MICHIGAN STATE UNIVERSITY

Project Plan

Electric Vehicle Charging Station App

The Capstone Experience

Team Ford

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From Students…
…to Professionals

Functional Specifications

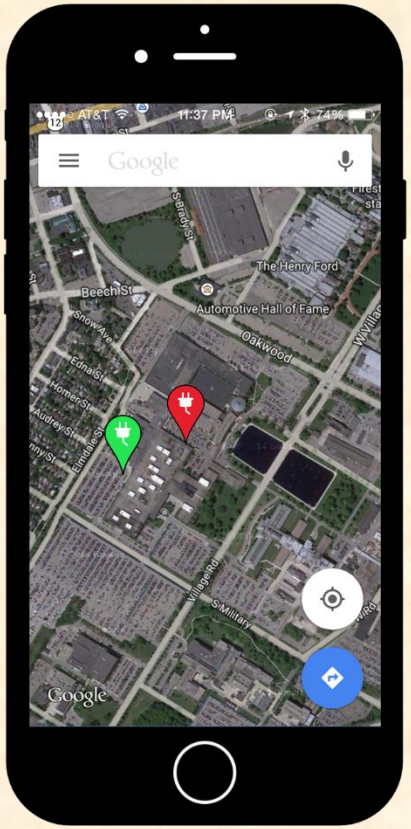
- Manage and monitor electric vehicle charging stations across Ford Dearborn campus
- Provide users with real time information on current status of vehicle charging stations
- Encourage electric vehicle owners to more efficiently use parking spaces

Design Specifications

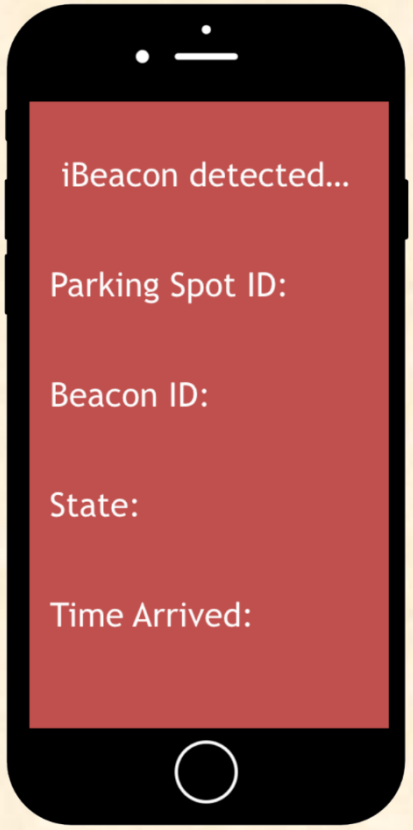
- Native iOS app will allow users to login and register their vehicle to an account
- Using the app, users will be able to locate available charging stations
- Users will also have the option of reserving a charging station ahead of time
- ‘Gamify’ the system by providing a leaderboard of people who respect 4 hour parking rule
- Push notification when 4 hours is approaching

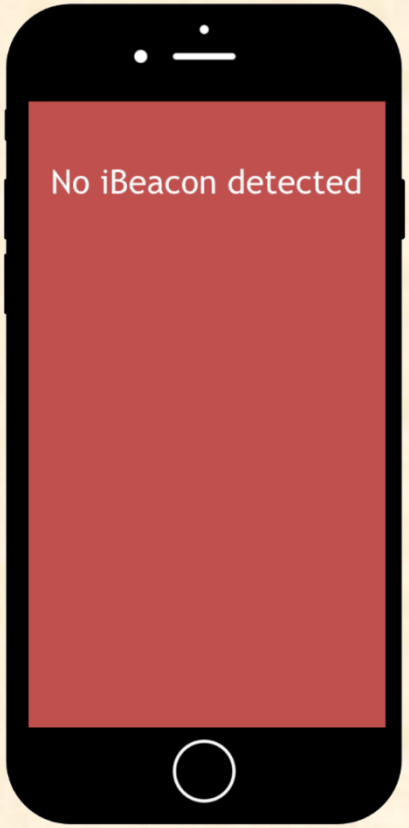
Screen Mockup: Registration

Screen Mockup: Station Availability



Screen Mockup: Test Harness App





Technical Specifications

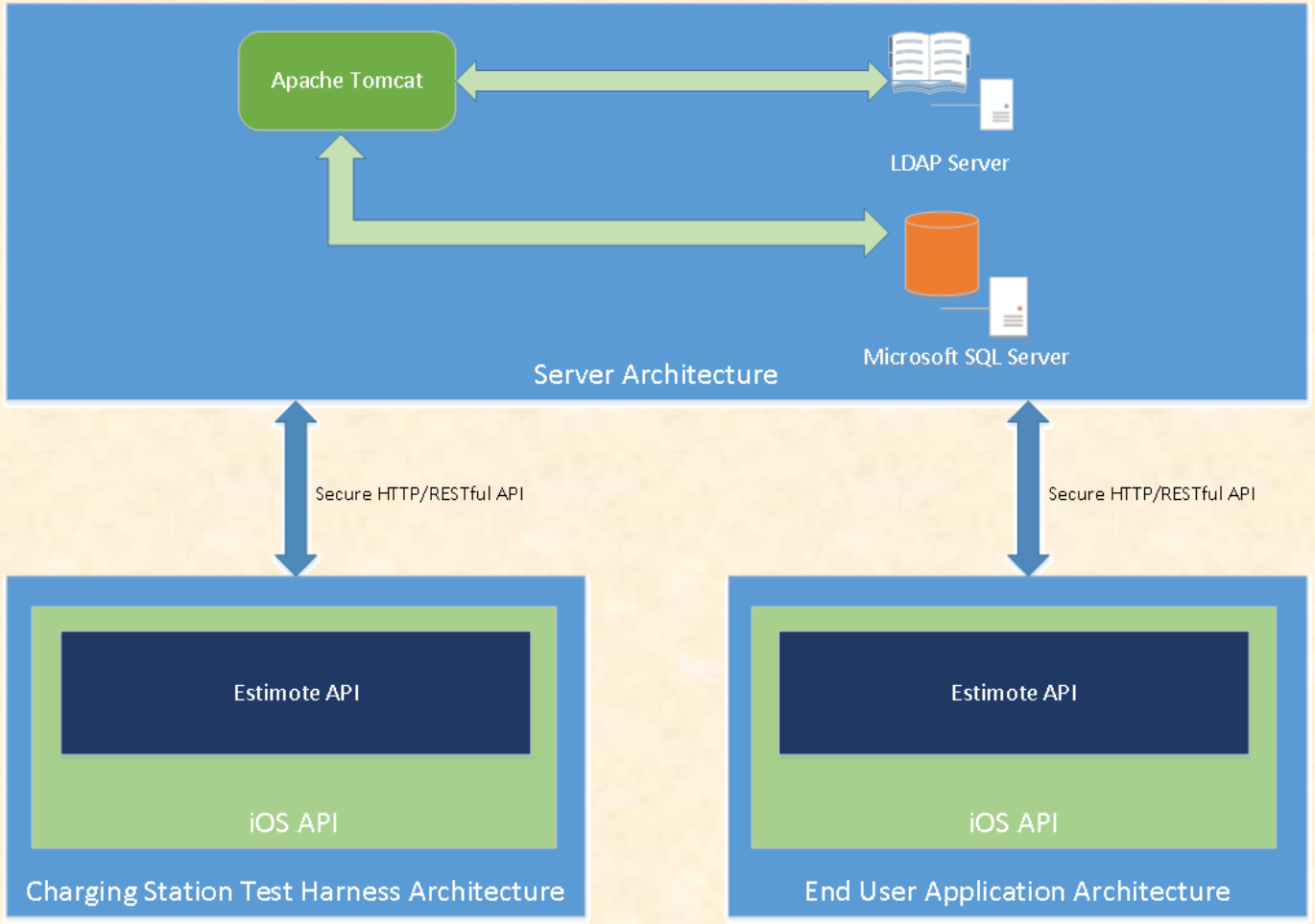
iOS Mobile Application

- Bluetooth used to communicate with iBeacons

Backend Web Services

- Web services backend provides RESTful API
  - HTTPS connection
- LDAP for user account management
  - Phased development approach
- SQL database for charging station vacancy information
  - Encryption TBD

System Architecture



System Components

- Hardware Platforms
  - Dell Server
  - Estimote iBeacon
  - iPhone 5, 6
- Software Platforms / Technologies

Web Services Backend
- Windows Server 2012
- Apache Tomcat
- Spring framework
- OpenLDAP Server
- Microsoft SQL Server 2012

iOS Mobile Application
- Estimote API
- Google Maps API
- Cocoa Touch UI framework

Testing

- Web services backend – jUnit
  - Continuous integration with Jenkins
  - Gradle builds
- iOS mobile applications – XCTest
  - Attempt continuous integration with Jenkins

Risks

Limited Objective-C experience and mobile app development

- Limited experience with iOS app development
- Mitigation Plan: Spent the past 3 weeks learning iOS development

Lack of experience with LDAP

- No experience with setting up and integrating an OpenLDAP server
- Mitigation Plan: Designate one person as lead on integrating OpenLDAP; Sys admins learn how to set up an OpenLDAP server

Inexperience with physical limitations of iBeacons

- Research revealed difficulties in dealing with range and signal interference regarding iBeacons
- Mitigation Plan: Will need to perform extensive real world testing to understand ranges and signal fluctuations from the iBeacon device.

Lack of Microsoft SQL Server knowledge

- No experience utilizing and interacting with Microsoft SQL server or performing queries.
- Mitigation Plan: DBA will research how to create database and tables; Web app lead will research how to run queries from a web application.