Bhavesh Patel

Project Proposal

Introduction:

In recent years, especially in a major city like London, public transportation has become essential to commuters and tourists. That is why for my project, I've decided to create a cross-platform application that can be used to make travelling around London much easier. The app will include a way to find directions between two locations (including the cost of this), public transportation maps, and specially for tourists – locations of and directions to popular tourist locations.

Project Overview:

The Problem:

London is a major world city and one of the most famous cities in the world, it is definitely not one of the easiest to navigate around, especially without any help. Whilst London's public transportation is great, understanding how it works is not simple by any means. In the London Underground, there are multiple issues with multiple lines every single day that can effect the timing of trains' arrival, this means the timetable provided by TFL can be very unreliable. This will make knowing what time your train will be arriving difficult and will leave you unsure on what the best route to take to your destination is. This can cause inconvenience for commuters and commuters alike.

The Hypothesis and the Approach:

The problem stated above could potentially be solved if travellers were able to conveniently access train arrivals in real time, this could be done in an app. Users could very conveniently access an app on their mobile phones that will allow them to see the train arrivals as well as additional functionality, such as; maps of the London Underground, a way to find directions between two stations and a list of popular tourist locations.

My approach will be to use Javascript and the Vue.js framework to create a cross-platform mobile app. I can retrieve data about London's public transportation by utilising TFL's (Transport for London) own API. TFL's API offers information such as current line statuses, live time arrivals and much more that I can implement into an app that is more user-friendly. I will be writing all of my code in the Visual Studio Code IDE and I will also be using GitHub to make my data easier to access and easier to keep track of.

Similar Apps:

To help create the app, I have researched a couple similar and popular applications. The two that I have looked at are Google Maps and Citymapper. These are the two most commonly used applications by travellers in London to help navigate throughout the city.

Google Maps: Google Maps is definitely the most popular app used for travel worldwide. In terms of public transportation, Google Maps is capable of showing the user how to get from

one location to another using public transportation. Google Maps is available on desktop platforms, as well as iOS and Android devices.

Citymapper: Citymapper is another example of a very popular app used for travelling, especially in London. In terms of public transport, Citymapper provides the most functionality. Within the Citymapper app, you are able to see the live arrivals for trains, see line statuses and much more.

Evaluation:

To ensure the app that I have decided to create works as intended and is appropriate for the target audience, the app will need to be evaluated and tested. There are a couple ways to do this that I have detailed below.

One way I can easily test the app myself is to actually use the app when I am travelling using London's public transportation and test the accuracy of the app's information, such as checking whether the time the app says the trains will arrive are accurate and checking whether the routes the app recommends me to take to my destination is indeed the quickest route I can take.

Other than the actual features of the app, the app will need to be tested to see if it has a good and appropriate UX and UI. I can achieve this by having my peers review the app, they can test the app in the same way that I have stated above whilst also testing the UI of the app. With a larger sample size from all my peers and their user feedback, I'll have a better understanding of how good the UX and UI are, as well as how to improve these aspects of the app.

Required Resources:

As the project I have chosen is purely software based, no hardware is required other than a computer that is capable of running an IDE such as Visual Studio Code. As previously mentioned, I will be using Javascript, the Vue.js framework and the API provided by TFL. I will also be using GitHub to make the whole process easier for me.

Deliverables:

During the process of creating the app, I have decided on making three prototypes before the app is finalised. The first iteration will be a simple paper prototype to outline the appearance of the app, this means I will plan out how the app will look by drawing it out, I plan to complete the first iteration by Week 11. The second iteration will be a working prototype of the app with basic working functions, such as the ability to retrieve some information correctly from TFL's API, I plan to complete the second iteration by Week 16. The third iteration will be the final prototype of the app and should be fully functional, I plan to complete the third iteration by Week 20, this will give me enough time to make any last minute changes and complete the final report. All of the deliverables are listed in the table below.

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Literature Review

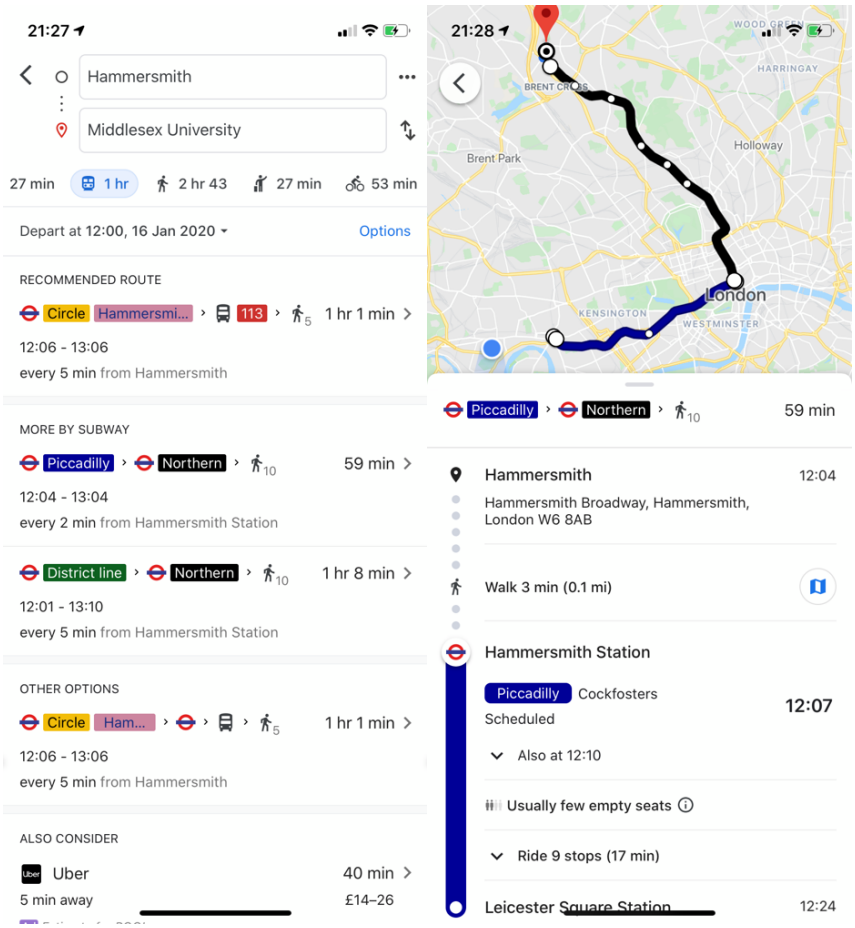
For my individual project I intend on creating a travel app. In summary, the app will allow users to find directions to a location, check the statuses of different modes of transportation within London and find popular tourist locations in the city. The app is targeted in particular at London residents as well as tourists to London. In this literature review, I will be looking at existing work which are similar to my project as well as technologies that could be used to develop my project.

Existing Work:

To help my development of this application I have researched multiples apps and other sources, by researching these various sources, I can gain a better understanding of how my app should look like and which features could be potentially included in my app. I can also gain an idea of which features may possibly be missing from other similar apps that I could include in my own to set it apart from other apps because of the added functionality.

Google Maps:

Google Maps is by far the most popular app for travel, and in this context specifically, public transport. Google Maps is an extremely reliable app to help navigate around the city with public transport. Unlike other popular apps such as Citymapper and TfL's own app which uses TfL's Unified API, Google relies on their own data for information such as live arrivals for different modes of Transport. This gives Google the upper hand when it comes to buses in particular as Google relies on their own traffic data to provide more accurate live arrival times.

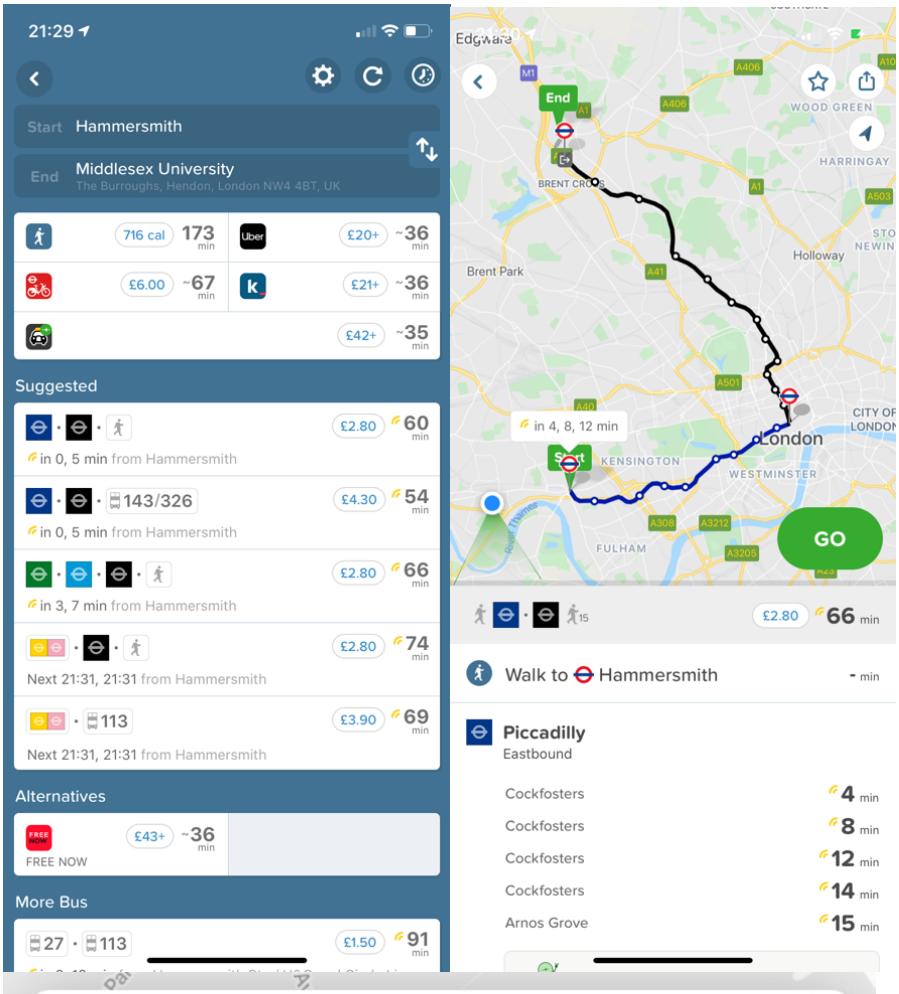


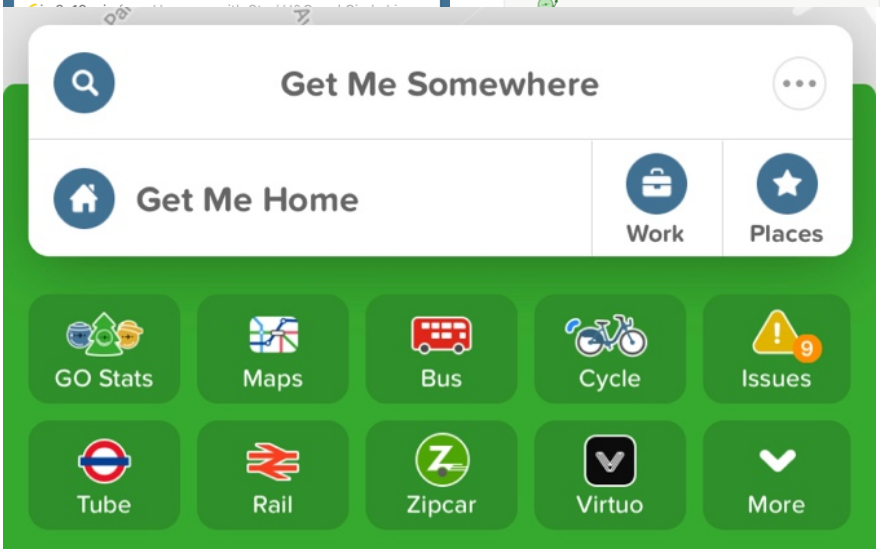
As shown from the images on the left, Google Maps gives you the option to choose to from different modes of transport, once you click on the public transport icon, the app will then show you different routes you can take to your destination. Once you click on a route, the app will show you a map of the route and will give you more details such as how many stops there will be

on your bus/train and what stations you need to interchange at. Google Maps has been entirely developed in JavaScript and is a native app.

Citymapper:

Citymapper is another popular example of a travel app and is extremely popular within London. Unlike Google Maps, Citymapper is only used for public transport. Also unlike Google Maps, Citymapper uses TfL's Unified API which means all of the information on the app such as routes and live arrival times is provided by TfL. As shown in the images on the left, Citymapper allows you to search for a location and also gives you the option of choosing home and work locations so you can quickly find routes to these destinations in the future. You are also able to click one of the icons to check the current status of tube lines and National Railways, check live arrival times, etc. Once you do choose your destination, the app routes from your location to your destination, although unlike Google Maps, Citymapper will show you how much each route will cost which is very important when using public transport. Once you click on a route, the app will show you a map of the route, live arrival times, what mode of public transport you will need to ask, when to interchange, etc.





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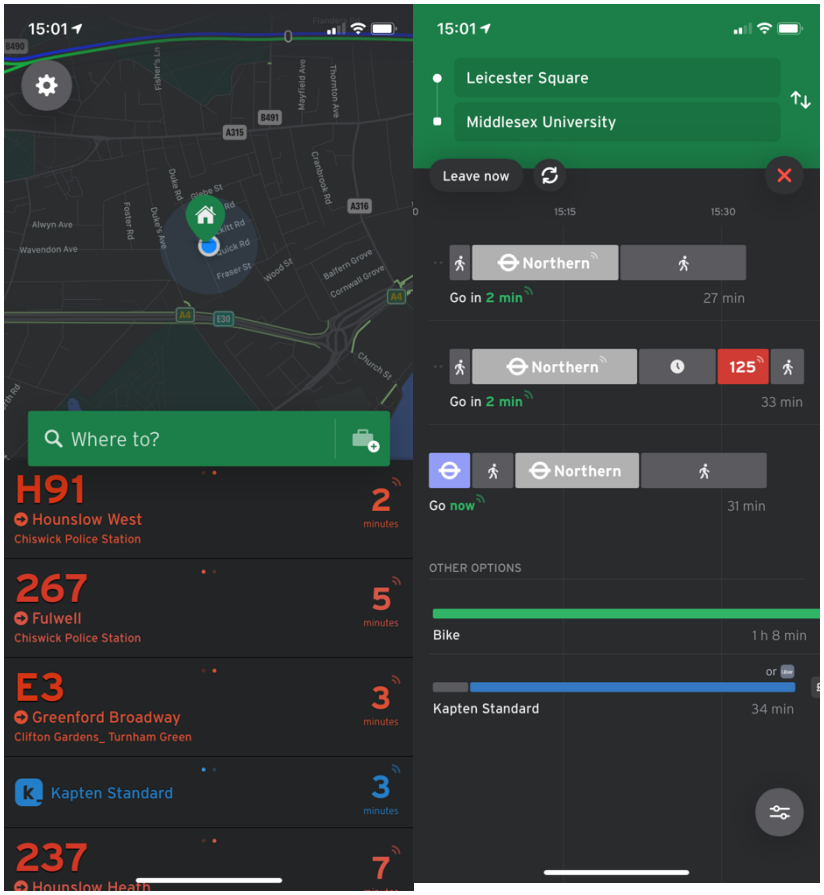

Transit:

Outside of Google Maps and Citymapper, there are not any particularly popular apps that are used for public transport, although one of the better ones, as shown on in the left, is Transit. Although Transit doesn't include as many features as Google Maps and Citymapper, one thing I particularly loved when compared to the two more popular options, is the user interface. The user interface is much more aesthetically pleasing and also primarily uses black, which is very important because having a dark colour scheme is a growing preference in users. Many of the most popular mobile apps such as Instagram and Twitter have added a "dark mode" option because of this. Other than the use interface, Transit like most apps in this category will allow you to choose a destination and show you various routes from your current location or a location of your choosing. Although after testing the app I have noticed the options are usually not as preferable as the routes shown in other apps.

Physical Map:

Of course we now have electronic devices which have maps of the entire globe and are easily accessible, but before that we of course used to use a physical paper map, as shown on the left which is a map of London Overground which we still see on trains today. Although it is difficult to make the comparison of a physical map to an app, it is important to look at the appearance of the map, and including these maps in a section of the app could be very useful to many users.

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Development Technologies:

"Mobile applications are viewed as one of the most dynamic business tools. They have become the new standard for building up a connection with customers." – Medium.
Apps in today's age are very important, of course when developing an app some sort of technology is needed to help create the app such as a framework, so it is essential to choose the appropriate developmental technologies for your app. There are multiple programming languages to consider such as JavaScript (the most popular option) and Swift (used to create native iOS apps), there are also various frameworks I could use to help me create this app such as Vue.js, React, etc.

Native vs Hybrid App Development:

From a developer's point of view, there are two different types of apps, hybrid apps and native apps. Native apps are apps that have been developed for a specific mobile operating system, for example, you could develop an iOS application in Xcode using Swift, although this app would only function on an iOS device. A hybrid app is an app that has been developed to work across multiple mobile operating systems and the web, although this does seem beneficial, it comes at the trade-off of performance when compared to a native app. This is because a native app is designed to work on a specific operating system whereas a hybrid app adjusts appropriately to the device it is being used on. Most popular mobile apps such as Instagram, Facebook and Twitter, are natively built applications and have separate native apps for every operating system. Developers of these popular apps do this because making changes to a native app are easier than making changes to a hybrid app and as mentioned, native apps perform better. Although, as frameworks for hybrid apps improve, the difference in performance only get smaller. Also, even though native apps are easier to make changes to, because of the many frameworks available, hybrid apps are quicker and easier to develop.

Vue.js:

Vue.js is an open source Javascript framework that primarily is used for building user interfaces and single page web applications. Vue.js is known for its very small size, compared to other popular frameworks such as React, Angular and Ionic, Vue.js has a relatively small size of only 18-21KB. This makes it a lot easier for a developer to download and use. Vue is also a very flexible framework and is fairly easy to understand for people who are unfamiliar with how the framework is used (but of course familiar with JavaScript). Overall, Vue.js is very flexible and is a very useful framework to create a hybrid web and mobile app.

React:

React is a JavaScript library developed by Facebook which is used for building user interfaces. As React is a library for UI development, for React to become a fully-fledged solution, apps written with React will require additional libraries. React can be used to write multiple-page applications as well as single-page applications. React is a fairly easy to learn and understand if you already have a good understanding of JavaScript and is used by companies such as Facebook, Twitter, Netflix, Uber and more. React is very flexible and uses JSX which is a HTML-like syntax so you are able to use HTML in JavaScript, only making

React a more flexible framework/library to use. Although, data in React is immutable meaning that once fixed, the data cannot be changed, which in this context makes is disadvantageous to another framework such as Angular.

Angular:

Angular is a JavaScript framework developed by Google. Angular is one of the two most popular JavaScript frameworks along with React, and is used by companies such as Apple, Nike, Microsoft, McDonald's and more. There are a lot of advantages to using Angular, although it is a very difficult framework to learn and understand when compared to Vue and React, and has much more fixed and complex app structure compared to the flexibility of Vue and React. Unlike React, Angular is a fully-fledged JavaScript framework and has all needed components built-in whereas React will require additional libraries to achieve the same results. Also unlike React, Angular's data binding is mutable meaning the data can be changed at any time.

Xcode and Swift:

Unlike Vue, React and Angular which are JavaScript frameworks used to create hybrid applications, Swift is an open source language created by Apple in 2014 which is used to create native applications for all of Apple's operating systems; Mac OS X, iOS, iPad OS and Watch OS. Although there are other ways to use Swift, Swift is designed to be used and is best used in Xcode. Xcode is an IDE developed by Apple and is only available on Mac OS X. Of course developing an app in Swift is very different to developing one in JavaScript, when using Swift you are almost forced to use Xcode whereas if you were to use JavaScript, you are able to use any IDE of choice. Swift is also a lot easier to learn and syntactically much simpler than Objective-C. Also, because you are are using Xcode, you are able to test your UI right inside the IDE which most other IDEs would not be able to do.

Conclusion:

After thoroughly researching various works and developmental technologies, I have learned more and have a better understanding about each popular JavaScript framework and Swift, this will help me make a more informed decision as to which programming language I should use to develop my app and whether I want to develop a hybrid app or whether I want to develop a native app. As Swift can only be used to develop native iOS apps, I will most likely choose not to use it as I want to create a cross-platform web and mobile application. I will most likely be creating a hybrid application using a framework such as Vue or React because of their simplicity and flexibility.

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First Iteration

Requirements:

After asking users that fall into the target audience of London residents and tourists, I was able to obtain some features or aspects of the app that they would require or want. Below is a list of these requirements which I will also briefly expand on:

- The app should show the user's location – this is of course a basic feature in any travel app, the user should be able to see their own location on the app and this could possibly be expanded to a show a map of the route from the user's location to their destination as in similar apps such as Google Maps and Citymapper.

- You should be able to click on one of the tourist attractions and gives the directions to that tourist attraction – as the app will have a section which shows a list of popular tourist attractions in London, it would be very helpful for tourists to be able to easily find directions from their current location to the tourist attraction.

- The app should have information on tourist attractions, for example, what time it opens and closes – allowing tourists to have easily accessible information about the attraction will help tourists decide which attraction is more appealing to them and will generally make the app a lot more useful.

- The app has icons of the tourists attractions on a map so that they are easier to locate – displaying the tourist attractions on a map as well as the user's current location would make it easier for users to locate a possible attraction and possibly see which attractions are closest to their current location.

- The app shows the cost of the route so that the user can plan their most preferable route – the user may not always just want to take the quickest route to their destination, the public transportation cost may also be an important factor so it would be very useful to show the cost of each possible route to the user's destination.

- The app supports all types of public transportation – although this does seem very obvious, it is very important to the user that the app supports all modes of public transportation such as the bus and the train.

- The app should show the length of time it takes to reach a tourist attraction – as with any other user-inputted location, the app should have the basic functionality to show how long it will take the user to reach their destination from their current location.

- The text should be made an appropriate size so that the visually impaired are able to use the app – I of course want all possible users to be able to fully utilise the app so it

is important to make sure all people such as the visually impaired are able to view the app clearly. Although instead of making the text big enough for these to users, it may be better for all users to be able to change the size of text to their own preference.

- The app should show if any modes of transportation are having any delays or any other issues – so that the user can plan their the best route to their destination, it would be very important for the app to show delays, closures, etc. to any modes of transportation so that the user can adjust their route appropriately.

- The app should save places the user has previously visited – of course when considering an option like this you must consider privacy, so there must be an option to turn this option on/off, although it may be useful for the user to be able to see locations they have previously visited.

Wireframe:

As shown in the images above , this is a basic look at what the app will look like. These are not all sections of the app but just three examples to show what the app will look like. The image on the left is the home screen, which will have a search bar at the top for the user to enter a location, below that is the statuses of London's most popular tube lines with a more button underneath so you can see the statuses of other tube lines and other mode of transportation in the city, and at the very bottom, is a few icons showing popular tourist attractions in the city. If you click on one of these icons, the app will take you to a page that as shown in the image in the middle, will give you information about the attraction and also have a button that the user can click on to be able to find directions to the attraction. The image on the right shows the search results page, as an example I have searched for Leicester Square, the app will then display transportation stations/stops and places that match the search, in this case it shows a place called Leicester Square as well as the station with the same name.

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Feedback:

After surveying numerous people that fit the description of the target audience, I have obtained some feedback about what I could possibly improve on. I have listed these possible improvements below and briefly expanded on some of them:

- Add a logo/branding – most apps will have the logo of the app or some sort of way to distinguish what app the user is using in the UI, in the case of my design, there is no such logo or branding so that is something I should add in.
- The colour scheme is too dark – as wanting a dark colour scheme in apps are a growing preference I wanted to incorporate a dark colour scheme. Although, I understand that some users may also want a light colour scheme so it may be useful to include a "dark mode" option so that users can choose between light and dark colour schemes to suit their preference.
- Not all users may be able to recognise tourist attractions just from icons – I understand that some users, especially tourists, may not be able to recognise tourist attractions just from the icons on the home screen so it may be helpful to add in the name of the attraction and a short description underneath the icon.
- There should be a section for live arrivals on the home screen – live arrivals is very important to many users because they of course want to see when their bus, train, etc. is arriving they would like it to be easily accessible from the home screen so this is something I could incorporate to the home screen.