NAAN MUDHALVAN

JEPPIAAR ENGINEERING COLLEGE

PHASE 2

DEPARTMENT OF AI&DS

2ND YEAR

TRAFFIC FLOW OPTIMIZATION

Parking Management following system approach for the city

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Innovation & Problem Solving

Title: Parking Management following system approach for the city

Innovation in Problem Solving

The objective of this phase is to explore and implement innovative solutions for urban parking problems using a systematic approach. Our aim is to optimize city-wide parking through integration of modern technologies such as IoT, AI, and real-time data analytics.

Core Problems to Solve

- Unavailability of Real-Time Parking Information – Citizens waste time and fuel searching for available spots.
- Inefficient Utilization of Parking Spaces – Spaces remain vacant or misused due to lack of monitoring.
- Traffic Congestion Due to Roadside Parking – Improperly parked vehicles contribute to bottlenecks.
- Revenue Leakage in Public Parking Systems – Manual systems lack transparency and accountability.

Innovative Solutions Proposed

Real-Time Parking Availability Detection

Solution Overview: Install IoT sensors in parking areas to track occupancy and guide drivers through a mobile app or digital boards.

Innovation: The system dynamically updates availability using cloud-based synchronization.

Technical Aspects:

- IoT-based ground sensors or overhead cameras.
- AI-powered algorithms for pattern recognition and forecasting availability.
- Cloud dashboard for city authorities.

Dynamic Pricing and Reservation System

Solution Overview: Introduce a mobile app to reserve parking and implement demand-based pricing.

Innovation: Encourage turnover and maximize space usage during peak times.

Technical Aspects:

- Mobile and web app for users.
- Payment gateway integration.
- Price algorithms based on location, demand, and time.

AI-Driven Enforcement and Monitoring

Solution Overview: Use ANPR (Automatic Number Plate Recognition) cameras to detect violations and monitor parked vehicles.

Innovation: Automate fine issuance and enhance law enforcement.

Technical Aspects:

- Camera networks integrated with AI for violation detection.
- Cloud database of registered vehicles.
- SMS or app notifications for users and officials.

Data Analytics for Policy Making

Solution Overview: Aggregate parking data for authorities to analyze usage trends and plan better infrastructure.

Innovation: Data-driven governance for long-term parking policy and planning.

Technical Aspects:

- Big data analytics platform.
- GIS mapping of parking trends.
- Predictive modeling for future demand.

Implementation Strategy

- Pilot Sensor Installation – Install smart sensors in select zones to gather baseline data and integrate real-time updates with a central dashboard.
- Develop User App and Admin Portal – Build a responsive app for users to find, reserve, and pay for parking; create a secure backend for city officials.
- Deploy AI Monitoring Systems – Install camera systems with ANPR to automate surveillance and enforcement.
- Policy Integration and Stakeholder Collaboration – Collaborate with municipal bodies, law enforcement, and private operators for full-scale deployment.

Challenges and Solutions

- **Hardware Maintenance:** Regular checks and contracts with vendors to ensure sensor reliability.
- **Public Adoption:** Awareness campaigns and initial incentives for users to adopt the system.
- **Data Privacy Concerns:** Implement robust encryption and data management policies aligned with smart city standards.
- **Cost and Funding:** Explore public-private partnerships and government smart city grants.

Expected Outcomes

- Reduced Traffic Congestion – Faster parking reduces idle driving time.
- Better Revenue Collection – Digital payments and audit trails improve accountability.
- Enhanced Urban Planning – Insights from data help build more efficient infrastructure.
- Improved User Experience – Stress-free parking via real-time availability and reservations.

Next Steps

- Pilot Launch in High-Demand Zones – Monitor performance and user feedback.
- System Refinement – Improve features, UI, and prediction accuracy based on feedback.
- City-Wide Rollout – Expand to other areas with integrated enforcement and policy support.