

# Spicy Avocado

## UI and Nielsen's Usability Heuristics

### 1. Visibility of system status



Our design has a visual indication (e.g. an overlay) over the map to show that the webpage is loading and computing the shortest path in the background. This may take awhile, so we added this indication so the user knows the status of their request.


### 2. Match between system and the real world

A UI design for address input. It features two white text boxes with rounded corners and blue borders, each containing the placeholder text "Enter address". Below the text boxes is a blue circular button with a white plus sign (+). The entire input area is set against an orange background.

The input boxes for addresses are labeled short and concisely to quickly allow users to understand what is needed to use the app and to speak the user's language. In the future, it may be good to add a small tutorial message to teach first time users how to use the app.




### 3. User control and freedom


### My Trips


 229 Vassar St, Cambridge → 75 Amherst St, Cambridge ⌚ 15:37 minutes  
📍 2 stops


In order to allow users to have more control over the app, deleting and applying a saved trip provides a confirmation prompt asking the user if they wish to continue.

4. Consistency and standards

 →  → 

1. 229 Vassar St, Cambr... → MIT Vassar St 

2. MIT Vassar St → Ames St at Main St 

3. Ames St at Main St → 75 Amherst St, Cambr... 

We use consistent icons and colors to represent walking and biking routes. Walking routes are always colored red and biking routes are always colored blue.

5. Error prevention

## Create User

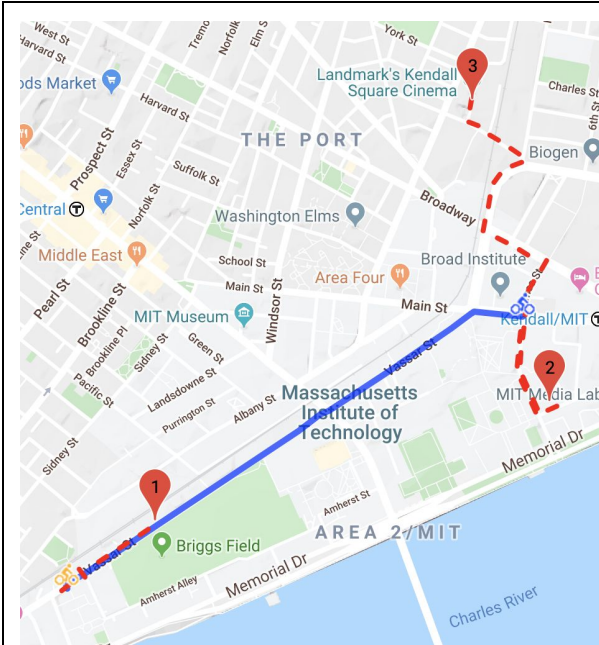
Email

Password

Create User

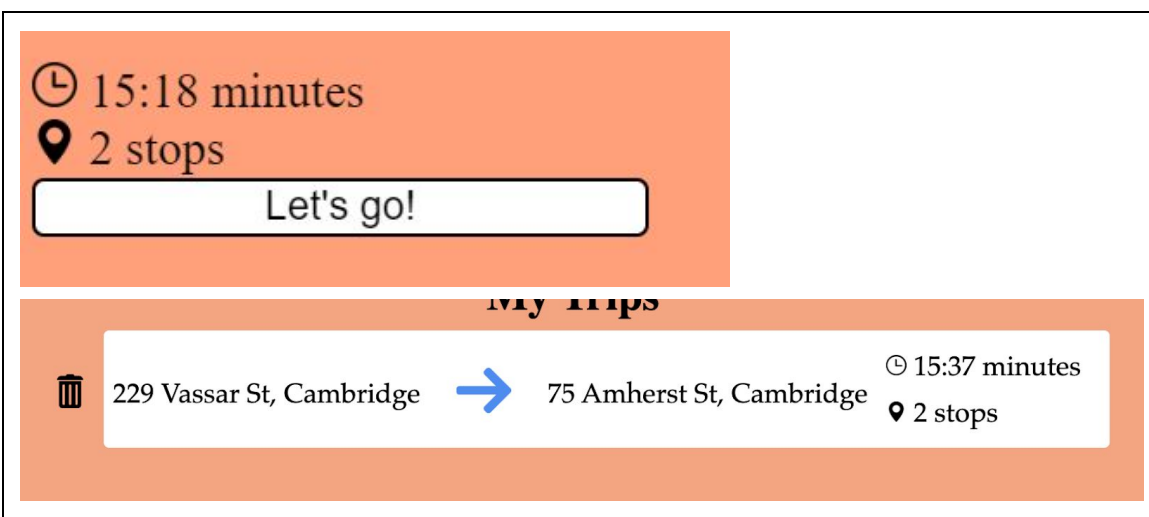
In order to prevent errors from trying to send users emails to an invalid email address, our system checks to make sure that emails are of the format “{string}@{string}.{string}” (e.g. y@w.com).

## 6. Recognition rather than recall



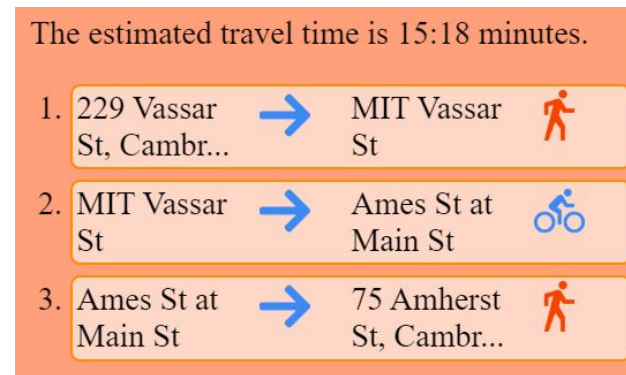
Our trips are currently color-coded such that red routes are by walking and blue routes are by biking. However, we do not explicitly write this. To improve our app, we can add a description for the routes in the future to incorporate elements of recognition instead of recall.

## 7. Flexibility and efficiency of use



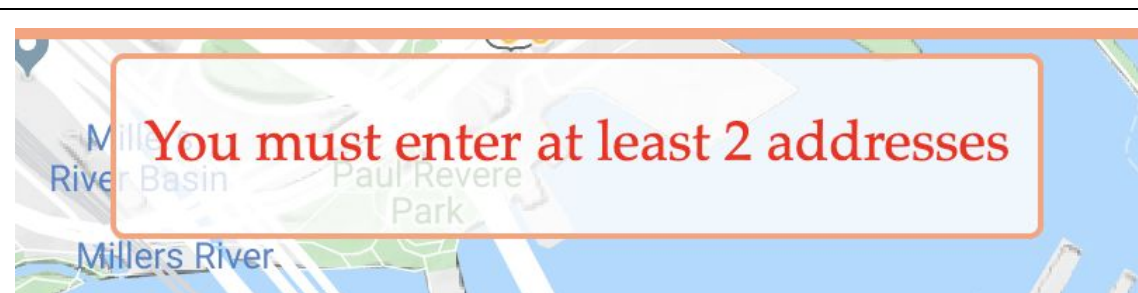
We provide an accelerator for users to easily start a trip by allowing users to select any previously saved trips and automatically view saved trip with the press of a single button. (Note: in our final version, we removed the small Let's go! button and just allowed for clicking on the entire block to start the trip. However, we show the original button to convey what this is supposed to do)

#### 8. Aesthetic and minimalist design



Our design for directions is very minimalistic because we only display essential information to users and users have the option to see more detailed information only if they choose to by clicking on any of the 3 routes.

#### 9. Help users recognize diagnose and recover from errors



Error messages are shown in the center top of the screen if any error occurs and the messages point users toward a solution to resolve the error.

#### 10. Help and documentation

BlueMaps is a travel planning service that helps you find the shortest path to travel from given start and destination locations (via riding Blue Bikes). Enter addresses in our address form in the top left hand corner to get started!

Right now, our app has this short description which lets new users know what to expect. In the future, our app should provide more documentation in order to let users know how to use every part of our app (especially for account related services).

## Design Decisions

### **Better Information Communication**

When the user starts a trip by inputting their origin and destination into the address form, a lot of information is thrown at them once they finally receive the trip. First, the map draws the routes for them, including the numbered dock and original stops. Then, the directions on the left panel are displayed, which can be very large chunks of text. All of this information might overwhelm users who are just trying to start their morning trip, so we made several design decisions when it comes to communicating this information that makes it easier for the user to take in. First, we decided to color the routes on the map with the corresponding directions on the left panel. Originally, we thought, to keep consistent with the app's color theme, we would have all the directions blue. However, this definitely does not match the different route colors, where red is walking and blue is biking. So, to not confuse the user, and to keep consistent with our route-coloring, it made sense to color the directions as red for walking directions and blue for biking directions as well. Lastly, we also shorten the direction blocks for each trip, so that when they originally appear, they just contain the start and end of the corresponding route. At first, we thought of just displaying all the directions for the entire trip, but for trips like MIT → Boston Common, this is just so much text. Instead, we have expandable directions blocks, which first appear as collapsed. Then, when user clicked on each block, the directions would expand to show everything in full detail, including time and specific instructions.

### **Always Compute Shortest Path**

For our transition from proof of concept to MVP, we considered saving the results of our shortest path computation in a database so that we don't have to recompute the shortest path between given start and destination locations repeatedly if they are searched repeatedly. However, we ultimately decided to compute the shortest path from scratch from start to destination because we realized that in order to provide the most accurate shortest paths, we must recompute the shortest path while taking into account Blue Bikes dock stations statuses in real time. Alternatively, if we instead decided to store the result of each query and check to see if a query has been made already whenever a user searches for a trip (similar to a memo), there are a couple of concerns that may make the shortest path inaccurate. First, the original computed shortest path took into account dock stations at the original time, which means the same dock stations that were used may or may not be available for use now. Next, roads may be closed or changed over time, so our shortest path information will become outdated unless we update our database every once in a while. Lastly, we can guarantee that the shortest path shown to the user is indeed the shortest only if we compute the shortest path while taking into account pathing and dock availability at the user's given point in time. As a result, our system always computes the shortest path and does not save exact trip detail information in order to provide users the best user experience for travel planning.

### **Silly Desktop, Maps are for Mobile**

As evident throughout this project design, we have created this product as a desktop-based web app. We think this platform would be more useful and convenient for our users, as planning an entire trip with possibly different stops and looking at the many routes on a map might be complicated and uncomfortable on a small, mobile screen. We also want the user to interact with our dock and location markers on the map, and we don't see this happening very well on mobile. However, we do understand that it's hard to memorize directions for a long trip, and that users would like to have their trip information on their mobile devices so they are able to see their directions again on the go. To enable this, we have decided to allow sending the trip details as an email to our signed in users. This way, they can plan their trip on desktop, and then view their directions and other details throughout their trip on their phones! We feel this decision supports our mission of making personal travel easy and efficient in Boston. First, we thought about implementing this decision through text instead of email, in which case we'd send the trip details as texts to the user's inputted phone numbers. However, we couldn't find many ways of performing this task, as some of the APIs for this such as Twilio charged money and were not free. Additionally, we would have to ask users for usernames, passwords, and phone numbers when creating an account, which we felt as a hassle and time-consuming process when the main goal of the app is to

quickly plan travel. On the other hand, we found many node packages such as nodemailer, which allows for easy sending of emails. Also, we can just ask for email instead of username at creation time and login, so we don't make the process longer. Lastly, email also provides ability to give HTML as the body so we can style the text.

## Social and Ethical Concerns

We believe strongly in our goals of making travel planning easy and accurate in a busy city like Boston, and making travelling itself more efficient for the people and the environment.

For the people, our app will make travelling with bikes easier, as our users won't have to spend money during rush hour to get from one point to another using expensive ride sharing services. In fact, planning trips with BlueMaps doesn't even require owning a bicycle, which can cost hundreds of dollars and cause headaches for storing over summers. Instead, our app uses Blue Bikes, costing \$2.50 per 30 minute trip, and whose \$99 yearly subscription is much less expensive than other public transport alternatives, such as the MBTA at \$90 a month. In this way, we hope to help both regular Blue Bikes users by giving them more control over their trip planning, and also people who use other transportation services by providing a cheaper alternative.

For the environment, our app will promote eco-friendly transportation services, such as biking and walking, over the widely-used cars, buses, and trains. Ironically, our app uses Blue Bikes to create green trips, and can hopefully reduce the carbon emissions that result from cars, which are harmful to our planet. The fact that Boston is a smaller city also helps our mission; many destinations can be reached with a combination of bicycling and walking in a short period of time. Additionally, with the ability to add multiple stops to a trip, users can be flexible in the trips they plan around the city, and they can take in the wonderful sights as they bike and walk.

In order to achieve these goals, we recognize the importance of creating an accurate maps system; most importantly, our estimate arrival times must be accurate. Otherwise, users will very quickly lose our trust and stop using BlueMaps. For the walking time durations from origins to bike docks and from bike docks to destinations, our app uses Google Maps data, which is reliably accurate. For the biking time durations between bike docks, we use averaged Blue Bike real user data over three months time. We believe this approach gives us an accurate portrayal of the time users actually take between bike docks, since Google Maps cannot provide the time it takes to arrive at the dock station,

get off the bike, and place the bike on the dock, among other real situations. By incorporating real-life user data into our time estimations, we believe we make our data much more accurate for the real-life user.

Continuing the same topic of the importance of being accurate, our system must also produce accurate maps, routes, and data. Currently, BlueMaps gives annotations on the map for every Blue Bike dock, and when the user clicks on one, they see the up-to-date status of that dock, including the number of bikes it currently contains. It's important for this information to stay up to date after the first time it is displayed, as we want to build trust with the user, so BlueMaps can become a reliable travel planning app. Otherwise, the user would quickly realize the real-life docks status is different from that displayed on the app, and will begin to question the reliability of other parts of the app. Furthermore, we recognize that the user is trusting the app to give an optimal shortest trip: trusting the app enough that he/she would go on the trip with just the directions that the app provides, and knowing nothing else about the environment. This could be extremely dangerous, as any unintentional mistake in the route, or perhaps any intentional misdirections, could lead the user somewhere he/she didn't want to go. However, BlueMaps uses Google Maps API to provide all the route and map data for our app, and we believe that Google Maps is a reliable well-known service for this type of work.

One possible concern is that the app knows too much about the current, future, and favorite locations for the user. Current and future location are known when a trip is created. For favorite locations, our app also allows users with an account to save their favorite trips for future reference. This means that the app will hold private user data concerning the places where users are, where users like to visit, and where the users mostly spend their time. While this design decision makes it more convenient for users to frequently plan the same trip, it comes with a huge responsibility, since this data might be extremely valuable to certain companies. In fact, this data can be stolen, and used in ways that are malicious for the user, such as for tracking them or for providing ads that are relevant to the places they are visiting. However, we acknowledge that BlueMaps is not a social media site, so the data will not be shared with strangers from within the app itself. To keep our users' trust, we will take on this responsibility by making sure the data is safe and secure.



Finally , we discuss the different stakeholders in our system:

- **Blue Bikes:** They will be used more, and the company will make more money since more people will be using them with our app
- **MBTA, ride sharing companies:** These entities will lose money, since more people will choose to walk and bike with our app
- **Students:** They will be able to plan trips more accurately, such that they don't waste time going to empty/full hubs, so they will be able to save time
- **Tourists:** Tourists that are visiting Boston will be able to easily plan their trips using our planner app to more easily explore the Boston area.
- **Bostonians:** People living in Boston will have easier access to transportation via Blue Bikes and can plan their trips easily with the option to save their favorite trips so they can revisit it in the future within re-entering location information.
- **Public roads (bike lanes):** With increased use of Blue Bikes, public bike lanes will be stress-tested and if the capacity is not enough, then bike lanes in Boston may have to be expanded to accommodate the increased use of bikes.