Bluetooth Bicycle Tracker

Trillium Health

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Background

Problem Description:

- Numerous **race management** mobile applications exist, BUT few with **bluetooth interaction** and **intermittent network capability**

- Design a system built for collecting and sharing data that could operate both online and off, while showing the user the most recent information available

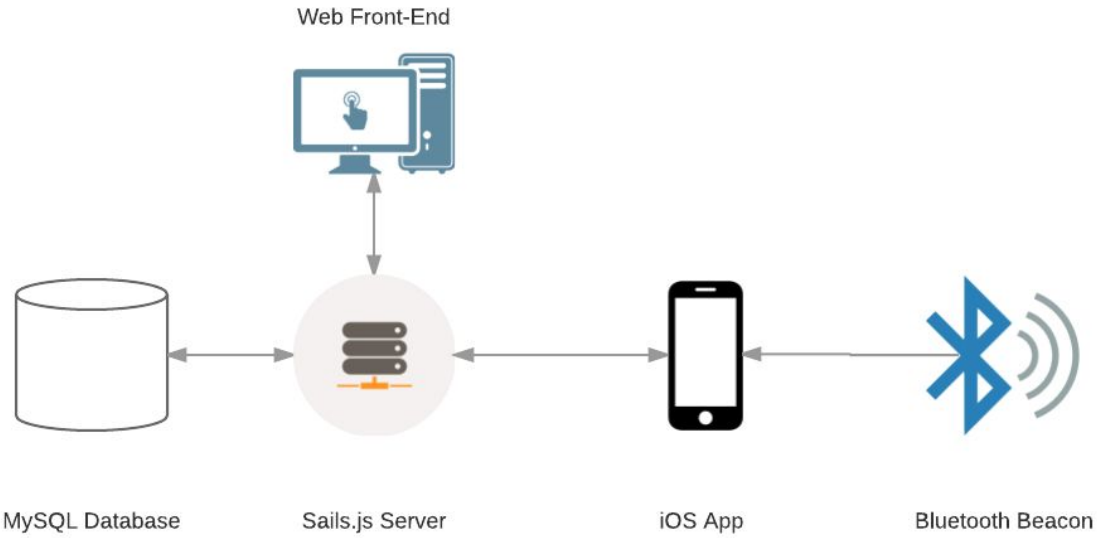
Background

Considerations:

- Mobile Application must be functional with intermittent connectivity.
- Application must estimate ETAs as well as positional information to the best of it’s ability.
- Mobile Application must automatically check-in/check-out racers via Bluetooth Beacons.
- Along with the iOS application we would also need an API for the mobile application to hit.

Background

Designed Solution, Architecture:



Background

Tradeoffs:

- Sails has no native front-end framework
- Sails is not good at supporting two different authentication types
- iOS has security limitations in establishing communications
- MySQL has a rigid schema

Demo

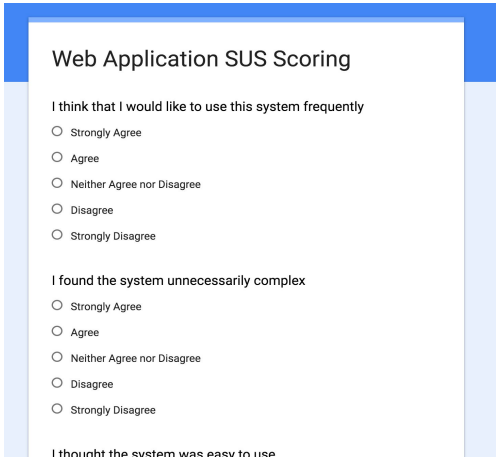

RaceChipper
Welcome!
About Us
Login
Safety First
How it Works

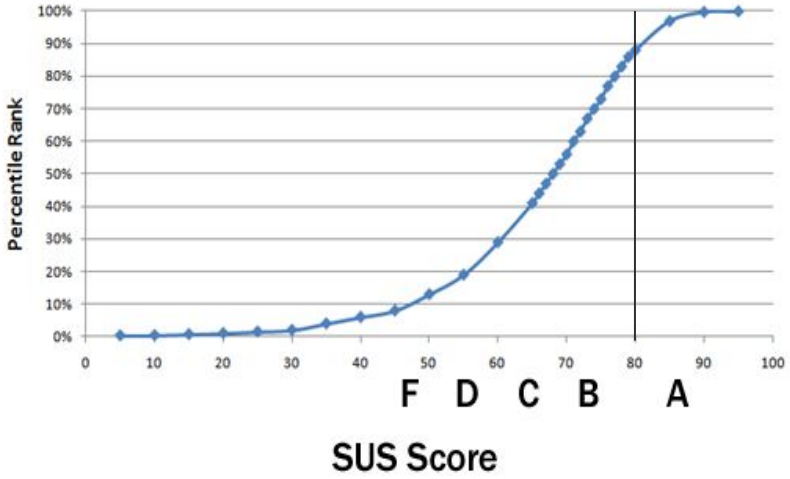
Testing - General

- Field testing
  - Dry run with actual racers to test automatic checkin/checkouts
- Unit testing
  - Framework in place, runs on build
  - Lagging due to time constraints to finish features

Testing - Usability

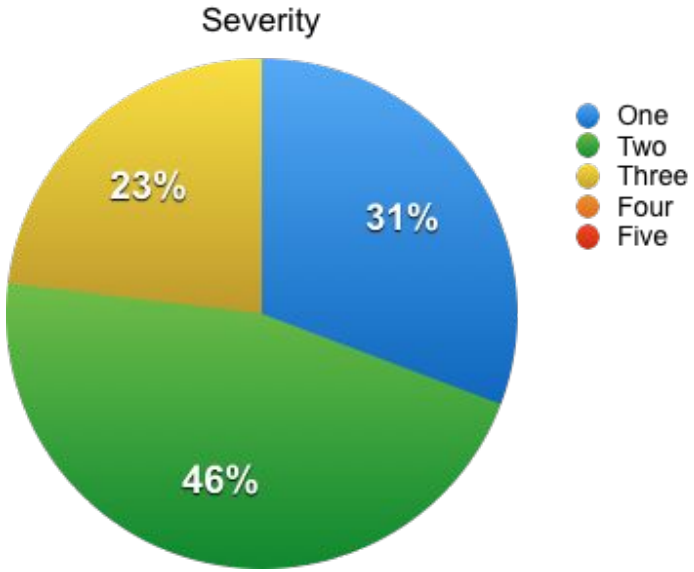
- SUS (System Usability Scale)
  - Alternative to SUMI
  - 10 questions, Likert scale; users follow script
  - RESULTS:
    - Sample of 15 participants
    - Average SUS score of **80.33**

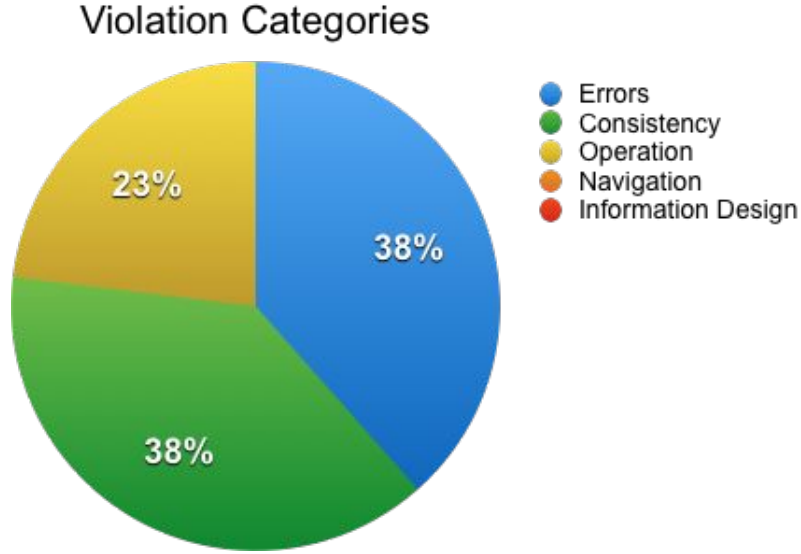




Testing - Usability

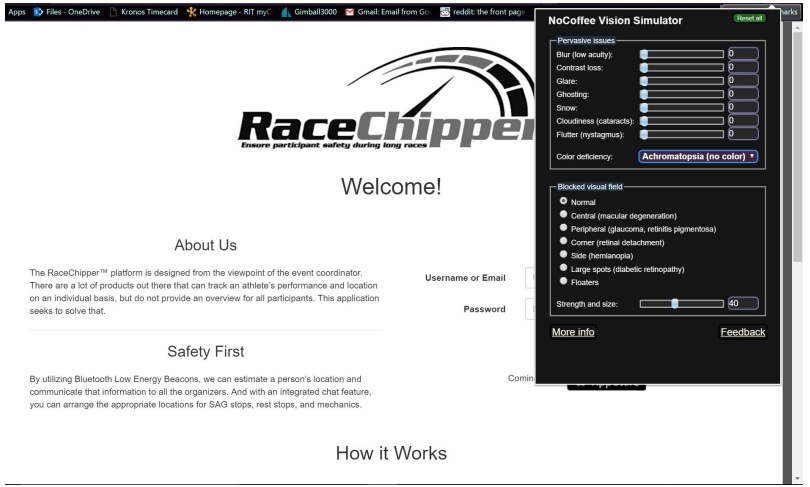
- Heuristic Analysis (developed by Jakob Nielsen)
  - Evaluate 10 heuristics; categories of consistency, errors, information design, navigation, & operation

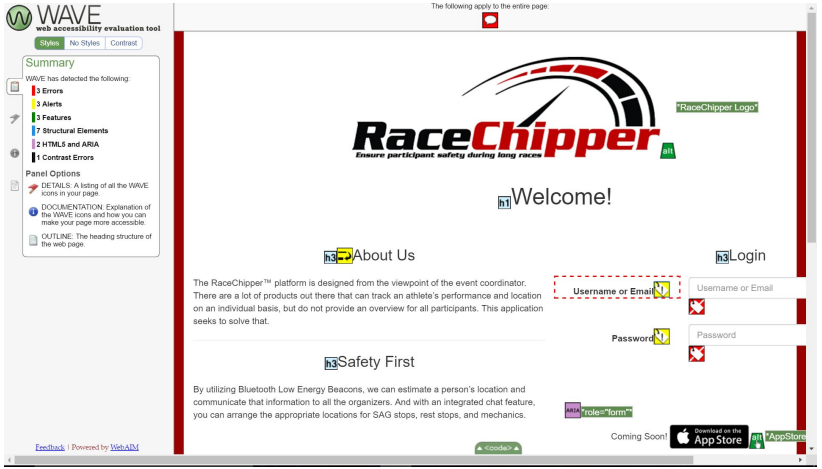




Testing - Accessibility

- ChromeVox Chrome extension
  - Alternative to JAWS screen reader
- NoCoffee Chrome extension
  - Vision simulator
- WAVE Chrome extension
- Keyboard-based navigation





Status - What was Accomplished

Completed 95% P1 Requirements, 70% P2, 38% P3, 0% P4

- iOS:
  - Racer Registration
  - Automatic/Manual Check-In & Check-out
  - Route Map with Racer Locations
  - Racer ETA
  - Chat
  - Offline functionality
- Webapp:
  - Account Registration
  - Events CRUD
  - Admin Functionalities

Status - Future Work

- Refined ETA calculations
- Optimized Bluetooth beacon tracking
- Streamlined Bluetooth device registration
- Racer accounts, statistics, social integration
- Fundraising

Challenges

- iOS development
- Bluetooth beacon interactions
- iOS testing bluetooth & offline functionality automated
- Offline capabilities

Reflection

Positive:

- Majority (95%) of P1 requirements completed, & other priority reqs
- Effective process selection
- Frequent sponsor input and consideration

Less Positive:

- Changing requirements caused delays
- Testing was largely neglected until end
- Communication could be better

Questions?