

Non-Autonomous traffic management system – a possible solution to traffic issues around the world

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Abstract—In the global mission of achieving a smart city and thenceforth, the smart world, the traffic has always been a priority for the thinkers and scientists. The increasing amount of vehicles over the years due to an amazing flux in the global population in urban regions has been a core for problems and needs special consideration. This paper includes a special recommendation model as a Non-Autonomous traffic management system which can be a possible solution to traffic issues around the world.

Index Terms— Non-autonomous traffic management system, Real-time traffic system, Smart traffic system, Traffic Management system, as.

1 INTRODUCTION

With the advancement of technology around the world, major sectors of world operations were shifted towards the technology side. This made feasibility, accessibility, convenience, security, and quick response as a part of all the strategic operations. However, it was seen that due to some technical issues and problems, the technological setups to cause major hazards and crash with heavy losses to material, lives and resources [1]. Due to the high number of accidents and road incidents affiliated with the traffic systems, the economies of the world started to create autonomous vehicles. It was assumed that autonomous vehicles and traffic management systems could create a better traffic system as they would not employ human.

Not including human ultimately lead to the fact that there would be no emotional health psychiatric issues related to the incident. Most of the incidents are observed due to a severe panic that occurred at the time of accidents major companies around the world started to create autonomous vehicles and introduce artificial intelligence and machine learning as a part of vehicle makes. Also, the traffic management systems with smart tracking and identification technologies were deployed in where is part of the word to know a better view of the current traffic system. It was successful somehow [2].

However, there were many things to catch up. Now, the world has started to shift towards management systems for traffic that is non-autonomous. By the tram non-autonomous, we need involving human and not deploying artificial intelligence to a greater extent.

2 CHALLENGES

The autonomous traffic management system has been a challenge to the prevailing world due to the technical formalities and hazards that may occur. In this scenario, the major task for the software developers and traffic management personnel

is to develop a system that is non-autonomous and can handle the traffic based on peculiar data attributes and identification parameters. Autonomous vehicles and traffic management systems are also prone to a higher rate of technical collapse, cybersecurity, power failures and other issues. The data might also be missed into the system, which can ultimately damage the whole system [3].

In this way, many other challenges exist for autonomous traffic management systems. The artificial intelligence and neural networking used for the training of the management systems can also be trapped with the help of cyberattacks. This can lead to major accidents and losses as hackers around the world can alter the data include it in the system. The algorithms are being used for data training, and manipulation can be tricked. This can lead to the training of malicious data packets into the system. Also, such systems are served on a cloud database. Whenever the cloud service providers stop providing their services, the whole system would collapse in a single go [4].

3 BENEFITS AND NEEDS

My understanding of the technical concern with the autonomous vehicles in traffic management systems, the world is now started to shift towards non-autonomous vehicles. It has become a major challenge for the developers and technical persons to deploy a system which is requiring unified for evaluation and operations.

However, the task of creating ease for a human is also the main concern. The system should also be highly efficient in terms of response, accessibility, feasibility and other issues. A better perspective exists for the systems which have autonomous vehicles deployed with non-autonomous vehicles which contribute to a better understanding of the systems with fast and efficient data management and supervision. Eagles have been a part of this world for more than a decade [5].

These are the most vehicles can know about the route, passengers, destinations and sources and other parts of the traffic systems. A system that is composed of Efficient data tracking, manipulation, vehicles, supervision system and smart roads is

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proposed in this document.

4 NON-AUTONOMOUS TRAFFIC MANAGEMENT SYSTEM WITH AUTONOMOUS VEHICLES

A non-autonomous traffic management system with autonomous vehicles and the smart road is more likely to perform well in this world as compared to fully autonomous or non-autonomous management systems. This system would be comprised of autonomous vehicles and smart roads, which would work incoherent with a non-autonomous management system.

4.1 Real-time location tracking

This management system would evaluate the performance of all the vehicles on the road with tracking of their locations through GPS systems. The speed and motion detectors on the road but also keep a check on the speed of the vehicles. This will help to maintain the traffic rules all around. Also, most vehicles would be equipped with the ability to know about the road signs and Road rules. The cars and other vehicles would have The information about speed, road signs, upcoming traffic depressions, roadwork, busy sites and school zones [6].

4.2 Partial intelligence

In this way, by saving the cost of human resources required for the system, the system would have a more efficient vehicle for driving on the road. However, it would be a challenge to monitor all the performance and progress of the cars as they go through an autonomous traffic management system. Therefore, it has been proposed that the anonymous traffic management system with lesser artificial intelligence and Neural learning capabilities and deploy human brains for operations would be more capable of performing the same task.

4.3 Autonomous vehicles

We assume that autonomous vehicles are safer than those that are driven by a human. This is said upon the fact that these vehicles are free from psychiatry and panic issues that occurred during the traffic. Also, these machines do not require any food, sleep or rest and would not have mood swings and emotions. These machines word based on data that has been assembled through different sensors, tools, computation systems and maps. This makes these vehicles smarter than humans as they can know about the next road without being there [7].

4.4 Road signals network

With a Network of intelligent traffic signals, indicators, road signs and cameras, this system would be capable of performing all the major task concerned with the traffic management system on its own. However, major supervision of human would be required so that the system would not perform an identified or wrong computations. This is important as the system would also be sending penalty receives for the violation of traffic rules and road conduct. The system should not pass on erroneous data as this could create hassles in the law and legislation of the cities and would irritate the citizens for being charged when they have not done any violations.

4.5 Human controlled violation actions

In this way, the system would be monitored by a human to

confirm the violations and pass the violations to the receipt system which would issue the receipts for the required penalty amount and email the receipts to the owners of the autonomous vehicles. The autonomous vehicle would also notify the users about the deadline penalties issued in different violations and will act as per the instructions issued by the management system [1].

4.6 Signals control

The management system would also control the street lights and cameras, managing their operations such as switching on and off, rotations, timing settings and or her operations. Some of the calls and signals could be comprised of motion and speed detectors between help the management system to detect the violations of speed as per the identified speed limit.

4.7 Maintenance and up-gradation

The management system would also require human effort to fix the system errors, bugs and crashes excessive usage and load. Maintenance and supervision team will be deployed to supervise the performance of the system throughout and detect any technical or operational. The users of the system would also be asked to identify any errors if they encounter. In this way, the autonomous management system would change into a partially autonomous system [4].

5 DATA MODEL

This part of the report would highlight the data model of the management system. The data model is used to identify the logical structure deployed behind a system. It will include all the entities that are required for the establishment of the management system. It is essential to know the data model of a system as it helps the developers to use the available resources and catch up to all the functional requirements of the system.

The data model of the system is made after consultation with the stakeholders. The stakeholders allow The system developers and project manager to discuss all the requirements and expectations. In this way, the developer comes up with a data model for all the entities that are required. If approved, the data model is further brought into the process of development [8].

The data model of the traffic management system is essential to know all the systems and subsystems involved in the system. this data would help the developers to know about the database that is deployed behind the system. The date of all of our proposed system is broken down into various tables and groups which are composed of different entities and attributes. All of these are interrelated with the help of primary and foreign keys. The section below shows different entities involved in the system.

5.1 Entities

- **Autonomous vehicle:** The major entity involved in the management system is the autonomous vehicle which will be comprised of different centres and subsystems to perform the required operations. This driverless vehicle would drive along the road with consideration of the

rules and regulations while keeping track of the fellow vehicles on the road.

- **Passengers:** A person who rides the autonomous vehicle would be counted as the passenger. There can be one or more passengers in a single-vehicle, depending upon the capacity of the vehicle. However, the passengers would need to have national registration in order to be a part of the system. The management system will also supervise their movement and keep them aware of their location.
- **Roads:** The root of the city, as identified by the GPS, would be an entity of the management system. The autonomous vehicles would only be authorized entry to travel and move on the identified roads and streets. Any attempt to divert their direction to an identified location would immediately be directed by the management system which will respond accordingly.
- **Traffic signals:** The traffic signals are an important part of the autonomic section of the management system. The system will control the duration of traffic signals, and they are working well, having a look at the traffic depression. The traffic signals would also be composed of motion and speed detectors which will help the management system to detect any speed and road conduct violations.
- **Street lamps:** A minor entity all the management system would be the treatment which will be switched on and off as per the lighting of the area. For instance, the street lamps would be switched on as soon as the sun gets down. While, they would be switched off, as soon as the sun rises.
- **Cameras:** Cameras are an important part of the management system. They would be used to detect and confirm traffic violations and supervise traffic performance. The human monitor would check for a violation detected by the traffic signals through the camera and confirm the case. After confirmation, the cases would be forwarded to the email section, which will email the penalties receipt to the passengers.
- **Traffic depressions:** The management system will also keep track of the traffic depression and different areas at different times. It will keep a record of the frequency of the traffic depression and will notify the passengers off the area about the traffic depressions prior to the depression. This will help the passengers to take subsequent routes if they have to travel urgently. The traffic depressions but also contribute towards controlled timing for the Traffic Signals.
- **Road links:** Road links play an important part of the management system as they will help the system to control the movement of autonomous vehicles in critical areas. Road links are considered as the most likely place for accidents. Therefore, road links must be supervised properly to avoid any accidents from autonomous vehicles.
- **Pedestrian and cycled tracks:** As the vehicle travels across the city, the management system would keep the autonomous vehicle informed about the pedestrian and

cycled tracks. This information would protect the movement of people across these tracks. The vehicles would also be trained to apply brakes whenever a person is detected in front of the vehicle or the direction of the movement

- **Road speed limits:** as per the variation of speed limits, the management system would keep the autonomous vehicles about the speed limits. In this way, the system would ensure the ambient speed of the vehicles at suitable locations. The variation of the speed limit in different areas would also be conveyed to the autonomous vehicles to ensure maximum catch up to the road contact. However, if the speed limits are not conveyed due to technical complexities, the vehicles would not be charged for violation.
- **Zones:** The citizens such as school zone, hospital zone, commercial zone, residential zone, and construction zone are vital to control the movement of an autonomous vehicle. As per the rules and regulations of different zones, vehicles would be informed about their priority Rules.

5.2 System working

All of the entities included in the management system or related to each other in terms of operations. The autonomous vehicle to travel on the roads why considering the indications of traffic signals. The vehicle, carrying the passengers, would keep track of the zones, road speed limits, road links, and pedestrian and cycle tracks. The movement will be supervised by the cameras. In this way, the movement of the autonomous vehicle will be supervised by the management system by the signals and detectors through the street light and traffic signals [8].

This will help the management system to check the performance throughout. Any violations in the road rules would be identified by the centers and send to the human operators who will confirm the violation after evaluating the camera report system. The management system will also control the duration and operation of streetlights and traffic signals. The working of the camera, for instance, rotation, zoom and recording, would also be controlled.

As the real time records of the system are obtained, the traffic management system not only record the data as history but also provides an extensive overview of the system performance which helps in admin analytics, supervision and system control. The extensive QA helps to obtain better results.

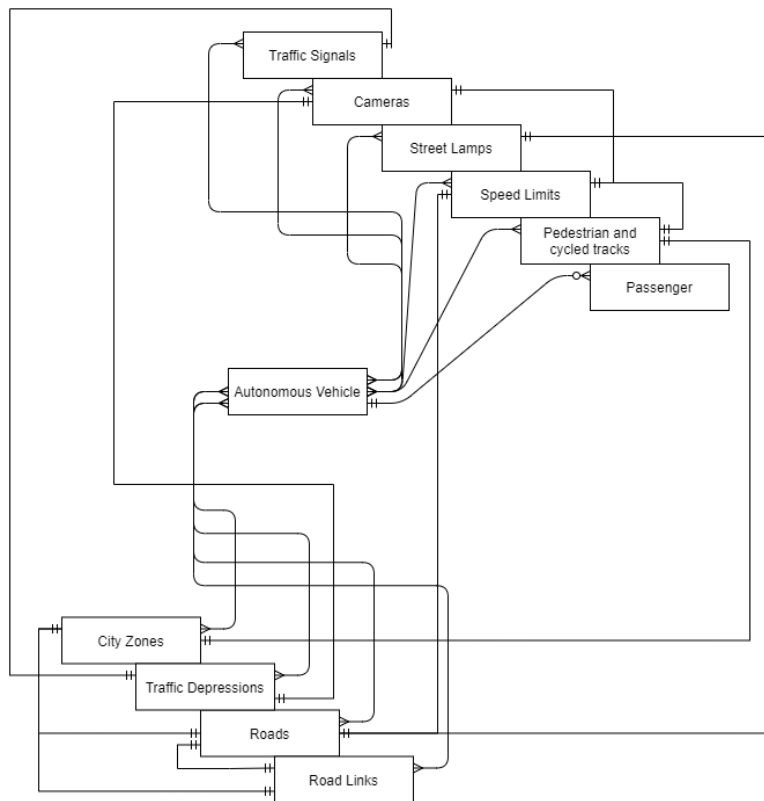


Fig. 1. ER diagram of the non-autonomous traffic management system with autonomous vehicles which shows multiple class entities and their relationships after BCNF normalization process.

5.3 ER Diagram

Navigate to the image above to see the ER diagram of the system depicting a detailed class structure and inter-class relationships obtained after BCNF normalization.

6 SYSTEM SCOPES

This traffic management system has full applications in major cities of the world. The increasing number of vehicles in the streets and roads are also giving rise to the number of accidents and rules incidents. This can only be prevented by prior management and supervision of the traffic. The perception of having autonomous management systems for the traffic can be active for sometimes. However, the technical complications and complexities involved in the system can cause a significant collapse in the system operations.

Initially, autonomous traffic management systems and vehicles were introduced into the cities. The systems were fully functional and introduced artificial intelligence and neural networking in the city plans. It contributed to the right amount of technological advancement for the global perception of smart cities [7].

For some time, the systems were highly efficient and capable. However, statistics revealed that the systems could cause significant blunders in case of technical inability. In this way, a non-autonomous system for the management of traffic with autonomous vehicles can be a significant milestone to trigger the technical inabilities. Human involvement in management systems can ultimately lead to better management and control.

This system performs primary operations. However, the system requires human involvement for maintenance, operation and up-gradation, violation case confirmation and others.

In this way, the system becomes a first attempt to attain the Milestone if smart cities with smart traffic systems and also help to avoid road accidents and zone violations around the cities. This system would also help to protect the citizens of the city who are using autonomous cars as they would only travel through the identify locations around the city. The system would also keep a record of the passengers for the vehicles they have used. This will help for the protection of the vehicles, and the traffic system.

With a high number of operations and functional capabilities, this system is expected to provide excellent support to the prevailing traffic management system in the city. The system the stakeholders believe that this system would replace and fix all the technical problems and maintenance issues concerned with the existing management system. It would also provide employment opportunities to people for maintenance, operations and system supervision [3].

7 CONCLUSION

Autonomous vehicles and management systems for the traffic have been a preference of the world for the development of smart cities. However, the technical problems and blunders that occur due to autonomous systems have created a mess in this achievement. A system of the partially autonomous traffic management system with autonomous vehicles can assist in preventing major technical flaws and issues concerned. This system would include

All the major entities included in the traffic system of the cities. The system intends to provide ease to the traffic users and ensuring their safety [4]. With real-time tracking, monitoring, operations, and supervision, this system performs the significant operations of the traffic management itself. The significant tasks concerning the law and legislation that is the identification of traffic rule violations and road conduct would be done by human operators. In this way, this system would require higher accuracy and ability to provide more services with a single system.

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