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AI-Based Traffic Control System with Dynamic Footpath Conversion

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Abstract: *This paper presents a detailed study of an AI-based traffic control system integrated with dynamic footpath conversion. The system utilizes real-time data from sensors and cameras to manage traffic signals efficiently while improving pedestrian safety. Artificial Intelligence and Machine Learning algorithms help in predicting congestion and dynamically allocating road space. This approach enhances smart city infrastructure and optimizes urban mobility*

Keywords: *AI-based traffic control system*

I. INTRODUCTION

Urban areas are facing severe traffic congestion due to rapid population growth and increased vehicle usage. Traditional traffic systems operate on fixed timing, which leads to inefficiencies during peak and non-peak hours. To address this issue, AI-based traffic control systems are introduced. These systems adapt to real-time traffic conditions and make intelligent decisions to improve flow and reduce waiting time. Additionally, pedestrian safety is often neglected. This system introduces dynamic footpath conversion, allowing unused road lanes to be converted into pedestrian pathways when traffic is low.

II. PROBLEM STATEMENT

Existing traffic systems suffer from several limitations:- Fixed signal timings leading to congestion.-Inefficient utilization of road space.- Lack of pedestrian-friendly infrastructure.- Inability to respond to real-time traffic variations.

III. OBJECTIVES

- To design an intelligent traffic control system using AI.
- To reduce congestion and waiting time
- To improve pedestrian safety through dynamic footpath conversion.
- To optimize road space utilization .

IV. METHODOLOGY

4.1 Data Collection

Traffic data is collected using CCTV cameras, IoT sensors, and GPS systems. These devices monitor vehicle count, speed, and density in real-time

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4.2 AI Processing

Machine Learning algorithms analyze traffic patterns and predict congestion. Techniques such as neural networks and reinforcement learning are used to continuously improve system performance.

4.3 Signal Optimization

Traffic signals are dynamically controlled based on real-time data. High-density lanes receive longer green signals, while low-density lanes are adjusted accordingly.

4.4 Footpath Conversion

During low traffic conditions, certain road lanes are converted into pedestrian pathways. Smart barriers and LED indicators guide pedestrians safely.

V. ADVANTAGES

- Reduces traffic congestion.
- Saves time and fuel.
- Enhances pedestrian safety.
- Promotes smart city development.

VI. APPLICATIONS

This system can be implemented in metropolitan cities, smart city projects, highways, and urban intersections.

VII. CONCLUSION

The AI-based traffic control system with dynamic footpath conversion provides an innovative solution to urban traffic challenges. By combining AI and smart infrastructure, cities can achieve better mobility, safety, and efficiency.

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