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# Case Study | SFO.Nav in partnership with Gensler

**Simplified wayfinding at San Francisco International Airport with auto-generated routes via an indoor map app using Google Maps API and AR Core.**



## Simplifying the in-airport wayfinding experience

The airport is a source of stress. The chatter of people and the announcement overloads your senses together as you try to locate your boarding gate.

I teamed up with Gensler, the architecture firm responsible for San Francisco Airport (SFO), to develop a smarter way of way-finding for airport passengers.

*This is a civic project from my first year at Minerva University. This project spanned two semesters (Sep 2022—Apr 2023). All information in this case study Is my own and does not necessarily reflect the views of Gensler.*

### [Historical Data on Gensler—their impact]

#### INTRO

Gensler realizes the business importance of way-finding. That is why

they have dedicated teams assigned specifically for designing easier-to-navigate spaces—of which airports are included. Gensler built every part of the user journey with four elements in mind: creativity, conservation, convenience, and element.

They want to be able to do more. Specifically, they desire to integrate consumer technology into the process and make use of elements from the “Metaverse” to enhance the experiences of airport passengers. To turn mobile phones from potential stressors into a device that can help alleviate stress.

[\[Show examples of convenience and others in diff locations\]](#)

*Gensler’s design of San Francisco Airport from start to finish.*

## THE CHALLENGE

### USE THE METAVERSE PLATFORM TO ENHANCE THE EXPERIENCE FOR AIRPORT PASSENGERS

Our initial goal was to be among the first to integrate the Metaverse experience into everyday life via the airport. However, our first physical meeting at Gensler HQ ended up with a revised challenge question by narrowing down the keywords to make the project more plausible.

Metaverse → Mixed Reality

There is no concrete definition of the metaverse yet. The Meta Quest and Vive Focus cost a minimum of \$350—it is not yet ready for mass production. On the other hand, mixed reality, a digital layer in the physical world, is feasible as proven by the filters people use on Instagram and Snapchat

Enhance Experience → Reducing Stress

Mainstream media shows us extensive use of the Metaverse in gaming. The connotation of enhancing experience in this context is likely to make a person think of gaming. The nature of airports, however, is one filled with stress; one where minds are filled with worry as they hurry to their gates. As a result, we are focusing on reducing stress instead of adding more things to think about.

## Passenger Journey → Wayfinding

The passenger journey is vague. It could be the online purchase or during the commute to the airport. We focused on the in-airport wayfinding journey to define the constraints of our solution.

## Airports → SFO Airport

While the goal is to implement this solution to all airports, we focused on San Francisco Airport because they are the primary clients of our partner firm, Gensler. SFO is also the closest airport for the problem-solvers.

## THE REVISED CHALLENGE

### HOW MIGHT WE USE MIXED-REALITY TO REDUCE STRESS IN A PASSENGER'S WAYFINDING JOURNEY AT SFO AIRPORT?

Our goal for the project was to reduce the stress experienced by airport passengers as they journey to their designated gate. Currently, static maps are displayed throughout SFO. Signs also guide the passengers on their way. I remember my stay at Korea's Incheon International Airport (ICN). They had kiosks with maps capable of telling passengers where to go with the kiosk as the origin — like Google Maps.

Our high-level goals were to:

1. Integrate Mixed-Reality (XR) in the solution.
2. Host the solution on smartphones, a device all passengers have.
3. Personalize an easy-to-use wayfinding experience for different types of airport passengers.

## MY ROLE

I spearheaded research and app architecture + prototyping. I collaborated with another designer to simulate the user journey and identify pain points.

In addition, I worked alongside two product managers, a content strategist, and two researchers.

The app is still a work-in-progress (WIP) until April 2023.

## KICK OFF

At the outset of the project, we didn't have a clear mission or specific goals for the wayfinding experience. So we redefined the research question into something more plausible, which you have seen above. We collaborated with Gensler multiple times in between school.

We received pre-existing insights from Gensler in their document, "SFO Principles of REACH" where Gensler aims to improve revenue enhancement and customer hospitality (REACH).

[IMAGE—Carl's Chart ]

We also utilized studies from the ACRP to help us make better decisions. ACRP is an applied research program for airport challenges authorized by Congress, sponsored by the Federal Aviation Administration, and managed by the Transportation Research Board (TRB).

THE DISCOVERY (CORRECT BS)

### **Our Target Users**

Our target users for this solution are families, disabled individuals, first-time travelers, layover travelers, and international travelers. We focused on families because we believe that navigating an unfamiliar airport can be especially stressful for those traveling with children. For disabled individuals, we will include a voice assistant for blind users and visuals through avatars for deaf users to improve accessibility. First-time travelers may also benefit from the added guidance and personalized route provided by our solution. Layover travelers, who may have limited time to navigate the airport, will also benefit from the efficient route provided by our solution. Finally, international travelers may appreciate the added convenience and personalized features of our solution as they navigate an unfamiliar airport.

### **Passengers need constant feedback for higher confidence in their decision-making.**

The wayfinding industry has decades of existing research. While SFO is filled with helpful and contextual signs, we discovered that passengers still find themselves getting lost without live feedback on the directions they are taking. Passengers often desired an experience like Google Maps, where both directions and information about the destination are displayed. Without real-time information on the arrival of the next

AirTrain, for example, passengers will feel more and more unsure if they will arrive at their correct destination.

We conducted a gap analysis to identify what current solutions lack. Digital kiosks have wayfinding but are stationary. SMS notifications from airlines only give gate status updates, but they do not help you locate gates. As a result, we started building on a solution that gives them visual, geospatial, and auditory feedback. Furthermore, our solution was built on four foundations of the passenger journey needs

### **The higher the satisfaction, the higher the airport revenue**

Research has a proven and direct impact of wayfinding on the passenger experience, which in turn correlates to airport business performance (Harding et al., 2011). The Level of Service (LOS) is a quantitative metric of success used by airports to determine passenger satisfaction. For the next semester, we will also use the LOS as our metric in measuring the success of their solution.

The Airport Cooperative Research Program (ACRP) introduced this metric to the industry. The ACRP is an industry-driven, applied research program developing practical solutions to problems faced by airport operators. ACRP is authorized by Congress, sponsored by the Federal Aviation Administration, and managed by the Transportation Research Board (TRB).

Based on a survey by ACRP of 1000 international passengers in the top 8 U.S. airports, it is clear that ease of finding their way through the airport is the most important customer satisfaction factor. This is followed by helpful human staff and detailed flight information screens. ACRP used the results to create guidelines for improving the airport for international passengers, synthesizing data and turning it into guidelines: the three Vs of communication. These guidelines have served as the backbone of our solution.

### **Less thinking—less stress**

Passengers are psychologically exhausted by the number of stimuli surrounding them in airports. Steve Krug's *Don't Make Me Think* philosophy emphasizes an important design philosophy that the team put in their mind as they designed around passenger experiences "As a user, I should never have to devote a millisecond of thought to whether

things are clickable—or not.”

Our passengers should be able to wayfind without thinking. In our context, this can be defined as having users make decisions in the solution through buttons or input fields. This philosophy helped the team adopt a user-first design. From asking for preferences during ticket purchase (bundling tasks) and opting for a minimalist user interface on the main screen.

### **Constraint Satisfaction based on Passenger User Journey Concentrations**

With internal heat map data from Gensler, the team identified three high-traffic destinations of passengers after the security check.

1. Restrooms
2. Restaurants and Retails
3. Gates and Waiting Areas

To further reduce stress, we identified the biggest pain points in each destination and created a user journey map of airport passengers. Doing this helped us refine our solution by satisfying specific constraints and problems faced by real-time passengers in the airport.

### **A Mixed-Reality Solutions to provide Personalized Airport Wayfinding**

Our mixed reality solution aims to provide a personalized airport wayfinding experience for travelers. The process begins by collecting user data during the airline ticket purchasing process, including preferences for waiting areas, food, and restrooms. Once a ticket is purchased, travelers will receive a message from the airport with a personal link to an auto-generated route based on the provided information.

Upon arriving at the airport, travelers can simply click the link to access the personalized wayfinding experience without the need for any additional downloads. The web app utilizes voice assistance and augmented reality elements, such as 3D arrows, to guide travelers to their designated gate and other important locations within the airport, such as restrooms and food options.

All necessary information, including the traveler’s boarding pass, is easily accessible with just a tap of a button. The web app also allows for

real-time notifications in the event of any changes to gate assignments. Additionally, the web app includes augmented reality elements to provide entertainment and make the waiting experience more enjoyable.

Overall, our mixed reality solution aims to make the airport journey as smooth and stress-free as possible for travelers. We believe that this web app offers a more personalized and convenient wayfinding experience compared to traditional solutions, such as static maps and signage. We hope that this web app will enhance the airport experience for travelers and make it a more enjoyable part of their journey.

Consequently, the cognitive load or the working memory of a person will be high. Asking users more inputs will

Inspiration: Karen Cheng of Meta

## HOW WE GOT THERE

### ITERATION # 1

We restated the how might we (HMW) from targeting the Metaverse to the use of Mixed-Reality (MR) in this meeting because both Gensler and the team needed to narrow down the idea of *digital reality*. As a team, we believed that there the technology for the metaverse is too inaccessible and expensive for us to dabble into. From then on, we focused on using smartphones because we assumed all passengers to have them. Now, we just have to focus on catering both literate and illiterate in tech aka simplifying the process.

I sketched out the very first iteration here which involved bringing the digital maps in stationary kiosks into the user's phone. However, I wanted to increase the revenue of SFO as well. My first iteration involved using a Google Maps UI with the addition of a section dedicated for "Uniquely SFO" tours. If I were to with for a Japanese-themed tour, a route with a Japanese activity, food, and souvenir would be made for me before it would direct me to my gate. I acknowledged that did not use any elements of the Metaverse or MR. I believe that my sketching + presentation of this idea laid the foundation for the future iterations.

### ITERATION # 2

<https://www.loom.com/share/bfaf40560ec240db8024fd0665748c34>

In the second iteration of our mixed reality solution for personalized airport wayfinding, we focused on adding an onboarding section to introduce users to the concept of the app. During this onboarding process, we asked users questions about their flight and travel plans to tailor the app to their specific needs. For example, if a user indicated that they were in a hurry, the app would provide the fastest route to their destination, while users who wanted to explore the airport would be presented with a variety of options, such as restaurants, restrooms, and baggage claims.

One unique aspect of this iteration was the inclusion of sponsored routes, where companies could pay to have their locations highlighted on the app as recommended stops for users. This could be a source of revenue for the app, while also providing a useful service for travelers by highlighting interesting or desirable destinations within the airport.

Overall, this iteration of the app aimed to provide a more personalized and efficient experience for travelers, while also offering the opportunity for exploration and discovery within the airport.

### ITERATION # 3

<https://www.loom.com/share/a5eb580617104c76a83f19727648167b>

In a previous iteration of our project, we explored the idea of building on top of Google Maps to create a personalized wayfinding tool for airport passengers. We chose to use Google Maps because it already has a well-established API for calculating routes and providing information about establishments at different points, and it is widely used, making it familiar to many people. We modified the layout of Google Maps to include buttons for accessing the nearest boarding gate, restroom, and waiting area, based on the user's data. We also added a request assistance button to allow passengers, particularly those who may have trouble interacting with technology or who may be traveling alone, to receive personal assistance from an employee. Additionally, we created a step-by-step flight boarding guide that provided dynamic maps based on the user's real-time location to help them navigate the airport. Finally, we incorporated virtual reality and augmented reality elements to provide an immersive and engaging experience for passengers. These



features were designed to address the main stress points identified in our research, such as poor customer satisfaction, difficulty finding one's way around the airport, and the overall lack of enjoyment in the airport experience.

## FUTURE PLANS

In the future, we plan to take the Figma prototype for our wayfinding tool and make it fully functional. We will then conduct user testing by asking Minervans, our fellow classmates, to try out the prototype. This is because Minervans are a valid potential user group as they travel to a different country every semester for school and may potentially encounter the same challenges at airports that our solution aims to address. As part of the design thinking process, we will gather feedback from these user tests and use it to iterate on and improve the prototype.

In addition to improving the functionality of the prototype, we also plan to add elements of gamification to enhance the experience of passengers while they wait at their gates. Gamification involves the process of adding elements from games to non-game products or services, and has five essential components: goals, rules, feedback, rewards, and motivation. By incorporating these components, we are enhancing their airport experience even more by reducing boredom while they wait for their flights.

## THE IMPACT

Assuming that this mixed reality wayfinding solution is successfully implemented at SFO Airport, we can expect to see a number of positive impacts.

Impact: Increased passenger satisfaction and reduced stress levels by at least 20%

Measured via: Surveys and interviews with passengers

What our web app did: Providing personalized routes and assistance, as well as access to relevant information and amenities based on individual preferences

Impact: Improved efficiency and reduced wait times by at least 30%

Measured via: Time studies and observations of passenger movements within the airport

What our web app did: By providing clear, efficient routes and real-time updates on gate changes and other pertinent information, we can help passengers navigate the airport more efficiently and reduce their wait times.

Impact: Increased revenue for airport and businesses within the airport by at least 10%

Measured via: Financial data and customer spending patterns

What our web app did: By directing passengers to specific amenities and businesses based on their preferences, we can help increase revenue for the airport and the businesses within it.

Overall, we expect to see a significant positive impact on the airport experience for passengers, as well as an increase in efficiency and revenue for the airport itself.

## LESSONS LEARNED

Through this project, I learned a number of valuable lessons that have had a significant impact on my approach to product design.

One key lesson I learned was the importance of considering both the user experience and the underlying technical aspects of a product. As a product designer, I had previously focused mostly on aesthetics and usability in order to win hackathons, but I learned the value of also considering the background processes, or back-end, in order to create a more effective and functional product. This lesson was particularly relevant in the context of the project, which involved designing a wayfinding tool for the busy and stressful environment of an airport.

I also learned the value of soft skills such as leadership and conflict resolution. As the leader of the team, I had to take on the responsibility of addressing conflicts and tensions within the group and improving our dynamics. Through the group “open session” and by encouraging a culture of open communication and mutual support, I was able to address these issues and improve the team’s ability to work effectively together. These skills will be valuable in any collaborative setting, and I

will be sure to apply them in future projects.

Overall, this project was a valuable learning experience that allowed me to not only develop my technical skills but also my interpersonal and leadership abilities. These lessons will be impactful as I continue to grow as a product designer and work on future projects.

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