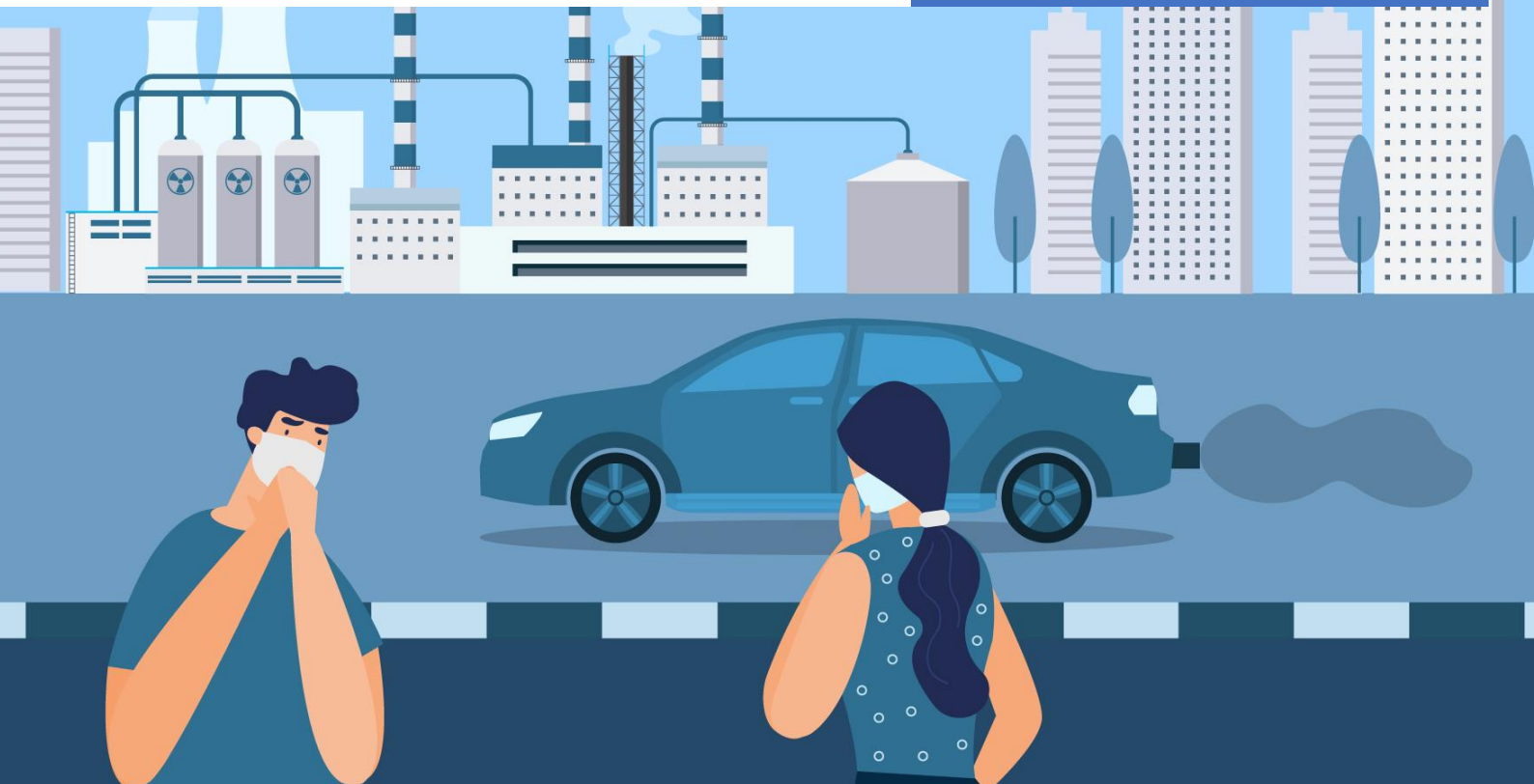




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2019 - 20



# **Web Based Vehicle Pollution Calculator**

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Course: CHE110

Section: K19FG

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- 3.) METHODOLOGY
- 4.) OBJECTIVES / CALCULATIONS
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## DISTRIBUTION OF WORK!

TITLE OF WORK	ASSIGNED TO
OVERALL	
Understanding & discussing overview of project	Rokibul, Utkarsh, Abhishek
Discussion for the background of the project	Abhishek, Rokibul, Utkarsh
Planning Methodology	Utkarsh, Abhishek, Rokibul
Research of the software needs & implementations	Rokibul, Utkarsh
Research for object detection & Convolutional Neural Network (CNN)	Rokibul
Research for web implementation with CNN	Utkarsh, Rokibul
Making vehicle detection software	Rokibul
Making web interface & web base calculator	Utkarsh, Rokibul
Connecting both web interface to object detection <sup>software</sup> re.	Abhishek, Utkarsh
Making vector graph for visualization of methodology	Rokibul
Research for vehicle emission based web data	Utkarsh
Calculation for vehicle emission based on web	Utkarsh, Rokibul
Testing in the field	Rokibul, Utkarsh, Abhishek
WRITING REPORT	
Cover Page (submitted soft copy)	Rokibul
Introduction	Utkarsh
Methodology	Rokibul
Purpose and Result	Abhishek
Presentation & Data Analysis	Utkarsh
Study results & Outcomes	Utkarsh
Project Summary	Abhishek, Utkarsh
Project photos & other supporting material	Rokibul, Abhishek, Utkarsh
Writing the whole report (soft copy) into handwritten	Utkarsh, Abhishek



## MAKING PRESENTATION (SLIDES)

Cover Slide	Rokibul
Basic Theming for the slides	Rokibul
Introduction Slide	Utkarsh
Methodology slide	Rokibul
Purpose & objective Slide	Abhishek R
Demonstration of working of Software Slide	Rokibul
Study Results & Outcomes slide	Utkarsh
Project summary	Utkarsh, Abhishek

# INTRODUCTION:

Cars, trucks, and buses powered by fossil fuels are major contributors to air pollution. In fact, transportation emits more than half of nitrogen oxides in our air, and is a major source of global warming emissions in the world. Studies have linked pollutants from vehicle exhaust to adverse impacts on nearly every organ system in the human body. Moreover it is not only dangerous for humans but in fact every living organism present on the earth.

The health risks of air pollution are extremely serious. Poor air quality increases respiratory ailments like asthma & bronchitis, heightens the risk of life-threatening conditions like cancer, & burdens the health care system with sustainable medical costs. Particulate matter is singlehandedly responsible for up to 30,000 premature deaths every year.

While this air pollution causes significant risks for human health and the environment as well as other living organisms also, on the other hand scientists and big companies are developing clean vehicles and fuel technologies that will cause either less or almost no pollution. With such measures we can significantly reduce emissions from our cars and trucks & help transform transportation.

Here in the project, we are aimed to make a convolutional neural network based, computer vision and web-based system to calculate the number of vehicles entering the university to make a calculation on how much emission is carried out by the vehicles everyday out of it.

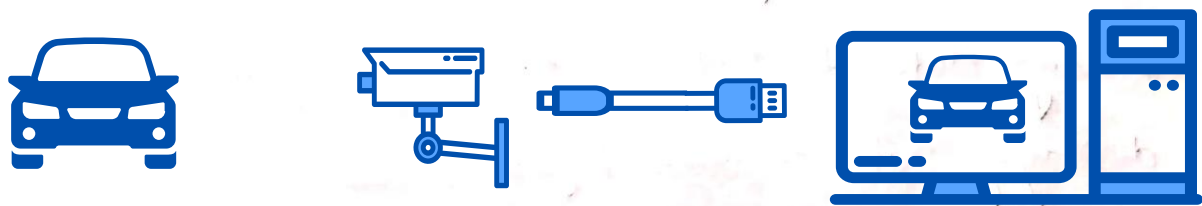


## METHODOLOGY

To make the system, we have thought of implementing computer vision + Convolutional neural network + web system. The final system then will be installed to the main gate or the parking entry of the campus to process the number of cars entering the campus every day and make a calculation of emission out of it.

The planned methodology is explained step by step below:

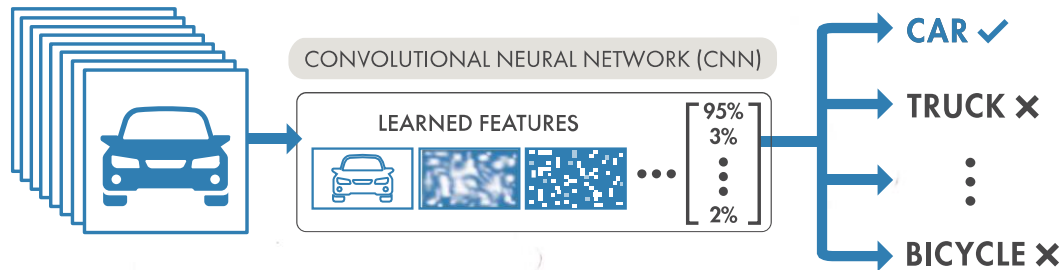
### 1. Data Collection & Data Input:



First the live footage of parking entry or main gate is to be captured using a portable camera. The camera will be placed in such a position so that it

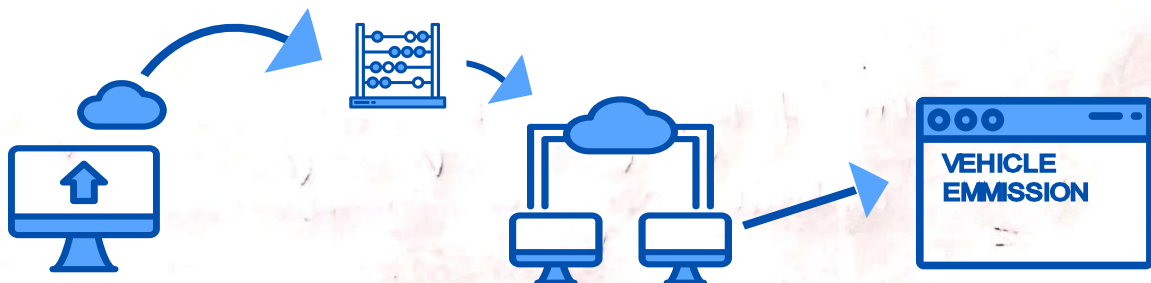
doesn't miss any car. Then the live footage will be transferred into a computer for further process.

## 2. Identifying vehicle using Convolutional Neural Network(CNN)



The data/footage received from the live camera will be transferred into a deep learning model (Convolutional Neural Network) to analyze the received data. For this neural network, we will be using pre-trained deep learning model.

## 3. Sending data to Database for web applications & displaying it to web-page:





## STUDY RESULT :

We all know it very well that in today's world when we have developed our transportation means and all the vehicles that everyone wants to have their own vehicle for them. This further leads to another well known problem of increasing pollution in the environment due to these vehicles. Every year more and more new vehicles are produced that increase the vehicle pollution day by day.

Our battle with the pollution will become even more difficult in the coming time as already the rate of the pollution emitted from the vehicles exhaust has always been increasing due to increase in the number of cars moving on the road. Moreover if we consider the pollution that are released by factories and industries then we have already damaged our ozone layer and contributed towards global warming. It has become very important for everyone to understand its ill effects as soon as possible.

The result coming from the CNN will be uploaded to cloud database for a real-time monitoring for the calculation. The real-time monitoring will enable multiple users to view the results on their devices simultaneously in real-time. The uploaded data on the cloud database, will be instantly sent into a calculator, which will calculate the number of cars incoming times the average emission of a four-wheeler and then a daily emission will be worked out from the data and the final result will be sent back to connected user in real-time. This data about the daily pollution emitted by the cars coming in the college can be used to take measures in order to reduce the increasing pollution to maintain a healthy and pollution-free environment.

# OBJECTIVES / CALCULATIONS:

## Vehicle Entry Tracker

Vehicle Count

75

3/29/2020

Estimated Emission (Today)

0.20475000000000002 Tonne

Estimated Emission (This Week)

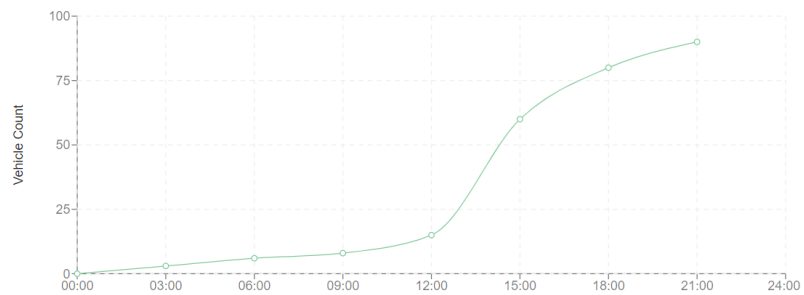
1.4332500000000001 Tonne

vehicle entered

vehicle entered

vehicle entered

Today



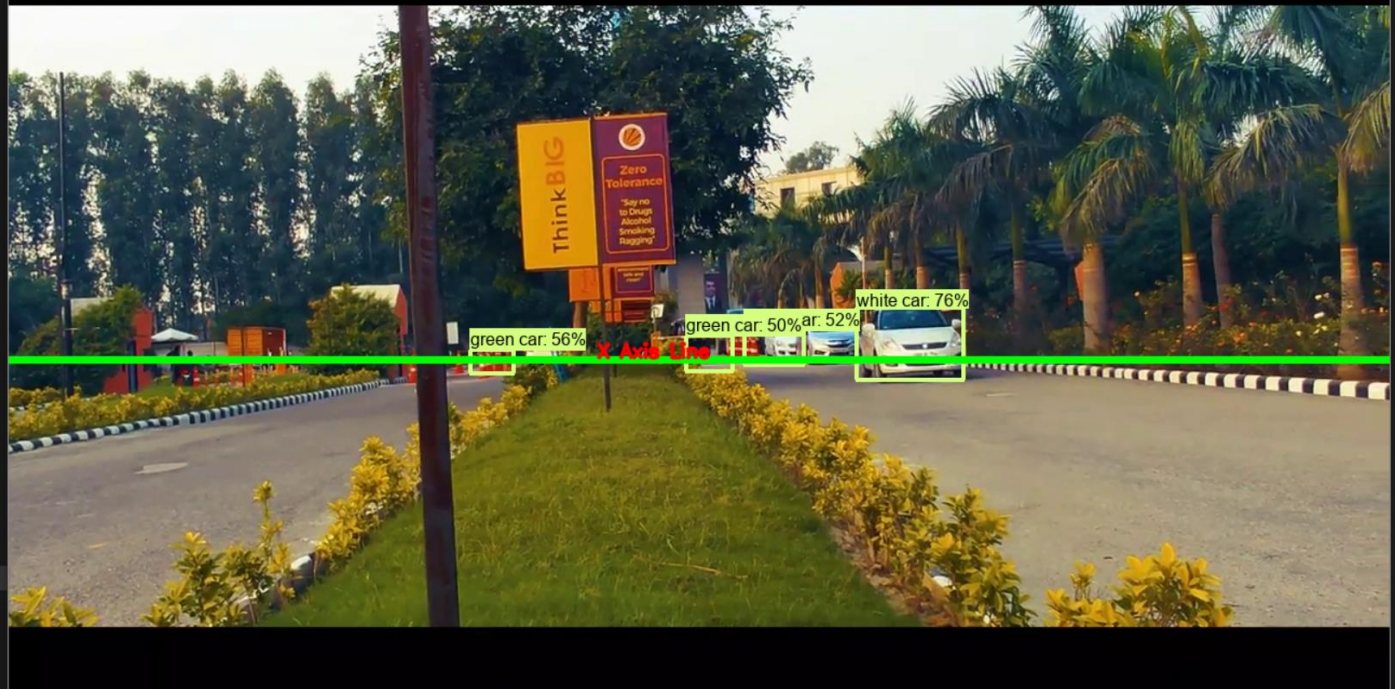
object counting

Detected Vehicles: 27





Detected Vehicles: 32



### Interface of Programme

Our Software's Convolutional neural network will analyse from the Camera footage and tell us the number of vehicles entering from the gate into the university. This number will be sent in real time so that it can be calculated at any point of time. Further this number will be sent to the web based pollution calculator that has the preset value of pollution emitted by vehicles per kilometer. Lastly the product of these two values will be multiplied with the distance

Our environmental project help the institutions and companies to monitor the pollution emitted by the vehicles in their area on a daily basis. This will provide them a fixed data based on the number of cars passing by or entering into the institution. For example if we consider our university, our project will monitor the pollution emission by the cars entering in the university. This will help to make better measures and more accurate precaution that the institute should take care of in order to reduce the pollution in the campus area. We will also generate more awareness regarding the pollution in general to the people who will enter the gate daily to make them more self-conscious.

This programme can also be installed in residential areas like apartments and enclaves, where it is very necessary that the pollution should be as low as it could get and our project will help towards this only.



## PROJECT SUMMARY:

The continuous increase in the pollution level in our environment is a very big threat for the nature and all other living organisms present on planet earth. Everyone talks about the pollution and the crisis which it can lead to if not controlled in time, but no one takes any initiative in order to reduce it, rather we just ignore the fact that it is very dangerous.

Through the means of this environmental project to calculate the  $\text{CO}_2$  emission in our own college we were able to talk about this topic extensively. And on our journey of researching about our project we learned lot of things about the pollution and the threats it can cause.

Moreover on our task of visiting the site we also interacted to different people and got to know about their view point on this topic as well. We even tried to spread more information about this threat to many other students as well.



that the vehicle has travelled inside the university which is roughly 1.5 km. The product of these values will give us the emission of  $\text{CO}_2$  by the vehicle.

We have taken the value of  $\text{CO}_2$  emission by a vehicle for every km from internet.

For example we will take the case of a working week in the university. At the end of each day we will have the combined amount of  $\text{CO}_2$  emitted by the vehicles that day

(i) Monday :- If there were total 3500 Cars detected, it implies the pollution emission will be

$$\text{no. of cars} \times \text{pollution (CO}_2\text{) emitted per km} \times \text{distance travelled in Campus}$$
$$= 3500 \times 0.00182 \times 1.5 = 1.36 \text{ tonnes of CO}_2 \text{ emission}$$

(ii) Tuesday :- If there were 450 Cars detected

$$\Rightarrow 450 \times 0.00182 \times 1.5 = 1.22 \text{ tonnes of CO}_2 \text{ emission}$$

(iii) Wednesday  $\Rightarrow$  If there are 400 Cars detected

$$= 400 \times 0.00182 \times 1.5 = 1.09 \text{ tonnes of CO}_2 \text{ emission}$$

?

(iv) Sunday  $\Rightarrow$  If there were 250 Cars  $\Rightarrow$

$$250 \times 0.00182 \times 1.5 = 0.68 \text{ tonnes of CO}_2 \text{ emission}$$

Like this we will have the pollution emission by the cars crossing the main gate on a particular day.

On the other hand we even learned to use the convolutional neural network and how it can be used to detect the cars entering the University. This project has helped us a lot in widening our knowledge about the increasing pollution and measures that can be taken to reduce it.

Our project is very useful in places like universities, offices, enclaves etc where lots of cars pass pass by. At such places its beneficial to have an estimate of how much  $\text{CO}_2$  is emitted by these vehicles so that pollution can be monitored and controlled. Earlier when no one is aware about how much pollution their vehicle produces daily, they don't take care about it but by this atleast it would be easier to explain people.