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DEVELOP A "SMART TRAFFIC LIGHT" COMPUTER MODEL TO PREVENT TRAFFIC JAMS AT INTERSECTIONS

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Annotatsiya:
Chorrahalardagi tirbandlik shaharlarning harakatchanligi va samaradorligiga ta'sir qiluvchi keng tarqalgan muammodir. Ushbu ilmiy maqola chorrahalarda tirbandliklarning oldini olish va transport oqimini optimallashtirishga qaratilgan yangi “aqlli svetofor” kompyuter modelini ishlab chiqish va baholashni taklif qiladi. Model real vaqt rejimida ma'lumotlarni yig'ish, sun'iy intellekt algoritmlari va signal vaqtlarini dinamik ravishda sozlash va avtotransport vositalariga shoshilinchlik asosida ustuvorlik berish uchun moslashuvchan boshqaruv strategiyalarini o'z ichiga oladi. Simulyatsiya sinovi tirbandlikni kamaytirish va qatnov tajribasini yaxshilashda modelning samaradorligini baholash uchun o'tkaziladi. Natijalar kechikishlarning sezilarli darajada kamayganini, transport oqimi samaradorligini va yo‘l harakati xavfsizligini kuchaytirganini ko‘rsatadi. Aqlli svetofor kompyuter modeli tirbandliklarni faol boshqarish va shahar transport tizimlarini yaxshilashda va'da beradi.

Kalit so'zlar: aqlli svetofor, tirbandlik, chorrahalar, kompyuter modeli, sun'iy intellekt, simulyatsiya testi.

Introduction

Congestion at intersections is a common problem in modern urban environments, causing delays, frustration among commuters, and increased carbon emissions. The development of a "smart traffic light" computer model to solve this problem holds significant promise. Using advanced technologies such as real-time data collection, artificial intelligence algorithms, and adaptive control strategies, this model aims to prevent congestion and optimize traffic flow at intersections. Traditional traffic light systems respond to changing traffic volumes or works on a fixed schedule that does not take into account unexpected events. In contrast, a smart traffic light system uses real-time data from sensors, cameras, and vehicle-to-infrastructure communication to dynamically analyze traffic patterns. Using AI algorithms and optimization techniques, the system can adjust signal times in response to changing conditions, prioritize vehicles based on their urgency, and optimize overall traffic flow efficiency.[5]

MATERIALS AND METHODS.

In today's fast-paced world, cities often suffer from traffic congestion, which leads to delays, frustration and increased pollution. Innovative solutions are needed to solve this problem, and one of the promising technologies on the horizon is the smart traffic light system. Traditional traffic light systems operate at fixed time intervals or on key sensors that are often inefficient

and contribute to traffic congestion, especially during peak hours. possible In contrast, a smart traffic light system uses the power of advanced technologies such as artificial intelligence (AI), machine learning and real-time data analysis to optimize traffic flow at intersections.[4]

The intelligent traffic light system is based on a sophisticated computer model that continuously monitors traffic conditions, traffic density and traffic patterns at intersections. Using AI algorithms, the system can adapt to changing traffic dynamics, adjusting signal times and priorities to reduce congestion and improve traffic efficiency in real time. One of the key features of a smart traffic light system is the ability to communicate with vehicles equipped with smart sensors or connected technology.This two-way communication allows the system to prioritize buses, emergency vehicles or pedestrians, ensuring smooth and safe passage through intersections. In addition, the system can predict traffic movements based on historical data, special events or weather conditions. can do, which allows to actively control the flow of traffic and prevent possible obstacles. By optimizing signal times, reducing unnecessary stops, and synchronizing lights along major corridors, a smart traffic light system can significantly improve overall traffic flow and reduce travel time for commuters. In addition, a smart traffic light system is environmentally friendly because it helping to reduce downtime, fuel consumption and stop-and-go emissions. By encouraging more efficient traffic flow, the system contributes to a greener and more sustainable urban environment. As cities around the world continue to grow and expand, the implementation of smart traffic light systems is leading to smarter, more efficient transportation networks is an important step. Using advanced technologies to revolutionize traffic management at intersections, these systems have the potential to change the way we move around cities, making our journeys faster, safer and more sustainable. [3]

RESULTS AND DISCUSSIONS

We can use the following components and strategies to develop a computer model of a smart traffic light to avoid congestion at intersections:

1. Real-time data collection: Use sensors, cameras, and other data-gathering devices at intersections to collect real-time information about traffic density, vehicle speed, and traffic patterns.
2. Artificial Intelligence Algorithms: Use AI algorithms to analyze real-time data and predict traffic patterns. Machine learning models can be trained to understand traffic flow and make dynamic decisions.
3. Traffic light control system: Development of a control system that can adjust signal times based on data analysis and predictions. The system should prioritize emergency vehicles, public transport and pedestrians to ensure efficient traffic flow.
4. Vehicle-to-infrastructure communication: Enable communication between smart vehicles and the traffic light system to provide additional information about vehicle location, speed and intentions. This information helps to further optimize signal times.
5. Adaptive control strategies: implement adaptive control strategies that can dynamically change signal times based on real-time traffic conditions. This includes extending green lights for high-volume roads or adjusting cycle lengths to reduce congestion.[2]

6. Optimization techniques: Use optimization techniques such as genetic algorithms or reinforcement learning to find the most efficient signal timing configuration that minimizes delays and maximizes throughput.
7. Simulation and testing: Simulate a smart traffic light system in a virtual environment to test different scenarios and fine-tune algorithms before deployment. Conduct field tests to evaluate system performance under real-world conditions.
By combining these components and strategies, we can develop a sophisticated intelligent traffic light system that effectively avoids congestion at intersections. This model uses advanced technologies to create a dynamic and flexible traffic management system that increases efficiency, reduces delays and improves the overall traffic flow in cities.[1]

CONCLUSION

In conclusion, a smart traffic light system is a game-changer in urban traffic management, offering a proactive, data-driven approach to ease congestion, improve mobility and improve the overall quality of life for city dwellers. With the continued advancement of technology and the ever-increasing number of intelligent transportation solutions, the future of transportation management looks brighter than ever.

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