Navigating Campus Using Augmented Reality

The Capstone Experience

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Functional Specifications

• Navigating campus using the online map can be difficult and time consuming

• AR tech can make navigating and exploring campus easier for new students and visitors

• Inserting graphics into the real world is both intuitive and fun
Design Specifications

• The design within the AR experience is most important
• Limited user input for quick and easy use
• Easy to use while walking
Screen Mockup: Tour AR

Spartan Stadium

Wells Hall

Spartan Stadium first opened in 1923 and seats about 75,000, which makes it the Big Ten's 6th largest stadium.
Screen Mockup: Wayfinding Select

Wayfinding
Select a destination

MSU AR Wayfinding provides:
Turn by turn walking directions on campus displayed with AR

Go

Cancel

Wayfinding
Select a destination

Engineering Building

MSU AR Wayfinding provides:
Turn by turn walking directions on campus displayed with AR

Go

Cancel
Screen Mockup: Wayfinding AR
Screen Mockup: Special Cases

Continue Thru Building

Proceed to the Route
Technical Specifications

• Native Android and iOS apps
  ▪ Android – API level 24-27
  ▪ iOS – iOS 11.0

• Written in Kotlin (Android) and Swift (iOS)

• Augmented Reality
  ▪ Android – ARCore
  ▪ iOS – 'ARKit + CoreLocation'

• Location and directions through MSU GIS
System Architecture

ArcGIS

Request Information

Building & Wayfinding Info

JSON

Request Information

iOS
- Swift
- ARKit
- Xcode
- iOS

Android
- Kotlin
- Android Studio
- ARCore
System Components

• Hardware Platforms
  ▪ No server
  ▪ Run entirely on iPhone X, Samsung S9, and Google Pixel 1

• Software Platforms / Technologies
  ▪ Android Studio
    ○ ARCore
  ▪ XCode
    ○ ARKit
  ▪ ArcGIS
Risks

• Risk 1 - Lack of resources (Medium)
  ▪ Description: There are not many resources for location-based AR apps.
  ▪ Mitigation: There is GIS information available for building locations on campus. We’ll learn how to label locations from existing examples.

• Risk 2 - Instability of GPS inside a building (Hard)
  ▪ Description: AR navigation leads users to go through foreground objects when operating inside a building
  ▪ Mitigation: Develop the app assuming user is running outside first and then get more accurate information from GPS.

• Risk 3 - Capability of supporting AR on each platform (Easy)
  ▪ Description: There is no true consensus as to which platform works better with location-based AR.
  ▪ Mitigation: We will develop different features on each platform
    o Will decide which platform to continue with after 9/24.

• Risk 4 – Inaccuracy of compass (Hard)
  ▪ Description: The compass in the phone is very inaccurate.
  ▪ Mitigation: For android, have the user walk in a straight line for about 10 feet. We can calculate the device rotation based on the bearing between the starting point and the ending point.
Questions?