Senior Capstone Project Proposal - SMS Navigation

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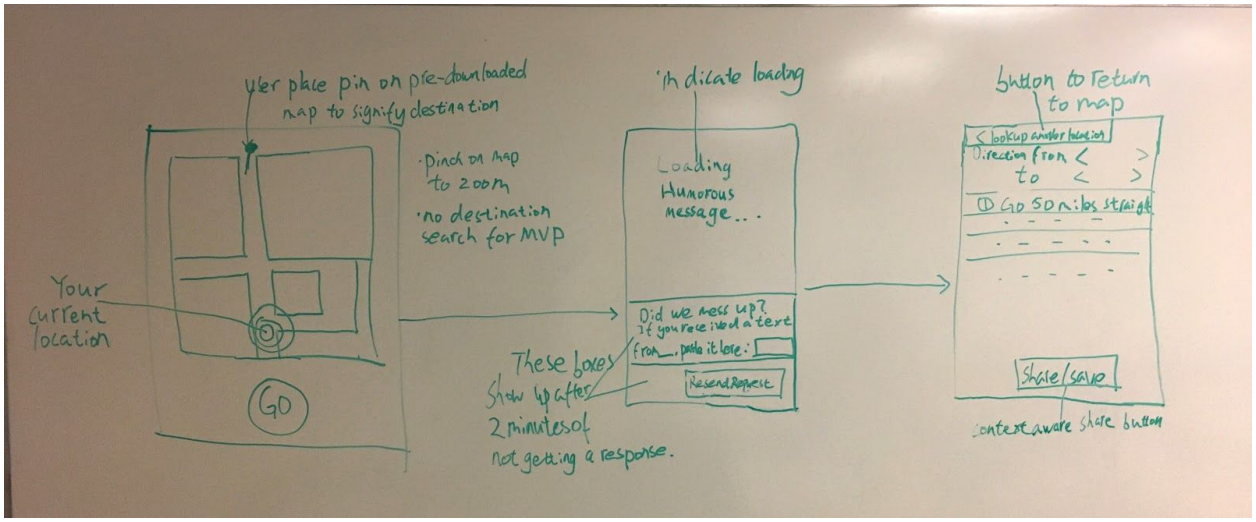
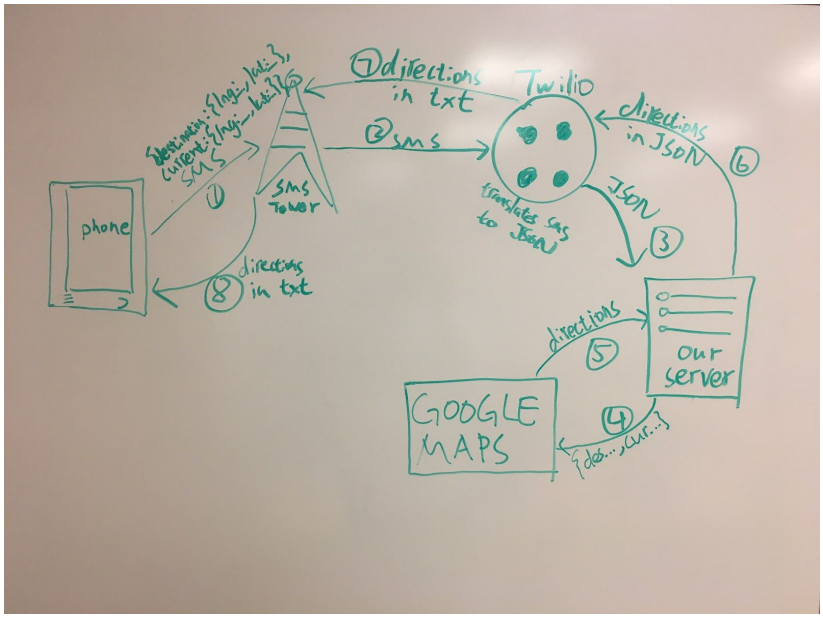
Update 10/29/17:

UI Outline



Backend processes:

The big challenge of this project is interacting with the data being sent via SMS between phone and backend server. After researching online, we believe that Twilio is the best approach. Their API will allow us to listen for SMS messages and parse them into useable json format for our server to handle. At this point we can use other services such as Google Maps to further manipulate data and return the correct results for the user (in this case, verbal directions). Twilio can also handle the process of returning our backend data to users' phones. Thus, our overall process receives an SMS message from a phone, has the backend process it, then send it back via SMS. (diagram below)



Mission Statement

The overall goal of this project is to provide the ability to communicate with a backend server via SMS communication. To prove the technology, we will develop a navigation application which relies on using SMS to push a user's location and receive feedback regarding their surrounding location.

Problem

In developing countries such as India and Pakistan, there has been a very large increase in mobile phone presence; however, with this recent increase in growth, a major problem has become apparent. Data plans are extremely expensive and coverage is not reliable, which makes it a bad option for many of these new users. Additionally, even though SMS is a cheaper communication option for users, it is limited in its use and does not work over the range of use cases that 3G does.

Context

The existing solutions to this problem are non-existent. Data rates are too expensive and not reliable in many locations. SMS does not accomplish the range of uses that data does. Something new is clearly needed - a cheap and more reliable solution to allow users in developing countries to communicate more effectively. There has been an attempt at this problem in a previous class which we will discuss with the sponsor.

Customer

The customers we wish to serve are people with smartphones in developing countries, who will be in a somewhat lower income bracket, who may not be able to afford a standard data plan for their cell phones. We hope to allow them to use their texting plan as an option for communicating wirelessly with applications.

Challenges

1. Speed - Much like a navigation app which transmits data over WiFi or a cellular network, users should be able to update their location quickly while also receiving timely response data regarding their surroundings.
2. Reliability and accuracy - When a user's location is sent via SMS to the request handling server, it should be ensured that this location data is as accurate as possible, or else the core functionality of the app will not work as the customer intends.
3. Security - we have to ensure that people do not tamper with the text messages that are being sent to our service and that the data is being passed in a secure manner.

Expertise

We will definitely need to use the Google Apps API and a text messaging API (e.g. Trello). The app will first query the phone's GPS service to get the user's coordinates, combine that with the user's destination, and generate a text message ready for sending. We still need to determine whether an app can send a message in the background, or the user has to give explicit consent by pressing send. Our back-end needs to be connected to a phone number (potentially multiple) that listen to incoming messages and queries the Google Maps API for directions. Once received, the server will send the instructions back through text. We still need to find out how our app can interact with the returned text message, and how to display this information in a useful way. At the minimum, we would like to get a back-end service working where you can send requests through text.

Our project requires some knowledge in networking that we need to acquire. However, we do not expect any significant technical hurdles. We will consult Ming regarding the security of our project.

Risks

First and foremost, we have concerns about sending and receiving text messages in regards to having text message data being relayed to external application (is this even possible?). We have concerns about how clunky the process of a user pushing their location to a request handling server via a text message will be. On a

related note, we will also have to find a good way to return surrounding location data in a response text. There are many usability questions here, namely - how can we make this app simultaneously easy to use while also presenting a good experience to the user?

Ethical Questions

We do not believe there are many significant ethical dilemmas with this project, aside from ensuring that location data is transferred securely, given that the customer trusts us to be able to keep their location private from any eyes that aren't their own. We also are debating the best way to send SMS data to our server, and whether it is both possible and ethical to send a text message from a user's phone "under the covers," or without them actually hitting the send button on a message.

Goal

The desired result is to create a method by which one can utilize SMS to accomplish much of the same uses as data provides. We hope to accomplish this via a backend server which receives requests via SMS and returns an appropriate responses given the request. Our main focus will be on creating this service with the potential to create a mobile application to apply the technology to a specific use case.

Documents

Our product is easy to explain to the general public: "Our app can help you navigate in areas without using the internet." This is a straightforward explanation with obvious upsides. Furthermore, our project can be extended easily to work with other API's, where we use SMS messages to replace HTTP requests.

To document our progress this year, we will provide weekly updates that say what we have accomplished and what our challenges were for that week, as well as our immediate goals in the coming weeks. We will also carefully document our project code so anyone can use it for their own benefits.