

AR Tour Guide - Design Document

CSCI 492

Context:

Currently the primary options for getting a tour of the WWU campus are to either join a guided tour in-person, or to take a virtual tour. Our project aims to posit a solution that will provide a new option for users to take a self-guided, or virtually guided tour on campus via their mobile device.

This will also help with people only wishing to navigate around campus for those unfamiliar with its layout. Current tours are largely pre-defined and have limited variation, leading to not much freedom being offered in how the campus is explored. The tour is set in stone, and cannot be deviated from, shortened, lengthened, or personalized, issues of which our app will aim to fix.

Scope:

- Showing building names when they are looked at via a smartphone camera.
- Giving directions to specific buildings.
- Giving information about buildings, and locations such as landmarks.
 - Departments located within.
 - Services provided within.
 - Links to relevant sites (departments, floor plans, restaurants, etc.)
 - Audio descriptions from human tour guides, which helps with accessibility.
- Tracking current GPS position.
 - No user data is stored, only used to determine where the user is located.
- Tracking the compass direction the user's phone is facing.
 - Used to know what buildings to load in, and what direction to point the virtual arrow in.
- Telling the user where to go next, and being able to steer them back onto the correct path if they get lost.
- Offering suggestions for various campus amenities and important places and services.

Goals:

Provide an interactive and user-driven experience for visitors and students on WWU's campus.

Provide administrators with a companion app to update building information as campus changes over time.

Make it easier for anyone to visit and become familiar with campus buildings, departments, services, and landmarks.

Serve users in a way that acts as a supplement to human-guided tours, in addition to serving users that do not wish to take a tour of campus, and simply wish to find a specific location to serve a certain purpose.

Give everyone a better understanding of their options of how they can use the campus to their advantage and to serve their specific needs.

Non-Goals:

Replace existing tour guides - we aim to give an alternative to human-guided tours, but also provide a supplementary tool that can be used for non-tour purposes.

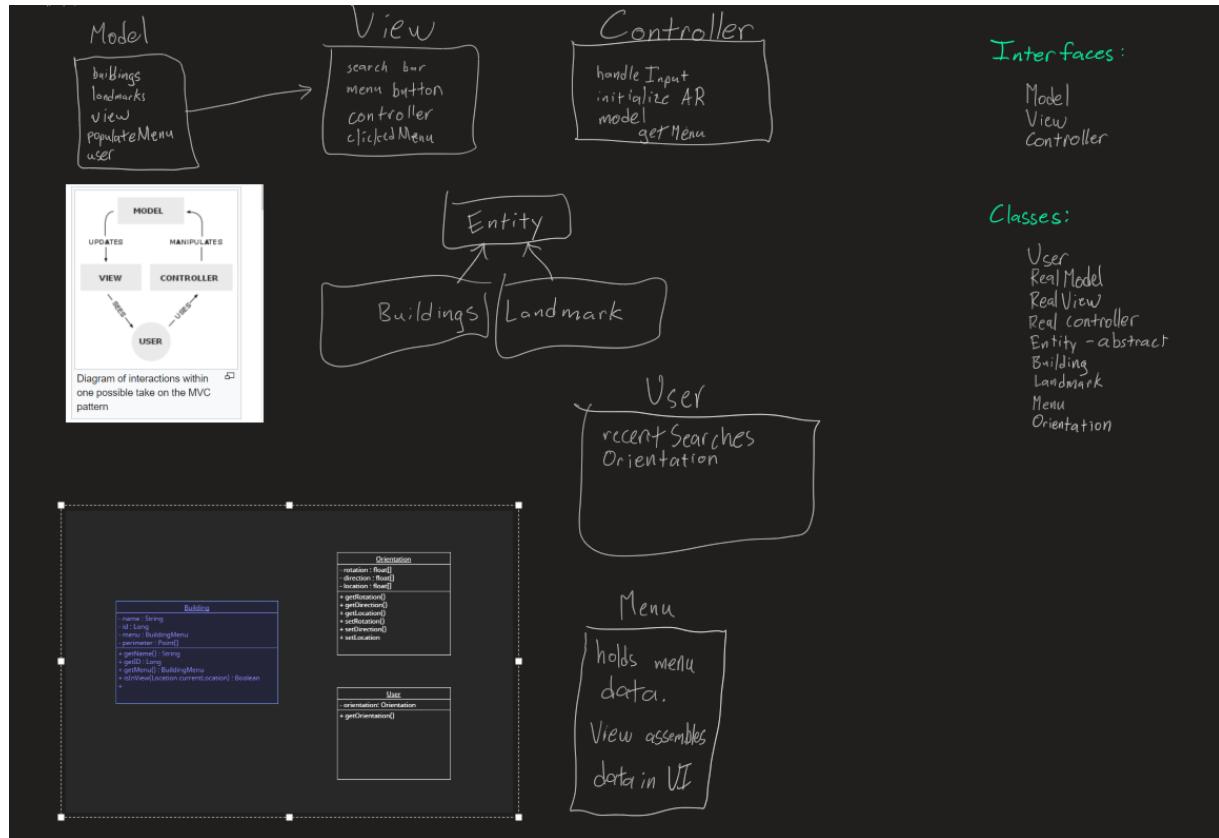
Provide the only definitive way to experience or view campus, as there are countless ways to make the most of WWU's services and what it has to offer.

Design:

We aim to have a clean, easy-to-digest user interface, that has a search bar at the top of the screen, an arrow in the center telling the user where to go, popups at the centerpoint of each building in view, and a hamburger menu at the top that will list more options if tapped.

Architecture:

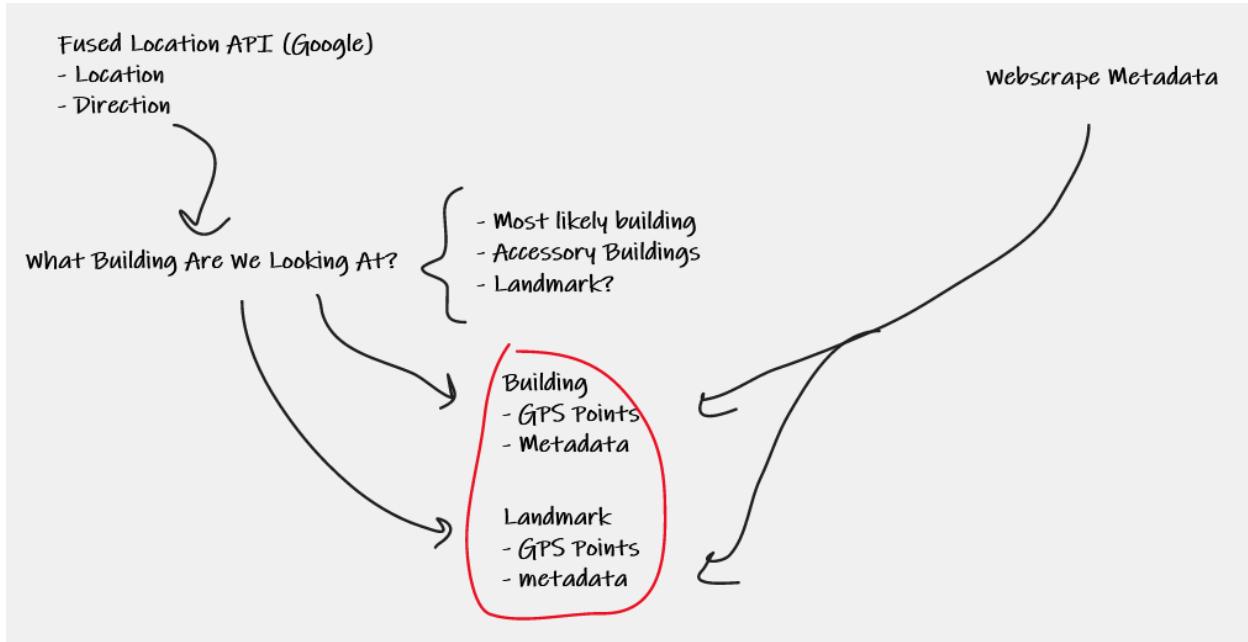
Model - View - Controller



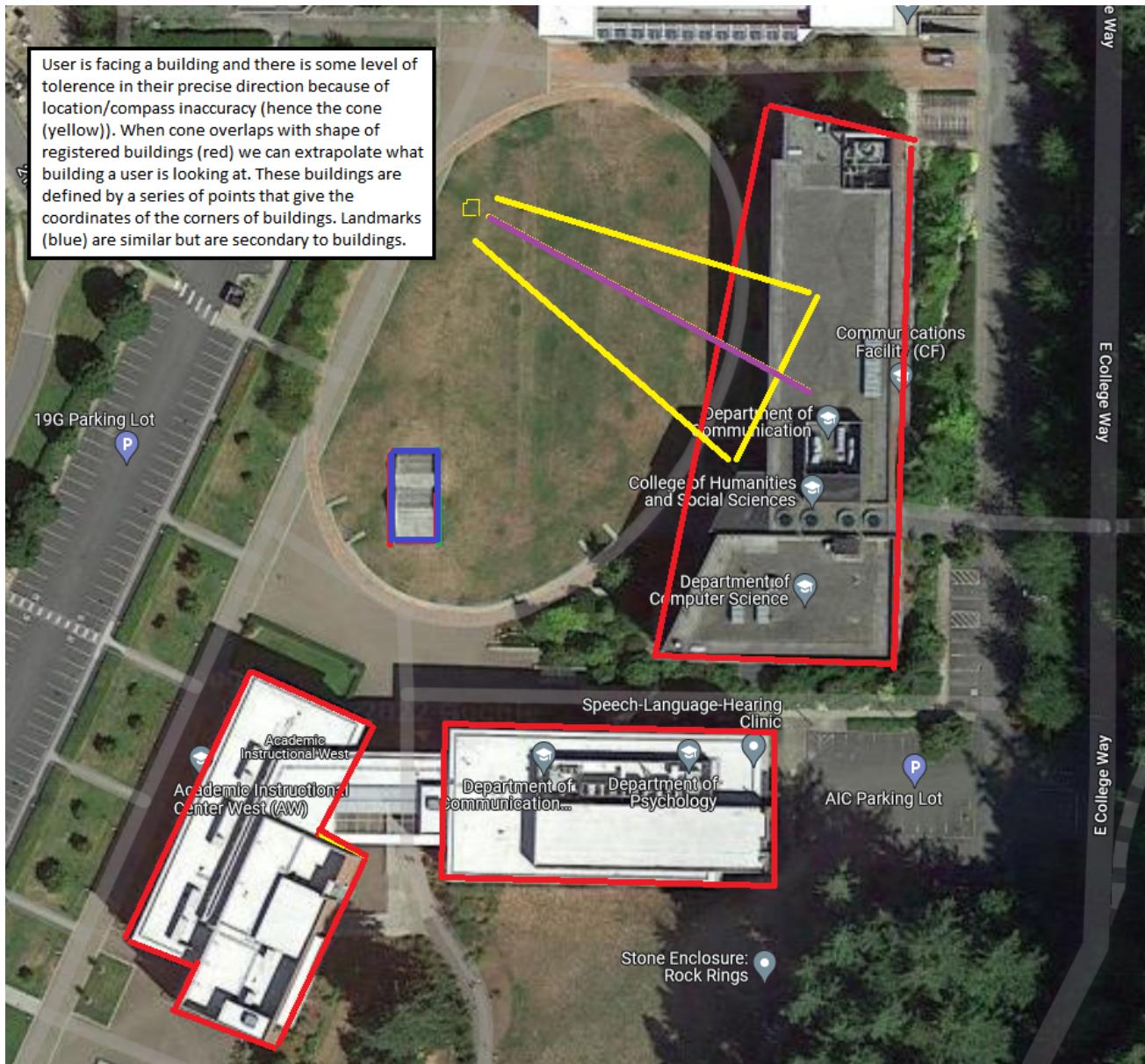
Using the MVC design pattern, we are able to split up the functionality of the database, user input and requests, and what the user sees.

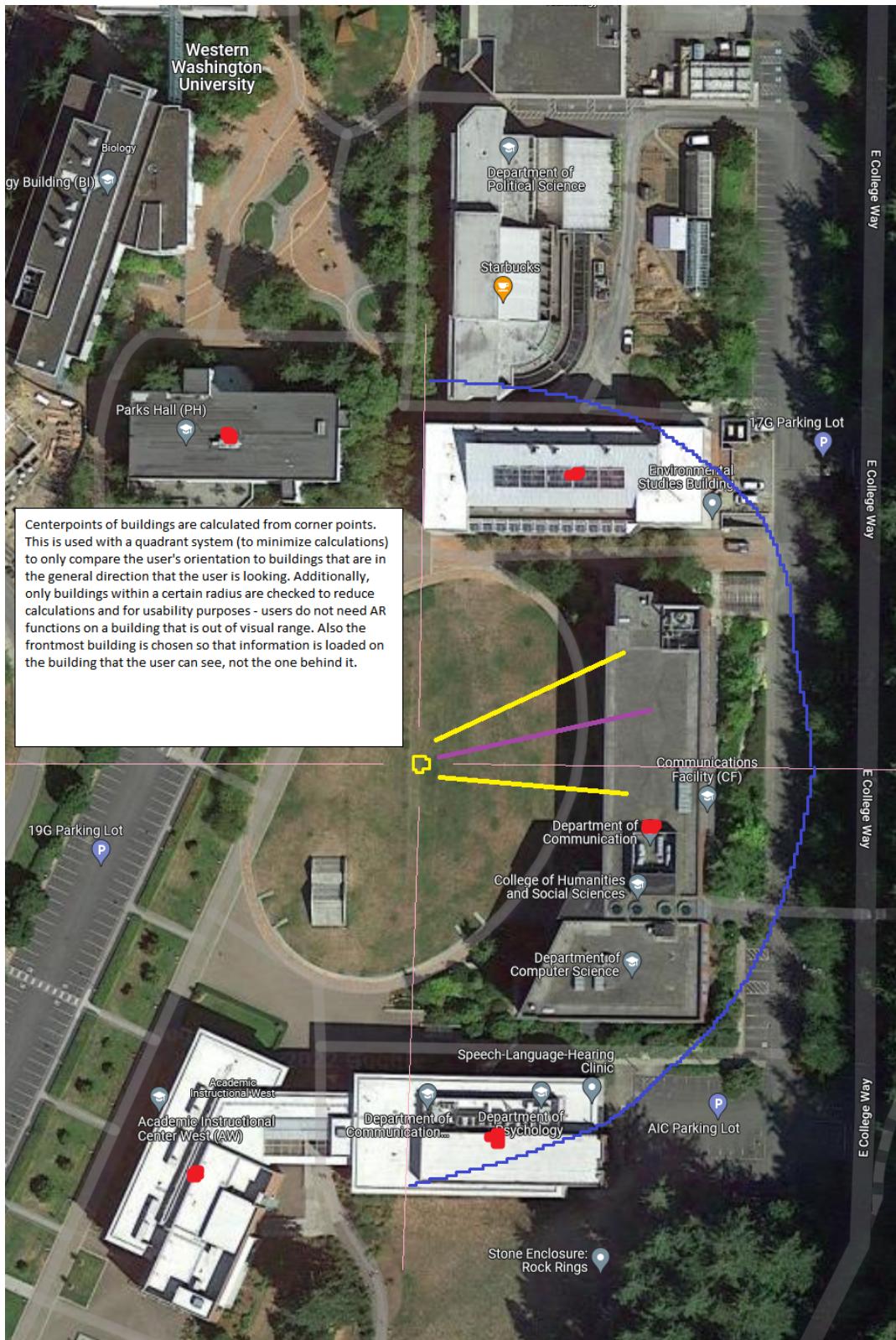
The model has the data of buildings, landmarks, and menus; the view has a search bar and menu button; and the controller has a way to initialize and query the database.

Controller:

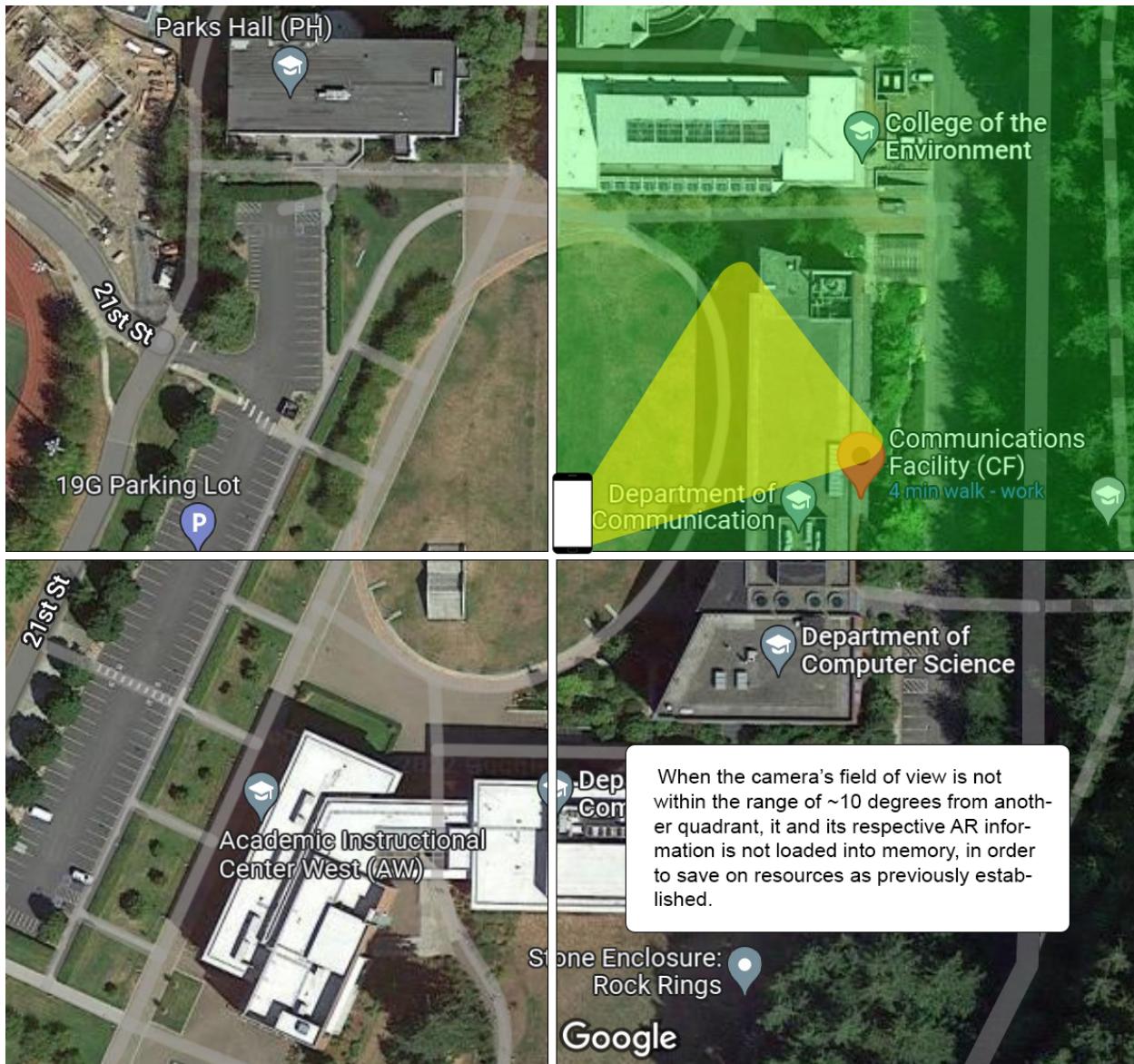


One class should handle figuring out what buildings/landmarks need to be displayed on screen based on location data and the available building information.

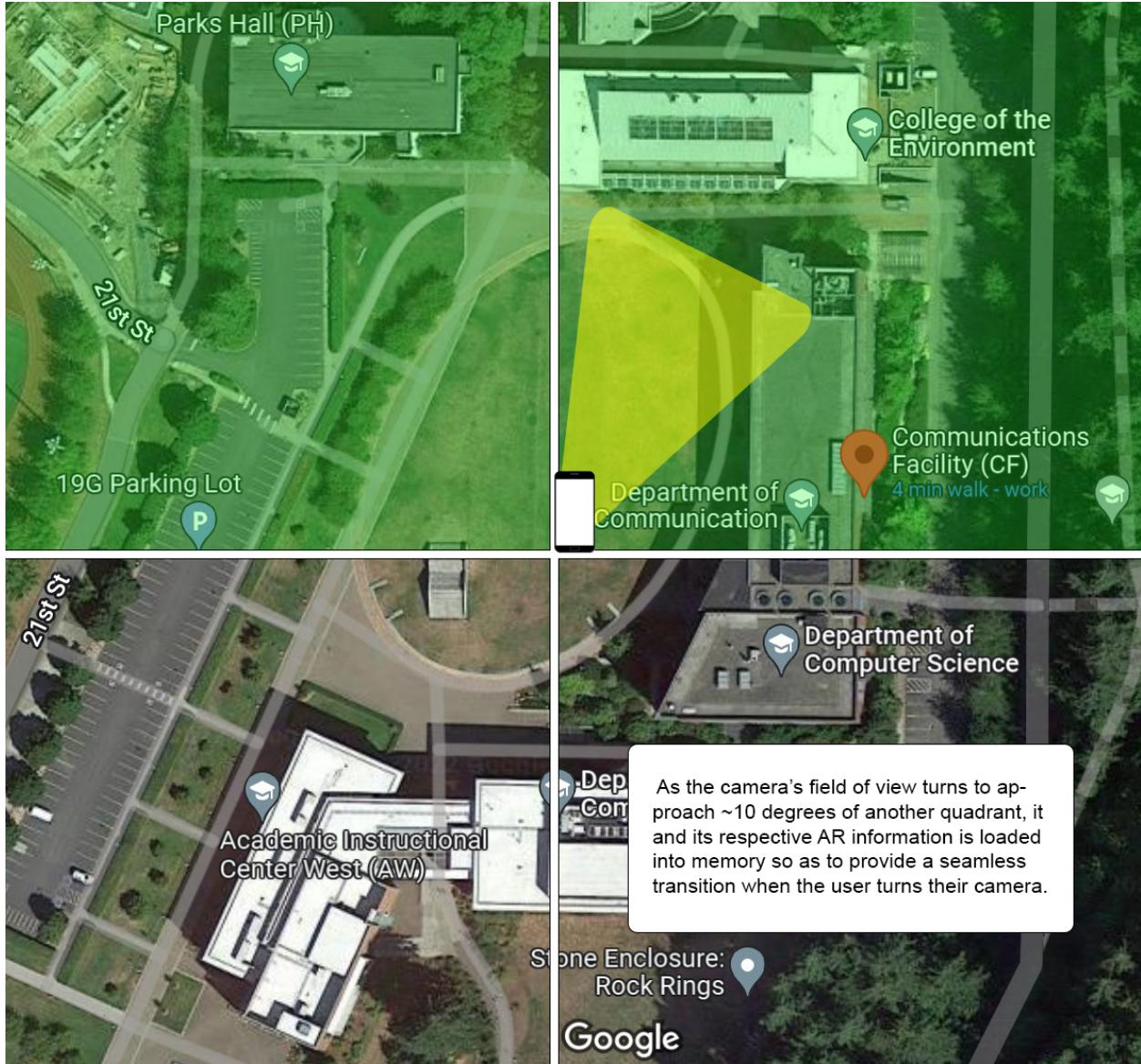




Utilizing a quadrant system, and seeing how the field of view 'cone' overlaps the different quadrants, we can know which buildings that are in the user's visual range need to be considered for display.

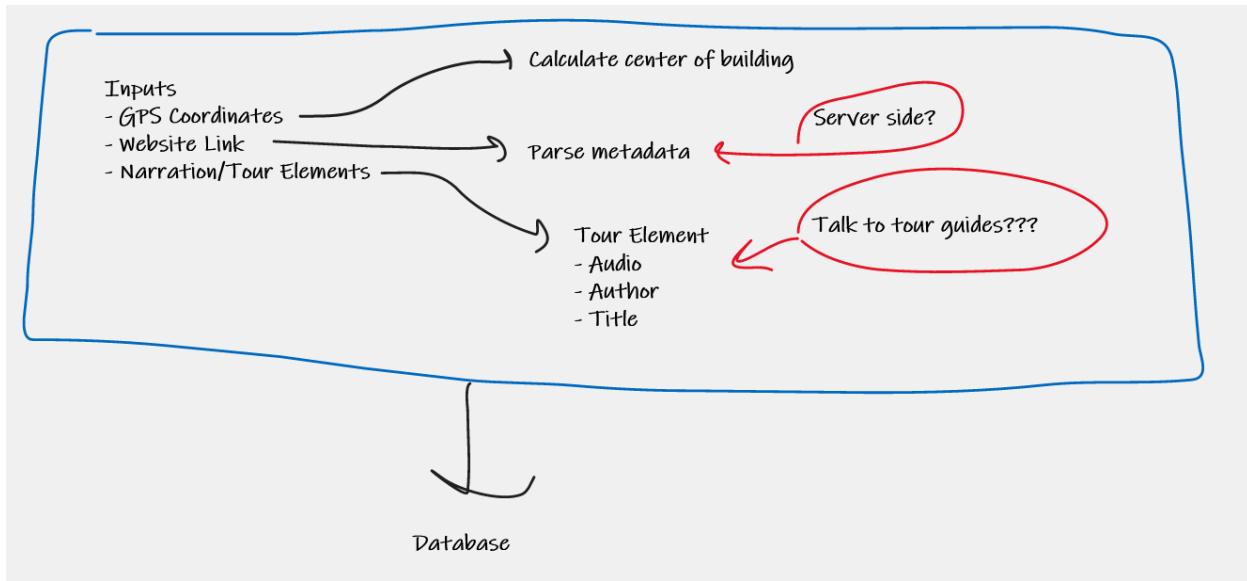


By analyzing the camera's field of view 'cone', we can know how far away it is from a given quadrant, and thus which quadrants need to be considered. This is key to providing a seamless transition to the user as they rotate their phone.



When the field of view 'cone' is less than 10 degrees from a nearby quadrant, start comparing the buildings in this quadrant to the user's field of view.

Model:



Metadata associated with buildings is scraped from the website - administrators provide GPS coordinates and a website link through an administrative web panel. GPS coordinates are obtained by clicking on map points/drawing a box on a map. Any audio associated with a location is also attached at this point. Administrators will then be able to edit information associated with each building/landmark at a later time if needed.

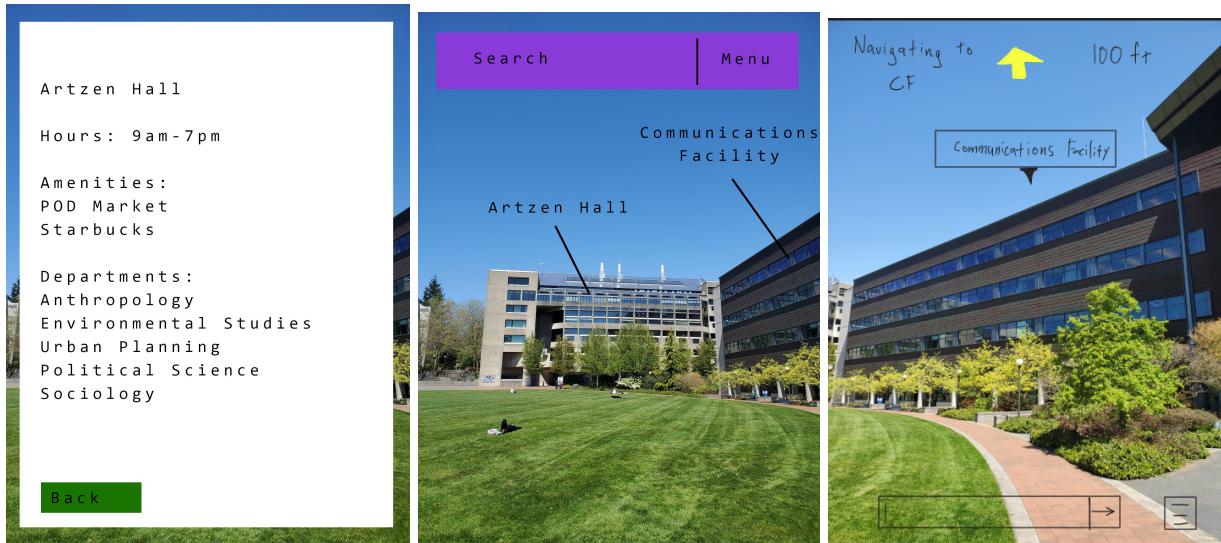
Web scraping -

- Name
- Building Code
- Building Type
- Floorplan Link
- Optional Data
 - Departments and Offices
 - Computer Labs
 - Dining (Need to account for when dorms list dining services that are not present at dorm location but just associated (ie Edens and VU))(also ridge commons does this kinda but in it's own weird way)

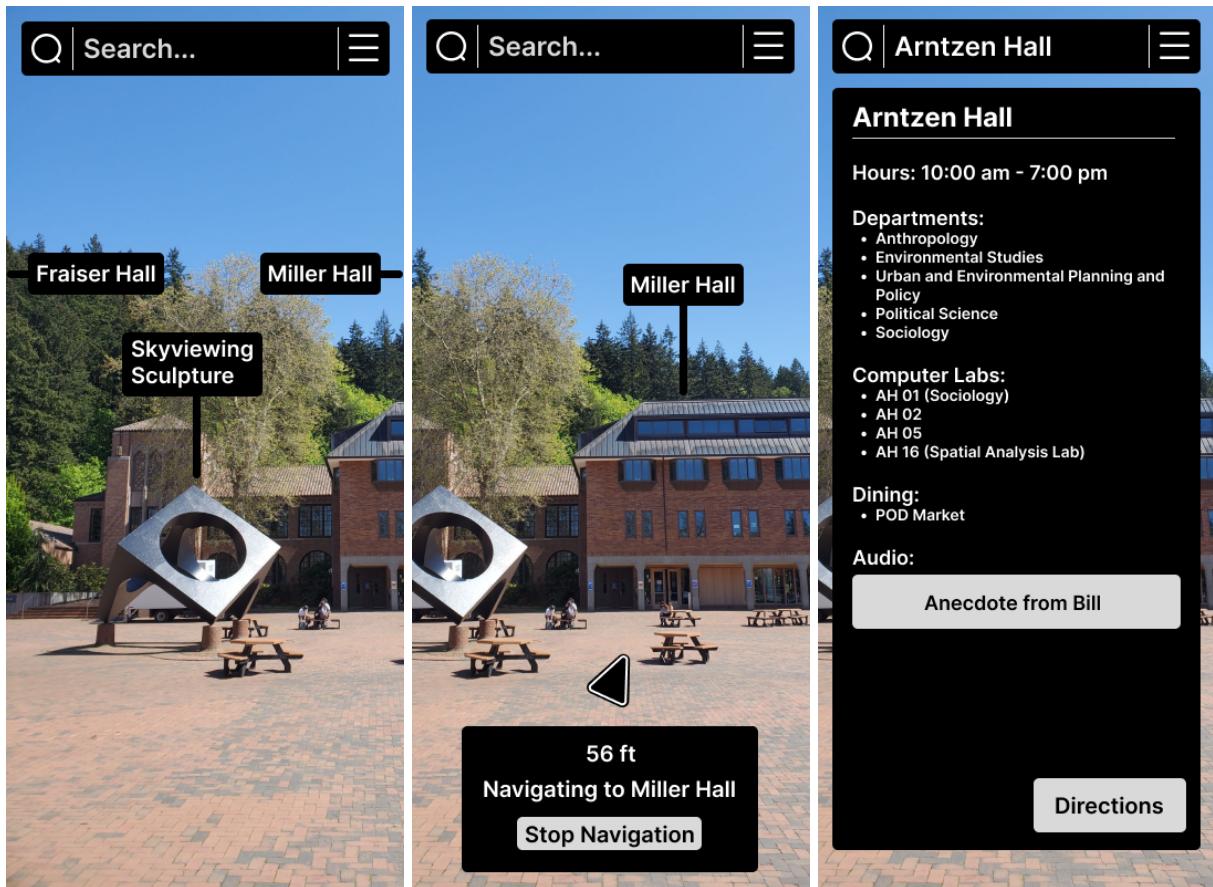
Building data updates should be checked at mobile app startup. This way new data is added to the user's view as it hits the database, without having to parse the database for every query on a building. Data is then cached locally in case of no connection/no internet.

Mockups/View:

Lowres/initial mockups



Higher Res/Figma mockups



APIs:

Google FusedLocation

Alternatives:

Alternative for navigation: 'painted' line on the ground for users to follow.

Alternative for floor plans: integrate directly into the app instead of providing a link.