Assignment 1

Aim: Identify Project of enough complexity, which has at least 4-5 major functionalities. Write detail problem statement for your system

Title: Smart Parking Management System

Introduction

In modern urban areas, managing parking efficiently has become a major challenge due to the increasing number of vehicles and limited parking spaces. Manual parking management often leads to confusion, delays, inaccurate record-keeping, and misuse of parking areas.

The **Smart Parking Management System** aims to computerize the process of parking space allocation, vehicle entry and exit, and revenue tracking using an object-oriented, GUI-based application. It automates daily operations, ensures data accuracy, and enhances overall efficiency for both staff and administrators.

Problem Statement

Traditional parking systems rely heavily on manual record-keeping, paper slips, and human supervision, which are prone to errors and inefficiencies. This results in issues like duplicate entries, loss of data, and inaccurate revenue calculation. Moreover, there is often a lack of centralized data for both administrators and staff to monitor parking activity effectively.

Hence, there is a need for a computerized, user-friendly, and reliable

system that:

- Automates the process of vehicle entry and exit.
- Tracks parking slots and revenue accurately.
- Provides role-based access for staff and administrators.
- Offers search and report generation functionalities for easy monitoring.

Major Functionalities

The system consists of the following **five core functionalities:**

1. **User Authentication and Role-Based Access**
    - Secure login for **Admin** and **Staff** users.
    - Admin can access advanced controls like revenue management and record search.
    - Staff can handle vehicle entries and exits.
2. **Vehicle Entry Management**
    - Allows staff to record car or bike details (registration number, position, ID, ticket).
    - Automatically generates parking slips and assigns available slots.
    - Enables printing of parking tickets for customers.
3. **Vehicle Exit Management**
    - Staff can update vehicle exit details and free up parking positions.
    - Database automatically records exit times and updates slot availability.
    - Prevents duplicate entries and ensures correct data updates.
4. **Revenue Calculation and Reporting**
    - Admin can view daily, category-wise (car/bike), or total revenue.
    - Revenue is calculated automatically based on the number of vehicles parked and their rates.
    - Supports report printing for record-keeping.
5. **Search and Record Management**
    - Admin can search parking records using criteria like registration number, ID, or date.
    - Displays results in a tabular format with options to print.
    - Helps maintain and verify data integrity across sessions.

Scope of the Project

The **Smart Parking Management System** will be a desktop-based application developed using Java Swing with backend support via a local database (Microsoft Access). It will manage real-time parking activities, provide accurate record tracking, and simplify day-to-day operations.

Future improvements can include RFID-based vehicle detection, online parking slot booking, and integration with mobile applications.

1. For Whom is the application for?

The system is designed for **parking lot administrators** and **staff members** in organizations, shopping malls, or public parking areas.

- **Administrators**: Monitor records, calculate revenue, and generate reports.
- **Staff Members**: Manage vehicle entry, exit, and slot assignment.

2. What problem will it solve?

The system will eliminate the inefficiencies of manual parking management, such as:

- Inaccurate tracking of available slots.
- Misplaced or duplicated paper records.
- Time-consuming revenue calculations.
- Difficulty in monitoring daily vehicle flow.

By automating these tasks, it ensures quick, accurate, and paperless operation.

3. Where will it be used?

The system can be deployed in:

- Shopping malls, office complexes, and public parking areas.
- Institutions or companies with large vehicle parking requirements.
- Any facility requiring systematic parking record management.

4. When is it needed?

The system is useful during all operational hours when vehicles enter and exit parking areas. It is especially critical:

- During peak hours or events with heavy vehicle inflow.
- At the end of each day when generating revenue reports.
- When administrators need to verify or audit parking data.

5. Why is it needed?

The system is needed to:

- Improve accuracy and reduce human error.
- Provide a systematic and paperless method of managing parking.
- Generate instant reports and revenue summaries.
- Increase efficiency and transparency for staff and management.

6. How will it work?

- The system starts with a **MainPage**, where users choose their role: Admin or Staff.
- **Admin Login (Adlog)** opens the AdminPanel, allowing access to **Revenue** and **Search** modules.
- **Staff Login** opens the **display** dashboard, which provides access to **Car Entry (Detail)** and **Bike Entry (BikeDetail)** forms.
- Each form records and updates data in the **ParkingDataBase**.
- Vehicle exits are managed through the **CarOut** form, which updates the database accordingly.
- All records are available for report generation, printing, and revenue analysis.

CONCLUSION

The **Smart Parking Management System** is an automated, object-oriented solution that improves the efficiency, reliability, and transparency of parking operations. It integrates multiple roles, database operations, and GUI functionalities into a single system that benefits both staff and administrators.