Technical Report: Deliverable #2 – User Stories and Use Cases

AUGMS Smart Garage System

Course: C-SW312: Introduction to Software Engineering
Semester: Fall 2025
Submission Date: November 16, 2025
Group Members:
- Aly Hassan, Mohamed Ehab, Alaa Shaaban, Kenzy Zedan, Youssef Osama

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1. Introduction

This technical report presents the work completed for **Deliverable #2** of the AUGMS (Automated University Garage Management System) project, focusing on **User Stories** and **Use Cases** using the **Event Decomposition Technique**.

The report is structured into two parts:

1. **User Stories** – Capturing stakeholder needs using the "As a <role>, I want to <goal>, so that <benefit>" format, with acceptance criteria and quality verification.

2. **Use Cases via Event Decomposition** – Systematic identification of external, temporal, and state events, mapping to use cases, followed by Usecase diagram.

All work builds upon **Deliverable #1** outputs:
- Stakeholder identification (four core categories + supporting roles)
- Functional and non-functional requirements

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2. Team Division and Methodology

As per guidelines, the team was divided into two sub-groups:

Role	Members
System Analyst	Aly Hassan
Stakeholders/Users	Mohamed Ehab, Alaa Shaaban, Kenzy Zedan, Youssef Osama

Stakeholders were further assigned representative personas:

Stakeholder Category	Representative	Role Played
Students / Faculty	Mohamed Ehab	4th-year CIS student & Junior TA

Stakeholder Category	Representative	Role Played
IT / Security	Kenzy Zedan	Head of Security Department
Garage Admin / Staff	Youssef Osama	Garage Admin + Occasional Staff
University Management	Alaa Shaaban	Acting University President

3. User Stories

3.1 Overview

Eight user stories were developed — two per stakeholder category — derived from:
- Functional requirements
- Stakeholder interviews
- Use case precursors

Each follows the standard template:
 As a , I want to so that

Acceptance criteria use **Given-When-Then** format.
Quality is verified using the **INVEST** model.

3.2 User Stories Table

ID	User Story	Acceptance Criteria	INVEST Check
UC1	**As a student**, I want to **check parking spot availability before arriving** so that **I save time and avoid crowd**.	**Given** I am logged into the system**When** I request real-time parking status**Then** I should see the number of available and occupied spots.	Valuable ✓Testable ✓Small ✓Clear ✓
UC2	**As a junior TA (faculty member)**, I want to **request car services (cleaning, EV charging)** so that **I can manage my needs conveniently**.	**Given** I am logged in**When** I open the "Services" menu**Then** I should be able to request car cleaning or EV charging.	INVEST ✓
UC3	**As a security head**, I want **all data communications to**	**Given** that the system is running**When** data is transmitted**Then** it must use secure	INVEST ✓

ID	User Story	Acceptance Criteria	INVEST Check
	be encrypted so that **the system remains protected from cyber threats**.	encryption (SSL).	
UC4	**As a security head**, I want **only authenticated users and admins to access the dashboard** so that **unauthorized access is prevented**.	**Given** a user accesses the login page**When** they enter valid credentials**Then** they should be granted dashboard access.	INVEST ✓
UC5	**As a garage admin**, I want to **manage vehicle registrations** so that **only verified users can access the garage**.	**Given** a user submits a new vehicle**When** I verify the details**Then** the vehicle should be marked as "approved."	INVEST ✓
UC6	**As a garage staff**, I want **vehicle entries, exits, and service actions to be automatically logged** so that **the system keeps accurate records**.	**Given** a vehicle enters or exits**When** its license plate is scanned**Then** a timestamped log entry is created.	INVEST ✓
UC7	**As the university president**, I want **automated reports summarizing garage usage** so that **I can make data-driven decisions**.	**Given** it is the end of the day/week/month**When** reports are generated**Then** they should include total entries, exits, peak hours, and service statistics.	INVEST ✓
UC8	**As the university president**, I want to **receive periodic system performance and reliability reports** so that **I can ensure the garage operates**	**Given** the president logs into the reporting dashboard**When** they select a reporting period**Then** the system displays historical performance and reliability reports and allows export.	INVEST ✓

ID	User Story	Acceptance Criteria	INVEST Check
	efficiently.		

4. Use Cases via Event Decomposition Technique

4.1 Step-by-Step Application

The **Event Decomposition Technique** was applied.

Step 1: Identify External Events

External Event	Agent	Use Case	ID
Student/faculty registers vehicle	Student, Faculty	Register Vehicle	UC-101
Vehicle arrives at entry gate	Sensor System	Validate Vehicle Entry	UC-102
Vehicle arrives at exit gate	Sensor System	Process Vehicle Exit	UC-103
User checks parking status	Student, Faculty	View Parking Status	UC-104
User requests service	Student, Faculty	Request Service	UC-105
Admin reviews registration	Garage Admin	Manage Vehicle Registration	UC-201
Admin monitors occupancy	Garage Admin	Monitor Garage Occupancy	UC-202
Admin handles service request	Garage Admin	Manage Service Request	UC-203
Management views reports	University Management	Generate Usage Report	UC-301
Admin modifies access	University Management, Admin	Manage User Access	UC-302

Step 2: Identify Temporal Events

Temporal Event (Trigger)	Use Case	ID
End of day (midnight)	Generate Daily Operations Report	UC-401
End of week/month	Generate Weekly/Monthly Summary Report	UC-402
Service request completed	Log Completed Service	UC-403

Step 3: Identify State Events

State Event	Use Case	ID
Garage reaches 100% occupancy	Update Garage Status to FULL	UC-501
Garage drops below 100%	Update Garage Status to	UC-502

State Event	Use Case	ID
	AVAILABLE	
Sensor malfunction detected	Generate Sensor Error Alert	UC-503

4.2 Brief Use Case Description Table

ID	Use Case Name	Brief Description
UC-101	Register Vehicle	User submits personal and vehicle details; system stores for future validation.
UC-102	Validate Vehicle Entry	Sensor scans plate; system compares with DB; grants/denies entry.
UC-103	Process Vehicle Exit	Sensor detects exit; system logs time, frees spot, opens gate.
UC-104	View Parking Status	User views real-time dashboard with available/occupied spots.
UC-105	Request Service	User selects EV charging or cleaning; system records request.
UC-201	Manage Vehicle Registration	Admin reviews, approves, or rejects pending registrations.
UC-202	Monitor Garage Occupancy	Admin views live occupancy by zone/floor/total.
UC-203	Manage Service Request	Admin assigns, tracks, and closes service requests.
UC-301	Generate Usage Report	System compiles entry/exit/service stats for management.
UC-302	Manage User Access	Authorized user enables/disables garage access.
UC-401	Generate Daily Operations Report	Auto-generated log of all daily events at midnight.
UC-402	Generate Weekly/Monthly Summary Report	Aggregated trends for management review.
UC-403	Log Completed Service	Auto-log when service marked done.
UC-501	Update Garage Status to FULL	UI updates to "FULL" when last spot taken.
UC-502	Update Garage Status to AVAILABLE	UI reverts when spot becomes free.
UC-503	Generate Sensor Error Alert	System logs error and notifies maintenance.

5. UML Use Case Diagram

Tool Used: planetuml
File Included in Submission: AUGMS_UseCase_Diagram.svg (in zipped folder)

AUGMS Smart Garage System
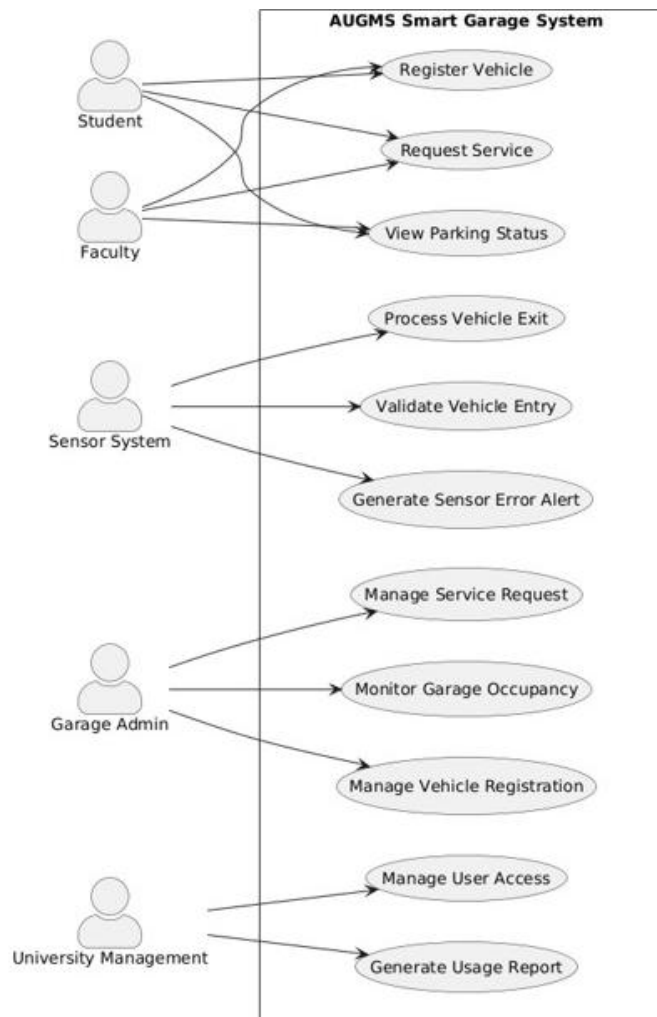
Actors

- Student

- Faculty

- Sensor System

- Garage Admin

- University Management

Key Relationships

- Student and Faculty → Register Vehicle, View Parking Status, Request Service

- Sensor System → Validate Vehicle Entry, Process Vehicle Exit, Generate Sensor Error Alert

- Garage Admin → Manage Vehicle Registration, Monitor Garage Occupancy, Manage Service Request, Manage User Access

- University Management → Generate Usage Report, Manage User Access

- System (internal) → Generate Daily/Weekly Reports, Log Service, Update Status

6. Assumptions and Rationales

Assumption	Rationale
Sensor system acts as an **actor**	It initiates events autonomously (entry/exit/error)
Students and Faculty share use cases	Both are operational users with same parking needs
Temporal reports run at **midnight**	Standard for daily batch processing
State changes trigger **UI updates**	Ensures real-time user experience
Management can manage access	Executive override for policy enforcement

7. Jira Timeline & GitHub Collaboration

- **Jira Board:**
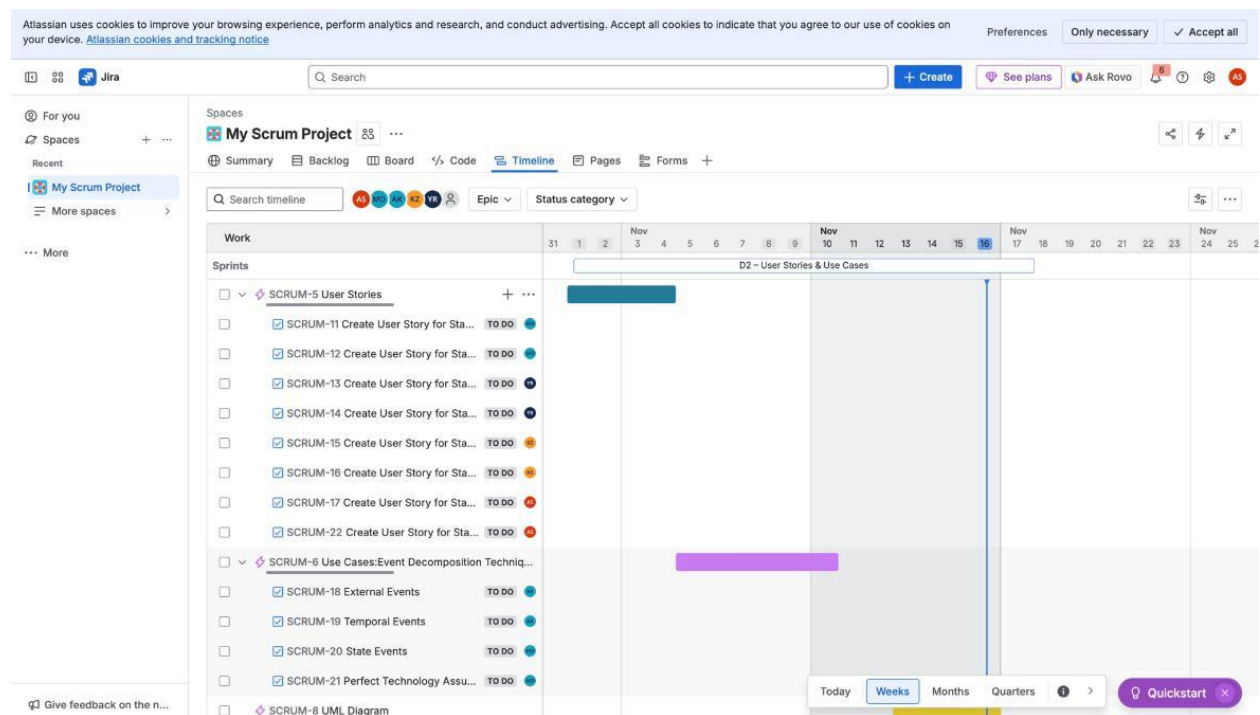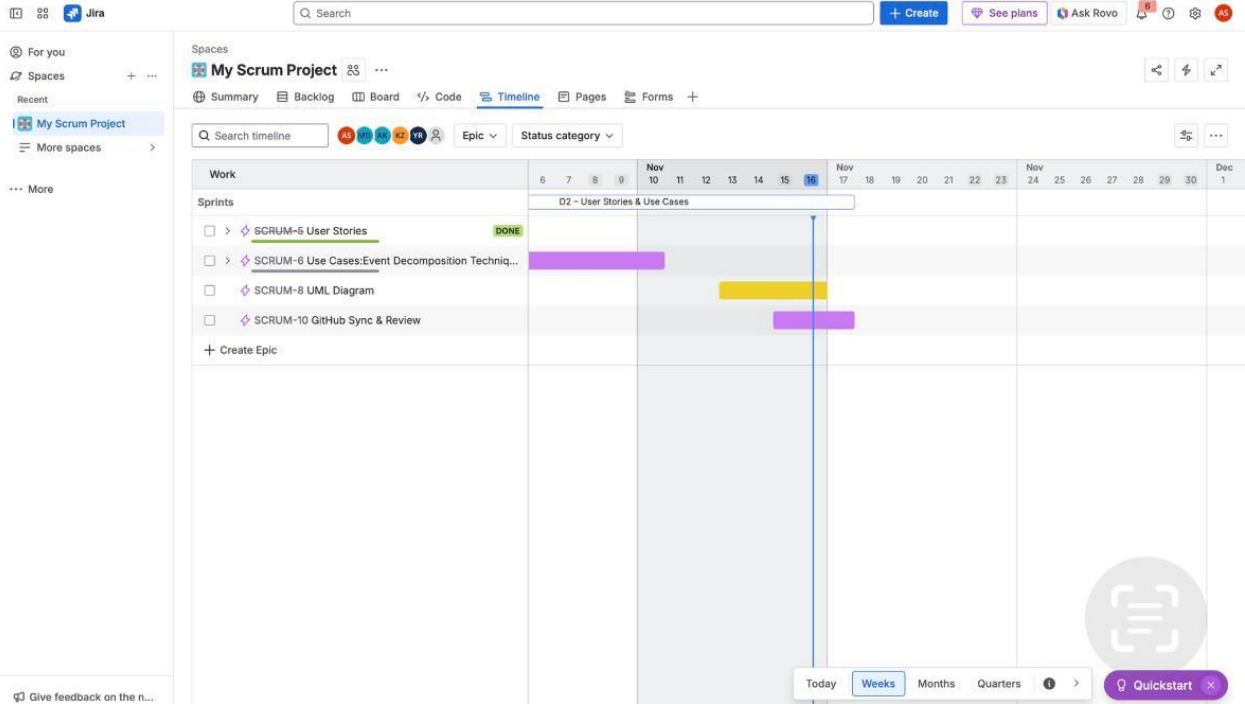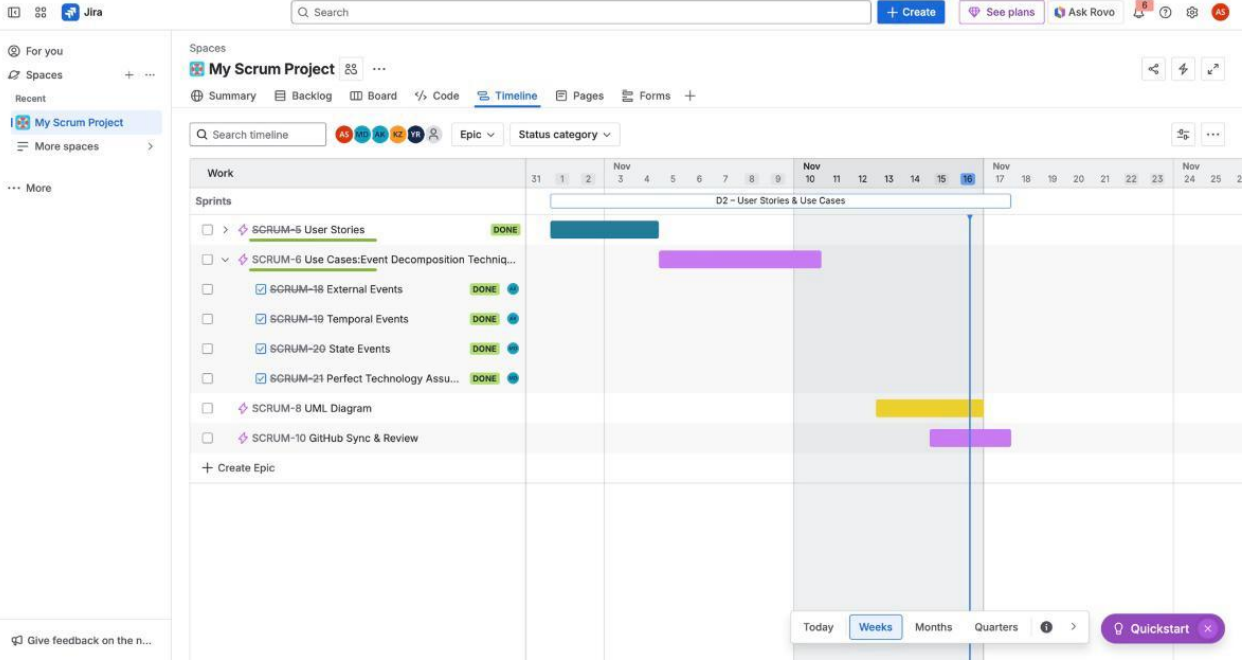
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| Work | | 31 | 1 | 2 | Nov 3 | 4 | 5 | 6 | 7 | 8 | 9 | Nov 10 | 11 | 12 | 13 | 14 | 15 | 16 | Nov 17 | 18 | 19 | 20 | 21 | 22 | 23 | Nov 24 | 25 |

Sprints — D2 – User Stories & Use Cases

- ☐ › ✦ SCRUM-5 User Stories — DONE
- ☐ ⌄ ✦ SCRUM-6 Use Cases:Event Decomposition Techniq...
  - ☐ ☑ SCRUM-18 External Events — DONE ●
  - ☐ ☑ SCRUM-19 Temporal Events — DONE ●
  - ☐ ☑ SCRUM-20 State Events — DONE ●
  - ☐ ☑ SCRUM-21 Perfect Technology Assu... — DONE ●
- ☐ ✦ SCRUM-8 UML Diagram
- ☐ ✦ SCRUM-10 GitHub Sync & Review

+ Create Epic

Today   Weeks   Months   Quarters   ⓘ   ›   ♀ Quickstart ✕

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Work			6	7	8	9	Nov 10	11	12	13	14	15	16	Nov 17	18	19	20	21	22

Sprints   D2 – User Stories & Use Cases

- ☐ > ◇ SCRUM-5 User Stories   DONE
- ☐ > ◇ SCRUM-6 Use Cases:Event Decomposition Technique   DONE
- ☐ ∨ ◇ SCRUM-8 UML Diagram   DONE
  - ☐ ☑ SCRUM-23 Add 5 actors: Student, Faculty, Sensor System, Garage Admin, University M...   TO DO
  - ☐ ☑ SCRUM-24 Add all use cases from table   TO DO
  - ☐ ☑ SCRUM-25 Draw association lines from actors to their use cases   TO DO
  - ☐ ☑ SCRUM-26 Connect related use cases   TO DO ···
  - ☐ ☑ SCRUM-27 Export as PNG + original file (.vpp or .drawio)   TO DO
- ☐ ◇ SCRUM-10 GitHub Sync & Review

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Work			31	1	2	Nov 3	4	5	6	7	8	9	Nov 10	11	12	13	14	15	16

Sprints   D2 – User Stories & Use Cases

- ☐ ∨ ◇ SCRUM-5 User Stories   DONE
  - ☐ ☑ SCRUM-11 Create User Story for Stakeholder Type A (1)   DONE
  - ☐ ☑ SCRUM-12 Create User Story for Stakeholder Type A (2)   DONE
  - ☐ ☑ SCRUM-13 Create User Story for Stakeholder Type B (1)   DONE
  - ☐ ☑ SCRUM-14 Create User Story for Stakeholder Type B (2)   DONE
  - ☐ ☑ SCRUM-15 Create User Story for Stakeholder Type C (1)   DONE
  - ☐ ☑ SCRUM-16 Create User Story for Stakeholder Type C (2)   DONE
  - ☐ ☑ SCRUM-17 Create User Story for Stakeholder Type D (1)   DONE
  - ☐ ☑ SCRUM-22 Create User Story for Stakeholder Type D (2)   DONE
- ☐ ∨ ◇ SCRUM-6 Use Cases:Event Decomposition Technique   DONE
  - ☐ ☑ SCRUM-18 External Events   DONE
  - ☐ ☑ SCRUM-19 Temporal Events   DONE
  - ☐ ☑ SCRUM-20 State Events   DONE
  - ☐ ☑ SCRUM-21 Perfect Technology Assumption Check   DONE
- ☐ > ◇ SCRUM-8 UML Diagram   DONE
- ☐ ◇ SCRUM-10 GitHub Sync & Review   DONE

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- **GitHub Repository:** https://github.com/alyhassankamel/Automated-University-Parking-System.git

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8. Conclusion

This deliverable successfully:
- Captured **8 user stories** aligned with stakeholder requirements.
- Applied **event decomposition** to identify **16 use cases** across external, temporal, and state categories.
- Modeled use cases using **tables** and **UML diagram**.

All these parts use deliverable 1 to prepare the system for detailed design in future phases.

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9. References And Tools:

- Satzinger, J. W., Jackson, R. B., & Burd, S. D. (2016). Systems Analysis and Design in a Changing World (7th ed.). Cengage Learning.

- Lecture Slides: C-SW312 – Chapters 3.

- StarUML Documentation.

- Jira Project Management Tool.

- Functional Requirements AUMGS.docx
- Stakeholder Identification AUGMS.docx