

## Project Overview:

This project involves the development of a Smart Campus Navigation and Facility Booking System (SCNFBS). The system aims to help students, staff, and visitors navigate the university campus and reserve facilities such as study rooms, sports venues, and labs. It will offer real-time room availability, interactive maps, and facility management capabilities.

## Functional Requirements:

### User Roles:

- **Administrator:** Manages buildings, facilities, booking rules, and user permissions.
- **Faculty/Staff:** Views availability and books university spaces (e.g., lecture halls, labs).
- **Student:** Locates rooms/buildings, checks availability, and makes reservations for study rooms or events.

### Interactive Campus Navigation:

- Users can search for rooms, buildings, or departments.
- The system provides step-by-step directions via an interactive campus map.
- Support for multiple entry points, elevators, and accessible paths.

### Facility Booking:

- Users can search for available time slots and book facilities based on eligibility (e.g., only faculty can book labs).
- Admins can define booking rules (e.g., max booking time, recurring reservations).
- Email notifications confirm bookings and send reminders.

### Resource Utilization Reports:

- Admins can generate reports on facility usage, peak hours, and booking trends.
- Users can view their booking history.

## Non-Functional Requirements:

### Security and Privacy:

- Role-based access control.
- Secure login and session management for all users.

### Usability:

- Mobile-friendly responsive interface.
- Minimal steps required for booking and navigation.

### Scalability and Performance:

- Capable of handling concurrent bookings and multiple users navigating simultaneously.

### Availability:

- Should remain accessible 24/7, especially during exam seasons or events.

## Project Phases:

### Phase 1: Requirements Gathering and Analysis

- Collect requirements from students, faculty, and facility managers.
- Develop a comprehensive Requirements Specification Document.

### Deliverables:

- Requirements Specification Document.

### Phase 2: System Design

- UML Diagrams:
  - Use Case Diagrams: For navigation and booking processes.
  - Class Diagrams: Including entities like User, Room, Building, Reservation, and MapPath.
  - Sequence Diagrams: For booking and navigation flow.
  - Component Diagram: For modular design (Navigation Module, Booking Module, Admin Panel).
- Database Schema: For users, rooms, bookings, and paths.

### Deliverables:

- UML Diagrams.
- Database Schema.

### Phase 3: Implementation

- Implement booking and navigation features.
- Web interface with responsive design.

### Deliverables:

- Source Code for frontend and backend.

#### **Phase 4: Testing**

- Unit and integration testing for booking logic, user roles, and map navigation.

#### **Deliverables:**

- Test Cases and Test Reports.

#### **Phase 5: Presentation**

- Present system demo with real-world campus data and use cases.

#### **Deliverables:**

- Technical Documentation.
- Presentation Slides.

### **Evaluation Criteria:**

- **Requirements Analysis (20%)**: Clarity and completeness of requirement gathering.
- **System Design (30%)**: Accuracy and complexity of UML and database schema.
- **Implementation (30%)**: Functionality and usability.
- **Testing and Documentation (10%)**: Testing rigor and documentation quality.
- **Presentation (10%)**: Effectiveness of live demo and explanation.

### **Tools and Technologies:**

- **Programming Languages**: JavaScript (Node.js), Python (Django/Flask), Java, or C#.
- **Database**: PostgreSQL, MySQL, or SQLite.
- **Modeling Tools**: StarUML, Visual Paradigm, or Lucidchart.

### **Final Submission:**

- All deliverables must be submitted by **Wednesday June 26**.
- Ensure all documents, source code, and reports are properly organized in a shared repository.