**Google Maps User Interface**

**ISE 164 Full Project Report**

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**Project:**

Google Maps User Interface

**Product:**

This project is to improve the Google Maps homepage’s user experience using human-computer interaction concepts.

**Team Name:**

Team number 6: Spam

**Quarter:**

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**Professor:**

Abbas Moallem

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| Presentation Comments |  |
| Report |  |
| Total Score 300: |  |
| Overall rating | 1. Exceptional 2. Very Good Work 3. Good 4. Acceptable   Need Improvement |

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# 1.0 Introduction (Dai Le)

Google, LLC is an American multinational technology company that specializes in Internet-related services and products, which include [online advertising technologies](https://en.wikipedia.org/wiki/Online_advertising), a [search engine](https://en.wikipedia.org/wiki/Search_engine), [cloud computing](https://en.wikipedia.org/wiki/Cloud_computing), software, and hardware. It is considered one of the [Big Four](https://en.wikipedia.org/wiki/Big_Tech) technology companies in the U.S. [information technology](https://en.wikipedia.org/wiki/Information_technology) industry, alongside [Amazon](https://en.wikipedia.org/wiki/Amazon_(company)), [Apple](https://en.wikipedia.org/wiki/Apple_Inc.), and [Microsoft](https://en.wikipedia.org/wiki/Microsoft).

*Our mission is to organize the world’s information and make it universally accessible and useful.*

## 1.1 Google Map iOS App Description

The Google Map iOS app is an app that almost every iPhone user can use to Navigate the world faster and easier.. Over 220 countries and territories mapped and hundreds of millions of businesses and places on the map. Get real-time GPS navigation, traffic and public transport info, and find what you need by getting the latest information on businesses, including supermarkets, pharmacies and other important places.

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| Figure 1. Google map icon on app store | Figure 2. Google map home page |

# 2.0 Interface Evaluation (Dai Le)

## 2.1 Feature Evaluated, Features to Design, Redesign, or Create

We will be focusing on the overall UI of the google map on the iOS device,and how we can redesign it by making it become simpler and easy to understand. There are several things we want to improve.

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| Figure 1. Google Map Icon | Figure 2. Home page |

For figure 1, Google map icon doesn't really show the definition of its function which is a map. When users look at Google map’s icon, It shows a point which confuses users.

For figure 2, Google map home screen looks simple and easy to understand. It also shows the main function of the map is to navigate to the destination that users want to. However, we want to add some features on it such as show detail current location.

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| Figure 3. Exploring page | Figure 4. Direction page |

For figure 3, it is exploring the screen. It looks very unprofessional because it only shows the view around while the users may not look for them. We want it to show the exploring place in the map including whatever is convenient for users such as: restaurants, drink places, park, event, etc …

For figure 4, The google map provides enough information for guiding users to the desired place. However, we believe that it will look greater if we can add some short-cut future on it such as sharing location to other contacts, matching to other users so they other people can keep track of where we go, and report if there is a car accident.

# 3.0 Comparative Study (Kevin Pham)

## 

## 3.1 Study of similar products or technologies

Aside from Google Maps, many companies developed their own mapping services with features similar to that of Google Maps. Below, we go into detail on two largely well known mapping services, Waze and Apple Maps, discussing the notable features of each.

### **3.1.1 Waze**

* Waze is a GPS navigation system that was acquired in June 2013 by Google. Waze provides information on traffic, crashes, constructions, and more. Users can also play music from third party applications such as Spotify through Waze using the music integration feature.
* Waze’s App Official Description:
  + *Waze helps riders and drivers get where they’re going--faster, smoother, safer, and happier--while working to beat traffic. Traffic starts with us, but it can end with us, too.*

### **3.1.2 Apple Maps**

* Apple Maps is a web mapping service by Apple providing directions and estimated time of arrival for various transportation methods. Apple Maps is only available on iOS, iPadOS, macOS, and watchOS.
* Apple Maps’s Official Description:
  + *With new cycling directions and alerts for speed cameras and red-light cameras, Maps makes it easier, safer, and more environmentally friendly to get where you need to do with any of your Apple devices. And with Guides to help you find the best places to eat, shop, and explore, you’ll have more to do and experience when you get there.*

Table 2. Notable Features of Google Maps, Waze, and Apple Maps

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| Google Maps | Waze | Apple Maps |
| - **Wheelchair accessibility**: Accessibility icons appear on locations with accommodations. These accommodations include seating, parking, restrooms, and entrances. This feature is not enabled by default | - **Share ETA to external** **parties**: Inform your peers of your arrival time by allowing Waze to access your contact list in order to send them a message on your estimated time of arrival. | - **Apple Exclusive**: Google Maps is available on all platforms. Currently only available on iOS, iPadOS, macOS, and watchOS. |
| - **Orient position with phone tilt:** Users can tilt their phones to show the direction they are facing. This is displayed as a blue flashlight cone. | - **Music Integration:** Users can connect music applications such as Spotify through Waze. | - **Flyover Feature**: Users can take a 3D aerial tour of over many of the world’s large landmarks and cities. |

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| Figure 5. Google Map Wheelchair Accessibility | Figure 6. Waze Music Integration | Figure 7. Apple Maps’ Flyover Mode |

**Figure 5.** This figure shows the wheelchair accessibility options provided to users. Upon enabling it, the wheelchair icon will appear under the locations that have mobility accommodations. This includes restaurant seatings, restrooms, parking, and entrances.

**Figure 6.** This figure displays the use of the music integration feature provided by Waze. In this example, the third party application, Spotify, is connected at the top of the Waze application. This prevents users from dangerously having to switch between mobile applications while driving.

**Figure 7.** Apple Maps’ Flyover mode enables users to enter a 3D simulation allowing them to fly over large cities and landmarks. Essentially, users get an aerial tour of a given location.

# 4.0 User Profiling (Lennie Gonsalves)

## 4.1 Targeted audience and Defined user profiles

The target audience of Google Maps and our improvement of the product is a wide and diverse range of users. A typical user can range from a young professional making their way through a new city or a senior citizen with motor disabilities trying to find their way to their grandchildren’s house. As a result, our updated Google Maps application must be able to cater to this massive group of targeted users. It is vital that our team of designers understands the characteristics behind the user’s behavior in order to create the design that demonstrates a knowledge of their expectations. We took a look at the massive scope of Google Maps users, all varying greatly in terms of education, motivation, experience, goals, ages, genders, backgrounds, and tools. In order to gather more information about our exact target audience, we were able to send out a survey via Google Survey on various platforms to extend the reach of the survey. We divided our survey into three sections. The first section was an information section describing our project and who we are. We also included a confidentiality agreement for users. Section 2 was the basic information section asking about age and name. Our final section was the actual survey. We included questions such as:

1. Do you use Google Maps?
2. If not, what navigation application do you use the most?
3. How often do you use Google Maps?
4. Considering your complete knowledge and experience about users’ interface with Google Maps, how likely would you be to recommend to a friend or colleague? (Scale of 1 to 5)
5. How difficult is it to read the map on the screen?(Scale of 1 to 5)
6. What is your opinion about the organization of Google Maps on the screen?(Scale of 1 to 5)
7. What do you find best about Google Maps?
   1. Ease of use
   2. Interface
   3. Features
   4. Quality
   5. Other:
8. How long does it take for you to go from opening Google Maps to being able to start navigating to your destination?
   1. 1 to 2 minutes
   2. 3 to 4 minutes
   3. 5 to 6 minutes
   4. 7+ minutes
   5. Other:

In order to reach a wider audience in terms of age, education level, job level, location, and motivation, the four of us pushed out the survey on various platforms. We were able to gather data from a wide range of users via Facebook, Instagram, LinkedIn, and Twitter. We do understand that there may be some bias in terms of age and location because we are all college students in the Bay Area but we were able to reach a somewhat global audience. Our survey confirmed that Google Maps has a huge scope of users. Age ranged from young preteens to 70+. The older the user, the more difficult they tended to have while using the application. Older adults also spent longer starting their route. Most users tended to recommend Google Maps to colleagues and choose the ease of use as one of the most important aspects of Google Maps. Overall, we were able to confirm the massive range of Google Maps users.

We analyzed various users to find what tasks they performed and their informational needs. Since Google Maps caters to a global community, the answer to what tasks users perform varied greatly. However, the basic informational need was the same. To get from place A to place B. This vertically distributed knowledge was the primary motivation for the usage of Google maps.

We created test personas to model what real users may expect from our application. Our test personas range in age, gender, profession, and motivation. This is indicative of the diversity of actual Google Maps users.

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| **Ashley**  **Age**: 32  **Occupation**: Elementary School Teacher  **Hobbies:** Reading, baking, and gardening.  **Home:** Pittsburg, California  **Goal:**  To find a good road to avoid traffic jams before and after school.  To be notified if there is a car accident in the route she has chosen so that she can determine if she needs to change to a different service.  To find the best educational landmarks for class field trips.  **Other:**  Ashley wants to be able to use Google Maps to find new areas around her to plan field trips. She is not very “tech-savvy”, but is able to operate the current version fine. She wants to be able to quickly find help on different functions of Google Maps and simplify it. | **Jessica**  **Age**: 30  **Occupation**: Project Manager  **Hobbies:** Running and enjoying movie night with family.  **Home:** San Jose, California  **Goal:**  Easy to find the good places around to take her children there.  To find a good road to avoid traffic.  To be notified if there is a car accident in the route she has chosen so that she can determine if she needs to change to a different service  **Other:**  Jessica is very comfortable around technology, but wants the interface to be simplified while driving. She does not want to have to stare at her phone while driving her children. She wants to be easily notified of traffic and route changes. As a project manager, she has higher expectations of Google Maps. |
| Figure 8. Persona #1, Ashley | Figure 9. Persona #2, Jessica |

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| **Jeff**  **Age**: 49  **Occupation**: Software Executive  **Hobbies:** Cooking and exploring the Bay Area.  **Home:** San Francisco, California  **Goal:**  To find the shortest commute to work.  To be able to change to shorter routes during his commute.  To find the best coffee shops on the commute to work.  **Other:**  Jeff works in technology and has much higher expectations of the current Google Maps. He wants the application to be more intuitive and offer more features. Jeff wants to be able to easily search up coffee shops, gyms, and grocery stores on his route. He wants to quickly be offered a faster route if available and warned of oncoming traffic. Jeff says the Google Maps logo on the App Store is also not indicative of the application. | **Christian**  **Age**: 28  **Occupation**: Bicycle Repair Shop Owner  **Hobbies:** Mountain biking, hiking, and hanging out with friends at Lake Tahoe.  **Home:** Reno, Nevada  **Goal:**  To find competing bicycle shops near him.  To find trails nearby to ride his bicycle.  To send his friends and family his route so they can follow him on long distance drives.  **Other:**  Christian lives in Reno and does not really care about many new features. He often goes on long trips to lakes and mountains with his family and friends. He wants to be able to share his route so that they can all be on the same route. He also wants to be able to explore nearby hotels, restaurants, bars, and shopping centers when he is out. As a bike shop owner, he often likes to keep tabs on competing shops. Christian wants more outdoor features on Google Maps, such as where bike trails are and where hiking trails are. |
| Figure 10. Persona #3, Jeff | Figure 11. Persona #4, Christian |

# 5.0 New Design User Requirements (Lennie Gonsalves & Shayanna Gatchalian)

The following is our new design requirements that we have come up with while researching other apps and reflecting on the current Google Map on iOS device:

* Redesign the Google map on the App Store so users can easily understand the purpose of Google Maps.
* Add more features to home screen when user open the app, so the users can save time from looking for them
* Redesign the exploring screen. Now, it looks very limited and users want more than just simple views around the current location.
* Create a new logo for Google map on the App Store.
* Adding sharing, matching features on the direction screen
* Change “search bar” (shown in figure 1) and “GO” button (shown in figure 2)
  + both have similar functionality, yet are displayed on the same scene
* In navigation mode (assuming that user is driving)
  + Make “exit” (bottom left X in figure 3) and “bird eye’s view” (bottom right split arrow in figure 3) buttons larger and more contrasted compared to rest of the screen (to make it easier to identify and click)
  + Get rid of “microphone” (top right microphone in figure 3) button (allow application to detect voice commands instead)
  + Change “view next navigation step” to make it more intuitive (now, user swipes left and right to view previous and next step; maybe add a visual indicator to show that function)

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| Figure 12. Search bar | Figure 13. “GO” button |
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| Figure 14. Navigation Screen |  |

# 6.0 Usability Metrics for Google Map iOS App. Design (Shayanna Gatachalian)

The following metrics will be used to measure the effective usability Google Map iOS app:

1. Reaction scale (from “Not Satisfied at All” (1) to “Very Satisfied” (10))
   1. To measure user satisfaction when surveying them on visual design of the application
2. Number of users that downloaded the application
   1. To measure popularity of the application
3. Number of destination searches
   1. To measure accuracy of search function (the less searches, the more accurate the function finds user’s desired destination)
4. Number of navigation errors (e.g., street name on application does not match street name in real life)
   1. To measure the number of accuracy and efficiency of the application’s navigation
5. Time (in seconds) to successfully search navigation to destination
   1. To measure feasibility for user to use the navigation function
6. Two measurements of time to locate and click on a button the first time vs. the tenth time
   1. First measurement used for control
   2. Second measurement used to compare with control and analyze if button design is easy to remember (i.e., if the second time is faster than the first, then the function is indeed easy to remember)
7. Time (in seconds) for application to calculate user’s desired navigation to destination
   1. To measure the efficiency of the navigation algorithm
8. Distance (in miles or kilometers)
   1. To measure the shortest distance from starting point to destination (i.e., algorithm efficiency)

# 7.0 Conceptual Prototype [Paper Prototyping] (Dai Le)

Below are the conceptual prototypes that we want to improve. We focused on minimizing the number of options available on each screen, a nod to Hick-Hayman’s Law. We placed the minimal essential functions that are necessary to help the users accomplish their goals.

## 7.1 Conceptual Design Evaluation and Modification

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| Figure 15. Home page (Before) | Figure 16. Home page (After) |

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# 8.0 Interactive Prototype (Everyone)

## 8.1 Tools

We used Figma and Adobe XD to create the interactive prototype.

## 8.2 Techniques

There were a number of techniques that our group had an option to choose in order to accomplish the goal of creating a prototype of the new design. After a certain period of deliberation, we settled on the technique of interactive prototyping due to it being the most suitable for the purposes of our project. Compared to labeling each component of the new design, the interactive prototyping technique has a distinct advantage of being a more dynamic way of testing and evaluating the product allowing simulations of real-world interactions that make it easy to go through the entire process and identify any design or functionality drawbacks if any are present. Fortunately, Adobe software provides easy-to-use tools for creating effective and efficient interactive prototypes. Thus, Adobe tools were used in this project to create the desired behavior of the prototype.

## 8.3 Tasks

As was stated above, Google Maps offers a wide variety of features, which enable users to perform a great number of tasks. Since the changes that we implemented in the application will be assessed through user-centered evaluation, our group focused on a number of convenient tasks that we would ask users to perform after the redesign process is complete.

There are 4 main tasks we want to redesign: Icon, Show details of location, exploring page, and add some short-cut features on the direction page. These tasks performed by Google map users served as guidelines during the design and evaluation process carried out by our group and helped us better understand the requirements for each step. To come up with the optimal design, it was essential for us to put ourselves in the shoes of everyday people who use Google map applications and expect high performance combined with ease of navigation. However, following the advice from the professor, we decided to focus on one feature which is the main page of googleMap.

## 9.0 Usability Evaluation Based on Your Usability Metrics (Shayanna Gatchalian)

In order to evaluate our new design, we decided to utilize a user-based usability testing technique. We attempted to simulate the field testing approach by asking a few of our friends and relatives to complete a Google Maps evaluation survey after using our interactive prototype. The main advantage of the field testing approach is that it provides a natural environment while retaining the context and functionality necessary to complete the evaluated process. We asked users to blindly test our prototype to test how easy it is for the average user to intuitively learn the prototype’s features without a direct tutorial from another person. During observation, the team took notes related to the usability metrics defined in section 6.0. Afterwards, the users were then led through a brief tutorial through the protype’s main features and were then observed again for a second series of metric observation.

Users were able to first know the details of places where they could see right after the app. Secondly, users were able to see what is popular around them, such as a restaurant, event, park, library, etc.

Users were also extremely happy with the new design of the Google Maps interface. The usability metric for this screen specified that all targets must be at least 0.5 inches wide and 0.5 inches long. We ended up increasing the target size even more, to comply with our original requirements. Test participants found the new design of the Search page to be very appealing and easy to navigate through.

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# 10. Usability Enhancement from Previous Design (Kevin Pham)

Overall, usability enhancements from the previous design can be subdivided into two main categories: visual design and functional.

## 10.1 Home page

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| Figure 17. Problem #1 | Figure 18. Problem #2 |

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| Figure 19. Explore Nearby |

## 10.2 Final prototype

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| Figure 20. Home page | Figure 21. Search Results |
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| Figure 22. Explore Nearby |  |

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# 11. Conclusion (Lennie Gonsalves)

Google Maps remains one of the leading online resources for map and location. Overall, the mobile application offers an impressive array of functionalities with an appealing design and easy-to-use features, which contribute to a positive user experience. However, the research done by our group discovered certain flaws and inconsistencies in parts of the Google Map application, which our group attempted to correct and improve.

The main conclusion that we made while working on this project is that during all stages of the development process, software engineers must pay close attention to even the smallest details, no matter how insignificant these details may seem at the moment. At the same time, as the Google Map mobile application demonstrated, it appears to be difficult for even skillful and experienced developers and designers to keep track of all the nuances that may influence the overall user experience. This seems to be precisely the reason why our group was able to detect a fair number of deficiencies in certain design elements of the application. Still, throughout the design and implementation process, our group was aware of the fact that many design preferences are a matter of taste, and certain improvements offered by one group can be actually viewed as downgrades by others. Therefore, when proposing changes to the existing Google Map design features, our group tried to strictly follow all accepted standards for design improvement based on the information learned throughout the semester in class.

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# Lessons Learned

## Kevin Pham

In class we learned about different principles that influence the design of typical user interfaces. Before learning about Mapping principles, I didn’t notice the difference between the placements of UI elements across different apps. I just assumed that the designers placed that element there just because they wanted to. Now looking back, there is always a purpose to where an UI element is placed. For example, the Google Maps search bar is placed at the top of the screen. However, when compared to Waze and Apple Maps, the search bar is placed at the bottom of the screen. The designers of Waze and Apple Maps may have brought into consideration the hand and thumb placement of mobile users. It is more natural to place your hand towards the lower portion of your phone which then explains why the search bar is placed at the lower region as it is more accessible. Therefore, when designing user interfaces, it is important to take into consideration how the end users will interact with it and not how you pictured it to work.

Now after having created a prototype for our project, I have further understood how challenging creating an efficient and concise interface design is. There is so much that we wanted to improve and change but doing so may conflict with the company’s standards. For our Google Map prototype, we made improvements to the homepage while making sure that the features Google implemented were not tossed out. Instead we had to work around them and displayed those features elsewhere on the prototype. Another challenge was that each member had a different design in mind. At the end of it all, we were able to collectively agree on a specific design and implement it.

## Lennie Gonsalves

One of the important things I learned while working in this team was the importance of intuition in design. The more intuitive and natural a design is, the faster a user is able to react. We wanted to work on making Google Maps as simple and intuitive as possible to improve the user experience across the massive scope of users. I learned that applications such as Google Maps have an extremely diverse target audience because almost everyone uses mobile maps in some way or another. We need to keep that in mind as we cater to a global audience which stretches in age, gender, occupation, socio-economic background, religion, and location. It is important we take that into account while creating a simpler application. I learned how to organize information based on mapping and grouping, when to include sounds and color, and how to create designs with the user in mind.

Over the course of the project, we learned what initiative interfaces are and how to best use human characteristics to create UIs. One of the largest aspects of this part of the project was the interactive prototype. Designers need to be able to understand the true behaviors of human nature in order to create the most efficient interfaces for the end users.

## Shayanna Gatchalian

Throughout all of the lectures in class, I learned about the importance of putting the user at the forefront of designing any kind of product, including computer interfaces, virtual or physical. In context of this Google Maps project, the group and I have found out how one universal application has the enormous task of catering to such a wide range of people, from young to old and novice to advanced users. For example, when I was doing the new design user requirements section, I had to think about the user when he or she is using Google Maps while driving. That user at that time must try to minimize the time he or she is interacting with his or phone because he or she should be focusing their attention to the road; in that context, we found that design changes such as bigger and more noticeable buttons or a heavier reliance on voice commands can help combat this problem. We also learned the importance of usability metrics in order to specifically define how well an aspect on an interface is meeting the user’s goals. These teachings help to improve an interface design with a better understanding and more efficiency.

In the second half of the semester, the class pulled away from HCI concepts to topics outside the scope of what is simply displayed on a computer screen. For example, we learned the importance of ergonomics and accessibility to ensure people of different backgrounds and abilities can enjoy a product at the same satisfaction level. We applied these concepts to our own prototype by taking frequently used input and putting them near the bottom of the phone screen, where it is easier for thumbs to reach. In addition, the team even asked friends and family to gather initial feedback.

Moreover, just as with any group project, I was reminded of the importance of effective communication, especially now that we are attending school from home. Initially, the team hit a few bumps in the road, but as people adapted to alternative ways to talk online, so did the group. I learned that even when everyone in the group had different schedules, we were able to get assignments done by asynchronously finishing tasks on our own time before an agreed deadline then coming together to look over assignments holistically.

## Dai Le

Thank you professor for assigning me with awesome teammates. We work together throughout the project very well. I have learned some interesting things from this class and my teammates. I had experience working with mobile app design, and Google map is one of the applications I want to deeply research about. I believe that I lead people in my team well to accomplish this assignment so far so good. We are all students, and we all take classes, our schedule sometimes doesn't match, but we make it because I always try to provide my teammates time and examples to finish the project . Our project has been going well, and we can do more than that for our final project. I also learn to put my feet on user’ shoes to understand what they need the most and the least from Google's map. The users always have stories behind them, which we are working on to provide the best solutions to them and to tech-providers. This project allows me to apply my knowledge about the app- design, human interaction, and teamwork. I have learned that User Interface Design is important because it can make or break my customer base. It creates fewer problems, increases user involvement, perfects functionality and creates a strong link between my customers and my prototype. These things help me to improve myself to achieve my career in the future.

After the second half of the project, I used more tools at adobe XD, so i also learned more about it. We had several meetings, and my teammates showed how he did, which is very helpful because I was self-learning. Besides, I have learned that communication is very important on the group project, especially in the pandemic time, we all need to stay home and work remotely. To have effective communication, we tried to explain things as detailed as possible, and always update on our chat channel. Thanks to this class, I had an opportunity to work with great teammates.