us that science will be improve more in future.

Machine learning is a science which was found and developed as a subfield of artificial intelligence in the 1950s. The first steps of machine learning goes back to the 1950s but there were no significant researches and developments on this science. However, in the 1990s, the researches on this field restarted, developed and have reached to this day. It is a science that will improve more in the future. The reason behind this development is the difficulty of analysing and processing the rapidly increasing data. Machine learning is based on the principle of finding the best model for the new data among the previous data thanks to this increasing data. Therefore, machine learning researches will go on in parallel with the increasing data. This research includes the history of machine learning, the methods used in machine learning, its application fields, and the researches on this field. The aim of this study is to transmit the knowledge on machine learning, which has become very popular nowadays, and its applications to the researchers.

8) *"Object Detection through Modified YOLO Neural Network" International Journal of Engineering Research & Technology (IJERT), vol. 2, pp. 2278–0181, 2013., Tanvir Ahmad, Yinglong ma, Muhammad Yahya, Belal Ahmad*

In this paper, a modified YOLOv1 based neural network is proposed for object detection. e new neural network model has been improved in the following ways. Firstly, modification is made to the loss function of the YOLOv1 network. e improved model replaces the margin style with proportion style. Compared to the old loss function, the new is more flexible and more reasonable in optimizing the network error. Secondly, a spatial pyramid pooling layer is added; thirdly, an inception model with a convolution kernel of 1 * 1 is added, which reduced the number of weight parameters of the layers. Extensive experiments on Pascal VOC datasets 2007/ 2012 showed that the proposed method achieved better performance.

9) *"Feature extraction for object recognition and image classification", International Journal of Engineering Research & Technology (IJERT), vol.2, pp.2278-0181,2013, A. Tiwari, A. Kumar, and G. M. Saraswat*

Feature Extraction is one of the most popular research areas in the field of image analysis as it is a prime requirement in order to represent an object. An object is represented by a group of features in form of a feature vector. This feature vector is used to recognize objects and classify them. Previous works have proposed various feature extraction techniques to find the feature vector. This paper provides a comprehensive framework of various feature extraction techniques and their use in object recognition and classification. It also provides their comparison. Various techniques have been considered and their pros and cons along with the method of implementation and detailed experimental results have been discussed.

10) *"A review of object detection models based on convolutional neural network" sciencedirect.com June 2020, F. Sultana, A. Sufian, P. Dutta*

In this paper described some popular state-of-the-art object detection models based on CNN. they categorization of those detection models according to two different approaches: two-stage approach and one-stage approach. explored different gradual developments in two-stage object detection models from R-CNN to latest mask R-CNN as well as in one-stage detectors from YOLO to RefineDet This research paper gives a brief overview of the You Only Look Once (YOLO) algorithm and its subsequent advanced versions. Through the analysis, we reach many remarks and insightful results. The results show the differences and similarities among the YOLO versions and between YOLO and Convolutional Neural Networks (CNNs). The central insight is the YOLO algorithm improvement is still ongoing.This article briefly describes the development process of the YOLO algorithm, summarizes the methods of target recognition and feature selection, and provides literature support for the targeted picture news and feature extraction in the financial and other fields. Besides, this paper contributes a lot to YOLO and other object detection literature.

III. EXISTING SYSTEM AND LIMITATIONS

A. Existing System

FASTag is a RFID passive tag used for making toll payments directly from the customers linked prepaid or savings/current account. It is affixed on the windscreen of the vehicle and enables the customer to drive through toll plazas, without stopping for any toll payments. The toll fare is directly deducted from the linked account of the customer. FASTag is also vehicle specific and once it is affixed to a vehicle, it cannot be transferred to another vehicle. FASTag can be purchased from any of the NETC Member Banks. If a FASTag is linked to the prepaid account, then it needs to be recharged/ topped-up as per the usage of the customer.

If adequate balance is not maintained by the customer, the FASTag gets blacklisted at the toll plaza. In such a scenario if the customer travels through a toll plaza without recharging then he won't be able to avail the NETC services and would be required to pay the toll fare through cash.

B. Limitations Of Existing System

1) The traditional system was only concerned with the collection of tolls.
2) Many frauds were occurring without the knowledge of authorities.
3) There are no previous methods used to detect fraud.
4) Detection - cannot detect the correct vehicle type according to the applied Fastag on it.
5) Payment - due to wrong vehicle detection the toll prices to be paid are not correct.
6) RFID– during initial stages of implementation there were issues regarding RFID reader. Most of the time it was not working. Sometimes handheld devices also become faulty.
7) Server availability– If the server fails, it will result in the failure of the automated electronic deduction system.
8) Ownership issues– owner's registration and bank details will be linked to the fastag account, so in case the owner sells the vehicle, it is not clear whether a new owner will be able to drive the car with the same fastag or not.
9) Safety of card– as it comes in tag form, it may be stolen or lost easily. In such a situation one will need to notify the authority to block the fastag account
10) Wrongly charged– there were many instances of charging the double amount of the original amount due to some technical issues.

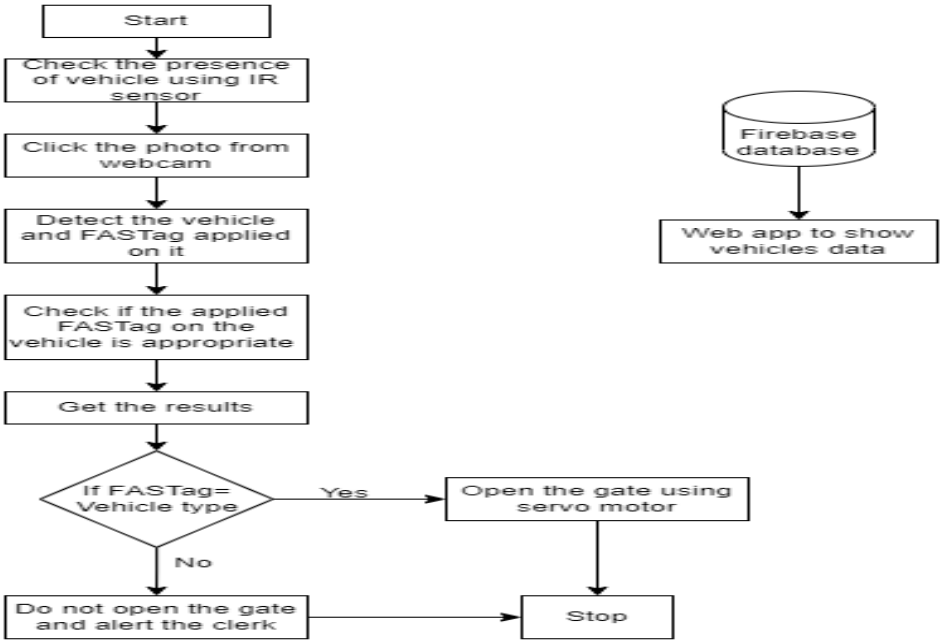
IV. PROBLEM STATEMENT

In today's digitized world with everything becoming automated and online, FASTag is a modern digitized way of collecting toll. Though it is a brilliant alternative to the regular method of collecting toll, people have found loopholes in the system and are misusing it. There are different prices for toll for different types of vehicles. But the heavy vehicle drivers are getting away by issuing FASTags for light vehicles and thus paying less toll. Thus, proposed a system to prevent this problem.

V. PROPOSED SOLUTION

Our proposed work is the study of various automated toll collection and fraud detection system. This fraud detection system is proposed using Iot based mechanism and machine learning algorithms. Using the MASK R-CNN algorithm a model will be trained that can identify type of vehicle whether the vehicle is light or heavy vehicle by using various aspects such as height width of vehicle. Interactive application for user for hassle free interaction.

Flow of the system:



1) We have proposed a system that will work effective than the existing fastag application and will be improved. Our system will start by detecting if there is object/vehicle near the toll booth.
2) It will then click a picture of the object which will then be sent to the database for further categorization. Once the picture is scanned by the MASK R-CNN Algorithm, the algorithm will send the results back showing the category of the vehicle.
3) Our system will then check if the vehicle at the toll booth is of the same specifications as the registered FASTag sticker on the vehicle's windshield. If the data does not match, an alert will be sent to the clerk and he/she will be notified. If the data matches, the system will approve it and open the toll gates after the fees has been deducted from the owners account.

VI. APPLICATIONS

1) This technique helps the government to get proper toll without any loss.
2) This method will help reducing overall frauds regarding fastag.
3) It increases transparency and efficiency in processing transactions.
4) The Machine Learning techniques used in this project can help identify different issues in later iterations of fastag application.
5) The Object detection software can be modified to detect any type of vehicle that might be made available later.
6) Image processing can be used to detect various types of codes that might be used in the future by fastag application.

VII. CONCLUSION

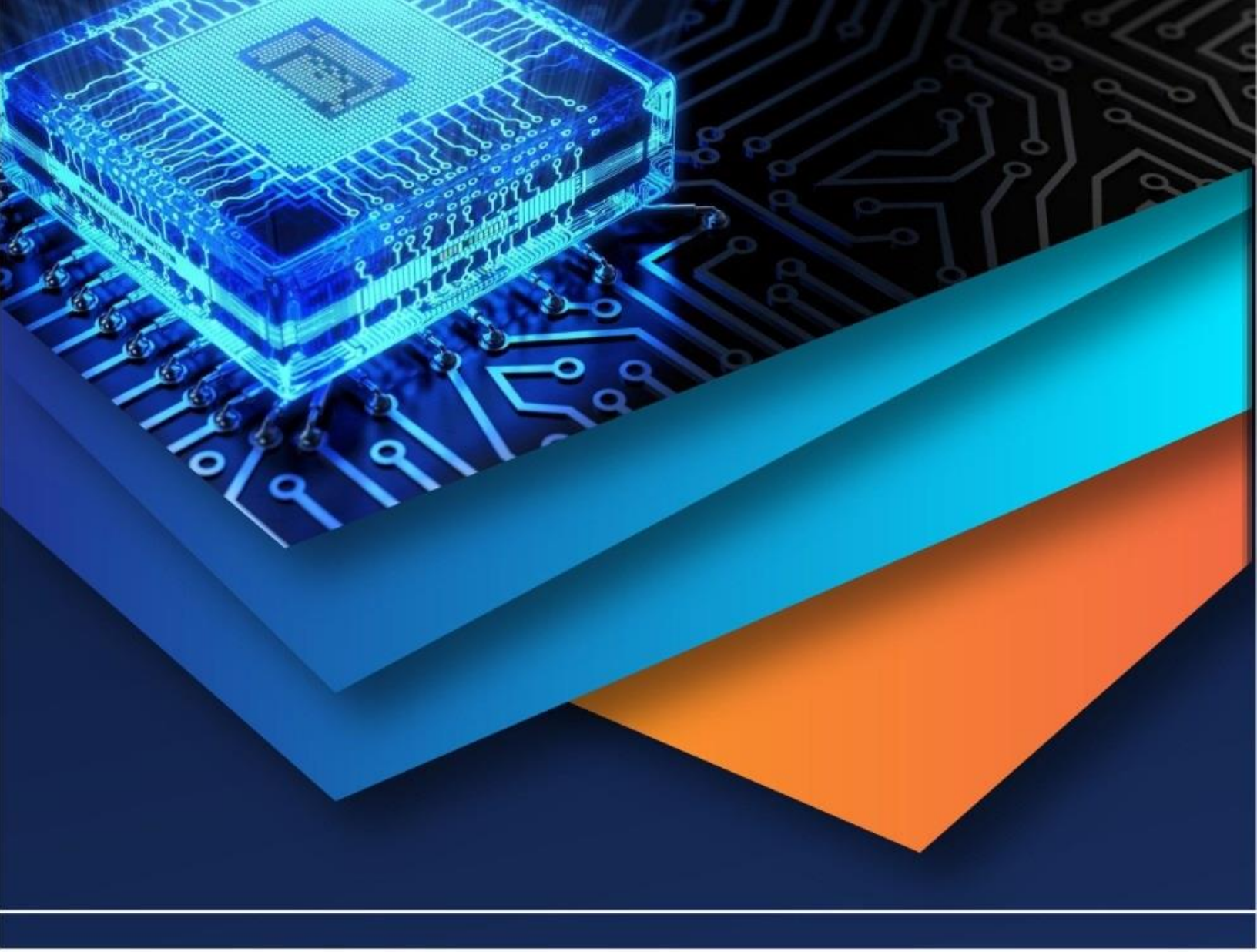
The main aim is to design and implement Fraud Detection System for FASTag. In this project we studied the various fraud detection system regarding the automated toll collection and its theft. FASTag is seen as an advantageous mode of toll collection system in India offering numerous socio-economic and environmental benefits to both – the user and the collector, until its drawbacks or the challenges are not uprooted to the base, the module shall continue to face serious crunch and may not work as intended. The Focus is on the system which helps to find the fraudulent FASTag of the vehicle on the size of the vehicle.

In today's digitized world with everything becoming automated and online, FASTag is a modern digitized way of collecting toll. Though it is a brilliant alternative to the regular method of collecting toll, people have found loopholes in the system and are misusing it.

There are different prices for toll for different types of vehicles. But the heavy vehicle drivers are getting away by issuing FASTags for light vehicles and thus paying less toll. Thus, we proposed a system to prevent this problem.

REFFERENCES

[1] Patel, Malvik & Joshi, Bharavi & Bhagat, Kajal & Desai, Hetakshi & Parmar, Jekishan. (2018). IOT BASED TOLL COLLECTION SYSTEM USING IMAGE PROCESSING. International Journal of Computer Engineering & Technology. 9. 132-139.
[2] Shantanu Paul; Guru Aradhya; Shreya Anand; K.s.Lakshmi."Effectiveness of Mandating the FASTag in National Highways & Cross Border Toll Collection Centres", Researchgate July 2021
[3] S. S. Kalyan, V. Pratyusha, N. Nishitha and T. K. Ramesh, "Vehicle Detection Using Image Processing," *2020 IEEE International Conference for Innovation in Technology (INOCON)*, 2020, pp. 1-5, doi: 10.1109/INOCON50539.2020.9298188.
[4] C. Bari, A. Kumawat and A. Dhamaniya, "Effectiveness of FASTag System for Toll Payment in India," 2021 7th International Conference on Models and Technologies for Intelligent Transportation Systems (MT-ITS), 2021, pp. 1-6, doi: 10.1109/MT-ITS49943.2021.9529291.
[5] A. V and S. P. Kulkarni, "Image Processing Based Vehicle Detection and Tracking: A Comparative Study," 2021 International Conference on Disruptive Technologies for Multi-Disciplinary Research and Applications (CENTCON), 2021, pp. 01-05, doi: 10.1109/CENTCON52345.2021.9687988.
[6] E. Bayhan, Z. Ozkan, M. Namdar and A. Basgumus, "Deep Learning Based Object Detection and Recognition of Unmanned Aerial Vehicles," 2021 3rd International Congress on Human-Computer Interaction, Optimization and Robotic Applications (HORA), 2021, pp. 1-5, doi: 10.1109/HORA52670.2021.9461279.
[7] Çelik, Özer. (2018). A Research on Machine Learning Methods and Its Applications. 10.31681/jetol.457046.
[8] Tanvir Ahmad, Yinglong ma, Muhammad Yahya, Belal Ahmad, ."Object Detection through Modified YOLO Neural Network" International Journal of Engineering Research & Technology (IJERT)[8], vol. 2, pp. 2278–0181, 2013.
[9] A. Tiwari, A. Kumar, and G. M. Saraswat, "Feature extraction for object recognition and image classification" International Journal of Engineering Research & Technology (IJERT) Vol. 2 Issue 10, October - 2013 IJERT ISSN: 2278-0181
[10] F. Sultana, A. Sufian, P. Dutta**,** "A review of object detection models based on convolutional neural network" sciencedirect.com[10] June 2020



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)