

I. INTRODUCTION

In today's world where technology has transcended all barriers it has now become easy to solve most human problems and one of these problems include traffic congestion. Traffic congestion has increased drastically over the years and has had negative impacts that include road rage, accidents, air pollution, wastage of fuel and most importantly unnecessary delays. One of the many causes of traffic congestion is improper traffic management systems.

Advantages of a Smart Traffic Management System

Cleaner, greener, safer, and more accessible roads are a few benefits of implementing IoT and intelligent technology.

It helps with the following:

- Reducing traffic jams and accidents on the streets
- Ensuring immediate clearance for emergency vehicles
- Facilitating safer and shorter commute times

- Reducing congestion & energy consumption at intersections
- Offering significant productivity benefits with real-time monitoring of crucial infrastructures
- Reducing operating costs with efficient traffic management processes
- Ensuring compliance with the regulations for reducing the carbon footprint
- Saving billions of gallons of fuel wasted every year
- Accurate tracking & quick recovery of lost and stolen vehicles

- **Sensors** for collecting data and sending it to a centralized cloud platform
- **Actuators** for physical devices to make necessary adjustments like – restricting the water supply in pipelines with leakages or dimming & brightening streetlights based on weather conditions.
- **Field gateways** to collect & compress data before moving it to a cloud platform.
- **Cloud gateways** enable secure data transfer between field gateways & the cloud storage of the traffic management system

The smart traffic management system captures the images of vehicles at the signals using the digital image processing technique. This data is then transferred to the control room via wireless sensors. The system also leverages BLE beacons or RFID tags to track the movement of vehicles and keep traffic congestion in control, track down stolen vehicles and even clear the road for emergency vehicles that are installed with RFID readers.

Moving Ahead

Traffic management plays a vital role in determining a city's livability. By using the tracking devices and data effectively – a city government can seamlessly regulate traffic & manage it without expanding the infrastructure. IoT in traffic management can save smart cities a significant chunk of their time, money & resources while making public transport safer and more convenient. Yet IoT will continue to gain momentum in the development & integration of infrastructure and services for future cities.

- **Data analytics** for analyzing the data from streetlight sensors on a centralized dashboard to adjust the intensity of lights
- **ML algorithms** to analyze traffic patterns & trends from historical data – stored in the data warehouse. The identified trends are then used to build predictive models for control apps. These apps modify the average vehicle speed to avoid congestion.
- **Rules** to enable actuators to automate the functioning & control of smart city objects and devices. These rules are manually defined to tell actuators what needs to be done to solve a specific problem.
- **User applications** that allow citizens to receive instant notifications in case of traffic jams and congested routes. Desktop user apps for control rooms send commands to

Functioning of Traffic Monitoring System Using IoT Capabilities

This intelligent system comprises several components, including wireless sensors, RFID tags, and BLE beacons installed at the traffic signals to monitor the movement of vehicles. A real-time data analytics tool connects the Geographic Information System (GIS-enabled) digital roadmap with control rooms for real-time traffic monitoring.

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IV CONCLUSION

This system configuration reduces huge traffic queues caused by the conventionally implemented system used in many places. The system also additionally reduces the workload of officers who would have to direct traffic in unexpected situations, or when the traffic lights are not responding. It also enables traffic lights to work continuously with less chances of malfunctioning. The system in simple words provides a simple yet effective solution to improper traffic management systems.