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SMART TRAFFIC AND PARKING MANAGEMENT

TEAM NO: 04

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CLUB NAME: Technology for Education

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1. Problem Statement:

- Urban cities face increasing traffic congestion, inefficient parking utilization, and illegal parking due to the absence of real-time parking visibility.
- Drivers waste significant time searching for parking, leading to fuel consumption, pollution, and road blockages.
- Traditional parking systems cannot dynamically update availability or guide users efficiently.

There is a need for a real-time, AI-driven solution that automates parking detection, allocation, and booking for better urban mobility.

2. Existing Solution:

- Manual parking supervision with guards.
- Sensor-based parking systems (IR sensors, ultrasonic sensors).
- Basic mobile apps showing estimated availability without real-time accuracy.
- RFID/FastTag-like automatic payment booths in some parking zones.

3. Limitations in Existing Solution:

- Lack of real-time accuracy due to reliance on sensors or manual updates.
- High installation and maintenance cost of sensor-based systems.
- No intelligent prediction or AI detection of parking occupancy.
- Limited user features—most apps do not support pre-booking, extension, or real-time alerts.
- No unified platform integrating detection, booking, and payment seamlessly.

4. Proposed Solution:

A real-time, AI-powered smart parking system using computer vision and YOLO object detection to identify empty and occupied parking slots. The solution updates parking status in a database and provides users with a mobile app to:

- Search available spaces (seat-selection style like RedBus)
- Pre-book and pay digitally
- Extend parking duration
- Receive alerts before expiration
- Enable easy, automatic payments through unique ID (similar to FASTag)

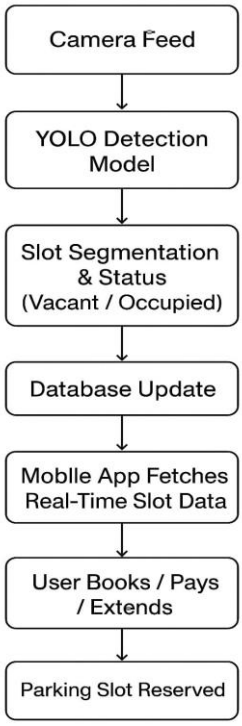
This system enhances parking efficiency, reduces congestion, and enables smart, data-driven urban traffic management.

5. Components / Technology Used:

- YOLO (You Only Look Once) for object detection
- Tinkercad simulation for prototype slot segmentation
- OpenCV for image/video processing
- Real-time camera feed for parking monitoring
- Backend server + Database (Firebase/MySQL/MongoDB) for storing slot status
- Mobile application (Flutter/React Native) for user interaction

- Cloud services for hosting and real-time updates
- Payment integration (UPI, wallet, FASTag-like unique ID)

6. Block Diagram:



7. Market Potential:

- Suitable for malls, airports, metro stations, IT parks, smart cities, and municipal corporations.
- Addresses a multi-billion-dollar smart mobility market.
- Can be scaled across multiple cities due to low hardware requirements (camera + software).
- Governments and private parking operators are major potential adopters.

8. Feasibility:

- Technical Feasibility: High — YOLO, real-time image processing, and mobile app development are well-established technologies.
- Economic Feasibility: Moderate — camera-based systems are cheaper than sensor-based installations.
- Operational Feasibility: High — easy integration with existing parking lots and minimal maintenance.

Overall, the system is highly feasible, scalable, and cost-effective for smart city deployment.

MENTOR **CO-ORDINATOR**