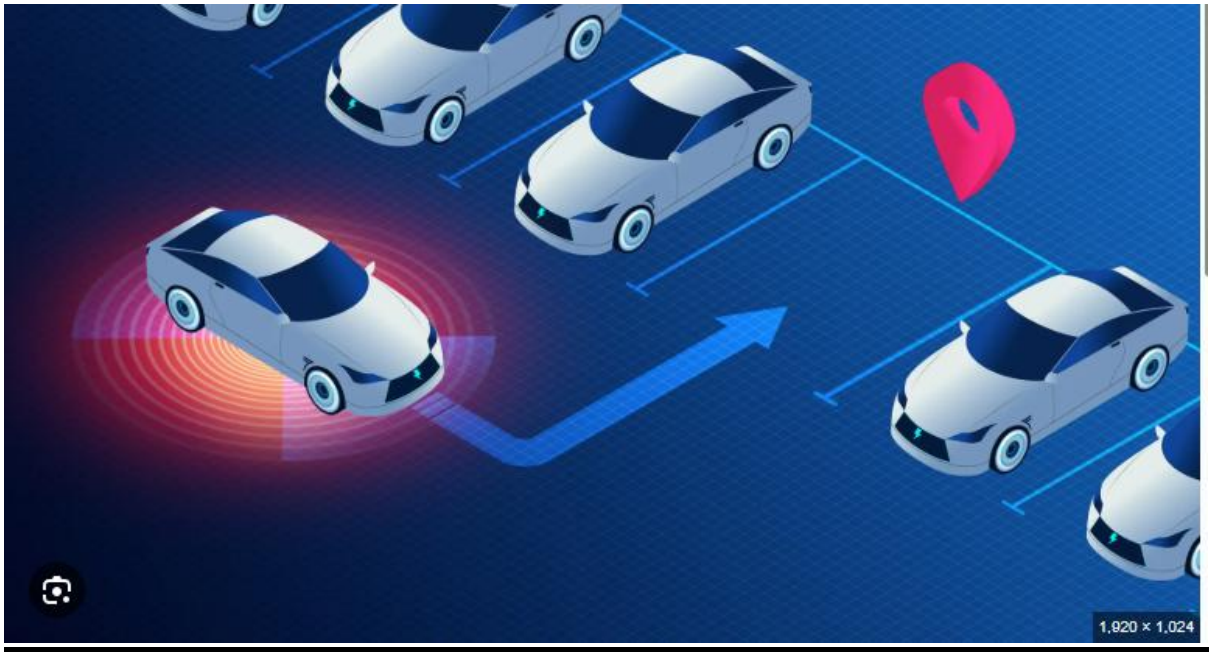
PROGRAM ANALYSIS AND PROJECT PLANNING FOR A "SMART PARKING SYSTEM"



Problem statement:

InfraTech Park is currently experiencing a severe parking management crisis. Employees spend an average of 20–30 minutes searching for available parking spots during peak hours. This results in employee frustration, lost productivity, congestion within the parking area, and inefficient use of existing parking infrastructure.

The absence of a centralized, automated system to guide drivers to available parking spots is the primary cause of this issue. Management requires a cost-effective, fast-to-plan solution that leverages existing infrastructure without purchasing new hardware during the planning phase.

Objective:

Initial software release: SMART

1. **Specific:** Detect and display real-time availability of parking spots using existing low-resolution cameras at entry and exit points.
2. **Measurable:** Reduce average parking search time from ~30 minutes to under 10 minutes during peak hours.
3. **Achievable:** Utilize basic computer vision techniques compatible with existing camera quality and infrastructure.

4. **Relevant:** Improve employee productivity and parking utilization without purchasing new hardware.
5. **Time-bound:** Deliver a functional prototype and project plan within 2 weeks.

Scope statement:

Inclusion:

1. Parking occupancy detection using existing cameras.

2.Entry/exit vehicle counting to estimate available spots

3.Backend logic to calculate total available parking slots

4. Simple web-based dashboard displaying:

5.Total available spots

6."Parking Full / Parking Available" status

7. Manual configuration of total parking capacity

8. Use of open-source or free-tier cloud services

Exclusion:

1. Individual spot-level detection

2..Mobile app development

3.License plate recognition

4.Parking spot reservation or pre-booking

5.Automated payment integration

6.High-resolution live video streaming

7.Installation of new sensors (ground sensors, LiDAR, RFID, etc.)

Feasability and cost analysis:

The proposed Smart Parking System is technically, operationally, and economically feasible within the given constraints because it relies entirely on

existing low-resolution entry and exit cameras, basic barrier gate signals, and proven open-source computer vision tools such as OpenCV to perform vehicle counting rather than complex spot-level detection. This approach minimizes computational requirements, works reliably with older camera hardware, and avoids the need for new sensors or infrastructure upgrades. The system architecture uses a lightweight backend and a simple web dashboard, ensuring easy integration with current operations and minimal staff training. From a cost perspective, the project stays within the $5,000 budget by eliminating hardware and software licensing expenses, allocating the majority of funds to development labor, and using free-tier or low-cost cloud services for hosting and data storage. Testing, documentation, and a small contingency reserve are included to manage risk without exceeding budget limits. Overall, the solution delivers measurable productivity benefits, low operational disruption, and a high return on investment while remaining scalable for future enhancements, making it a highly feasible option for the initial release.

Cost analysis:

For cloud services

Free-tier or low-cost VM + storage (e.g., AWS / Azure / GCP free tier)
Cost: $800

Software & Tools
Open-source tools (OpenCV, Python, Flask)
Cost: $0
Development Labor
2 developers * 40 hrs * $40/hr
Cost: $3,200

Testing & Validation
Test video data, environment setup
Cost: $500
Ensures reliability and accuracy

Technical Documentation $100 System design and user guide
Project Planning & Reporting
$150

Cost: $250

Risk Buffer (approx: 5%)

$200

Unexpected integration or tuning issues

Total cost: $5000 USD

WORK BREAKDOWN STRUCTURE AND SCHEDULE:

The work breakdown for the Smart Parking System project includes requirements analysis and system design, followed by integration of existing entry and exit cameras for data capture. Computer vision techniques are then implemented to detect and count vehicles, after which backend logic is developed to calculate parking availability and manage data. A simple web-based dashboard is created to display real-time parking status. The project concludes with system testing, bug fixing, and preparation of final documentation and reports.

Week 1

Day 1–2: Requirements analysis & system design

Day 3–4: Camera feed integration & data capture

Day 5: Vehicle detection and counting logic development

Week 2

Day 6–7: Backend logic for availability calculation

Day 8: Web dashboard development

Day 9: System testing with sample footage

Day 10: Bug fixes and performance tuning

Day 11–12: Documentation and final presentation preparation

Initial risk register:

Initial Risk Register

Risk ID	Risk Description	Likelthood	Milligation Stranegy
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Conclusion:

This project plan delivers a cost-effective, feasible, and scalable Smart Parking System using existing infrastructure within strict budget and timeline constraints. The initial release focuses on delivering immediate operational value while laying the groundwork for future enhancements


Smart Parking System
Jack Lemonade
Where do you want to go today?
Search the location
SPACE
TECHNOLOGIES