MICHIGAN STATE

U N I V E R S I T Y

Project Plan
Office Navigation Using Augmented Reality

The Capstone Experience

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From Students…
…to Professionals

Functional Specifications

- iOS Application

- Indoor Navigation of Large Complex Buildings
    - Administrator configures environments
    - Users follow turn-by-turn instructions

- Utilize Augmented Reality for localization and navigation
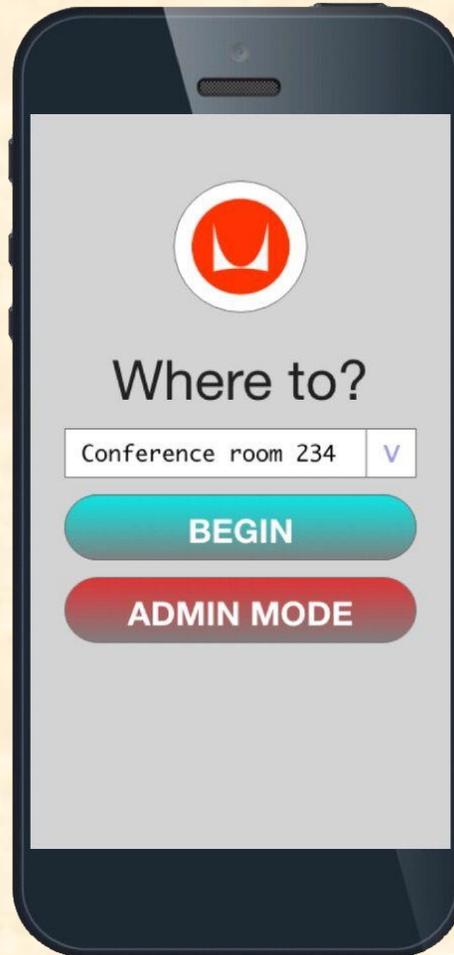
Design Specifications

- Administrator Mode
  - Configuration of places and routes
  - Version control
- User Mode
  - Navigate from place to place
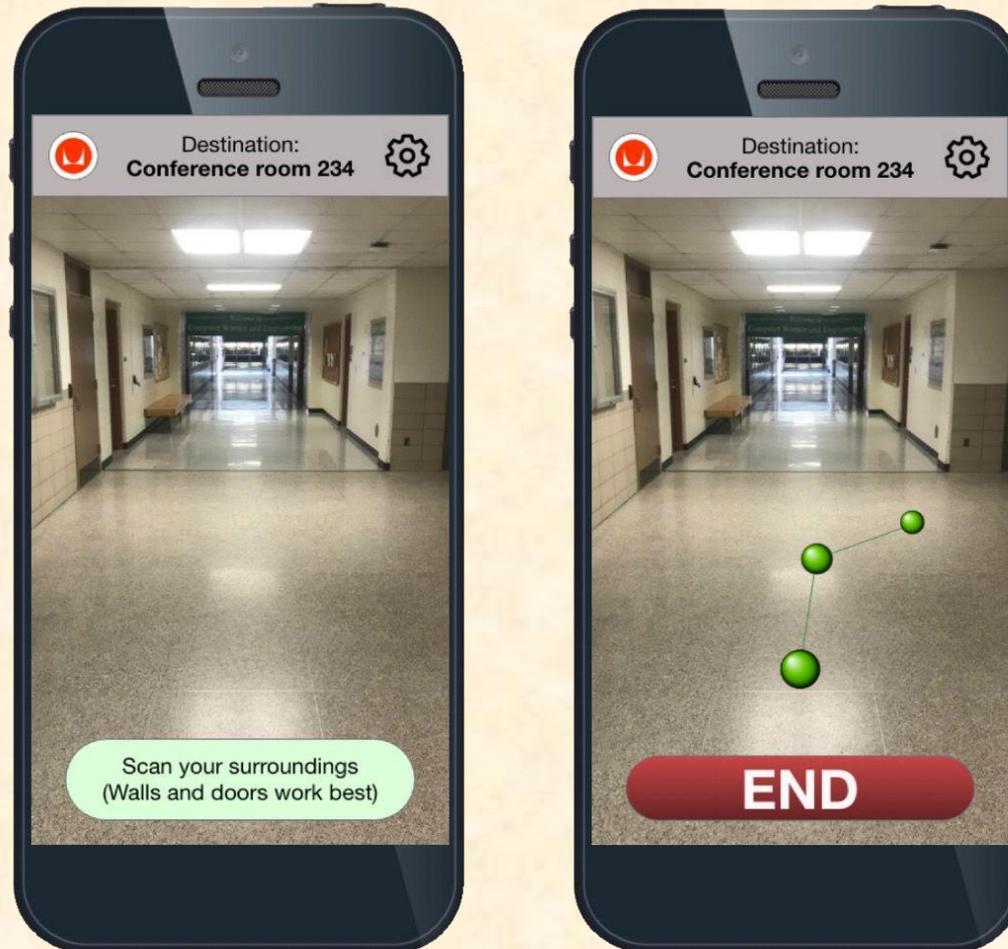 - Self-healing functionality

Screen Mockup: Home Screen

Screen Mockup: User Mode Dashboard

Screen Mockup: User Mode Localization
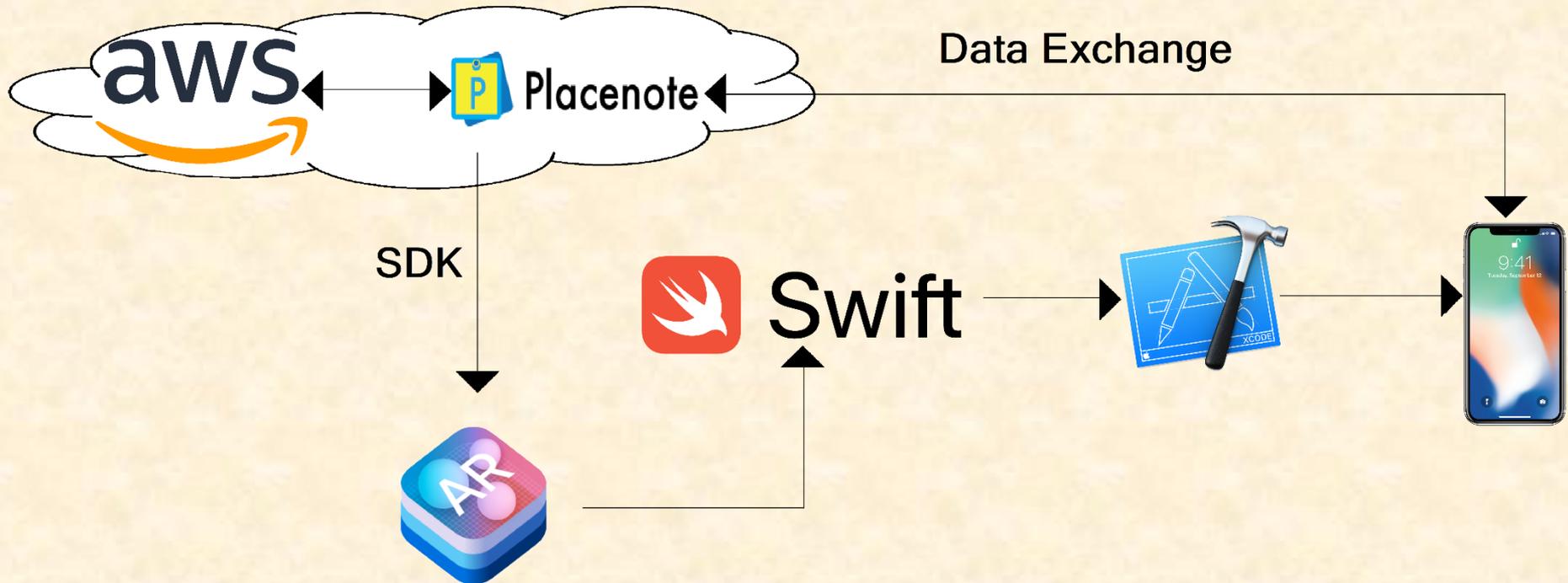
Screen Mockup: Administrator Mode

Technical Specifications

- Development Software
  - Xcode: IDE
  - ARKit: Library for AR function calls
  - Placenote: Third party SDK for extended functionality
  - Pods: Integrate third party SDK to Xcode
- Server-Side Software
  - Placenote: Cloud storage
  - Amazon SageMaker: Machine Learning

System Architecture

System Components

- Hardware Platforms
  - Apple device with A9 core and above
  - iMac Pro
- Software Platforms / Technologies
  - iOS 12 and above
  - Swift and ARKit
  - macOS

Risks

- Placenote Map Size Limitations
  - Databases only handle maps of up to 2000 sq. ft and they do not have a built-in system to connect maps to each other.
  - Working on connecting multiple small maps locally.
- Machine Learning Data for Self-Healing
  - This data is not readily available and would have to be generated through use of app.
  - The data gathering will be through video. Training could be done by Amazon SageMaker to train and deploy machine learning model.
- iPhone Hardware Limitations
  - iPhone hardware only allows for AR detection of up to 4m in front of camera. This will limit feature detection capabilities.
  - Prompt all users to avoid open areas all the time.
- Choosing Long Lasting Feature Points
  - Uncertainty of recognizing constantly changing places or routes.
  - Direct administrator to map more concrete feature points.

Questions?