**TITLE:SMART PARKING**

**ABSTRACT:**

As urbanization accelerates, the demand for efficient and sustainable transportation solutions becomes increasingly critical. Smart parking systems have emerged as a transformative technology to address the challenges associated with urban mobility. This abstract presents an overview of a state-of-the-art Intelligent Parking Management System designed to enhance parking efficiency, reduce congestion, and contribute to the creation of smarter, more connected cities.

The proposed system integrates cutting-edge technologies such as Internet of Things (IoT), sensor networks, data analytics, and mobile applications to create a seamless and user-friendly parking experience. Utilizing a network of smart sensors deployed across parking spaces, real-time data on space availability is collected and transmitted to a centralized platform. This information is then processed using advanced algorithms to optimize parking space allocation and facilitate effective traffic management.

Data Collection: Deploy sensors within parking spaces to collect data. These sensors can monitor things like occupancy status, temperature, and humidity. Data can be sent to a central server.

Data Preprocessing: Clean and preprocess the sensor data to ensure accuracy. This may involve handling missing values, outliers, and noise.

Feature Engineering: Extract relevant features from the sensor data. For parking systems, this might include factors like usage patterns, environmental conditions, and historical maintenance records.

Predictive Maintenance Model: Train a predictive maintenance model, such as a machine learning algorithm (e.g., regression, decision trees, or deep learning), to predict when maintenance is likely to be needed. This model could use historical data to identify patterns and anomalies.

Thresholds and Alerts: Set thresholds for sensor data that trigger maintenance alerts. For instance, if the sensor data indicates a significant increase in the number of vehicles entering and exiting a parking lot, this could indicate the need for maintenance soon.

Continuous Monitoring: Continuously monitor the sensor data and run it through your predictive maintenance model. If the model predicts that maintenance is likely to be needed soon, generate maintenance alerts.

Maintenance Planning: Once an alert is triggered, the system can plan for maintenance activities. It can schedule repairs, replacements, or other necessary actions.

Feedback Loop: Collect data on the maintenance actions taken and their outcomes. This data can be used to further improve the predictive maintenance algorithm.

Integration: Integrate the predictive maintenance system with the overall smart parking system, allowing for real-time notifications to parking operators and maintenance teams.

User Notifications: Consider sending notifications to users if a maintenance event will disrupt parking availability, keeping them informed.

Cost Analysis: Keep track of maintenance costs and benefits to ensure the predictive maintenance system is cost-effective