INTERNET OF THINGS (CS-3007)

REPORT

on

Traffic Management System

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Introduction to Traffic Management Systems

Introduction:

In the modern world, where urbanization and technological advancements continue to shape our societies, effective management of traffic has become paramount for ensuring safety, efficiency, and sustainability in transportation systems. Traffic Management Systems (TMS) represent a crucial component in addressing the challenges posed by increasing traffic volumes and urban congestion.

Definition:

A Traffic Management System (TMS) encompasses a range of tools, technologies, and strategies designed to monitor, control, and optimize the flow of vehicles, pedestrians, and other modes of transportation on road networks. These systems utilize various sensors, cameras, communication networks, and algorithms to gather real-time data, analyze traffic patterns, and implement responsive measures to enhance traffic flow and safety.

Purpose:

The primary goal of a Traffic Management System is to mitigate congestion, reduce travel times, minimize environmental impacts, and enhance overall transportation efficiency. By providing authorities with comprehensive insights into traffic conditions and enabling timely interventions, TMS can improve the quality of life for commuters, enhance economic productivity, and contribute to sustainable urban development.

Components:

Traffic Management Systems typically consist of several interconnected components, including:

Surveillance and Monitoring: This involves the deployment of cameras, sensors, and other monitoring devices to collect data on traffic volumes, speeds, and congestion levels across road networks.

Data Processing and Analysis: Collected data is processed and analyzed in real-time using advanced algorithms and traffic management software to generate actionable insights and identify traffic patterns, bottlenecks, and potential incidents.

Control and Coordination: TMS enables authorities to implement control measures such as traffic signal timing adjustments, lane management, and dynamic route guidance to optimize traffic flow and alleviate congestion.

Communication and Information Dissemination: TMS facilitates communication between traffic management centers, transportation agencies, and motorists through electronic message signs, mobile applications, and other platforms, providing real-time information on traffic conditions, incidents, and alternative routes.

Incident Management and Emergency Response: TMS supports rapid detection and response to traffic incidents, accidents, and emergencies by alerting authorities and coordinating emergency services to minimize disruptions and ensure public safety.

Benefits:

Implementing a Traffic Management System offers numerous benefits, including:

Reduced congestion and travel times
Improved road safety and reduced accident rates
Enhanced environmental sustainability through reduced emissions and fuel consumption
Increased efficiency and productivity in transportation networks
Better utilization of existing infrastructure and resources
Enhanced public satisfaction and quality of life for commuters
Conclusion:

In conclusion, Traffic Management Systems play a vital role in addressing the complex challenges associated with urban traffic congestion and transportation management. By leveraging advanced technologies and data-driven approaches, TMS empower authorities to make informed decisions, optimize traffic flow, and create safer, more sustainable urban environments for citizens and commuters.Title: IoT in Traffic Management Systems: Enhancing Efficiency and Safety

Introduction:

Traffic Management Systems (TMS) have evolved significantly with the integration of Internet of Things (IoT) technologies. IoT enables the collection, analysis, and utilization of real-time data from various sensors and devices, allowing for more efficient traffic monitoring, control, and optimization. This section provides an in-depth exploration of how IoT enhances TMS capabilities.

Sensor Networks:
IoT-enabled sensor networks form the backbone of modern TMS. These sensors, deployed across road networks, intersections, and infrastructure, collect diverse data such as traffic volume, vehicle speed, occupancy, and environmental conditions. Various types of sensors, including radar, lidar, cameras, and inductive loops, provide comprehensive insights into traffic dynamics.

Data Acquisition and Processing:
IoT facilitates seamless data acquisition from distributed sensors, ensuring high-fidelity data streams for traffic analysis. Advanced data processing techniques, including edge computing and cloud-based analytics, handle massive data volumes in real-time. Machine learning algorithms analyze incoming data to detect traffic patterns, predict congestion, and identify anomalies.

Adaptive Traffic Control:
IoT enables adaptive traffic control strategies that dynamically respond to changing traffic conditions. Smart traffic signals equipped with IoT capabilities adjust signal timings based on real-time traffic flow, prioritizing high-volume routes and minimizing congestion. Coordinated signal networks optimize signal phasing and coordination to enhance traffic throughput.

Dynamic Route Guidance:
IoT-powered dynamic route guidance systems provide motorists with real-time traffic information and alternative routes. Mobile applications, connected vehicles, and electronic message signs deliver personalized route recommendations based on current traffic conditions, accidents, and road closures, optimizing travel times and reducing congestion on congested routes.

Incident Detection and Management:
IoT enhances incident detection and management capabilities within TMS. Automated incident detection algorithms analyze sensor data to identify accidents, breakdowns, and road hazards promptly. Integration with emergency response systems enables rapid incident notification to authorities and dispatches emergency services, minimizing response times and mitigating traffic disruptions.

Vehicle-to-Infrastructure (V2I) Communication:
IoT facilitates seamless communication between vehicles and infrastructure through V2I connectivity. Connected vehicles exchange data with roadside units and traffic management centers, providing

real-time updates on vehicle positions, speeds, and intentions. V2I communication enhances situational awareness, enabling proactive traffic management and collision avoidance.

Environmental Monitoring and Sustainability:
IoT sensors monitor environmental parameters such as air quality, noise levels, and emissions in urban areas. Real-time environmental data integration into TMS enables eco-friendly traffic management strategies, such as green wave optimization and low-emission zones. IoT-driven sustainability initiatives promote cleaner transportation and improve urban air quality.The objectives of a Traffic Management System (TMS) can be summarized as follows:

Congestion Mitigation: TMS aims to reduce traffic congestion and alleviate bottlenecks in road networks by implementing strategies to optimize traffic flow and reduce delays.

Enhanced Safety: Improving road safety is a key objective of TMS, achieved through measures such as traffic signal coordination, speed management, and incident detection and management to minimize the risk of accidents and injuries.

Efficient Resource Utilization: TMS seeks to maximize the efficiency of transportation infrastructure and resources, including road capacity, traffic signals, and emergency services, to meet the demands of growing urban populations and increasing vehicle volumes.

Environmental Sustainability: By promoting smoother traffic flow, reducing idling times, and optimizing routes, TMS aims to minimize environmental impacts such as air pollution, greenhouse gas emissions, and fuel consumption associated with vehicular traffic.

Improved Mobility and Accessibility: TMS endeavors to enhance mobility for all road users, including motorists, pedestrians, cyclists, and public transport users, by providing efficient and accessible transportation options and reducing travel times.

Real-Time Monitoring and Response: TMS employs real-time monitoring and data analysis to detect traffic incidents, congestion, and anomalies promptly, enabling swift responses and interventions to minimize disruptions and maintain traffic flow.

Optimized Traffic Signal Control: Implementing adaptive traffic signal control systems within TMS allows for dynamic adjustments to signal timings based on current traffic conditions, maximizing throughput and minimizing delays at intersections.

Public Information and Communication: TMS provides timely and accurate information to the public regarding traffic conditions, alternative routes, and travel advisories through electronic message signs, mobile applications, and other communication channels to enhance situational awareness and facilitate informed travel decisions.

Emergency Response Coordination: Facilitating effective coordination between traffic management agencies and emergency response services, TMS ensures rapid response to traffic incidents, accidents, and emergencies to minimize risks to public safety and mitigate traffic disruptions.

Continuous Improvement: TMS aims to adapt and evolve in response to changing traffic patterns, technological advancements, and urban development to maintain its effectiveness in managing traffic and meeting the evolving needs of communities.Literature Review: Traffic Management Systems

Traffic management systems (TMS) are critical components of urban infrastructure, designed to address the complex challenges associated with increasing traffic volumes, congestion, and safety concerns. This literature review provides an overview of key research findings, methodologies, and advancements in the field of traffic management systems.

Traffic Flow Modeling and Simulation:

Research in traffic flow modeling and simulation has been instrumental in understanding the dynamics of traffic systems and developing effective management strategies. Various approaches, including macroscopic models, microscopic simulations, and hybrid models, have been employed to analyze traffic behavior, predict congestion, and evaluate the impacts of management interventions (Chowdhury & Santen, 2000; Treiber et al., 2000). These models provide valuable insights into traffic flow characteristics, capacity limitations, and the effectiveness of control measures.

Intelligent Transportation Systems (ITS):

Intelligent transportation systems leverage advanced technologies, including sensors, communication networks, and data analytics, to enhance the efficiency, safety, and sustainability of transportation networks. Research in ITS has focused on developing intelligent algorithms for traffic signal control, adaptive routing, incident detection, and traveler information systems (Abdel-Aty & Ekram, 2007; Menendez & Sun, 2013). These systems enable real-time monitoring, decision-making, and response to traffic conditions, improving overall system performance.

Dynamic Traffic Management Strategies:

Dynamic traffic management strategies aim to adaptively control traffic flow based on real-time conditions, optimizing throughput and minimizing congestion. Approaches such as adaptive signal control, dynamic route guidance, and congestion pricing have been investigated to manage traffic demand, allocate resources efficiently, and incentivize mode shift (Cetin et al., 2017; Zhang et al., 2019). Research indicates that dynamic strategies can significantly reduce travel times, emissions, and fuel consumption while improving overall network performance.

Connected and Autonomous Vehicles (CAVs):

The emergence of connected and autonomous vehicles presents new opportunities and challenges for traffic management systems. Research in this area explores the integration of CAVs with infrastructure and communication networks to enable cooperative traffic management, platooning, and intersection control (Alonso-Mora et al., 2017; Shladover, 2019). By leveraging vehicle-to-infrastructure (V2I) and vehicle-to-vehicle (V2V) communication, TMS can enhance safety, efficiency, and mobility in future transportation systems.

Multi-modal and Sustainable Transportation:

Efforts to promote multi-modal transportation and sustainability have spurred research into integrated traffic management solutions that accommodate diverse modes of transport and prioritize environmentally friendly travel options. Studies have investigated strategies such as transit signal priority, bike-sharing programs, and pedestrian-friendly infrastructure to improve accessibility, reduce dependency on private vehicles, and mitigate environmental impacts (Chaniotakis & Papageorgiou, 2019; Zhou et al., 2020). Integrated approaches that consider the needs of all road users are essential for creating inclusive and sustainable urban mobility systems.

In conclusion, research in traffic management systems encompasses a diverse range of topics, including traffic flow modeling, intelligent transportation systems, dynamic management strategies, connected and autonomous vehicles, and sustainable transportation. By advancing our understanding of traffic dynamics and developing innovative solutions, researchers contribute to the development of more efficient, safe, and sustainable urban transportation networks.

References:

Abdel-Aty, M., & Ekram, A. (2007). Artificial neural network approach to real-time freeway incident detection. Transportation Research Record, 2019(1), 28-36.
Alonso-Mora, J., Samaranayake, S., Wallar, A., Frazzoli, E., & Rus, D. (2017). On-demand high-capacity ride-sharing via dynamic trip-vehicle assignment. Proceedings of the National Academy of Sciences, 114(3), 462-467.

Cetin, M., Ge, S., & Papageorgiou, M. (2017). Modeling and optimization of dynamic traffic management systems: A review. IEEE Transactions on Intelligent Transportation Systems, 18(10), 2609-2624.

Chowdhury, D., & Santen, L. (2000). Statistical physics of vehicular traffic and some related systems. Physics Reports, 329(4-6), 199-329.

Menendez, M., & Sun, C. (2013). Traffic signal control: A review of the state of the art and future challenges. Transportation Research Part C: Emerging Technologies, 33, 185-193.

Shladover, S. (2019). A vision of cooperative intelligent transportation systems. IEEE Transactions on Intelligent Transportation Systems, 20(7), 2765-2776.

Treiber, M., Hennecke, A., & Helbing, D. (2000). Congested traffic states in empirical observations and microscopic simulations. Physical Review E, 62(2), 1805-1824.

Zhang, L., Wei, Y., Wu, J., & Li, K. (2019). Traffic congestion pricing strategies: A review. Transportation Research Part C: Emerging Technologies, 98, 359-376.

Chaniotakis, E., & Papageorgiou, M. (2019). Transit signal priority at isolated intersections: A critical review. Transportation Research Part C: Emerging Technologies, 107, 1-20.

Zhou, X., Ma, Z., Huang, Y., & Chen, J. (2020). A review on the sharing economy and its impacts on traffic and environment. Journal of Cleaner Production, 248, 119230.
Developing a system model for a Traffic Management System (TMS) involves outlining the key components, their interactions, and functionalities within the system. Below is a simplified system model for a TMS:

Components of TMS:

a. Sensors and Data Collection Devices: This component includes various sensors such as cameras, radar, lidar, loop detectors, and weather stations deployed across the road network to collect real-time traffic data, including vehicle speed, volume, occupancy, and environmental conditions.

b. Communication Infrastructure: The communication infrastructure facilitates the transmission of data collected by sensors to a centralized traffic management center (TMC) for processing and analysis. It includes wired and wireless communication networks, such as fiber optics, cellular networks, and dedicated short-range communication (DSRC) systems.

c. Traffic Management Center (TMC): The TMC serves as the central hub for monitoring, analysis, and control of traffic operations. It houses servers, databases, and traffic management software responsible for processing incoming data, generating insights, and implementing control measures.

d. Traffic Control Devices: This component includes traffic signals, dynamic message signs (DMS), variable speed limit signs, and lane control signals installed at intersections and along highways. These devices are controlled by the TMC and used to regulate traffic flow, provide guidance to motorists, and disseminate real-time information.

e. Control Algorithms and Decision Support Systems: Control algorithms and decision support systems analyze incoming data, predict traffic conditions, and generate control strategies to optimize traffic flow, minimize congestion, and enhance safety. These algorithms may include traffic signal optimization, adaptive ramp metering, and incident detection algorithms.

Interactions and Functionalities:

a. Data Collection and Transmission: Sensors collect real-time traffic data, which is transmitted to the TMC via the communication infrastructure.

b. Data Processing and Analysis: At the TMC, incoming data is processed, cleaned, and analyzed using advanced algorithms to detect traffic patterns, identify congestion, and predict future traffic conditions.

c. Decision Making and Control: Based on the analyzed data, control algorithms generate optimal control strategies for traffic signal timings, lane assignments, and variable message displays. These strategies are implemented in real-time to manage traffic flow and respond to incidents.

d. Information Dissemination: The TMS disseminates real-time traffic information to motorists through dynamic message signs, mobile applications, and traffic advisory systems. This information helps drivers make informed decisions and navigate around congestion or incidents.

e. Monitoring and Feedback: The TMC continuously monitors traffic conditions and system performance, collecting feedback from sensors and control devices. This feedback loop allows for adaptive adjustments to control strategies based on real-time observations.

System Objectives:

a. Congestion Mitigation: The primary objective of the TMS is to mitigate congestion and improve traffic flow efficiency across the road network.

b. Safety Enhancement: TMS aims to enhance road safety by reducing accident rates, minimizing conflicts, and facilitating smoother traffic operations.

c. Efficiency Optimization: The system seeks to optimize the utilization of transportation resources, including road capacity, infrastructure, and travel time.
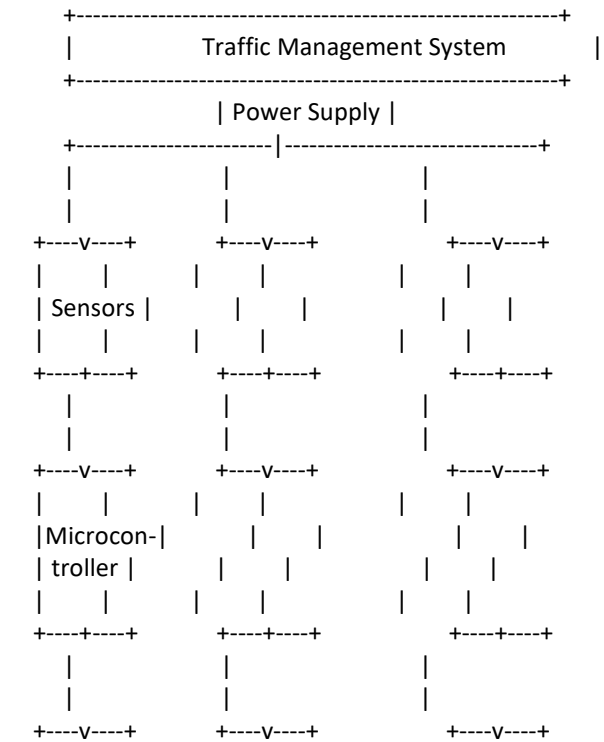
d. Environmental Sustainability: TMS contributes to environmental sustainability by minimizing emissions, reducing fuel consumption, and promoting eco-friendly travel options.
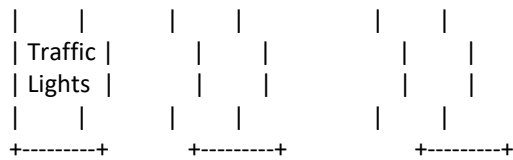
e. Real-Time Responsiveness: The system aims to respond promptly to changing traffic conditions, incidents, and emergencies, ensuring timely interventions and minimal disruptions.

This system model provides a framework for understanding the components, interactions, and objectives of a Traffic Management System, serving as a basis for further analysis, design, and implementation.Creating a circuit diagram for a traffic management system involves integrating various components such as sensors, microcontrollers, traffic lights, and communication modules. Below is a basic representation of a simplified traffic management system circuit diagram:

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    |               Traffic Management System        |
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                    | Power Supply |
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  |    |         |    |          |    |
  | Sensors |         |    |          |    |
  |    |         |    |          |    |
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  +----v----+         +----v----+          +----v----+
  |    |         |    |          |    |
  |Microcon-|         |    |          |    |
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  +----v----+         +----v----+          +----v----+
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|    |        |    |    |          |    |
| Traffic |   |    |    |          |    |
| Lights  |   |    |    |          |    |
|    |        |    |    |          |    |
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Components:

Power Supply: Provides the necessary electrical power to all components of the traffic management system.

Sensors: Various types of sensors such as vehicle detection sensors (inductive loops, infrared sensors, ultrasonic sensors) and environmental sensors (temperature, humidity) are used to collect data about traffic flow and environmental conditions.

Microcontroller: Controls the operation of the traffic management system based on input from sensors and pre-defined algorithms. It processes data, makes decisions, and sends signals to control traffic lights.

Traffic Lights: These are the visible signals that regulate the flow of traffic at intersections. The microcontroller controls the timing and sequence of the traffic lights based on the information received from sensors.

Communication Modules: Advanced traffic management systems may include communication modules for connecting to a central control system or for transmitting data wirelessly to other systems or vehicles.

This circuit diagram represents a basic setup for a traffic management system. In reality, the system may include additional components such as cameras for video surveillance, actuators for controlling barriers or gates, and communication interfaces for integration with larger transportation networks or smart city systems. Additionally, the complexity of the system may vary depending on the scale and requirements of the traffic management application.The working principle of a traffic management system (TMS) involves the coordinated operation of various components to monitor, control, and optimize traffic flow and safety. Below is a generalized explanation of the working principles involved:

Data Collection:

The TMS gathers real-time data from various sources, including:
Sensors: Vehicle detection sensors, environmental sensors, and other monitoring devices collect data on traffic volume, vehicle speeds, occupancy, environmental conditions, and other relevant parameters.
Cameras: Closed-circuit television (CCTV) cameras capture video footage of traffic conditions, allowing for visual inspection and monitoring of roadways.
Communication Networks: Data is transmitted over communication networks, such as wired or wireless networks, to central control centers for analysis.
Data Analysis and Processing:

The collected data is processed and analyzed in real-time using advanced algorithms and traffic management software. This analysis includes:
Identifying traffic patterns, congestion hotspots, and bottlenecks.
Detecting incidents, accidents, and abnormal events.
Predicting future traffic conditions based on historical data and current trends.
Decision Making:

Based on the analysis of incoming data, the TMS makes informed decisions to optimize traffic flow and safety. This may include:
Adjusting traffic signal timings at intersections to minimize delays and congestion.
Implementing dynamic route guidance to divert traffic away from congested areas or incidents.

Coordinating responses to incidents, accidents, and emergencies, such as dispatching emergency services or redirecting traffic.
Control and Implementation:

The TMS implements control measures to execute the decisions made based on data analysis. This involves:
Sending control signals to traffic signal controllers to adjust signal timings or activate specific signal phases.
Displaying real-time traffic information and advisories on variable message signs (VMS) to inform motorists and guide their travel decisions.
Communicating with connected vehicles and mobile applications to provide personalized route recommendations and updates.
Monitoring and Feedback:

Throughout the process, the TMS continuously monitors traffic conditions and the effectiveness of implemented measures. This allows for:
Real-time adjustments to control strategies based on evolving traffic patterns and feedback from sensors and cameras.
Evaluation of system performance and the identification of areas for improvement.
Integration and Collaboration:

The TMS may integrate with other transportation management systems, such as public transit systems, emergency response systems, and intelligent transportation systems (ITS), to facilitate coordinated operations and enhance overall system efficiency.
By following these working principles, a traffic management system can effectively manage traffic flow, improve safety, and optimize transportation operations in urban and highway environments.The analysis of a traffic management system (TMS) involves evaluating various factors to assess its effectiveness in achieving its objectives. Below are key aspects to consider in the result analysis of a TMS:

Traffic Flow and Congestion:

Evaluate changes in traffic flow patterns, congestion levels, and travel times before and after implementing TMS interventions. Look for improvements in overall traffic flow, reduction in congestion hotspots, and smoother traffic operations.
Safety Performance:

Analyze trends in traffic accidents, incidents, and fatalities to assess the impact of TMS on road safety. Look for reductions in accident rates, severity of crashes, and improvement in intersection safety.
Travel Time Reduction:

Measure changes in average travel times, delay per vehicle, and queue lengths to gauge the effectiveness of TMS strategies in reducing travel delays and improving mobility for commuters.
Environmental Impact:

Assess the environmental benefits of TMS interventions, such as reductions in vehicle emissions, fuel consumption, and air pollution levels. Monitor changes in air quality, noise levels, and carbon emissions to quantify the environmental improvements achieved.
Operational Efficiency:

Evaluate the operational efficiency of TMS components, including traffic signal control, incident management, and emergency response coordination. Measure response times to incidents, effectiveness of signal timing adjustments, and coordination with other transportation agencies.
User Satisfaction:

Gather feedback from motorists, pedestrians, cyclists, and public transport users to assess their satisfaction with TMS interventions. Conduct surveys, interviews, or focus groups to understand user perceptions, preferences, and experiences with the system.
Cost-Effectiveness:

Analyze the cost-effectiveness of TMS investments by comparing the costs of implementation and operation with the benefits achieved, such as reduced travel times, improved safety, and environmental gains. Consider factors such as return on investment (ROI), cost per accident prevented, and cost per unit of emissions reduced.
Adaptability and Scalability:

Evaluate the flexibility and scalability of the TMS to adapt to changing traffic conditions, technological advancements, and future growth in traffic volumes. Assess the system's ability to integrate new technologies, expand coverage area, and accommodate evolving transportation needs.
System Reliability and Resilience:

Assess the reliability and resilience of TMS components to withstand potential failures, disruptions, or adverse weather conditions. Measure system uptime, response to system failures, and backup measures in place to ensure continuous operation.
Comparison with Benchmarks and Standards:

Compare the performance of the TMS against established benchmarks, industry standards, and best practices in traffic management. Benchmarking against similar systems in other jurisdictions or cities can provide valuable insights and identify areas for improvement.
By conducting a comprehensive analysis across these key areas, stakeholders can assess the effectiveness, efficiency, and impact of the traffic management system and identify opportunities for further optimization and enhancement.In conclusion, the implementation of a traffic management system (TMS) represents a critical step towards addressing the complex challenges posed by urban congestion, traffic safety, and environmental sustainability. Through the integration of advanced technologies, data-driven strategies, and coordinated interventions, TMS endeavors to optimize traffic flow, enhance safety, and improve overall transportation efficiency in urban and highway environments.

The effectiveness of a TMS is evident in its ability to mitigate congestion, reduce travel times, and minimize delays for commuters. By leveraging real-time data from sensors, cameras, and communication networks, TMS enables adaptive traffic control strategies, dynamic route guidance, and incident management, resulting in smoother traffic operations and improved mobility for all road users.

Furthermore, the safety benefits of TMS are substantial, as evidenced by reductions in accident rates, severity of crashes, and intersection conflicts. Through proactive incident detection, emergency response coordination, and enhanced traffic signal control, TMS plays a vital role in preventing accidents, minimizing risks to public safety, and creating safer road environments for pedestrians, cyclists, and motorists.

Moreover, TMS contributes to environmental sustainability by optimizing traffic flow, reducing vehicle emissions, and promoting eco-friendly transportation modes. By minimizing idling times, optimizing routes, and encouraging modal shifts, TMS helps mitigate air pollution, greenhouse gas emissions, and environmental degradation, thereby contributing to cleaner and healthier urban environments.

In conclusion, the implementation of a traffic management system represents a multifaceted approach to addressing the complex challenges of urban transportation. By harnessing the power of technology, data analytics, and collaborative strategies, TMS facilitates efficient, safe, and sustainable mobility solutions that enhance the quality of life for citizens, improve economic productivity, and promote the long-term viability of urban infrastructure. As cities continue to evolve and grow, the importance of effective traffic management systems will only continue to increase, making them

indispensable tools for modern transportation planning and management.Here are some references on the topic of traffic management systems:

References:

https://www.sciencedirect.com/science/article/pii/S2589791820300207

https://relevant.software/blog/iot-in-transportation-smart-traffic-control-system/

https://www.pantechsolutions.net/iot-based-intelligent-traffic-management-system

https://iopscience.iop.org/article/10.1088/1742-6596/2027/1/012017/pdf

https://www.hologram.io/blog/7-ways-iot-can-improve-traffic-management/

https://www.infosysbpm.com/blogs/retail-cpg-logistics/iot-in-transportation-all-you-need-to-knowabout-smart-traffic-control-systems-using-iot.html

https://www.rishabhsoft.com/blog/smart-traffic-control-using-iot

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