Navigating using SMS Communication

Functional Specification

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Overview

The (currently unnamed) service that we are building is a map navigation app which can be used to give directions to users to get from point A to point B. The kicker is that all data sent to and from the backend server is handled through SMS communication, making this service ideal for those in developing countries who have little access to data on their phones, due to either availability of wireless data infrastructure or due to cost.

Scenarios

- Scenario 1: Abhishek lives in a developing part of India. He has access to relatively slow internet at his job, but his part of the country is not reliably serviced by data providers. Abhishek's job as a carpenter has him visiting homes around his town, so he downloads our app and uses it to travel to unfamiliar addresses, as well as how to return either back home or to his workplace.

- Scenario 2: Naveed lives in Pakistan. He recently acquired a smart phone so that he can better communicate with his family who lives overseas. However, money is tight and he cannot afford an expensive data plan. He wants to be able to get around his surrounding communities to visit friends but is not good with directions. He downloads our app to accomplish this without needing to pay for a data plan with money he does not have.

Goals

Our app will have the following features on release:

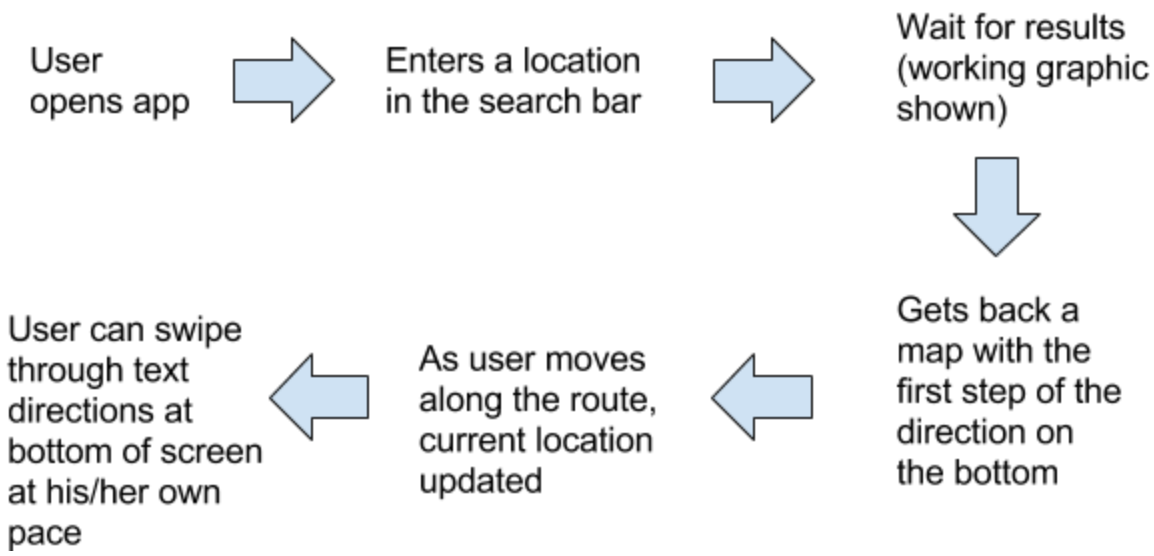
- Upon supplying the app with a start and destination location, returns a map back to the user detailing the route to be taken
- Supplies a list of more detailed directions to the user
- Exclusively rely on SMS communication (once the app is downloaded)

Non-goals

Initially, our app will not support the following features:

- Wrong turn navigation, for when users don't follow the given route
- Live traffic reports
- Interactive map (we can only send back photos through SMS)

User Flowchart



Minimum Viable Product

We expect our minimum viable product to be able to take in a start and endpoint specified by the user and return a corresponding map and set of directions to the user.

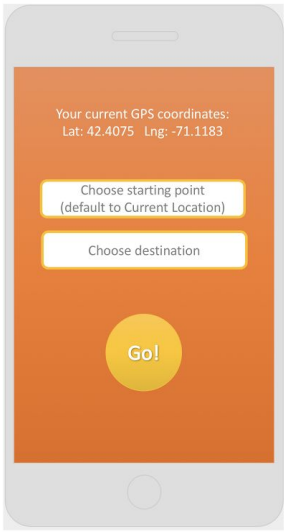
Future Work

We want to look at being able to keep a live marker on the map which represents the user's current geolocation. This would be periodically updated to the server as the user moves.

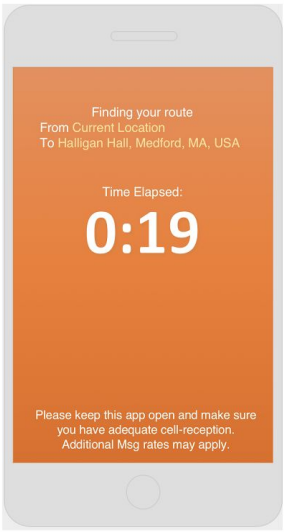
Screen By Screen Specification

We only plan on having a few screens in our app, detailed as follows:

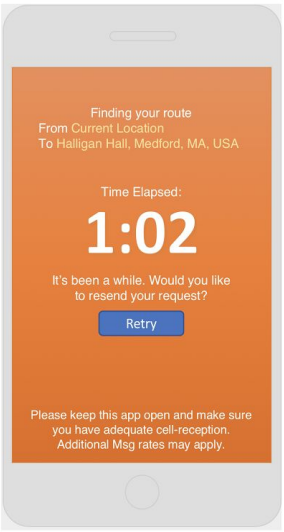
- A home page, where users are presented with two texts fields, in order to input a start and end location pair. A button is also present in order to submit the start/destination information to the server.
- A loading page shown while user waits for the server to respond with directions.



Home Page

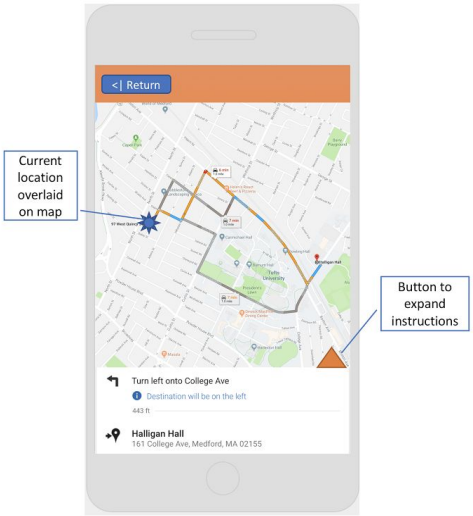


Loading Page

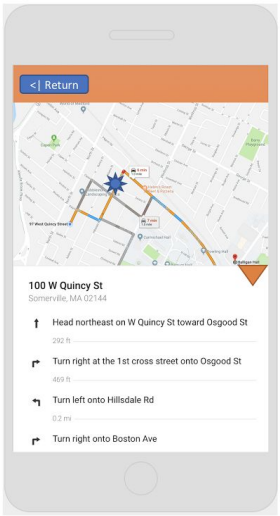


Loading Page
(with timeout)

- A map page which contains the image of the map, as well as a list of directions which can be swiped through as the user progresses on their trip.



Map Page (start)



Map Page
(with directions expanded)

Technologies

We are looking at the following technologies in order to accomplish our design:

- Google Maps API
    - Allows us to generate an HTML containing a map.
    - Text-directions
- Twilio API
    - Twilio allows us to send and receive text messages using its web service APIs
    - Also makes it easy to make simple REST requests through Twilio's server using SMS

- WK<html>topdf
    - Open source (LGPLv3) command line tools to render HTML into PDF and various image formats using the Qt WebKit rendering engine.
    - These run entirely "headless" and do not require a display or display service
    - We can use this to obtain images of maps to return to the user via Twilio
    - We will use the server side aspect of the Google Maps API to obtain a HTML documenta which corresponds to a map which can be captured via this service.

Technical Flowchart