

Automatic E-Challan Generation on the Violation of RTO Helmet Rules

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Abstract: Motorcycle accidents have been growing day by day throughout the years because road safety is often neglected by riders worldwide leading to accidents and deaths. The demand for a transparent, quick and hassle-free traffic violations management systems with the support of E challan has been the need of the day in a vast country like India with large motor vehicles with limited police enforcement infrastructure. The proposed system not only disciplines the commuters and the traffic police officials, but also can enhance the level of compliance and thereby arrest revenue leakage to the governmental agencies. The paper proposes an automated E challan generating system that works with the existing vehicle database capable of detecting helmet and non-helmet bike rider and provide online interface to the offenders for payment of traffic fines whenever they are captured by the system as non-helmet bike rider. The prototype enables the traffic police to seek online identification of the driver as well as the vehicle and the E-challan system supports the offenders to enable the payment through the link transmitted to his e mail ID for complying with the requirements of fine payment. Further the police officials are tracked and logged for enabling a performance assessment.

Index Terms: Helmet Detection, Tensorflow, Keras, OpenCV, Image processing, Deep Learning, Machine learning, YOLO, OCR, Automatic E-Challan Generation, Challan-number Id.

I. INTRODUCTION

A helmet aims to scale back the impact of a force or collision to the head by an accident, that reduces a chance of great head and brain injuries bydissipating the force and energy of the impact, motorcyclists must take extra precautions to guard their bodies. As the law mandatorily tells that, every motorcyclist must wear a helmet while riding a motorbike. Wearing a helmet over non helmet wearer increase their possibility of survival. But many bike riders used to ignores their safety and thus leading to the violation of RTO helmet rule as they drive vehicle without defence apparatus like a helmet. The policeman tried to manage this problem manually but it is inadequate for the real situations. Recently helmets are made mandatory, but still, people drive vehicles without helmets. Hence there is a desire for a closed-circuit television that's capable of detecting helmets and preventing the deaths. To unravel this problem a more sophisticated computer vision model that encompasses image processing, OCR (Optical character recognition), YOLO (You Only Look Once), etc., frameworks are used for real-time detection of traffic rule violators who ride bikes without employing a helmet. The road CCTV footage is employed using Deep Learning and Image Processing technology to detect whether a rider is wearing a helmet or not. And thus it will detect riders without a helmet then the system is going to send an automatic notification to the rider using the number plate (Optical character recognition (OCR) used for number plate detection.) of that vehicle.

Detection and tracking of traffic violations have been a challenging process, despite tremendous automation in detection and issuance of challans in respect of speed and signal violations using radars and back end systems being introduced in developed countries. In case one looks at the other traffic rules violations such as not wearing seat belt, helmets, not carrying necessary documents, etc. the process of tracking of violations, issuing of challans related automations including administration etc. yet to be fully evolved. Given the large volume of vehicles in a country as vast as India, detection of traffic rules violation is a very difficult process and it becomes a very tedious job for the traffic police department to control and handle the entire violations management process including the irregularities being committed by the constabulary. In the case of already automated violations which is generally tracked through the number plates, the number plate as such can be tampered easily. In this background, this paper introduced a device for the generation and payment of challan by using number plate number as a mode of identification of the vehicle

The vehicle number plate number is used to identify the user who violated the RTO helmet rule and thus we can send auto generated mail to the offenders he can come to know that he has to pay the generated Challan now, Our system provides the link of E-Challan website through which he can pay Challan through our website, and also the list of records of non-helmet bike riders are also stored so from that how many times the violation happens by a single offender can be calculated, A Challan-number id will be sent through which payment for a particular challan number can be calculated. Thus In this paper, an automatic E-challan generation system has been proposed to record and manage traffic violations.

II. IMPLEMENTATION

Implementation of our system is mainly divided into 2 parts, Part 1 and Part 2. Part 1 mainly consists of Detection Part i.e. Helmet Detection and Number Plate Detection and Extraction. Whereas Part 2 consists of E-Challan Website implementation after generation of automatic E-Challan they are as follows:

III. Implementation part 1

It mainly consist of Detection of helmet and non-helmet bike rider using YOLO algorithm. YOLO (You Only Look Once) is an algorithm that uses neural networks to provide real-time object detection and location of the object. This algorithm is famous because of its speed as well as accuracy. YOLO algorithm has used by many professionals in many platform to detect traffic signals, human, parking meters, and animals.

At the very beginning, Whenever the input frames are coming we are first checking if it is a number plate or not and if it is a number plate then the system is checking if it is a helmet or non-helmet bike rider, if a bike rider is with helmet then system just simply passing it without doing any actions but if it is a bike rider with no-helmet detected by the system then system is going to capture its full image out of that image it is going to crop the image of the number plate and after that using Tesseract-OCR system is going to capture the numbers from the number plate after that matching that extracted number plate number with existing database sheet, system comes to know that which particular person have violated the RTO Helmet Rule and after recognizing that person, system writes in the database by generating the Challan ID that a particular person have violated the rule by taking that person's entry in database who have violated the rule the records for non-helmet bike rider will be stored. At the same time the system is going to send the auto-generated email with proof as a full photo to that particular bike rider who have violated the rule. If in between escape key is pressed the program ends.

On the other when a system generated mails are seen by the offenders they can pay the challan using the E-Challan Website link provided by our system and the user name and password are provided by at the same time for login and payment. Offenders can see the number of times the violation of the rule happens by his side on his dashboard and admin or can say RTO officer can see the database of peoples how have violated the rule with a specific date and time

This system uses SMTP server for sending auto-Generated mails. SMTP stands for Simple Mail Transfer Protocol, and it's an application used by mail servers to send, receive, and/or relay outgoing mail between email senders and receivers. To access this server we need to configure the settings related to SMTP in our system and also we have to do some settings related to our google account. For accessing google account by Third-Party like SMTP we have to give the Third-Party password to SMTP for accessing it.

Tesseract is an optical character recognition engine for various operating systems. It is free software, released under the Apache License. Originally developed by Hewlett-Packard as proprietary software in the 1980s, it was released as open source in 2005 and development has been sponsored by Google since 2006, Tesseract is also known as Tesseract-OCR here OCR stands for optical character recognition, it is used to read text from images, drawback of it is that it cannot read the handwritten texts. In our system it is used to extract the numbers from the number-plate. The accuracy of this engine running during the implementation of project is very low as it can capture the special symbols like #, @, %, *, & Etc. that's why we have to apply some other tricks for removing this special symbols while coding. It is also known as Pytesseract or can say Pytesseract-OCR

Tesseract needs more and more clear image for the recognition of the numbers and alphabets inside the cropped number plate image and thus then the extraction of numbers from the number plate happens from after the clear image is introduced. That extracted number plate number is stored in python variable for crosschecking the extracted number plate number is match with which person in the Excel sheet in which the records of all the bike riders are stored already (RTO record Sheet.) and thus in this way system comes to know the details of all the offenders who have violated the rule. Accuracy of Tesseract is 70.2% to 92.9%.

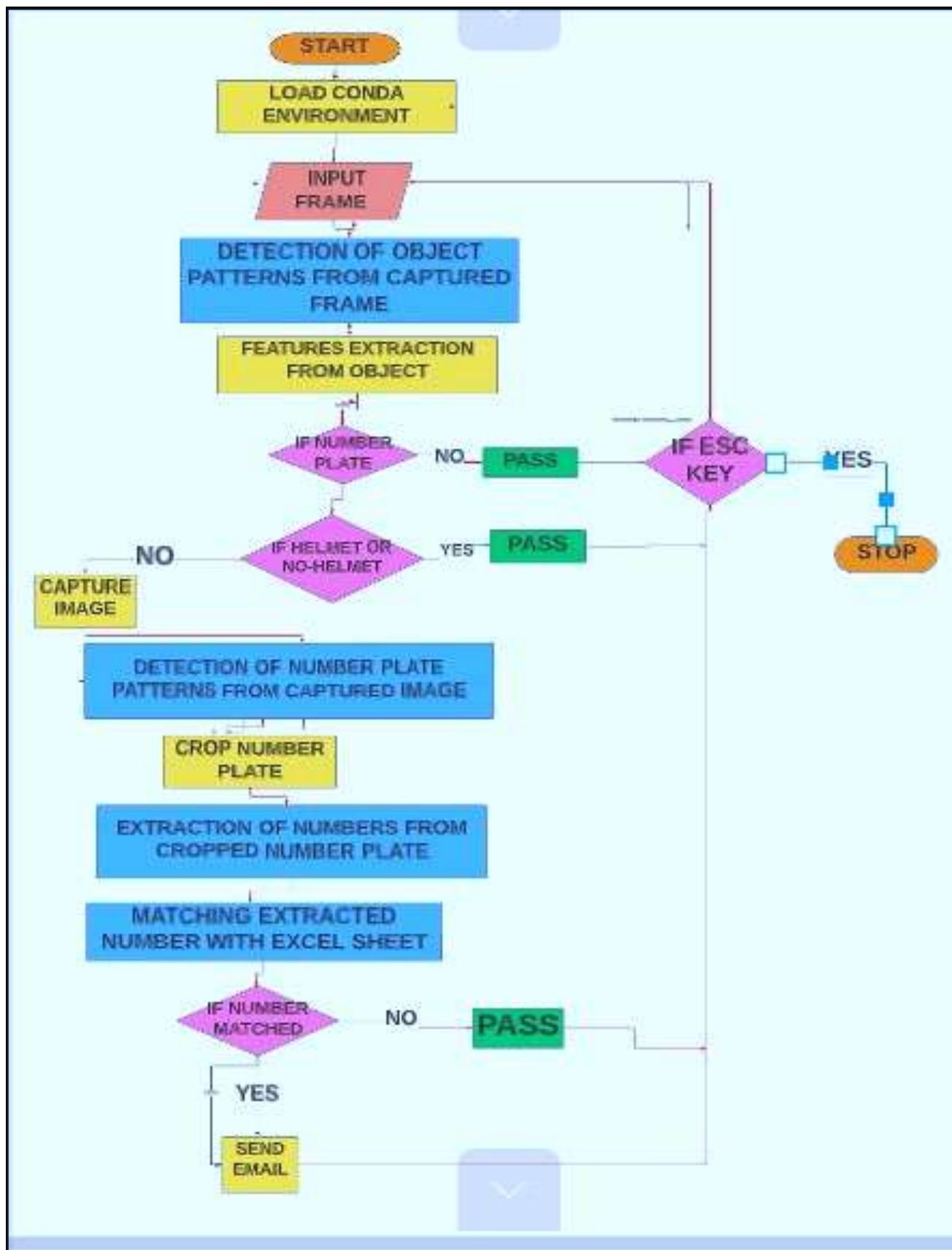
Flowchart

Fig 1: Flowchart

Accuracy of YOLO

Table 1

Sr. No.	Parameters	Yolo v3
1.	Modal names	You Only Look Once
2.	Accuracy	80.3 %
3.	Time	0.84-0.9 sec/frame
4.	Speed	Low
5.	Mean Average Precision	0.358
6.	Frame per second	45

Implementation part 2

It mainly consists of the implementation of E-Challan Website where offenders can come and pay the Challan online. It is as follows:

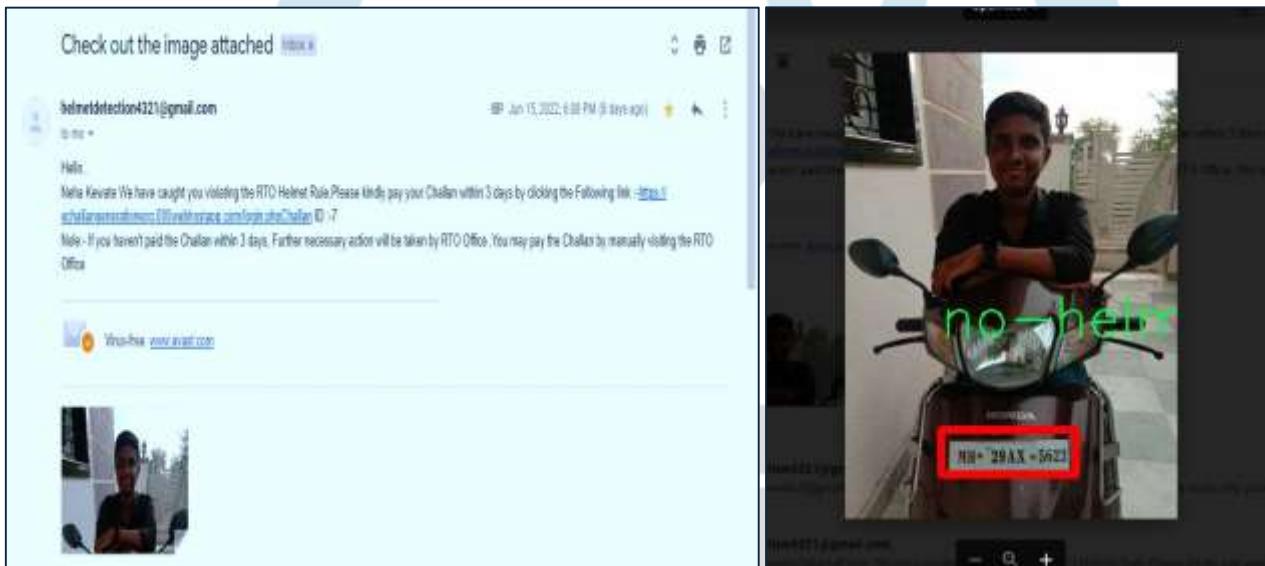


Fig 1: Email

Here we are sending email to the offender who is violating the helmet wearing rules. We have also performed live detection on person and successfully sent the email to offenders email id mentioned in the official's data sheet. Firstly we have implemented our helmet detection code then we have recognized the offender by scanning the offender's vehicle number plate using OCR technology. After recognizing the offender we simply sorted the official's database and recognize the offender then using python code we have sent the E-challan generated message that we have coughed you violating the RTO Helmet rule. Please kindly your E-challan within 3 days by clicking following link using SMTP.



Fig 1: E-Challan Website Login



Fig 1: User Dashboard

User Address	Payment		
Full Name	Accepted Cards		
<input type="text"/>			
Email	Name on Card		
<input type="text"/>	<input type="text"/>		
Challan ID	Credit card number		
<input type="text"/>	<input type="text"/>		
Challan Amount	Exp Month		
1000	<input type="text"/>		
State	Pincode	Exp Year	CVV
Maharashtra	44001	2020	<input type="text"/>
Pay Now			

Fig 1: Payment Page

Now we have provided the E-challan website link and the one time generated user name and password to the violator and they can login and pay their e-challan by using out dummy payment page. Here Violator can see their precious e-challans and their due dates by clicking on previous e-challans and can see this due challans and payment status. By clicking on Pay your e-challan here violator will directed on payment dummy page. Here they can fill their information and pay their E-challans. By clicking on ‘Pay Now’

payment status on database will get changed to payed from unpaid and payment time will also recognized and database will get stored.



Fig 1: Thank you page

Name	Email id	Number plate	Challan Id	Payment status	Challan Date & Time
Mohit Dubekar	dubekarMohit@gmail.com	MH29AS1141	296	PAID	23/06/2022 18:20:42
Mohit Dubekar	dubekarMohit@gmail.com	MH29AX2622	453	PAID	23/06/2022 00:07:10
Mohit Dubekar	dubekarMohit@gmail.com	MH29AS1141	8161	PAID	23/06/2022 23:59:30
Mohit Dubekar	dubekarMohit@gmail.com	MH29AS1141	8398	PAID	23/06/2022 18:25:38
Mohit Dubekar	dubekarMohit@gmail.com	MH29AX2622	9944	Unpaid	23/06/2022 14:06:16
Mohit Dubekar	dubekarMohit@gmail.com	MH29AX2622	9985	Unpaid	23/06/2022 14:06:58

Fig 1: User Dashboard

After payment violator will be directed to Payment ‘Successful’ Information page where they will be informed about the RTO’s Helmet and Road transportation rules if they violate the rules consistently officials may take strict action against them and they have to face Sevier consequences. We have provided Popup for click here for checkout and the popup message will say Thank you! Your payment has been successfully submitted. Thanks!

Violator can check their payment status right after paying e-challan and take the note of when they have paid the e-challan on which date and time they have payed. After that violator can logout by simply clicking on Logout button.



Fig 1: Admin Login

Name	Email_Id	Vendor_gstin	Challan_id	Payment_Status	user_name	password	Challan Date & Time
Sohel Kawali	sohelkawali123@gmail.com	MG129MCT984	9995	Paid	sohel	12345	22/08/2022 19:01:39
Ahmed Dakku	ahmeddakku123@gmail.com	MUG29AXS22	8994	Unpaid	ahmed	12345	23/08/2022 14:04:14

Fig 1: Admin Dashboard

Here we have also provided the checking platform for Officials. The admin login will be the site for checking the e-challan ID who violates the RTO rules and regulations. After generating the e-challan id from our code first it will be sorted from official's database then directly sent to the admin database which will be directed to admin website. Admin can see the e-challan id's of violators and their information as shown in figure. They can also check the payment status and time on their Dashboard. If the violator has not paid the e-challan within 3 days officials or admin can take action on violator accordingly which is suitable for their offence. If e-challan is paid the payment status will be showed on admin Dashboard.

IV. ADVANTAGES

- Automatic E-challan Generation
- Traffic Regulation will be achieved
- Death percentile will be reduced due to accidents
- Corruption and Multi-window hectic will be reduce

V. FUTURE SCOPE

- Speed-Challan Generation

- This technique can be used in smart City innovation

VI. CONCLUSION

This paper is the implementation work of automatic e-challan generation on the violation of RTO helmet rule has been done successfully. The proposed solution is characterized and described concerning steps, they are as follows:

- Detection of Number Plate in the captured Image.
- After detection of number plate, Detecting motorcycle rider with or without Helmet
- If a non-helmet bike rider then sending of automated mails happens internally by capturing number plate
- Implementation of E-Challan website is explained.

The traffic camera footages from a variety of sources are in implementation. Domains like Image Processing and Machine Learning are used to make it easier. Punishment of motorcyclists who do not wear protective helmets can be done through the discovery of motorcycles and helmets and the recognition of number plates. Finally, the implementation of project done successfully

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