CSC 431 – Spring 2025

IntelliCup

Software Requirements Specification (SRS)

Group 13

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Version History

Version	Date	Author(s)	Change Comments
1.0	2/23	Sofia Papa	Start of document. System requirements and system restraints.
2.0	2/23	Gargi Yadav	Changes made to the requirements to improve clarity and specify constraints.
3.0	2/23	Gargi Yadav	Added detailed use cases with actors and inserted diagrams to illustrate user interactions.
4.0	2/24	Gargi Yadav	Requirements Modeling with Use Case Diagrams.
5.0	2/24	Gabriel Huang	Evolutionary Requirements.
6.0	2/24	Gargi Yadav	Expanded Hardware Constraints.
7.0	2/25	Gargi Yadav	Refined Tables, Figures, and Use Case Diagrams. Improved clarity in Goal System tracking.

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1. System Requirements

1.1 Functional Requirements

Table 1.1.1

Title	Liquid Identification
Description	The system must be able to identify the liquid type based on properties like color, density, pH, and conductivity.
Priority	0
Precondition(s)	The user pours liquid into the IntelliCup.

Basic Flow	1. User pours liquid into IntelliCup. 2. System analyzes liquid properties 3. System classifies the liquid and sends results to the mobile app.
Postconditions(s)	The identified liquid is displayed on the app.
Use Case Diagram	See Section 3.1.1.

Table 1.1.2

Title	Consumption Tracking
Description	The system logs the user's liquid intake to monitor hydration and beverage choices.
Priority	1
Precondition(s)	The system has identified a liquid.
Basic Flow	1. The system records the identified liquid. 2. The system updates the user’s consumption log. 3. The system provides insight to the user dashboard.
Postconditions(s)	The log updates and insights are displayed on the app.
Use Case Diagram	See Section 3.1.2

Table 1.1.3

Title	User Dashboard
Description	A mobile interface displaying identified liquids, consumption history, and personalized recommendations.
Priority	2
Precondition(s)	The system has tracked consumption.
Basic Flow	1. The system retrieves consumption data. 2. The system generates visual analytics. 3. The dashboard presents insights to the user.
Postconditions(s)	User views analytics and recommendations.
Use Case Diagram	See Section 3.1.3

1.2 Non-Functional Requirements

Table 1.2.1

Title	Security
Description	User data must be securely stored and encrypted to protect privacy.
Priority	0
Applicable FR(s)	Liquid Identification, Consumption Tracking, User Dashboard (Ensuring data encryption and secure access.)

Table 1.2.2

Title	Performance
Description	The IntelliCup system must process and classify a liquid within 3 seconds and update consumption tracking within 1 second after user interaction. The system should remain responsive and prevent lag under normal usage conditions.
Priority	0 (High)
Applicable FR(s)	Liquid Identification (Ensuring quick classification of liquids), Consumption Tracking (Ensuring seamless data logging without delays), User Dashboard (Fast data retrieval for analytics and recommendations).

Table 1.2.3

Title	Usability
Description	The UI should be intuitive for all users, with accessibility considerations.
Priority	2
Applicable FR(s)	User dashboard

2. System Constraints

2.1 Tool Constraints

Table 2.1.1

Title	Front-end Development Framework

Description	React Native for cross-platform mobile app development.
Priority	0

Table 2.1.2

Title	Backend and Database Services
Description	Firebase for authentication, cloud storage, and real-time data handling.
Priority	0

Table 2.1.3

Title	Version Control
Description	Git and GitHub for source code management.
Priority	1

Table 2.1.4

Title	Development Environment
Description	Visual Studio Code (VS Code) as the primary IDE.
Priority	1

Table 2.1.5

Title	Testing Tools
Description	Jest for unit testing, Cypress for end-to-end testing.
Priority	1

Table 2.1.6

Title	Deployment Tools
Description	Expo for app deployment on iOS and Android platforms.
Priority	1

2.2 Language Constraints

Table 2.2.1

Title	Programming Languages
Description	JavaScript (React Native), Python (backend), and SQL (database)
Priority	1

2.3 Platform Constraints

Table 2.3.1

Title	Mobile Application Compatibility

Description	Must be compatible with iOS and Android.
Priority	1

2.4 Hardware Constraints

Table 2.4.1

Title	Simulated Sensor Input
Description	The system will use simulated sensor data for liquid property detection, including color, density, pH, and conductivity. The mobile app will process these values to classify liquids. Future iterations may incorporate actual sensor integration.
Priority	1

2.5 Network Constraints

Table 2.5.1

Title	Internet Dependency
Description	The system requires an internet connection for cloud storage and syncing.
Priority	2

2.6 Deployment Constraints

Table 2.6.1

Title	Mobile App Stores
Description	The application must comply with App Store and Google Play guidelines.
Priority	2

2.7 Transition & Support Constraints

Table 2.7.1

Title	Maintenance & Updates
Description	Requires periodic maintenance and software updates.
Priority	3

2.8 Budget & Schedule Constraints

Table 2.8.1

Title	Development Timeline
Description	The project must be completed within the semester.
Priority	0

Table 2.8.2

Title	Cost

Description	The system should operate within a minimal budget using available cloud services.
Priority	0

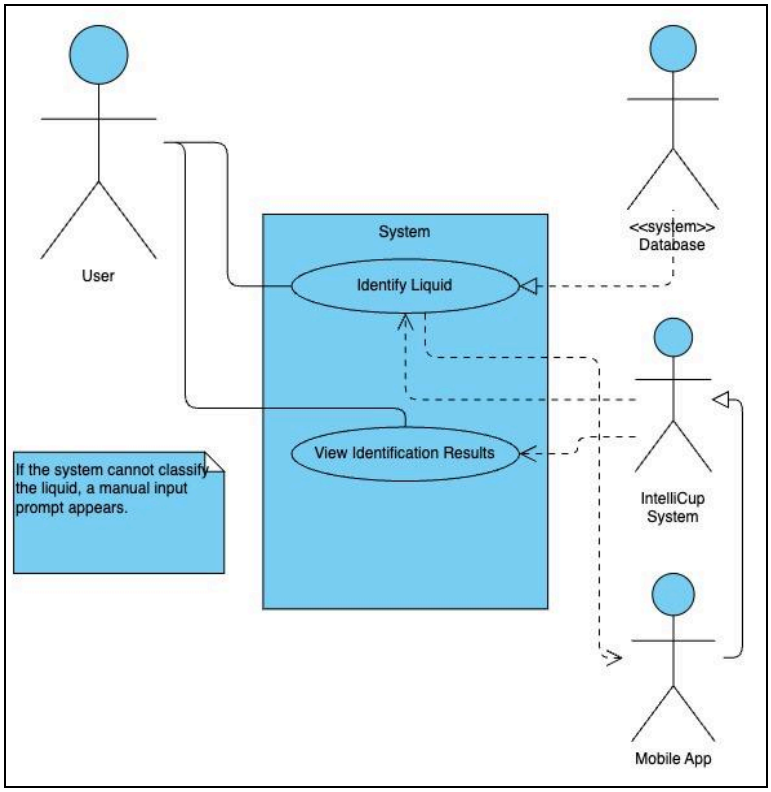
2.9 Miscellaneous Constraints

Table 2.9.1

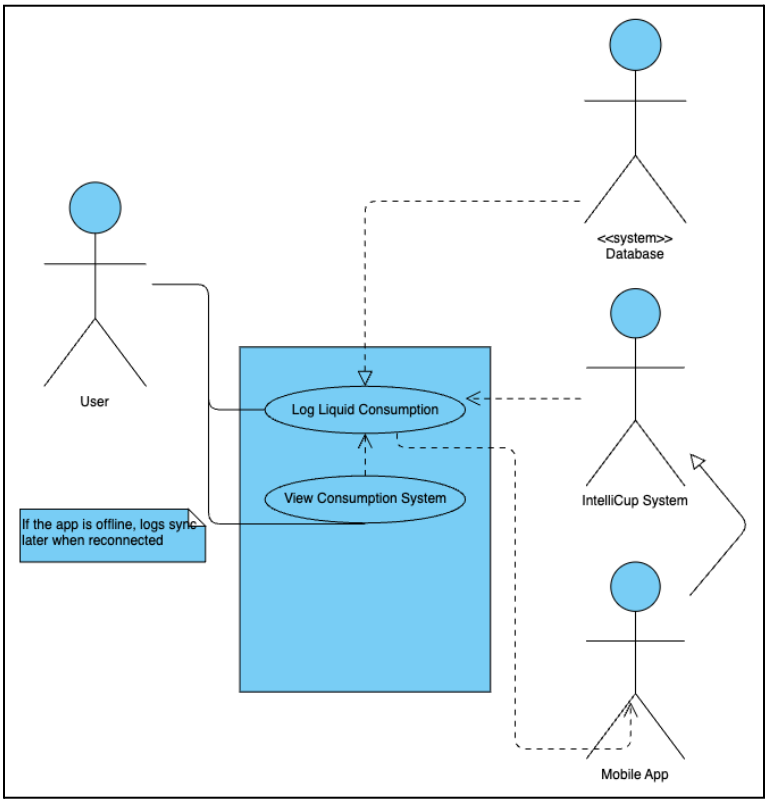
Title	Legal Compliance
Description	Must comply with data privacy regulations (GDPR, CCPA).
Priority	0

3. Requirements Modeling

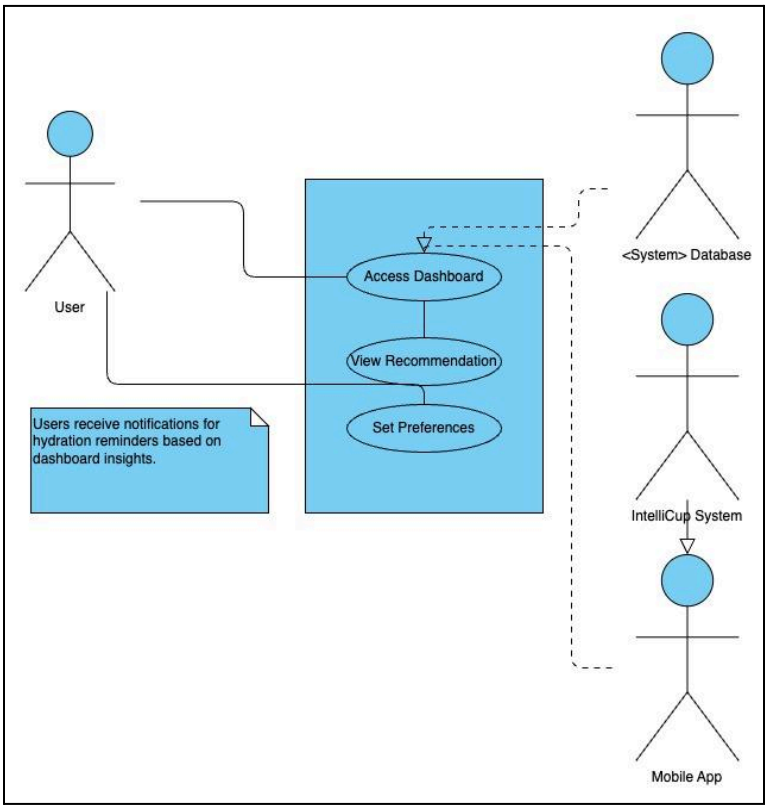
3.1.1 Liquid Identification Use Case



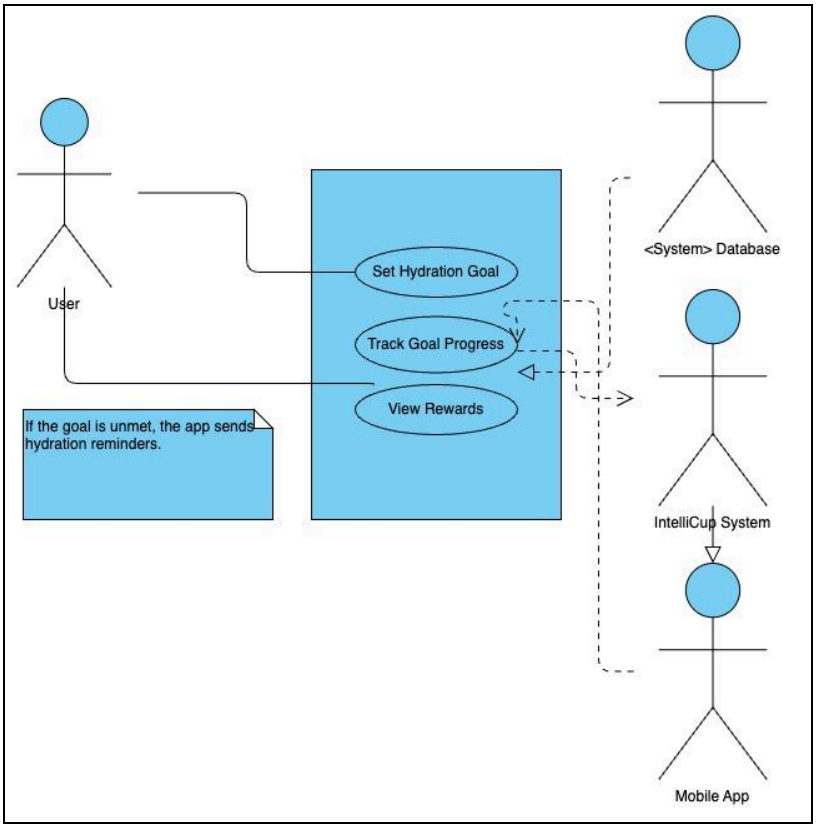
3.1.2 Consumption Tracking Use Case



3.1.3 User Dashboard Use Case



3.1.4 Goal System Use Case



4. Evolutionary Requirements

4.1 Functional Requirements

4.1.1 Integrating AI Model

Title	AI-Based Liquid Classification
Description	Implement an ML model to classify liquids more accurately.
Priority	1
Precondition(s)	The system already collects liquid properties (color, density, pH, conductivity).
Postconditions(s)	The liquid classification is more accurate and adaptive over time.

Use Case Diagram	See 3.1.1, except with integrated model

4.1.2 Adding Goal System

Title	Hydration Goal Rewards
Description	Integrate a reward system for hydration goals.
Priority	2
Precondition(s)	The system tracks user consumption consistently.
Postconditions(s)	Users receive badges or points for hitting daily/weekly hydration targets.
Use Case Diagram	See 3.1.4

4.2 Non-Functional Requirements

4.2.1 Optimizing Processing Speed

Title	Optimize Processing Speed
Description	Improve the liquid classification algorithm to reduce processing time to under 3 seconds.
Priority	0
Applicable FR(s)	Liquid Identification, Consumption Tracking

4.2.2 Improving Accessibility

Title	Accessibility for Visually Impaired Users
Description	Improve accessibility features for visually impaired users.
Priority	2
Applicable FR(s)	User Dashboard