

ECEN 403 – Senior Design

Project Management Assignment

FireGuard: Smart Fire Alarm with Occupant Detection

Team 3 Members

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1- project scope into specific work packages:

Work packages will be divided into eight work packages of our FireGuard Project to make sure of performing all technical and non-technical actions systematically. FireGuard will integrate millimeter-wave radars to detect occupancy, and then send fire alarm signals and information using wireless transmissions about occupancy in the building in emergency fire cases. The information will be processed and transmitted to find out the occupancy in the Android.

Work Package	Title	Description
1	Requirements and System Analysis	Functional & non-functional requirements, features of the system, & performance requirements.
2	System Architecture and Component Selection	System architecture, sub system, hardware components, and communication protocol design.
3	Hardware Development	Wire mmWave radar sensor + input that provides + fire alarm + signal.
4	Software and Algorithm Development	Write the code to read the occupancy and process the information and logic to understand the data received from the sensor.
5	Android Application Development	Designing the android interface which fires the status and shows to the fire-fighters.
6	System Integration	Processing of the software, wireless communication and android app with embedding hardware together in one system.
7	Testing and Validation	Validate system and subsystem for functionality/integrity/accuracy/integration/reliability.

8	Optimization and Final Documentation	Write technical documentation, troubleshoot and optimize the system performance, and do the final demo.

Table 1: Work Packages and Descriptions

2-deliverable(s) and validation plan for each work package:

Work Package	Expected Deliverable	Validation Plan
1	Requirements specification document	Make sure that the requirements are clear and measurable, as well as achievable in light of the project goals.
2	System architecture diagram, component list, and design specifications	The architecture is validated for the requirements, for compatibility of components, and for interfaces and technical specifications.
3	Functional hardware subsystem containing the mmWave sensor and fire alarm interface	Sensor test and fire alarm detection with the use of electrical fixtures and good supply of electricity supply.
4	Functional occupancy detection and data-processing software	Occupancy detection (occupied to unoccupied, multiple).assess the accuracy and reliability of the test.
5	Functional Android application	Visualizing incoming occupancy and fire alarm data in Android app.
6	Integrated FireGuard prototype	Test the complete communication path from the sensors to the Android.testing covers the sensors,processing, software, wireless communication and Android interface.
7	Testing results and validation report	Measure detection accuracy, response time, and communication reliability. Detection accuracy, response time and communication reliability.

8	Optimized prototype and final technical documentation	Prepare full documentation and a demonstration, conduct final acceptance testing, and review requirements of the project.

Table 2: Expected Deliverables and Validation Plans

3-Allocate people who will be work on each work package and the estimated duration:

Team Member	**Role**	**Main Responsibilities**
Moza	Team Leader	Team coordination, ConOps, system integration, communication, budget management, and testing.
Alreem	ConOps & Hardware	ConOps, system operation, hardware integration, occupancy detection, and testing.
Aisha	Introduction & Requirements	Problem definition, objectives, existing solutions, system requirements, and documentation.
Shaikha	Planning & Validation	Project timeline, milestones, testing and validation, documentation, and project tracking.

Table 3: Team Members, Roles, and Main Responsibilities

Work Package	Responsible Members	Duration
1 – Requirements and System Analysis	Aisha, Moza	September 2026
2 – System Architecture and Component Selection	Moza , Alreem, Aisha	October-November 2026
3 – Hardware Development	Alreem , Moza	November 2026
4 – Software and Occupancy Detection Development	Alreem ,Moza	January-February 2027
5 – Alarm and Communication	Moza , Alreem	December 2026-February 2027
6 – System Integration	Moza , Alreem	February-March 2027
7 – Testing and Validation	Shaikha , Moza, Alreem	March-April 2027
8 – Optimization and Final Documentation	Shaikha , Aisha, Moza	April-May 2027

Table 4: Work Package Responsibilities and Estimated Duration

4-Sequence related work packages and be aware of mandatory dependencies:

Work packages will be executed as technical dependencies permit. Some activities are done in parallel while others depend on the work packages done before.

It has the following order of operation:

1. Work package 1: Requirements and System Analysis: Project specifications and requirements to be defined before detailed system development.
2. Work package 2: Architecture of the system and selection of components (WP2): Depends on WP1 as the architecture selected and the components used for the system must meet the requirements.
3. Work package 3: Hardware Development: Starts after hardware architecture and component specifications are defined.
4. Work package 4: Algorithm and software development: Opening out from the processing requirements and system architecture specification.Software design can also mean design for parallel hardware.
5. Work package 5: Android app development: It begins after the fixing of communication requirements and data format.It can be done in conjunction with hardware and algorithm development.
6. Work package 6: System Integration: This work package requires the design and testing of hard-ware, software, and Android application subsystems separately.
7. Work package 7: Testing and Validation: To be performed after successful integration and working prototype.
8. Work package 8: Optimization and Closing Documentation: Uses the results of the validation to identify improvements, address problems, and produce the final project documentation.

Instead, the hardware and software will overlap the application development in an effort to shorten the project time. However, the system integration will commence only after the functional tests of the required subsystems are conducted.

5-Generate the Gantt Chart for you project (spanning the full project time until end of ECEN 404):

The following Gantt chart presents the proposed project schedule from September 2026 until May 2027, covering the remaining ECEN 403 activities and the complete ECEN 404 development phase.

Milestone	Target Period	Expected Outcome
M1 – Requirements Completed	September 2026	Approved project requirements and specifications.
M2 – Design Finalized	November 2026	Completed architecture and component selection.
M3 – Subsystems Developed	January–February 2027	Functional hardware, software, and Android application.
M4 – Prototype Integrated	March 2027	Working FireGuard integrated prototype.
M5 – Validation Completed	April 2027	Completed testing and validation results.
M6 – Final Project Completion	May 2027	Optimized prototype, final documentation, and demonstration.

Table 5: Project Milestones and Expected Outcomes

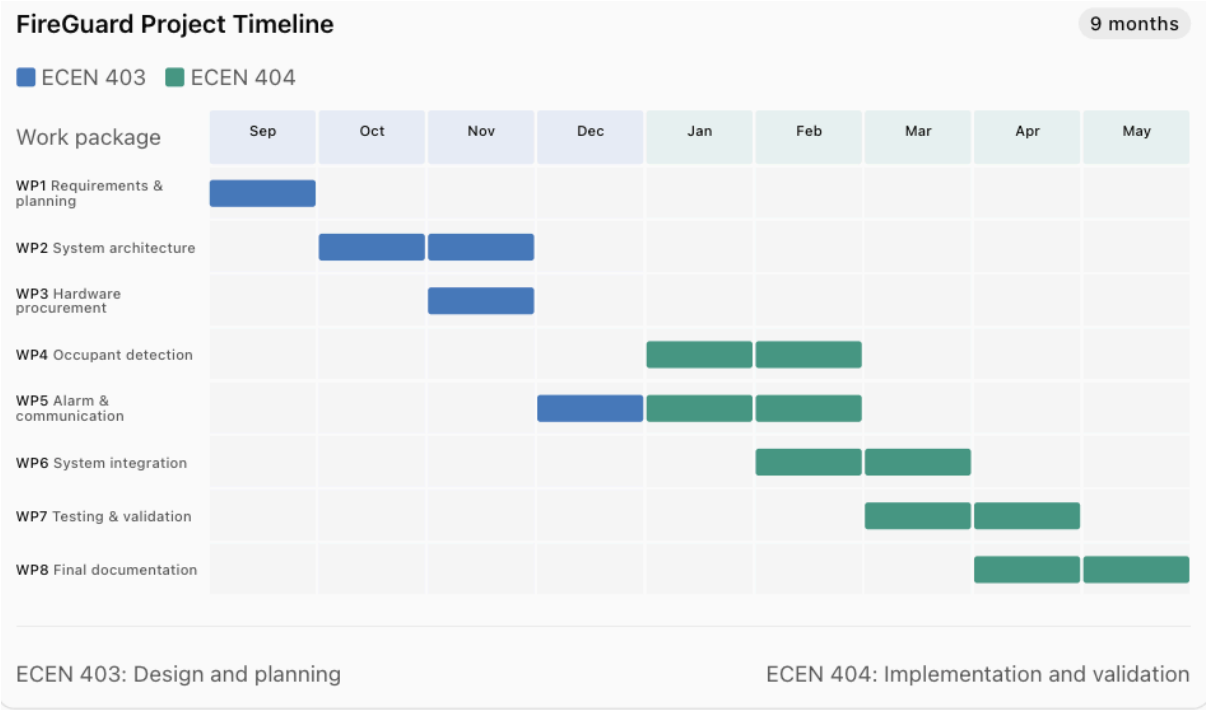

Figure 1: FireGuard Project Gantt Chart

Conclusion

The anticipated project management plan breaks down FireGuard into 8 work packages and identifies the deliverables, validation, individual team the responsible, and the estimated duration.Activities are ordered in a way to respect technical dependencies and enable parallel execution of independent hardware and software activities.

This Gantt chart outlines a schedule for ECEN 403-404 to ensure that the project flows from requirements and design to implementation, integration, test, and validation.Keep communicating with team members about the progress of the project to know the status of the project. It will help in finding the delay, technical issue, and completing the deliverables on the planned time.