

**CSE6224 Software Requirements Engineer TT3L**

**SRS**

**GROUP 1**

**Prepared by :**

|  |  |  |
| --- | --- | --- |
| **NAME** | **STUDENT ID** | **EMAIL** |
| MUHAMMAD NAQIB BIN ZULL AZRI | 1211112306 | [1211112306@student.mmu.edu.my](mailto:1211112306@student.mmu.edu.my) |
| MUHAMMAD HARITH AIMAN BIN MUHD ZULKAPLI | 1211112350 | [1211112350@student.mmu.edu.my](mailto:1211112350@student.mmu.edu.my) |
| DHARVIN DARAN A L ELANGOO | 1231303548 | [1231303548@student.mmu.edu.my](mailto:1231303548@student.mmu.edu.my) |
| GOH YENG XUN | 1231303430 | [1231303430@student.mmu.edu.my](mailto:1231303430@student.mmu.edu.my) |

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## 

# Introduction

## 1.1 Purpose

The purpose of this document is to specify the software requirements for MMUAccess, a campus accessibility navigation system. The document outlines the functionality, constraints, and design requirements of the platform, which aims to assist students, staff, and visitors in navigating the university campus — especially those with accessibility needs. This document is intended for software developers, system designers, project stakeholders, and testers involved in the development and deployment of the system.

## 1.2 Scope

MMUAccess shall facilitate mainly the following operations

1. Navigation across campus with accessible route
2. Real-time updates on campus events
3. Integration with MMU’s event calendar to guide users to accessible event locations

## 1.3 Product Overview

### 1.3.1 Product Perspective

MMUAccess is a new, independent system designed specifically for Multimedia University. However, it will interact with existing university systems such as the campus facilities management database and the official event calendar system. The system is developed as a responsive web and mobile application to ensure accessibility across multiple platforms.

This product will serve as an enhancement to the university's infrastructure by supporting inclusive campus navigation. It provides real-time route adjustments and helps users with disabilities find the most suitable paths and access points.

### 1.3.2 Product Function

MMUAccess shall facilitate the following core functions:

i. Generate accessible navigation routes across the MMU campus, avoiding stairs, blocked paths, or other obstacles.  
ii. Provide real-time notifications and updates regarding campus events and their impact on navigation routes.  
iii. Integrate with MMU’s official event calendar to help users locate event venues and determine if the routes and locations are accessible.

### 1.3.3 User Characteristics

i. Students, staff, and visitors of MMU who require assistance navigating the campus, especially users with mobility, visual, or auditory impairments.  
ii. Users with varying levels of technical experience, from tech-savvy individuals to those with limited digital skills.  
iii. Administrative staff responsible for updating facility information and event accessibility details.  
iv. Users accessing the system from different devices, including smartphones, tablets, and desktop computers.

### 1.3.4 Limitation

i. The system depends on timely data updates from MMU staff for construction zones, elevator outages, and event information.  
ii. Internet connection is required for accessing real-time updates and using the application.  
iii. MMUAccess is limited to the MMU campus environment and will not provide navigation outside university grounds.  
iv. The system’s route accuracy may be affected by incomplete or outdated facility data.

## 1.4 Definition

# 2.0 References

i. IEEE Std 830-1998, *IEEE Recommended Practice for Software Requirements Specifications*.

# 3.0 Requirement

## 3.1 Functions

## 3.2 Performance Requirements

## 3.3 Usability Requirement

## 3.4 Interface Requirement

## 3.5 Logical Database Requirement

This section defines the logical data requirements and relationships necessary to support the functionality of the MMUAccess platform. It outlines key data entities, their attributes, and the relationships between them to ensure seamless, accessible navigation and real-time event guidance.

Data Entities and Attributes

| **Entity Name** | **Description** | **Key Attributes** |
| --- | --- | --- |
| **User** | Represents students, staff, and visitors using the system. | UserID (PK), Name, Role (Student, Staff, Visitor), Email, PasswordHash, AccessibilityNeeds (e.g., wheelchair, visual aid) |
| **DeviceSession** | Stores session data for cross-platform login and usage. | SessionID (PK), UserID (FK), DeviceType, LoginTimestamp, LastActivityTimestamp |
| **Building** | Represents each building on campus. | BuildingID (PK), Name, Latitude, Longitude, Description |
| **Facility** | Details accessibility features of buildings and paths. | FacilityID (PK), BuildingID (FK), Type (Ramp, Elevator, Accessible Entrance), Status, LastUpdated |
| **NavigationRoute** | Stores pre-calculated routes across campus. | RouteID (PK), StartPoint, EndPoint, IsAccessible, PathDetails, EstimatedTime |
| **Event** | Represents campus events synced with MMU’s event calendar. | EventID (PK), Title, Description, StartTime, EndTime, Location, IsAccessible, OrganizerContact |
| **EventImpact** | Links events to impacted facilities or routes. | ImpactID (PK), EventID (FK), FacilityID (FK), RouteID (FK, optional), ImpactDescription |
| **UpdateLog** | Logs updates made by admin staff. | UpdateID (PK), UserID (FK), EntityModified, ModificationDetails, Timestamp |

*Table 3.5.1 Data Entities and Attributes*

Relationship Between Entities

1. **One-to-Many**:

* One User can have multiple DeviceSession records.
* One Building can have multiple Facility records.
* One Event can impact multiple Facilities or NavigationRoutes.
* One User (admin) can create multiple UpdateLog entries.

1. **Many-to-One**:

* Multiple Facilities belong to a single Building.
* Multiple EventImpact records may point to one Event.

1. **Optional Relationships**:

* An EventImpact may affect either a Facility, a NavigationRoute, or both.
* AccessibilityNeeds may be empty for general users without specific impairments.

Entity Relationship Diagram

The Entity-Relationship Diagram (ERD) for MMUAccess illustrates the logical structure of the system’s database. It identifies the main entities involved—such as users, buildings, facilities, events, and navigation routes—and the relationships between them. This diagram serves as a blueprint for how data will be stored, connected, and retrieved within the system, supporting core functions like accessible navigation, real-time updates, and event impact tracking. The ERD ensures a consistent and scalable design that meets the accessibility and usability goals of the MMUAccess platform.

A diagram of a software application

Description automatically generated with medium confidence

*Figure 3.5.1 Entity Relationship Diagram*

Data Integrity and Constraints

- **Unique Constraints**

* Email in User must be unique.
* Primary keys must be unique and auto-incremented if needed.

- **Referential Integrity**

* Foreign keys ensure links between events, buildings, users, etc., are valid.

- **Value Constraints**

* Controlled vocabularies for Role, Type, Status using ENUMs.
* AccessibilityNeeds as a multi-select SET for flexibility.

- **Nullable Fields**

* FacilityID and RouteID in EventImpact may be NULL to indicate partial impacts.

- **Data Update Logging**

* All modifications to accessibility-related entities must be logged in UpdateLog.

Justification for Design

* The schema supports **real-time accessibility data** and **event routing** integration.
* EventImpact acts as a bridge between static data (routes, facilities) and dynamic updates (events).
* All data is normalized to reduce redundancy and maintain referential integrity.
* Role-based user modeling prepares for future expansion (e.g., admin dashboards, staff permissions).
* Ensures **mobile-first access** with lightweight queries (pre-computed routes, indexed foreign keys).

## 3.6 Design Constrains

Design constraints specify limitations on the design or implementation of the system due to:

* Software, hardware, or platform requirements,
* Regulatory standards,
* Development practices,
* System environment.

**Design Constrains**

**3.6.1 Platform Compatibility**

The system shall be implemented as a responsive web and mobile application. It must function consistently across multiple platforms and devices, including smartphones, tablets, and desktop computers, using standard-compliant web technologies.

**3.6.2 Accessibility Standards**

The user interface design must comply with the **Web Content Accessibility Guidelines (WCAG) 2.1**, ensuring that the system is usable by individuals with visual, auditory, or motor impairments.

**3.6.3 Integration Requirements**

MMUAccess shall integrate with the following existing university systems:

* The **official MMU event calendar system**, to fetch event details and update the accessibility status of events.
* The **campus facilities management database**, to retrieve real-time information about the availability and status of paths, elevators, and facilities.

All integrations must adhere to the respective systems’ data formats, API specifications, and authentication protocols.

**3.6.4 Technology Constraints**

* The frontend of the system shall be developed using **HTML5**, **CSS3**, and **JavaScript** (preferably using the **React** framework).
* The backend must be built using **Node.js** or any other server-side technology approved by MMU’s IT department.
* Communication between client and server components shall use **RESTful APIs**.

**3.6.5 Security and Privacy Compliance**

All personal and sensitive user data must be managed in compliance with the **Personal Data Protection Act (PDPA) of Malaysia**. The system shall employ secure password hashing algorithms and implement secure session management for user authentication.

**3.6.6 Network Dependency**

The application depends on an active internet connection to deliver real-time functionalities, including live navigation updates, event impact notifications, and route recalculations.

**3.6.7 Maintainability**

The system must be designed to allow authorized administrative staff to maintain and update event data and campus facility statuses through a secure admin interface without requiring developer intervention.

**3.6.8 Database Constraints**

A **relational database management system (RDBMS)** such as **MySQL** or **PostgreSQL** shall be used to ensure data integrity, support structured queries, and maintain ACID (Atomicity, Consistency, Isolation, Durability) compliance.

## 3.7 Software System Attributes

### 3.7.1 Availability MMUAccess will be accessible around-the-clock, particularly during school hours. The system will notify users in advance of scheduled maintenance windows.

### 3.7.2 Security HTTPS will be used by the system to ensure secure communication. Facility and event data can only be updated by authorised university employees. To stop unwanted changes, user data will be encrypted and access limits will be implemented.

### 3.7.3 Accessibility The system must be usable by people with visual, auditory, and motor disabilities in accordance with WCAG 2.1 (Web Content Accessibility Guidelines). High contrast themes, screen reader compatibility, and keyboard navigation are among the features.

### 3.7.4 Reliability With a goal uptime of 99.5%, the system must run continuously. When connectivity is restored, it should continue services and gracefully handle small data failures or outages.

### 3.7.5 Maintainability In order to facilitate future updates, such as new accessibility features or third-party integrations, the codebase will adhere to modular architecture and documentation standards.

### 3.7.6 Portability Through web browsers and mobile apps, MMUAccess will work on a variety of systems, including Windows, macOS, Android, and iOS. To accommodate various screen sizes and devices, the application will be created with responsive design.

## 3.8 Supporting Information

### 3.8.1 References and Background information that supports the development of MMUAccess

* MMU Campus Map and Facilities Management Data
* MMU Official Event Calendar API documentation
* WCAG 2.1 Accessibility Guidelines (<https://www.w3.org/WAI/WCAG21/quickref/>)
* IEEE 830-1998 Standard for SRS Structure
* Comments on accessibility from student questionnaires and interviews that were done during the elicitation stage

# For users with impairments, there are currently restrictions on how to use the campus 4.0 Verification

# 5.0 Appendices

## 5.1 Assumptions and Dependencies

## 5.2 Acronyms and Abbreviations