Milestone 1 Evaluation

FIT AR Navigation App
(FITARNA)

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Client: Dean of the Library, Jason Martin mmartin@fit.edu

Milestone 1 Task Matrix

Task	Completion	Dathan	Ethan	Jacob	Vincenzo	To do
1. Compare and Select Technical Tools	100%	25%	25%	25%	25%	None
2. Demo Android App	100%	10%	10%	70%	10%	None
3. Resolve Technical Challenges	100%	25%	25%	25%	25%	None
4. Compare and Select Collaborative Tools	100%	25%	25%	25%	25%	None
5. Design Document	100%	20%	40%	20%	20%	None
6. Requirement Document	100%	20%	20%	20%	40%	None
7. Library Outline	80%	20%	20%	20%	20%	Significance of rooms and appliances
8. Test Plan	100%	40%	20%	20%	20%	None

Task Report:

- Task 1: For task 1, we compared technical tools for our project and decided to use the following tools. For the engine, framework, and SDK, we are using Unity Game Engine, Unity's AR Foundations framework, and Unity's XR plugin for Google's Android ARCore SDK. For navigation algorithms, we are planning to use A*. For programming languages, we are hoping to exclusively use C# for Unity development; however, if we run into a feature we can not build using just Unity, we will be using Kotlin for Android

app development. For crash reports/ logging, we are using Unity and VS Code's built-in console debugger. And for data formats, we will be using some JSON files for floor information, and data organization/ readability.

- Task 2: There are three separate parts of the app demo. First, we have the use of scanning software, namely RealityScan, a tool created by Epic Games. Scanning a room requires 200-300 high-quality, connected photos for a quality scan. During this time, Jacob was only able to get one medium to high quality scan on the smaller room, and a low to medium quality scan for the larger room. The software particularly struggled with a large, empty wall on the right, and it did not even render that wall or the ceiling connected to it. We were still able to use the scan, given the other walls and doors. The second part of the task was uploading the scans to a Unity project, scaling them to a real-life scale of meters, and then connecting them together in one Scene. This included measuring features of the room and spending time lining things up. This is important for image recognition and spawning prefabricated objects in the future. The last part of the demo was spawning a prefab object with a QR code. We had difficulties with this as we originally tried to use a logo instead of a QR code, and an Animated Möbius strip. This had several issues that were unresolved, so we moved to using QR codes and simple objects. For Milestone 2, Task 3, we plan to use some portraits and door plaques for image recognition instead of QR codes, and integrate the first draft of pop-up objects.

- Task 3: Jacob familiarized himself with Unity's basic AR functions and learned about the challenges and requirements of scanning. Additionally, we should be able to develop exclusively with Unity and use their ARCore plug-in to directly build and run the application on Jacob's Google Pixel phone for Android Testing. We are still working on pathfinding and localization, but we have figured out image tracking/localization of spawned AR objects using QR codes. If we can use logos / other images with this, and integrate a pathfinding algorithm like A* into a script, we should be able to successfully plot and update the user's position and best pathway based on the door plagues, paintings, and other key features that they see.

- Task 4: For documentation, we are using Google Docs for simultaneous editing and leaving comments. For communication, we are using Discord group chats, and for the calendar, we are using Unity's roadmap/task board. For presentations, we are using Google Slides. Finally, for programs, we are using GitHub for version control.

- Task 5: For this task, we completed the full design document for the FITARNA app. The document outlines the system overview, data design, system architecture, component design, and user interface. Each section contributes to a detailed plan for how the app will function and how it will be implemented. The document contains details of the system design and component breakdown, which was divided into key components: the User Interface, Tour Manager,

Navigation Manager, Pop-up System, AR System, and Stored Data. Each component was assigned specific responsibilities, such as the UI handling menus and navigation elements, or the AR System managing Unity and camera integration. The Component Design section expanded on how each system component might function internally in a modular system of subsystems. Pseudocode for each subsystem was given to give a better idea of how the app will function as a complete package. For the User Interface, we went over the system's functionality from a user's perspective. We provided both an overview and a detailed breakdown of screen objects and actions. The Main Menu, AR Navigation screen, and different modes with the AR Navigation (Navigation, Tour, Pop-up) were described, showing how they will access features like tours, search, and interactive AR elements. Finally, a matrix of all the tasks the app is expected to accomplish was compiled for the Requirements Matrix for FITARNA.

- Task 6: For this task, we wrote the requirements doc. This document serves to clearly define the requirements of our project. It details the app's three major modes and their functions, as well as performance expectations and design constraints. It will be used going forward to ensure the team, advisor, and clients have a shared understanding of the app's goals and objectives.

- Task 7: For the library outline (Task 7), Jacob spoke to the Dean of the Library and received the floor layout (with and without furniture, and without measurements). We now need to measure the length/width of the hallways to put the layout to scale and integrate it into Unity. Once this is complete, we will start compiling information for the pop-ups as stated in Milestone 2, Task 2.

- Task 8: For this task, we wrote and proofread the test document, which helped us get a clear visual of what needed to be done testing-wise for our app. Some obstacles we faced were not being very familiar with testing apps, and also thinking of new ways to effectively evaluate our app. We decided to utilize error codes in order to show us when our app crashes or has a bug, where specifically the bug is, or what it is related to.

Individual Report:
- Vincenzo Barager: My contribution to the 1st milestone is mostly the documents. I wrote the requirements document and helped with the test plan and design document. I also helped select the technical tools and collaborative tools.

- Dathan Dixon: For my contribution to the 1st milestone, I wrote the software test document and helped compare the technical and communicative tools we will use for this project. I also made small corrections to the other documents.

- Jacob Hall-Burns: My major contribution was the demo. This included figuring out how to scan rooms, uploading those scans, and aligning them in Unity. Making an AR demo in

Unity and learning how to port it to my Android device. And filming parts of each step and compiling them into a demo video. I also handled coordination with our client and got the floor layouts (with and without furniture) for each floor. I made corrections to other documents and majorly contributed to the Milestone 1 evaluation paper. Finally, I helped decide on several of the technical tools and partially overcame several of our technical difficulties related to AR and scanning.

- Ethan Wadley: For my contribution to the 1st milestone, the majority of my time was spent writing the design document. The design document includes sections for system overview, system architecture, data design, component design, user interface design, and a requirements matrix for the app, complete with each of the subsystems, how they work, and mock-ups when appropriate. In addition, I helped with the app's design and resolved technical problems as they arose.

Milestone 2 Tax Matrix:

Task	Dathan	Ethan	Jacob	Vincenzo
1. Importing and Integrating Library Floor Plans into Unity	25%	25%	25%	25%
2. Compiling details for each room and facility for informational pop-ups and getting them approved by the library.	25%, Pop-up info for floor 1	25%, Pop-up info for floor 2	25%, Pop-up info for floor 3	25%, Pop-up info for floor 4
3. Initializing App version 1.0 and integrating navigation and pop-ups for the first floor.	25%, Creating and placing pop-ups	25%, Pathfinding	25%, Image Tracking / Recognition	25%, Creating pathways, localization, and tying features together

Task Proposal:

- Task 1: We plan to start coding the basic structure of the app. With both backend and frontend functioning, we will be able to start building the general foundation for what we want the app to be and operate as.

- Task 2: We plan to import and implement the library floors and other measurements into Unity in order to get a basic AR architecture. Using this, we can base our code in a solid enough state to begin working on the main AR Navigation feature, combined with the use of GPS to accurately navigate spaces.

- Task 3: We plan to create informational pop-ups for use inside the app. Once we write them, we will take them to the library staff in order to get approval for using them in our app. We will also have to compile the different measurements for the different rooms in order to effectively utilize the AR capabilities of our tools

Client Meeting Date:
> Monday, September 22nd, 2025, 15:30

Client Feedback:
- Task 1: No Comment.
- Task 2: No Comment.
- Task 3: Suggested we work with Martin Gallagher (He is in charge of the DSL).
- Task 4: No Comment.
- Task 5: Looks good, no additional comments.
- Task 6: Looks good, no additional comments.
- Task 7: There is a plan to gather information and have it approved by Jason Martin and other library staff before it is published to the app. Library staff may be able to give us additional information for our informational pop-ups. We were also given floor layouts for the entirety of the library. This will be used to help plan the navigation routes and asset allocations for each floor of the library.
- Task 8: Looks good, no additional comments.

Faculty Advisor Meeting Date:

       September 26, 2025

Faculty Advisor Feedback:

      "I do not have suggestions on specific tasks at this point.
Based on the reports and work being done, I think
that the team is working well together, and tasks are
being completed as expected. This is a somewhatA
complex project with many components that need to
be integrated.

      There are some technical aspects of this type of AR
The application can be challenging to implement, including
camera calibration and the alignment ofthe coordinate
systems from different graphics and sensing
frameworks. These technical aspects of AR should be
handled well by the libraries selected by the team."