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CENTRALIZED CCTV AND GPS-BASED AUTOMATED TRAFFIC LIGHT SYSTEM (CATS)

ABSTRACT
Urban traffic congestion and emergency delays remain critical challenges as traditional fixed-time signals fail to adapt to real-time conditions. This paper proposes the Centralized CCTV and GPS-Based Automated Traffic Light System (CATS), a smart, adaptive framework integrating computer vision, IoT, GPS, and AI. CCTV cameras monitor vehicle density, pedestrian flow, and incidents, while each traffic light is equipped with self-localizing GPS for plug-and-play installation. An IoT-enabled mesh network connects traffic lights, enabling them to share data, synchronize signals, and maintain local decision-making through distributed caching. A centralized hub with AI algorithms dynamically adjusts cycles, detects violations, and generates green corridors for emergency vehicles. By combining CCTV, IoT communication, and GPS intelligence, CATS delivers a scalable, fault-tolerant, and future-ready solution that reduces congestion, enhances emergency response, and forms the backbone of next-generation smart city mobility.
Keywords: CATS, CCTV Analytics, IoT Mesh, GPS Self-Localization, Adaptive Traffic Lights, Emergency Corridor, Smart Cities.

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