Indoor Navigation App: Overview

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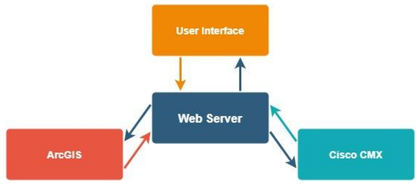
Abstract

- GPS does not work indoors
- Indoor Navigation uses Wi-Fi tracking
- Uses Wi-Fi Access Points and Building Blueprint to track location and enable indoor navigation
- We have demonstrated the feasibility of this approach by using Green Hall as a prototype



Interaction between applications

Architecture

Graphical User Interface (GUI)

- Enables user to specify current start and stop locations
- Shows current position via Cisco CMX

Cisco CMX

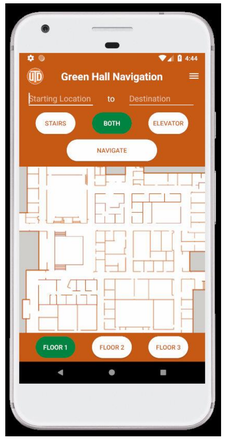
- Locates Wi-Fi points on a map
- Places the user's location using triangulation from Access Points

ArcGIS

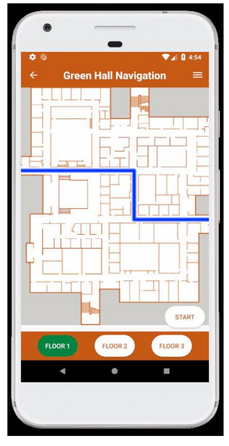
- Plots path between the source and destination
- Uses Dijkstra's Shortest Path Algorithm

Web Server

- Provides a common URL for all users to access the service
- Hides internal details from the users
- Coordinates between all the applications



Home Screen of Navigation App



Routing Screen of Navigation App

Method Calls

Java GUI

- Display the path from the user's current location to the selected destination, allow user to choose preferred paths
- Notify the user if they stray from the current path and reroute
- Notify the user upon reaching destination
- Manually terminate the route upon request

Web Server

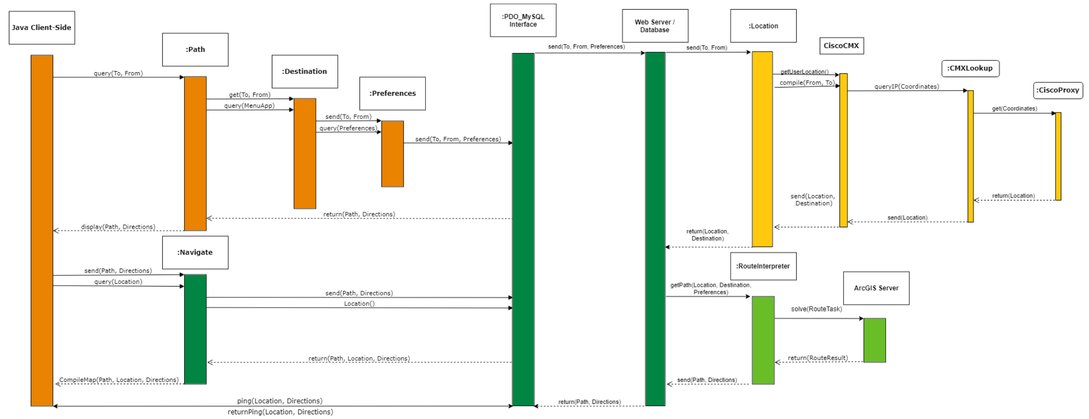
- The dependencies need to install onto the Linux server are: Apache, MySQL, MySQL Workbench
- MySQL Workbench as a MySQL GUI Program to allow us to create tables, databases, etc. in a much simpler manner

Cisco CMX

- Find IP addresses with position information, map information, and statistics about accuracy
- Ensure that the origin of the request and the IP address requested are the same

ArcGIS

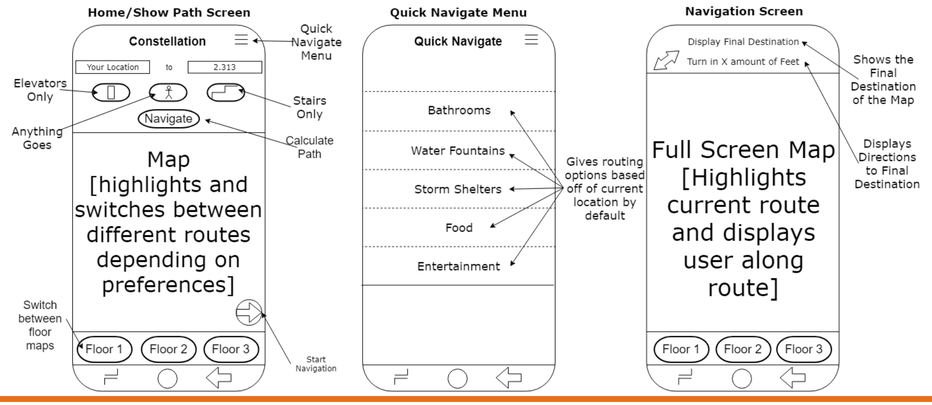
- Compute the shortest path between two points
- Communicate the path in a compressed fashion through the web server to the client
- Return an error if the destination is unreachable



Overview of Method Calls in the App

UI Implementation – Routing and Recalculation

- When the user's location is more than 10 meters (determined using a 95% confidence interval) from the path, the app will query the user to determine whether or not to recalculate the path from the user's current location
- Path recalculation will be accomplished by sending a new navigation request, as the web server does not store the path of any individual user



Conclusion

- The UTD Indoor Navigation app is intended to eventually be expanded to function wherever there is Wi-Fi access on campus
- Cisco CMX has a field of 6-10 meters where it's 95% confident of where the user is
  - This confidence interval can be improved in the future using Hyper location Technology to increase the accuracy to 1-2 meters

Contact and Acknowledgments

For contact: Dr. Ravi Prakash, ravip@utdallas.edu

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