Traffic Congestion

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ENGR 102 Introduction Engineering Design

Key Words : Traffic Congestion , AI, IoT, Networking.

ABSTRACT

Traffic congestion is one of the major problems that most of the countries face nowadays. Traffic congestion mainly happens because the demand for roads is always greater than the supply because the rate of growth of vehicle ownership is always greater than the rate of provision of transport facilities. Therefore, it was suggested that government should give greater priority to rapid mass transit, construction and development of roads networks should be embarked upon, also traffic light should be made available to control the traffic flow in Cairo and implementation of IOT systems in vehicles and AI in traffic systems for more efficient control on traffic and better tracking.

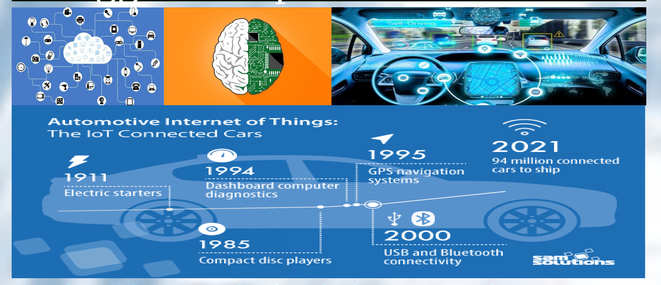
INTRODUCTION

Managing Urban Traffic Congestion Report (2007) stated that traffic congestion refers to the physical phenomena related to behavior or situations that prevent the movement of vehicles to each other in order to get the limited space on the road to achieving maximum capacity. Congestion also refers to the phenomenon in relation to the expected performance of the service road system. Congestion also is the inability to move (immobility). Congestion is a phenomenon in which long lines of vehicles moving slowly or stopped at the highway city, suburban highways or city streets. Congestion can occur every day at the same time at a specific location that is referred to as recurrent congestion or accidents during road maintenance or availability of any non-recurring congestion. Normally, congestion occurs when the road system cannot accommodate the volume of traffic at a reasonable speed, there is a conflict between the various types of traffic such as cars, trucks, buses or pedestrians and traffic control are not used efficiently. Convergence path, decreasing the capacity of a sudden, that movement is stuck or increased friction also led to increased traffic congestion.

Problem Definition

Traffic congestion is a normal phenomenon associated with transportation, especially in urban areas. Congestion is one of the problems involving road. Normally, network congestion occurs on land transport on roads. As demand approaches the capacity of a road or of the intersections along the road, extreme traffic congestion will set in. When vehicles are fully stopped for periods of time, this is colloquially known as a traffic jam or traffic snarl-up. Traffic congestion can lead to drivers becoming frustrated and engaging in road rage.

Suggested Options for Solution



- Implementing IOT technology in the transportation:

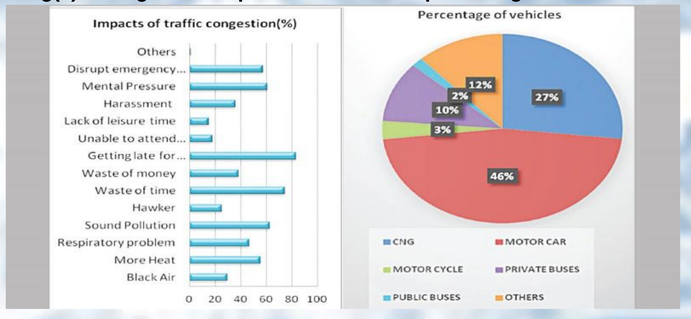
Internet and autonomy era is upon us. The IOT technology is causing a great transformation in our world with its creative applications. IOT makes us closer to full automation. Internet of Things (IOT), It's basically connection of devices with each other, with the internet and with us automatically with vast global network infrastructure where physical and virtual things have identities and are connected to each other through the internet. With vast improvement in wireless technology (RFID, load sensors, NFC, WSN, Barcode) and technology as a whole. In parallel with the networking advancement, manufacturers took the advantage of it in order to lead the autonomous transportation by connected vehicles and infotainment systems.
A self-driving electric car may be thought of like a dream from a future, but with the implementation of IoT technology, it is already applied with luxury car brands like Google, Mercedes and many others manufacturing prototypes. The revolutionary IOT movement that powers the vehicles of tomorrow is set to transform the driving experience as well as the operational capabilities of businesses with a vehicle fleet. Modern-day vehicles are already prepared for high-tech features, but the addition of internet connectivity have brought vehicles; touch-screens, sophisticated navigational systems and an array of IOT-enabled sensors that can be controlled remotely.

-Implementing AI in Traffic management and systems:

Artificial Intelligence (AI) is one of the modern terms that have appeared surprisingly in the field of technology and is being used at various places in the name of "innovation and Creativity". It is being called as the following big thing and has been thought of in order to solve many problems.
As for the definition, AI is a branch of CS that includes creation of smart machines that work as normal people and possess all the abilities as that of human brains. They can perform numerous functions such as Normal language processing and recognition, learning, planning and problem solving.
Application of AI in traffic management system: As so much as utilizing AI in open area, such as roads, is concerned, it can be considered to be a possibility to install AI enabled traffic management system as part of the infrastructure before launching the self-driving vehicles.
An AI enabled traffic management system can provide greater leeway to the self-driving vehicles as they can then be directed and controlled more by the external environment. Recently, the Delhi Traffic Police has obtained permission from the Ministry of Home Affairs to set up an intelligence traffic management system (ITMS) which will work on a radar-based monitoring with the help of Artificial Intelligence. One of the key tools within the system are going to be automatic traffic signals. It will facilitate the urban center Traffic Police to analyze the traffic pattern, volume, number of vehicles and collect them on a cloud which will be further used to manage the traffic.

ANALYSIS

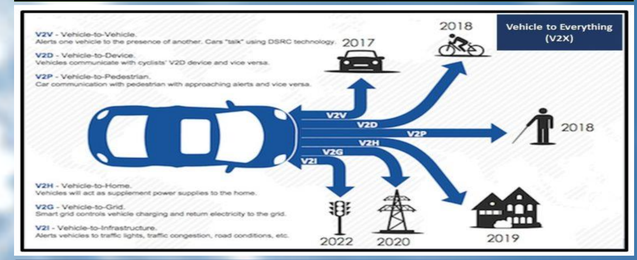
Fig(1) : Congestion impacts and vehicles percentages :



Fig(2) : Customized Cars using IoT Sales :

Fig(3) : Losses Caused by Traffic Congestion :

CONCLUSIONS & RECOMMENDATIONS



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