CIENA SOLUTIONS

School Name City and Country: *Vikas Bharati Public School, Delhi India*

Student Team Name: *The Nifty Earthlings*

Project title: *TrAffIc Management System to control pollution*

Number of team members: *6*

The Problem

“Traffic Jam”, something which everyone experiences in these modern day road tracks full of vehicles. We all hate traffic jams; but have we ever tried to think of the reason or cause of these jams? Have we ever made an effort to eliminate such jams? Probably not.

There are numerous facts which tell about the adverse effects of traffic jams. They are one of the root causes of pollution which is increasing day by day and it needs to be controlled to save planet Earth. There are various reasons for pollution that are related to traffic jams like bad driving practices, poor vehicle manufacturing, inappropriate tyre pressure in vehicles, unethical attitude towards traffic rules, poor road development and high fuel consumption. It is really important to control traffic jams in order to limit pollution and other harmful consequences like Global Warming and other natural calamities; since automobile engines release a lot of carbon dioxide and other harmful greenhouse gases on fuel combustion.

The Problem

Our team is dedicated towards the improvement of this vulnerable situation on the roads today. We were inspired to take up this topic because it has become a prominent problem nowadays as it is leading to many life losses and also, the fuel consumption rate rises while one is stuck in a jam. These jams are a big cause of Noise and Air pollution. Hence, immediate action is required in order to control traffic jams.

So, we the students take upon ourself to bear the responsibility of tackling this social issue prevailing in the society. We are the youth of the nation and the generation responsible for a secure future for the generations yet to come. Therefore, we have put an effort to find a solution for these Traffic Jams on road.

Research

- *Traffic congestion increases vehicle emissions and degrades ambient air quality, and recent studies have shown excess morbidity and mortality for drivers, commuters and individuals living near major roadways. Presently, our understanding of the air pollution impacts from congestion on roads is very limited.*

- *Air pollution in India is a serious health issue. Of the 30 most polluted cities in the world, 21 were in India in 2019. As per a study based on 2016 data, at least 140 million people in India breathe air that is 10 times or more over the WHO safe limit and 13 of the world's 20 cities with the highest annual levels of air pollution are in India. The 51% of pollution is caused by the industrial pollution,* ***27 % by vehicles****, 17% by crop burning and 5% by fireworks.*

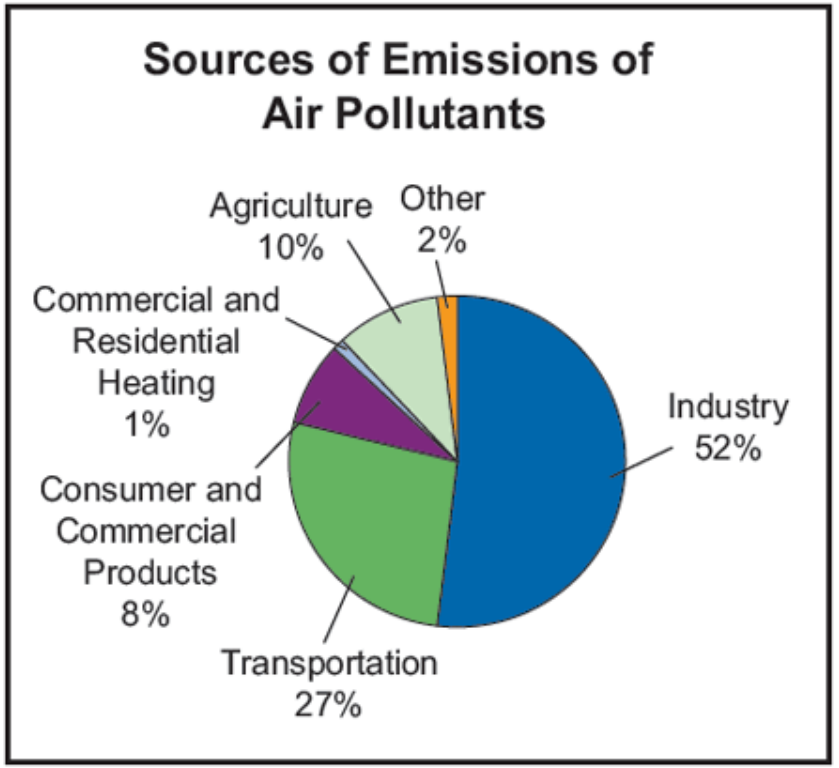
- *Average traffic speed on 13 arterial roads 50-60 per cent lower than their design speed and 35-48 per cent lower than the regulated speed of 40-50 km/hour*

Research

- *Nearly one half of everyone living in the United States—an estimated 150 million—live in areas that don't meet federal air quality standards. Passenger vehicles and heavy-duty trucks are a major source of this pollution, which includes ozone, particulate matter, and other smog-forming emissions.*

- *In 2018, the total number of motor vehicle theft cases reported stood at 14,344,158, as compared to 10,39,084 in 2017 – which accounted for about 91% of the total vehicle theft crimes reported. However, only 29.6% cases were solved, the police data also stated.*

(the above data is only for India).



We have researched about our topic and found this data and other similar facts which actually is a proof of the disastrous effects of the mismanagement of traffic. Accidents, life losses due to untimely emergency services and vehicle thefts are the main problems highlighted by us in our project which will further help in limiting pollution.

The Concept

From the research, we got to know that the condition of traffic management system, the lost/stolen vehicle recovery, and speeding ticket issuing system throughout the world is bad. So basically, we have come up with an idea of a system consisting of RFID sensors, RFID cards in each vehicle, Road barriers, NODE MCU, a self-created intelligent Mapping system, Vehicle speed scanners, an AI based security system comprising of cameras, speakers and sensors; a directory containing the IDs of each vehicle.

The idea is, to create a road mapping system using RFID technology which would sense and scan the density or the number of vehicles on each road and accordingly use the Road barriers for a safer road management, i.e. blocking the road with less vehicles and simultaneously making way for the congested ones. Along with this, we have decided to create a small instrument using Arduino and GSM that would be directly connected with the speedometer of vehicles and would measure the speed. It would keep uploading the speed each second on the SQL database which we would create using the Microsoft SQL storage. If the speed is higher than the set maximum value for a longer time, then an e-ticket would be issued as punishment to the Traffic Rule violators.

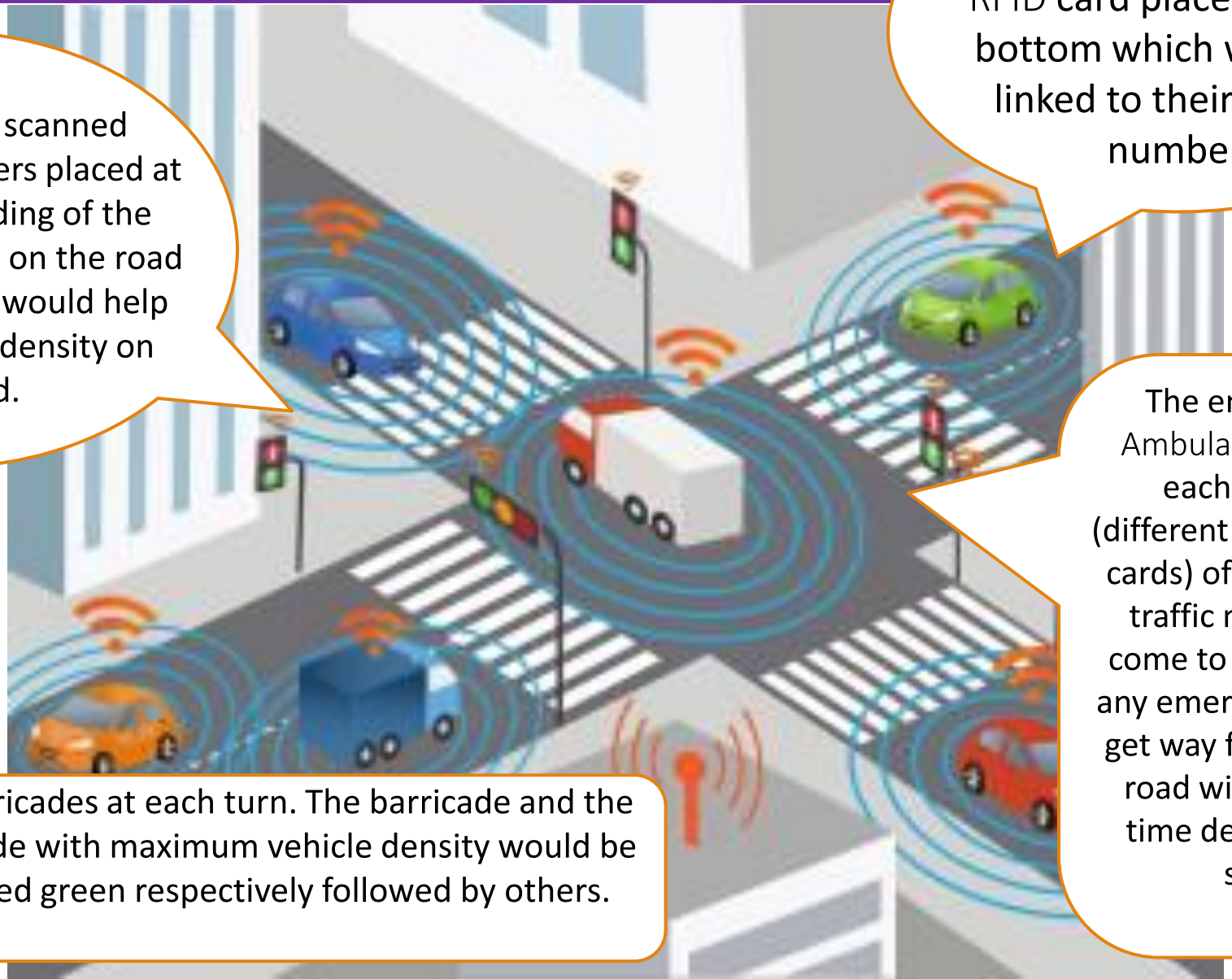
Ethics

We believe our AI project aligns to each of the *Microsoft ethics principles* because it takes care of each and every individual's privacy by not making anything public. The vehicle tracking system can tell a person the location of his/her vehicle but he/she will be needing the vehicle number and a password which is only known to the owner of the vehicle. Hence, it maintains privacy and security. Besides, this idea considers reliability/fairness because the overspeeding punishment would be issued in accordance to the speedometer of the vehicle which makes it more accurate. This system would enable an easy traffic management, thus making roads safer for people to drive and providing a better chance of survival for the patients reaching hospitals. There is transparency since people are not being misled or cheated and every part of the idea would be open in front of them. Also, in case of any mistake or problem, the Traffic Police Department and the Technical team would be accountable for a compensatory help. This idea is inclusive of various problems to solve which makes it versatile. To conclude, our main aim is to reduce pollution and serve for humanity in the best possible way.

Solving the Problem

All vehicles would have an RFID card placed at their bottom which would be linked to their vehicle number.

RFIDs would get scanned through RFID scanners placed at the starting or ending of the road and at all turns on the road tracks. This system would help us to scan vehicle density on each road.



The emergency vehicles such as Ambulance, Fire Brigade etc. would each have a unique RFID card (different from the normal vehicle RFID cards) of their own. Through this, the traffic management system would come to know about the presence of any emergency vehicle which needs to get way first and for it, that particular road will be cleared first so that no time delay occurs for the access of such urgent services.

There would be barricades at each turn. The barricade and the traffic light of the side with maximum vehicle density would be removed and turned green respectively followed by others.

Solving the Problem

Whole of the system would be controlled by servers (whose controlling and monitoring will be done by government) and processing chips that would help the RFID scanner to control traffic lights and the barriers. The system would also have a backup power system that would give enough electricity to open all barricades and lock them at their position in a case of a power outage to avoid traffic.

Apart from managing traffic, the RFID system will help in scanning and tracing the location of the missing vehicle to find it back. Each RFID scanner would have its own location co-ordinates. Each vehicle would have a separate database. So whenever an RFID scanner would scan a vehicle's RFID, it would upload its coordinates into the vehicle's database with time at which it was scanned. This would form our Vehicle Tracking System. Using Azure Maps and a coordinate mapping system (that we would create) we would display the travel path of each vehicle. Each vehicle's location can be accessed via an app (whose controlling, and monitoring will be done by government) by using the vehicle number and password.

We will create a small instrument using Arduino and GSM that would be directly connected with the speedometer of each vehicle and would measure the speed. It would upload the vehicle's speed after each second on the SQL database that we would create using the Microsoft SQL storage. If the speed is higher than that set for a longer time, then an e-ticket would be issued as punishment to the Traffic Rule violators. The fee ticket issued would be displayed on an app. (this app would also be used to view the vehicle's location)

Thus, by managing Traffic and solving other related problems, our idea would help in limiting fuel consumption and hence Pollution (Noise and Air) to some extent.

LINK OF THE PITCH VIDEO

Traffic Management System - YouTube

Use of Artificial Intelligence

In this project, we will be using the following Microsoft Cognitive Services:

- Azure SQL Databases (Server Stretch Database)
- Log Analytics
- Azure Maps
- OpenCities Websites

Our AI model will be detecting the vehicles of the area and will control the traffic of the region. For instance: If an ambulance is stuck in traffic, the RFID readers placed on the road will read and detect that an ambulance is passing through the road and our AI will analyze the situation and clear the traffic of that area as soon as possible. Log Analytics and Azure Maps will be used here. Azure SQL Databases will be helping us in storing the places visited by the vehicle. The owner of the vehicle will have an access to the records of the places visited by his/her vehicle. OpenCities Websites will be helping us as a bridge to connect through the owner to track down the vehicle. The databases will be updated automatically when RFID reader scans the vehicle.

References

1. https://tinyurl.com/2x4r4uy
2. https://tinyurl.com/tapj78yv
3. https://tinyurl.com/3af87xj5
4. https://tinyurl.com/n5bh6ntm
5. https://tinyurl.com/77wkm5z
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Thank you!