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Intelligent Wheel Jammer Tracking and Management System

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Abstract

Automatic detection of road signs has recently received attention from the computer vision research community. The main objective of this system is to detect signs from a moving vehicle. Road Traffic Sign Detection is a technology by which a vehicle is able to recognize the traffic signs put on the road e.g. “speed limit” or “children” or “turn ahead”. Consider a condition user is driving a car at night or in rainy season then it is not possible for driver to keep watch on each and every road symbol or the message plates like turn, speed breaker, school, diversion etc. This is very useful project in this condition here we will use one signal transmitter in each and every symbol or message plate at road side and whenever any vehicle passes from that symbol the transmitter situated inside the vehicle will receive the signals and display proper message or the symbol details on LCD connected in car. Now driver can concentrate on driving.

INTRODUCTION

Vehicle serve as an essential mode of transportation for travellers, offering a reliable means to reach various destinations. Each Vehicle operates on a predetermined route with specific stops, accompanied by a scheduled timetable that outlines arrival times at each location. However, due to their size and the complexities of navigating through traffic,buses can experience delays, particularly when previous passengers cause hold-ups or when unforeseen mechanical issues arise. The challenge of missing a bus is significant, as alternatives may be limited, creating inconvenience for commuters.To address these challenges, a new system has been developed to enhance Vehicle operations by effectively recording and monitoring the usage of wheel locks or jammers throughout the day. This innovative system is designed to provide evidence and improve oversight of the bus generation process. It features an advanced wheel lock/jammer equipped with a communication module and a backup battery, ensuring continuous interaction with a centralized storage system even during network outages. Additionally, the integration of a geo-location sensor allows for real-time tracking of bus locations, significantly improving operational control and efficiency. This new system can create many wonders in keeping a track of rule breaking vehicles. It consists of a wheel lock which is a device that is used in situations where it is necessary to inspect a parked car. This hardware is fitted on to the wheel lock in such a manner that it

works according to the lock state or unlock state of the device itself. The hardware includes the GPS that is connected to the server and thus it is used as a covert unit which continuously or by any interrupt to the system, sends the location data to the monitoring unit.When the wheel lock is put on the vehicle, the location data from tracking system and sends the GPS coordinates to the specified server and keeps the traffic police updated about the actions of the vehicle. The status of the lock or unlock state of the wheel lock will help to identify the number of times wheel lock was used, for how much time was the wheel lock in active state and the required location. the Anti-Theft Wheel Lock Tracking System is designed to serve as an effective tool in monitoring and managing rule-violating vehicles. This system integrates a GPS-based activity tracker within a wheel lock mechanism, enabling authorities to track vehicles parked in no-parking zones and streamline enforcement actions. The system's hardware, embedded within the wheel lock, includes a GPS module that transmits real-time location data to a central monitoring unit. This ensures continuous updates on the vehicle's status while operating discreetly to prevent unauthorized removal or tampering. When the wheel lock is engaged, the system records and transmits GPS coordinates to the designated server, allowing authorities to stay informed about the location and status of the locked vehicle. Additionally, by tracking the locked and unlocked states of the wheel lock, valuable data can be gathered regarding its usage frequency, duration, and enforcement efficiency.

LITERATURE SURVEY

Several research studies have explored the integration of IoT, cloud computing, GPS tracking, and advanced security mechanisms in parking management and enforcement systems.[1]. In a smart parking management system utilizing IoT sensors and cloud computing was developed to enable real-time data collection for efficient parking space utilization and traffic flow optimization [2]. The study highlighted the role of cloud computing in remote monitoring and dynamic resource allocation, emphasizing its impact on reducing congestion and promoting sustainable urban development [3].Additionally, examined the implementation of advanced anti-theft mechanisms in parking security, integrating biometric access controls and tamper-proof locking systems to prevent unauthorized access and vehicle theft [4]. The study emphasized the psychological impact of enhanced security measures in fostering trust among vehicle owners while reducing vehicle-related crimes and associated costs. Similarly, introduced an intelligent wheel lock system with automated monitoring and remote control, streamlining parking enforcement and improving compliance with regulations [5]. The study demonstrated its potential in reducing unauthorized parking, alleviating traffic congestion, and promoting eco-friendly urban mobility.Another study explored the integration of GPS technology with electronic locking mechanisms for efficient parking enforcement.[6]. By utilizing real-time GPS tracking, the system enabled effective monitoring of parking violations, minimizing disputes and improving traffic management. The study also highlighted the potential for enhanced revenue collection through automated enforcement mechanisms.[7] Furthermore, investigated advanced vehicle tracking and security measures, incorporating real-time surveillance and tracking systems to deter theft and vandalism in urban parking spaces[8]. The study emphasized the role of these security measures in supporting law enforcement agencies while contributing to a safer urban mobility ecosystem.These studies demonstrate the transformative potential of IoT, GPS tracking, and intelligent security systems in parking management[9]. The proposed system builds on these findings by integrating advanced technologies to enhance monitoring, security, and enforcement, ultimately improving urban transportation efficiency.[10].

OBJECTIVE

The primary objectives of this project aim to enhance the effectiveness of urban transportation through the integration of advanced technologies. By focusing on the development and implementation of a sophisticated monitoring system, the project seeks to address the challenges faced by current bus transportation and parking management.

1. **To Enhance Monitoring**: Develop a comprehensive system for recording and monitoring the usage of wheel locks/jammers, providing accurate data for operational analysis and decision-making.
2. **To Improve Security**: Integrate advanced anti-theft mechanisms, including biometric access controls and tamper-proof systems, to enhance the security of vehicles in urban parking spaces.
3. **To Facilitate Real-Time Tracking**: Implement a geo-location sensor for real-

time tracking of vehicles, allowing for efficient management and immediate response to unauthorized usage.

4. **To Optimize Parking Management**: Utilize IoT and cloud computing technologies to streamline parking operations, improve compliance with regulations, and reduce instances of unauthorized parking.
5. **To Minimize Congestion**: Promote smoother traffic flow and reduce the time spent searching for parking through better resource allocation based on real-time data.
6. **To Foster Sustainable Practices**: Encourage eco-friendly urban transportation by decreasing emissions associated with unnecessary driving and optimizing parking resource usage.
7. **To Support Data-Driven Decisions**: Utilize collected data to inform stakeholders about usage patterns and areas for improvement in urban parking and transportation systems.

PROPOSED WORK

The need of Anti-Theft Wheel Lock Systems is to monitor the use of traditional devices for vehicles are encroached in parking places. The system will monitor by collecting the data of the number of times the wheel lock/jammer was used on a specific day. The Anti-Theft Wheel Lock Tracking System would consist of the wheel lock which has enhanced performance-based design and also efficient technical performance which lacks in traditional equipment. The Anti-Theft Wheel Lock Tracking System would also consist of processing, communication, tracking modules which are composed of Arduino, Sim module, GIS module.

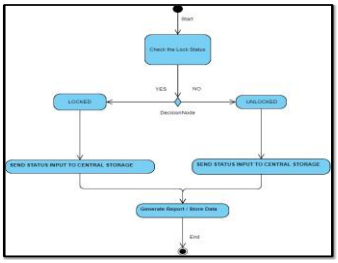

Fig:1 Activity diagram of the proposed system

METHODOLOGY

The development of the Advanced Wheel Lock/Jammer System follows a structured approach that integrates modern technologies to enhance vehicle monitoring and security in urban transportation. The design phase focuses on creating a 3D-printed wheel jammer casing that houses essential electronic and mechanical components. The system is powered by a rechargeable battery with a Mini DC Digital Voltage Meter to display live voltage levels.A DC motor with a worm gear mechanism is employed to control the opening and closing of the wheel lock. The motor is driven by a DC motor driver, which is connected to an Arduino Uno microcontroller for efficient operation. To enable wireless control, the system integrates an HC-05 Bluetooth module, allowing communication between the wheel jammer and a mobile application.

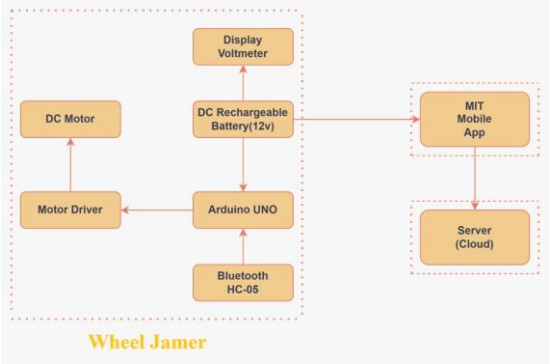

Fig 2: Block diagram

EXPECTED RESULT

The **Anti-Theft Wheel Lock Tracking System** was developed to enhance parking management and vehicle security by integrating **IoT, GPS, and cloud computing**. The system successfully **monitors and records** the usage of wheel locks in real-time, providing **traffic authorities** with valuable data to track parking violations.

Fig 3: Project Hardware with Mobile App and Cloud Dashboard

EXPECTED CONCLUSION

The implementation of the advanced wheel lock/jammer system, integrated with geo-location tracking and communication capabilities, represents a significant advancement in the management and security of urban transportation. By enabling real-time monitoring and recording of the wheel lock's

usage, the system provides critical evidence to improve operational control and enhance safety. Drawing insights from existing literature, the integration of IoT sensors, cloud computing, and GPS technology has been shown to optimize parking management, reduce congestion, and foster a safer urban environment. The emphasis on automated monitoring and anti-theft mechanisms aligns with contemporary trends in smart city initiatives, paving the way for more efficient resource allocation and better compliance with parking regulations.

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