# Augmented Reality (AR) Navigation System for Wheelchair Users

**AR/VR** Practicum Final Presentation

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In Collaboration with Daniel Nikolov and LBS Tech



#### **Base Team**







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#### Mentors



Daniel Nikolov, Research Engineer, Institute of Optics



Kristen Love, Faculty Member, Warner School of Education



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#### **Motivation**

There are currently **no commercial software or University tools** that support wheelchair navigation on campus or even more widely, posing a significant challenge to wheelchair users.





## **Project Overview**

Our project goal was to develop an AR app that would allow easier navigation for wheelchair users by suggesting wheelchair accessible routes in an app environment.



## **Data Collection**



#### Locations

Rush Rees Library Bausch & Lomb Hall Hoyt Hall Dewey Hall Lattimore Hall Morey Hall

Accessibility Features Doors Stairs Elevator Toilet



## **Data Collection**



Collecting obstacle & accessibility

Developed by LBS Tech



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## App Development

Unity set-up



- · Getting the app to talk to the data
  - LBS provided the API
  - Locations and information of each building and entrance
  - Navigation route

## App Development



Reference code: https://github.com/dmbfm/unity-ar-gps-location-mapbox-route-sample

## License Status of the Packages

- AR+GPS Location
  - Extension Asset: "One license required for each individual user."
- Mapbox
  - Pay as you use: 50k map loads free; 100k map loads \$250
- Github Repo
  - MIT License



# App Interface



Starting menu has a **list of buildings** (destinations) and shows a **map**.



When the user selects a destination, they are given different entrance options with **pictures of the doors**.



## App Interface (cont.)











#### Features

- Truly wheelchair accessible navigation
- Wheelchair time to destination
- Augmented reality (AR) environment
- Voice feedback
- Building entrance visualization

## Challenges

- Unexplored solution space
- Unity development
- Synchronizing collected data with LBS Tech and our app
- Understanding the needs of the wheelchair community
- Time constraints



## Feedback and Recommendations

- Feedback from accessibility experts
- User testing
- Feedback we have incorporated: Voice feedback, time to destination estimates, more information when reached destination, etc.



## What We Learned

- Always back up working versions!
- ChatGPT <u>cannot</u> code in C# or Unity.
- Do not leave final testing for the day before your deadline...



## Future Work

- Based on testing and user feedback, future work would include the following improvements:
  - Extending the scope beyond the Eastman Quad
  - Voice prompting & tactile feedback
  - Weather and surface tracking
  - More user testing with diverse representation
  - Integration with adaptive technologies
  - Additional facility features

## **Questions?**



#### **Demo Slides**



#### Demo

