



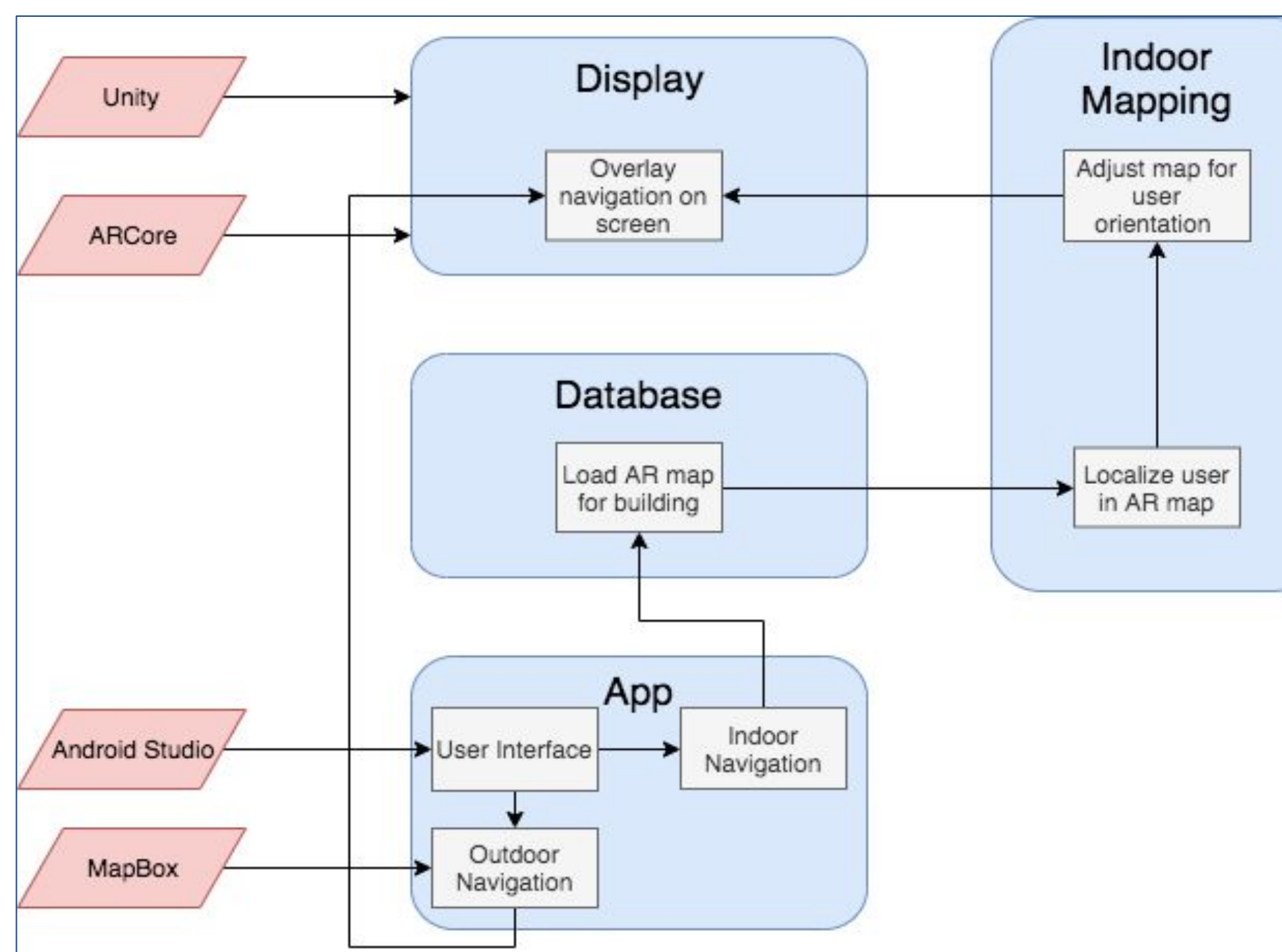
ZotFinder 2.0 - GPS for Indoor UCI Classrooms

Team Cypher - Jericho Capati, Nathan Darius Costa, Hieu Khac Nguyen, Yousef Althaqeb
Professor Stuart Kleinfelder
Department of Electrical Engineering and Computer Science

Background and Goals

UCI has a dedicated GPS application, known as ZotFinder, that works similar to conventional GPS applications, such as Google Maps. However, one fundamental problem this application contains is the lack of indoor mapping, which could prove problematic when traversing difficult-to-find indoor locations, such as classrooms and offices. Our goal with ZotFinder 2.0 is to solve this aforementioned problem and create an application that can navigate not only outdoor locations, but also indoor classrooms throughout UCI using modern technological trends, namely augmented reality.

Implementation



Materials

Hardware:
- Android Device

Software:
- ARCore
- Mapbox API
- Unity
- Android Studio

Design

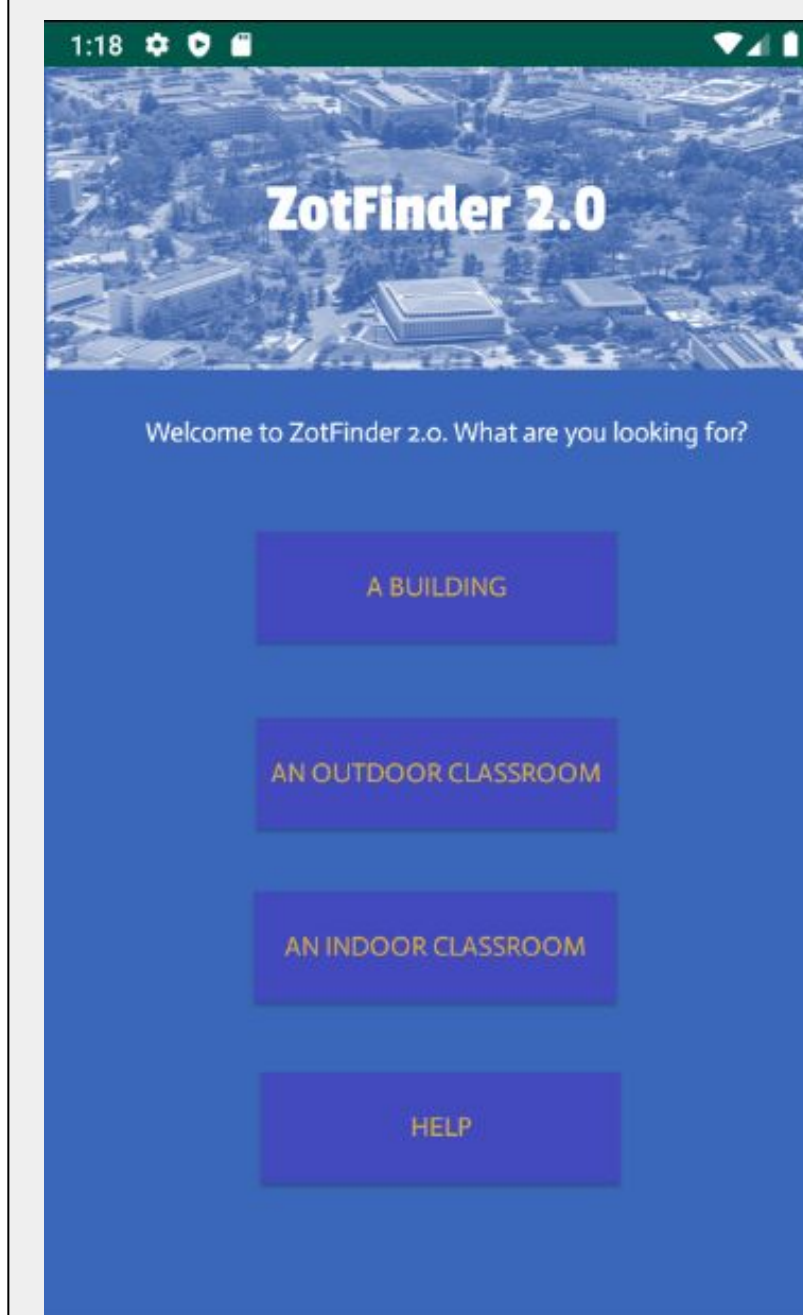


Figure 1 - Menu of app

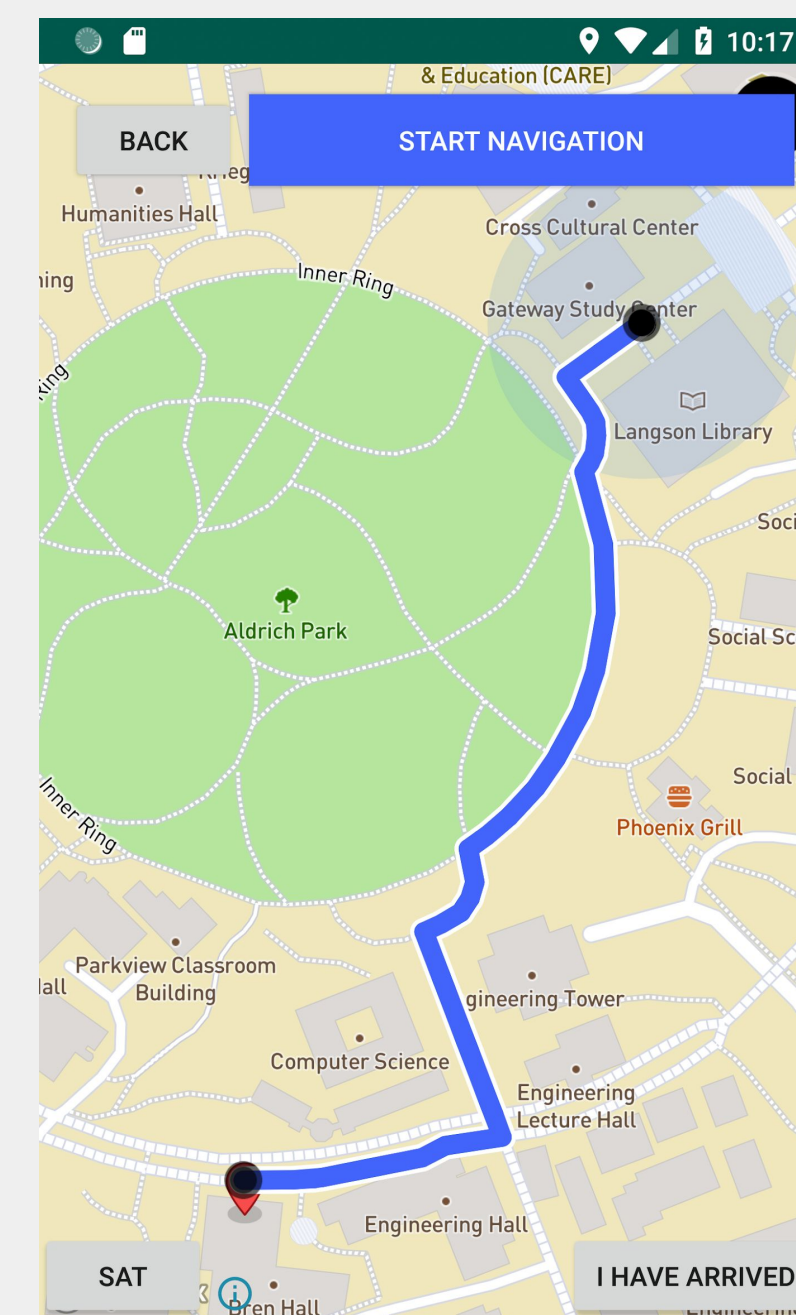


Figure 2 - Outdoor navigation menu

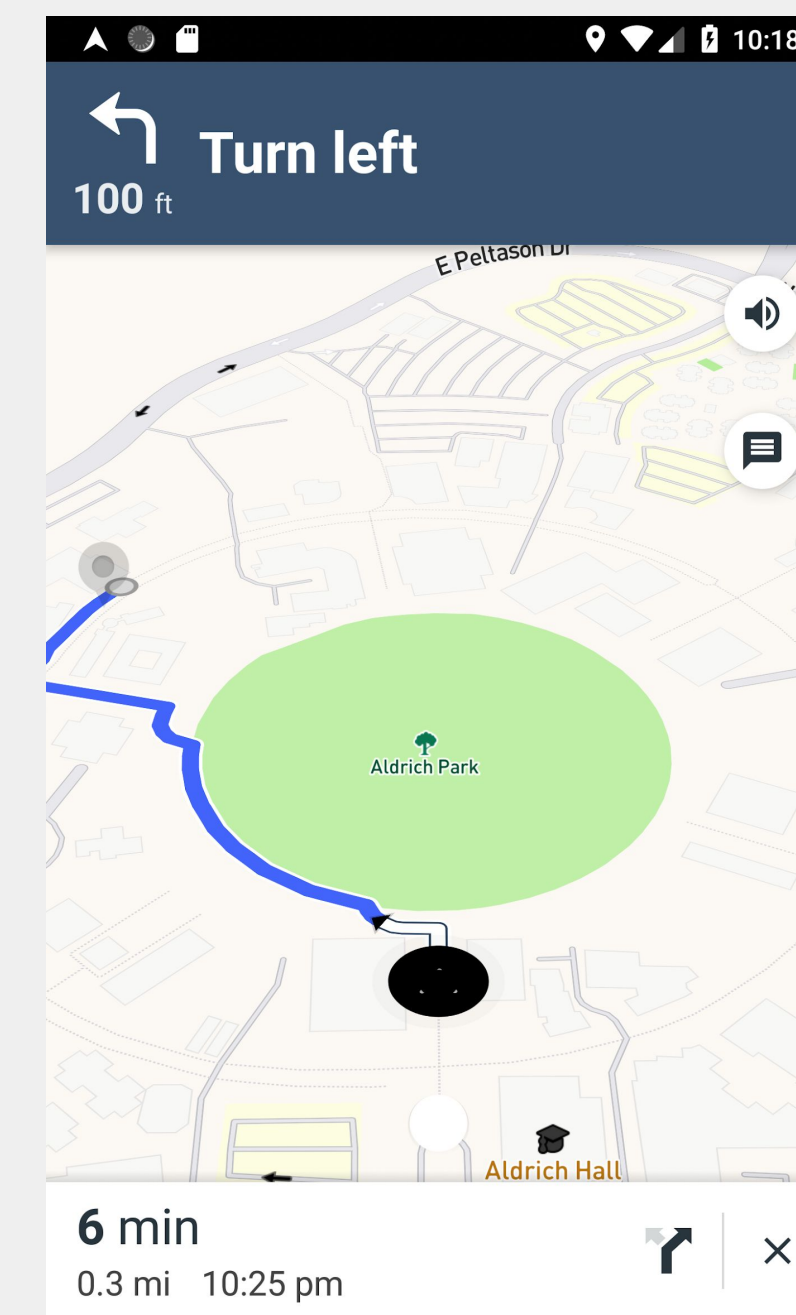


Figure 3 - Outdoor navigation demonstration

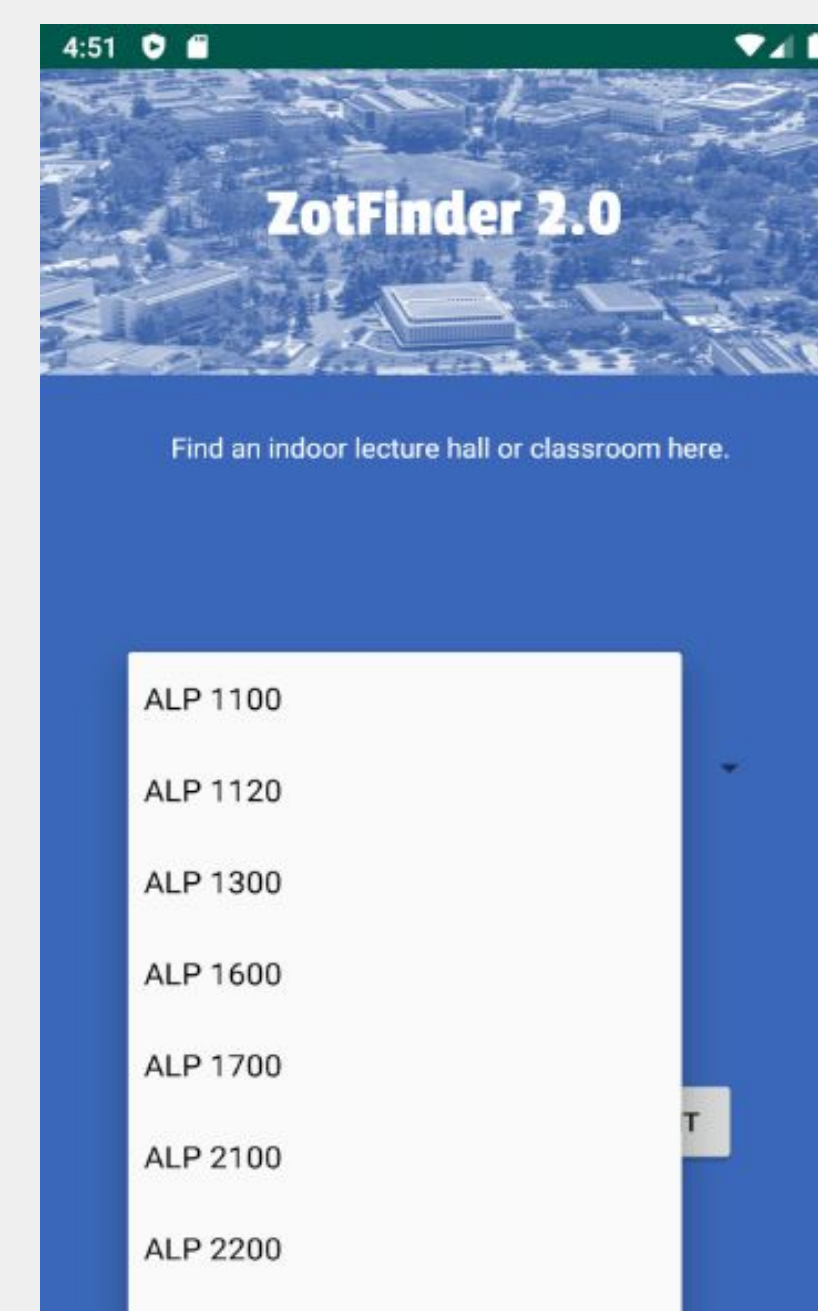


Figure 4 - Selection of indoor classrooms

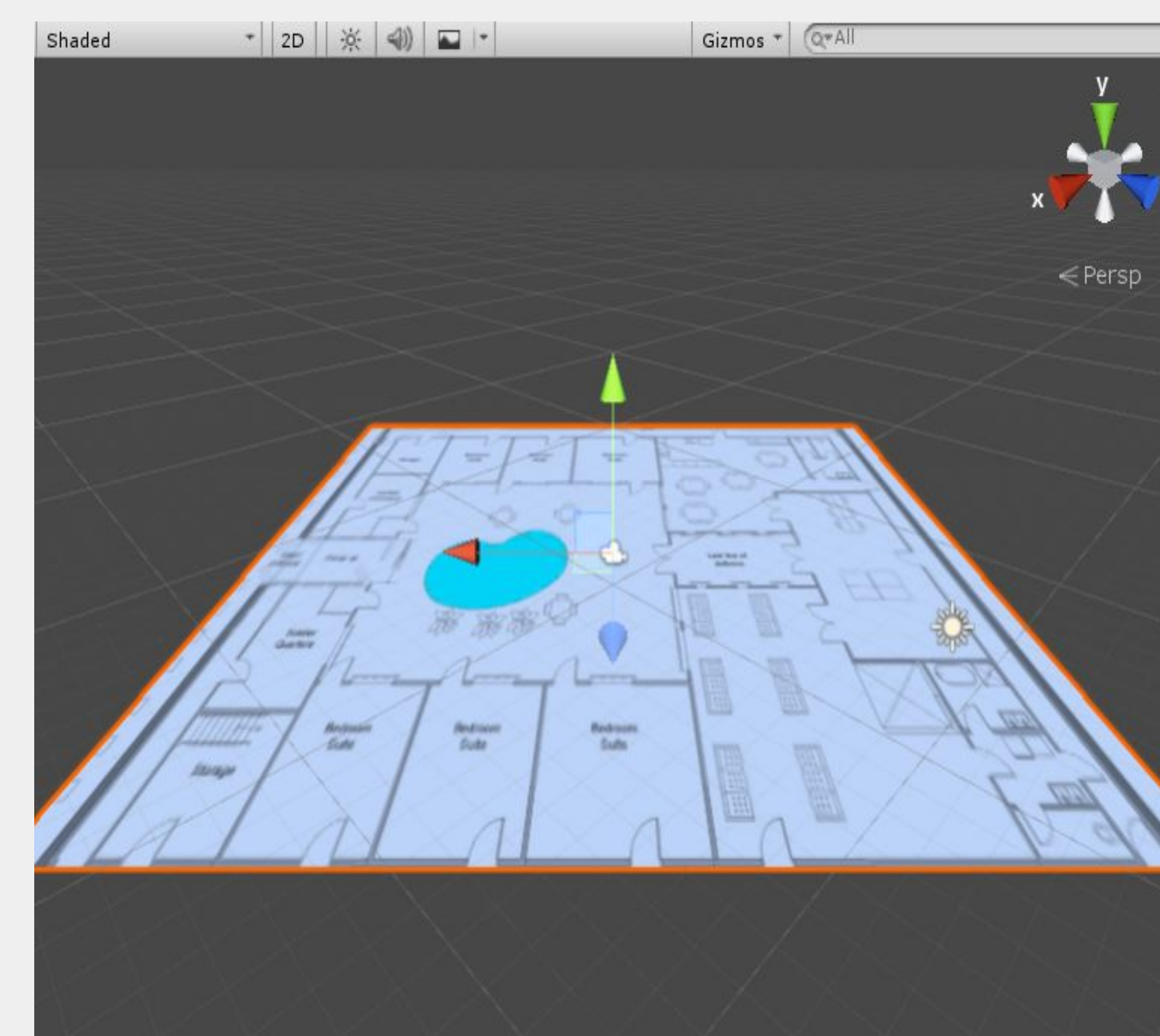


Figure 5 - Utilization of building floor plans to create model paths for indoor navigation

Results

Quarter 1

In Fall 2019, our team accomplished creating a user interface and implementing the foundation for outdoor navigation via Mapbox, with the application able to navigate to a few locations. The majority of this quarter was spent conducting research in augmented reality and the applicable tools necessary for implementing indoor navigation, as well as ensuring that our application works for multiple Android devices.

Quarter 2

In Winter 2020, our team accomplished implementing and optimizing additional outdoor locations for navigation and building the foundation for indoor navigation, with the application able to navigate most UCI buildings and outdoor classrooms and a few indoor classrooms of one building. While 10 weeks was not sufficient towards creating a fully completed application, we have at the very least the knowledge and tools necessary to accomplish a completed application.

Improvements

In regards to outdoor navigation, we must ensure that every path is the shortest possible path, whereas in regards to indoor navigation, we have the foundation and methods set up to where we can implement additional locations. Additionally, this application could be improved to be more accessible to different kinds of people. Examples include alternative paths made for the disabled and additional language options for international students.

References

“A REVIEW OF RECENT RESEARCH IN INDOOR MODELLING & MAPPING”, M. Gunduz et Al,
<https://pdfs.semanticscholar.org/d313/91529b99050046b0af114207f24646ca60d6.pdf>

“Indoor positioning system using geomagnetic anomalies for smartphones”, Seong-Eun Kim, Yong Kim, Jihyun Yoon and Eung Sun Kim <https://ieeexplore.ieee.org/abstract/document/6418947>

