

Final Report: “Pulse” Mobile App

Team: Crowd Ctrl

Bogart, Mackenzie

Eiler, Jodie

Grossenbacher, Dawn

Parker, Jordyn

DePaul University
HCI 594 Capstone Studio
Summer 2025

Table of Contents

Team/Project Information.....	4
Abstract.....	4
Introduction	5
Goals.....	6
Original Goals (Out of Scope).....	6
New Goals (In Scope)	6
Methods.....	7
Method 1: Competitive Analysis.....	7
Method 2: Literature Review	7
Method 3: Class Activity Survey.....	7
Method 4: User Interview and Task Observation.....	8
Method 5: Card Sort	8
Method 6: Tree Test.....	8
Method 7: Vibe Filter Survey	9
Method 8: First-Click Test (wireframe).....	9
Method 9: Exploratory Prototype Evaluation.....	9
Method 10: Moderated Usability Testing.....	10
Tools.....	10
Results	11
Results for Method 1: Competitive Analysis.....	11
Results for Method 2: Literature Review	11
Results for Method 3: Class Activity Survey	12
Results for Method 4: User Interview and Task Observation.....	13
Results for Method 5: Card Sort	16
Results for Method 6: Tree Test	17
Results for Method 7: Vibe Filter Survey	19
Results for Method 8: First-Click Test (wireframe).....	20
Results for Method 9: Exploratory Prototype Evaluation	20
Results for Method 10: Moderated Usability Testing	22
Hi-Fi Prototype Iteration and Usability Adjustments.....	26
Final Concept & Model.....	27
Features	27
<i>Explore Page: Map View</i>	27
<i>Explore Page: Feed View</i>	27
<i>Location Details Page</i>	27
<i>Pulse Check (Location Check-In) Page</i>	28
Concept Model.....	28
Data Layer	28
<i>Pulse Check Interaction</i>	28
<i>Google Places API</i>	28
<i>Native Smartphone Sensors</i>	29
Service Layer	29
<i>AI Service</i>	29
Application Layer	29
Discussion.....	29
Future Works	32

Conclusion.....	32
References.....	32
Appendix 1: Supporting Material.....	34
Detailed Competitive analysis.....	34
<i>Direct Competitors.....</i>	37
<i>Indirect Competitors.....</i>	39
Detailed Literature Review	40
Annotated Bibliography (reading summary articles).....	42
Appendix 2: Additional Report Sections	44
Design Brief	44
Narrative	44
Target Users	44
Platforms and Form Factors.....	44
Needs and Motivations	44
Key User Tasks.....	44
Site Map and Flow Diagram.....	45
Interactive Prototype	47
Prototype Low-Fi Links/Instructions	47
Prototype Mid-Fi Links/Instructions	47
Prototype Mid-Fi Final Version Links/Instructions	47
Prototype Hi-Fi Final Version Links/Instructions	47
Prototype Main Elements	47
Concept Model	56
Personas.....	57
Persona 1. Zara Patel – Explorer of New Spots.....	57
Pulse Use Scenarios:	57
Persona 2. Marcus Rivera – Vibe Checker of Routine Spots or The Seasoned Sightseer.....	58
Pulse Use Scenarios:	58
User Interview Template and Scripts.....	60
Preliminary User Research Interview Template	60
<i>Screener.....</i>	60
<i>Adult Study Consent Form.....</i>	61
<i>Test Session Guide.....</i>	62
<i>Task Observation Notes Sheets</i>	64
Usability Testing Round 1 Interview Template	65
<i>Screener.....</i>	65
<i>Adult Study Consent form.....</i>	66
<i>Test Session Guide.....</i>	67
Usability Testing Round 2 Interview Template	70
<i>Screener.....</i>	70
<i>Adult Study Consent form.....</i>	71
<i>Test Session Guide.....</i>	72
<i>Task Observation Sheets</i>	74

Team/Project Information

Provide a bit of information about your team and your project (minimally, your team's name and your project name). List your teammates (a bulleted list is fine, but the table below is recommended).

Team Name

Crowd Ctrl

Team Members

Team Member	Roles and Responsibilities*	Email	Portfolio Link
Mackenzie Bogart	Submit files, compile deliverables / create presentations	Mbogart2@depaul.edu	
Jodie Eiler	Figma lead	Jeiler@depaul.edu	
Dawn Grossenbacher	Lead research	Dgrossen@depaul.edu	https://www.linkedin.com/in/drdawngrossenbacher/
Jordyn Parker	Lead editor	Jsmitt371@depaul.edu	https://www.linkedin.com/in/jordynniara/

Abstract

This paper explores the design and evaluation of the Pulse mobile application, a platform that integrates real-time crowd density and social ambiance (vibe) data to support users in making more confident decisions about places to spend time. The primary objective for the project was to conceptualize a platform that addresses gaps in existing mapping and review platforms, which often fail to capture dynamic experiential qualities of locations. To achieve this, our team employed methods such as user interviews, surveys, information architecture testing, and moderated usability testing. Preliminary research revealed that the current platform landscape lacks real-time vibe information, which is more important for determining the quality of experience than real-time crowd density information, according to crowd experience literature. Following initial research of the competition and relevant literature, we conducted live user research in which we interviewed participants and observed how they discover places to go with existing digital tools. We learned about their current habits of searching across multiple platforms and their need for a centralized application, as well as their interest in our project. To further ensure user understanding of the concept and accurate recognition of different “vibes”, we conducted a survey. We applied this information to begin creating wireframes, and conducted a card sort, tree test, and survey about vibe tag preferences to develop an early prototype. We learned about preferred navigation patterns and user preference for clear, concrete vibe descriptors as opposed to abstract terms.

We conducted two rounds of prototype evaluation – a generative one with a static prototype and a summative one with an improved interactive prototype. Findings from testing confirmed strong enthusiasm for Pulse’s core concept of presenting real-time-powered descriptions, and revealed challenges regarding data transparency, feature discoverability, and clarity of filter terminology. Adjustments to the prototype between rounds of testing improved navigation and boosted user confidence, with participants reporting improved ease of use and high interest in integrating the app

into their routines. Overall, the project demonstrated that users value a balance of practical and experiential information when making decisions about where to go, and that iterative, user-centric design can translate abstract ideas into a concrete interface. With further development of features such as onboarding, social aspects, and a rewards system, Pulse has the potential to bridge the gap between functional location discovery tools and live insight into atmosphere and crowd dynamics; reducing stress, increasing spontaneity, and helping users choose the right spot with ease.

Introduction

The Pulse mobile application was conceived as a response to the limitations of existing digital platforms that are used to find and decide on locations at which to spend time. While popular tools such as Google Maps, Yelp, and social media provide information on different locations such as reviews and photos, they fail to offer information about the real-time atmosphere, or “vibe” of locations. Other less-popular options such as CYZL and Bar Peak offer a bit more information, but the locations to view are limited to nightlife. To make informed decisions about where to go, many people use a combination of platforms – switching between apps and comparing information offered. Our project sought to address this gap by designing and testing a prototype that streamlines the process of deciding where to spend one's time. Using real-time crowd and vibe data, the Pulse mobile app assists users in making confident decisions.

To better understand the landscape in which our app would reside, we conducted a competitive analysis of both direct and indirect competitors on the market. Direct competitors such as Bar Peak, CYZL, Crowd Alerts, and Waitz demonstrate the potential for real-time crowd and atmosphere data but are limited in scope, accuracy, diversity of venues, and geographic reach. Indirect competitors such as Yelp, Google Maps, social media platforms, and reservation platforms such as Open Table and Resy provide useful content for venue discovery and information on overall vibe, but fail to capture real-time ambiance such as energy and mood. The competitive analysis revealed a key opportunity for Pulse: to display real-time information about not only crowd size, but experiential information such as mood and energy levels. Our findings influenced our app’s focus on data transparency, clear visualizations, diversity of venues, and an overall emphasis on real-time information.

To further establish a foundation for our work, we conducted a literature review. In their article on decision fatigue and purchase postponement in luxury retail, Li and Kang (2025) demonstrated how sophisticated AI can foster trust and emotional connection between the user and their platform, reducing decision fatigue. As one of our primary goals with Pulse was to reduce decision fatigue, this article helped us understand how human-centered design regarding language and interactions would increase user trust and improve confident decision-making. In an article about *VibN*, a continuous sensing application for smartphones, Miluzzo et al. (2011) describe a platform that leverages the sensors embedded in users' devices. By utilizing inputs from things like the phones accelerometer or microphone, the app delivers real-time vibe information. This work informed our exploration of passive data collection methods and the associated implications for user privacy. Although we briefly considered collecting data through social media scraping and user-generated updates, we ultimately chose to focus on smartphone sensors and user location check-ins as our primary data sources. This decision introduced challenges around privacy and trust but also presented an opportunity to build upon Miluzzo et al.’s research, which similarly investigated how mobile devices could be used to deliver ambient

insights. Our consideration of social media as a data source, however, led us to an article by Santani and Gatica-Perez (2014), which examined how location-based images—including those sourced from social platforms—can effectively convey ambiance. This strengthened our confidence in the potential to provide accurate, real-time vibe information through user-submitted imagery. Finally, Flinger, Easton, Waterson, and Haslam (2016) explored factors that influence crowd experience. Their article demonstrates the importance of context and crowd management over crowd density, providing us with further evidence of the importance of understanding real-time ambiance when deciding where to go. Overall, our literature review provided us with topics for discussion and design direction from which to begin our project and base our user research.

Following this initial research, we decided to ground our project in the guiding principles of trust, usability, and experiential decision-making. We sought to deliver the concept and early design for an app that offers real-time data presented with transparency, empathy, and accuracy. Our design process allowed us to use user research and testing to find the best ways to emphasize intuitive navigation, mood-driven exploration, and user privacy within our app. Shaped by a foundation of both preliminary and usability testing, Pulse aspires to bridge the gap between functional mapping tools and subjective social realities of urban life, offering users a more reliable, all-encompassing, and human-centered way to discover and decide on places to go.

Goals

Our project goals are split into two categories: those that are in scope and those that are beyond the scope of this project. Initially, we aimed to evaluate the success of Pulse as a fully developed, publicly launched application. However, as the project evolved, it became evident that these objectives were not feasible within the given timeframe, nor could they be measured. In response, we established a set of in-scope goals designed to provide achievable benchmarks and measurable outcomes that align with the constraints of this project.

Original Goals (Out of Scope)

Goal 1: Ensure users make the app apart of their daily routine

Measure: High user retention rate and weekly usage.

Goal 2: Users regularly contribute to reviews and ratings.

Measure: High user engagement with rating/review features.

Goal 3: Users make quick decisions on where to go.

Measure: Low average time between opening the app and selecting a location to visit.

Goal 4: Improving overall user satisfaction with outings.

Measure: High percentage of positive reviews and ratings.

New Goals (In Scope)

Goal 1: The Pulse app addresses gaps in current mapping applications by incorporating real-time vibe and crowd data while also providing personalized location recommendations.

Measure: Positive user feedback on a prototype designed to address identified gaps and introduce vibe-centric, real-time features.

Goal 2: The Pulse app instills confidence and sense of safety through transparent sourcing and presentation and of real-time data.

Measure: Users express trust in how real-time data is sourced and visually communicated during prototype testing.

Goal 3: Users find the Pulse app intuitive and can envision it as part of their future routines.

Measure: Users report ease of use during prototype testing, with reasonable task completion times.

Methods

Method 1: Competitive Analysis

Purpose: Preliminary Research

Detailed Description: We will analyze eight competitors: four indirect and four direct. Our direct competitors will be platforms which focus on providing users with real-time crowd data to help them make decisions about where to go in the moment. Indirect competitors will be more general platforms for reviewing and rating locations. We will review each platform for real-time crowd data, real-time vibe data, focus of venues, visual content, social features, privacy, venue discovery methods, and monetization. Following this review, we will assess strengths, weaknesses, and opportunities for improvement.

Revisions or adjustments: No changes or revisions.

Method 2: Literature Review

Purpose: Preliminary Research

Detailed Description: We will read and analyze five initial documents to build the foundation for our research and design. We have chosen peer-reviewed articles which address crowd experience and smartphone sensing for crowd data aggregation. We will use findings from these articles in [Appendix 1](#) to strategize for our design process.

Revisions or adjustments: Throughout the initial stages of the project, we read and reviewed three more articles to further support our ideas. We chose articles on smartphone sensing, decision fatigue, and identification of atmosphere from photos.

Method 3: Class Activity Survey

Purpose: Preliminary Research – Defining “Vibe” Survey

Detailed Description: This online survey will explore how users define and categorize the word “vibe” as part of our preliminary research before designing, helping us decide how to best represent a location’s vibe in our application. Participants will first define “vibe” in their own words and select a related term. Next, they will view photos of locations and judge whether the vibe is good or bad, explaining their

reasoning. They will then view additional photos and either choose or provide a word that best describes the vibe, followed by a final round where they submit only a single word with a brief explanation. The results will show how people define “vibe,” how much agreement exists across participants, and whether our categories are descriptive enough. There will be 4-8 participants for this method. Recruitment will consist of participants from class. Data will be analyzed by visualization and frequency counts of survey answers.

Revisions or adjustments: This activity changed from a user interview and task observation to a survey. Since we performed this class activity early in the quarter, we chose to run a survey instead to support our preliminary research. Additionally, to increase our sample size we opened the survey up to our personal networks after a few days of limiting participation to the class.

Method 4: User Interview and Task Observation

Purpose: Early Live User Research

Detailed Description: In an interview, the interviewer will ask the participant questions about their current tools and habits when looking for locations to go. There will be a follow-up observation of a task where the participant will be asked to find a location in which to hang out. There will be 4-8 participants for this method. Recruitment will consist of participants from our personal networks. Data will be analyzed using affinity diagramming, visualization techniques, and thematic analysis.

Demographic Summary: We interviewed 8 participants (5 women, 3 male), ages 27-40 (average age 32.5), from a range of professional backgrounds. Most participants reported high comfort and proficiency with technology, using it frequently to discover new places, plan outings, and check logistics like crowds and parking. A smaller subset of participants reported less frequent use of technology, relying more on word of mouth or prior knowledge to find locations. Overall, the majority actively integrate multiple digital tools into their routines.

Revisions or adjustments: No changes or revisions.

Method 5: Card Sort

Purpose: Help with design of navigation scheme.

Detailed Description: This will be an online activity to learn how participants sort and group information. Participants will be given a variety of cards and will be asked to group them into specific categories based on their personal mental models. This will give an idea of how the application should be structured . There will be 4-8 participants for this method. Recruitment will consist of participants from our personal networks. Data will be analyzed by viewing “Proven By User” data visualization reports.

Revisions or adjustments: No changes or revisions.

Method 6: Tree Test

Purpose: Help with design of navigation scheme.

Detailed Description: This will be an online activity to test the navigation structure of the application without design or visuals. Participants will be tasked with finding an item within the menu. They can then click to navigate through the menu options. This will help assess if the navigation is intuitive, labels are appropriately placed, and if users can efficiently find what they need without backtracking. There will be 4-8 participants for this method. Recruitment will consist of participants from our personal networks. Data will be analyzed by viewing “Proven By User” data visualization reports.

Revisions or adjustments: No adjustments to the description, however we did have to create the tree test twice due to some participants finding the first version confusing. A revised version was sent out to participants.

Method 7: Vibe Filter Survey

Purpose: Help with choosing vibe filters.

Detailed Description: This will be an online survey that helps us to narrow down vibe filter types and which descriptor words make sense with each mood. Participants will be given various vibes and choose which ones they like or dislike. There will be 4-8 participants for this method. Recruitment will consist of participants from our personal networks and students from class. Data will be analyzed by visualization and frequency counts of survey answers.

Revisions or adjustments: This is an additional method.

Method 8: First-Click Test (wireframe)

Purpose: Help with design of navigation scheme.

Detailed Description: This will be an online activity to find out where participants click on a wireframe first when given a specific task. Participants will be shown a wireframe layout of the application screen and click on a menu, button, or label to complete the given task. This will reveal if users are able to complete the task with the current design, how long the task took to complete, how susceptible the design is to causing errors, and if the layout is confusing or intuitive to the user. There will be 4-8 participants for this method. Recruitment will consist of participants from our personal networks. Data will be analyzed by viewing “Proven By User” data visualization reports.

Revisions or adjustments: We chose not to conduct this test because we had already completed surveys, a card sort, a tree test, and had two rounds of prototype testing still to complete. Due to time constraints and the sufficient data collected from these methods, we decided to omit this test from our plan.

Method 9: Exploratory Prototype Evaluation

Purpose: Live user research and prototype testing.

Detailed Description: This will be a combination of an online activity with a prototype and moderated video call to observe participants. We will interview participants as they explore each page, look at different features and functions, and review different aspects of the application. This method was

chosen to gather general insights into our product without having participants focused on completing tasks. We will look for insights by collecting data based on participants' behaviors, reactions, language, gaps, and impressions. Data collected will be evaluated to gain insight into improving the design of our prototype and idea. There will be 4-8 participants for this method. Recruitment will consist of participants from our personal networks. Data will be analyzed using affinity diagramming, visualization techniques, and thematic analysis.

Demographic Summary: We interviewed 8 participants (6 women, 2 male), ages 26-54 (average age 34), from a range of professional backgrounds. Most participants reported frequent use of technology to find places, often leveraging maps apps or social media to discover or evaluate options. A few participants expressed lower comfort levels or preference for simpler tools. In general, the majority of the group relied heavily on technology for exploration, while a smaller subset used it more selectively or with lower confidence.

Revisions or adjustments: We conducted an exploratory evaluation of our mid-fi prototype. Since interactivity was not built into the prototype at this stage, participants were asked to share their general impression of the layout, page options, and potential functionality. This provided early feedback on design direction and areas to refine for future iterations.

Method 10: Moderated Usability Testing

Purpose: Live user research and prototype testing

Detailed Description: This will be a combination of an online activity with a prototype and moderated video call to observe participants. Participants will be given a series of tasks using a clickable prototype of the application. The moderator will observe how they use the prototype and can help if the participant gets stuck or confused at any point. This will reveal how a user performs given tasks and provides an opportunity for them to ask follow-up questions to learn more about their navigation choices during the tasks. It will help us to understand user pain points and catch layout or navigational problems before creating the hi-fi prototype. There will be 4-8 participants for this method. Recruitment will consist of participants from our personal networks. Data will be analyzed using affinity diagramming, visualization techniques, thematic analysis, and aggregating Likert-scale ratings.

Demographic Summary: We interviewed 8 participants (6 women, 2 male), ages 23-56 (average age 30.25), from a range of professional backgrounds. Most participants reported frequent use of technology and location-based apps to discover new places and assess the location's atmosphere through photos, reviews, or visits. A few participants were less frequent app users and preferred word of mouth recommendations.

Revisions or adjustments: We adjusted this to be a usability test with an interactive version of our mid-fi prototype. Due to time constraints, we decided to focus our second round of testing on interactivity and participants' experience using the prototype, rather than the branding of the application.

Tools

- **Testing tools:** Card Sorts, Tree Tests (used Proven By User)
- **Design and Prototyping:** Paper & Pencil, Figma, Adobe CC
- **Research Tools:** Google Forms, Zoom, NotebookLM
- **Other:** Microsoft Teams, FigJam

Results

Results for Method 1: Competitive Analysis

Goal of the Activity: The goal of this activity was to better understand the competitive landscape of our application by analysing both direct and indirect competitors. By identifying how other platforms approach real-time crowd and vibe data, as well as more general review and rating systems, we aimed to uncover existing strengths, weaknesses, and gaps in the market. This analysis helped us generate insights into opportunities for differentiation and informed the direction of our own design decisions.

Overview: We conducted a competitive analysis of eight platforms, four direct and four indirect competitors. Direct competitors were selected for their focus on real-time crowd data, while indirect competitors were chosen for their broader emphasis on venue reviews and ratings. Each platform was reviewed for its approach to real-time data, social features, privacy, monetization, and overall user experience. By evaluating these factors, we developed a clearer picture of industry standards, current features, and potential weaknesses to avoid, providing a foundation to shape our product strategy.

Findings: Our direct competitors (Bar Peaks, CYZL, Crowd Alerts, and Waitz) all focus on providing real-time information about crowd levels, while these platforms succeed in giving users timely data about how busy a location is, each one is limited in scope. Bar Peaks and CYZL target nightlife, restricting their audience to a narrow set of venues. Crowd Alerts offers more variety but relies heavily on user-generated inputs, raising questions about accuracy. Waitz stands out for its sensor-based data collection, which increases reliability, but its focus on campus environments prevents broader use. Across the group, vibe data is missing, leaving an opportunity for more engaging, experience driven design.

Our indirect competitors (Yelp, Google Maps, Instagram/TikTok, and OpenTable/Resy) provide robust discovery, reviews, and user-generated content. Yelp and Google Maps excel in coverage and engagement, but their real-time data is limited and inconsistent. Instagram and TikTok are strong at capturing the vibe of a location, but they lack structure and reliability, making it difficult for users to filter for meaningful insights. OpenTable and Resy address availability and reservations effectively but offer little beyond logistics. In general, indirect competitors succeed at engagement, but not in providing actionable, real-time context.

Our analysis highlights a clear market gap: direct competitors provide real-time crowd information, but are limited in scope and locations available, while indirect competitors offer broad engagement and discovery but lack reliable real-time insights. This suggests an opportunity to create a system that provides accurate, real-time crowd and vibe data that communicates a more comprehensive and user-centered solution. For a full overview of individual competitors and their feature comparisons, see [Appendix 1](#).

Results for Method 2: Literature Review

Goal of the Activity: The goal of this literature review was to establish a research foundation for our application by examining existing studies on crowd experiences, smartphone sensing, and mobile applications for crowd data aggregation. By analyzing peer-reviewed articles, we aimed to identify

factors that influence satisfaction and perception in crowded environments, explore methods for collecting and interpreting real-time crowd data, and extract insights that could inform the design of our own application. This initial research ensures that our design decisions are grounded in evidence from both human factors and technological perspectives.

Overview: Our review included five primary articles, which covered a range of topics, including participant perspectives on crowd satisfaction, human factors influencing crowd navigation, the use of smartphones for continuous sensing of city atmospheres, and the technical design of crowd density applications. Each research study or article was analyzed for insights into user behavior, environmental design, data collection methods, and privacy considerations. Findings from these articles were used to inform design strategies and feature prioritization for our application.

Findings: The literature highlights several key considerations for designing crowd-focused applications. Filingeri et al. emphasize that crowd satisfaction depends not only on crowd size but also on physical space, comfort, and crowd control measures. Kendrick and Haslam stress the importance of safety, prior expectations, and demographic differences in crowd tolerance. Studies on smartphone sensing, including Miluzzo et al. and Wirz et al., demonstrate that mobile devices can provide scalable, real-time insights into crowd density and city atmosphere, while also noting the need for data calibration and quality control. Szabo's research further shows the potential of GPS-based crowd tracking and highlights privacy considerations in collecting location data. Collectively, these studies inform our application's approach to combining real-time crowd intelligence with user-centered design, helping to guide decisions around features, data collection, and overall user experience. For a full overview of our literature review, see [Appendix 1](#).

Results for Method 3: Class Activity Survey

Goal of the Activity: The goal of this activity was to help us define the word “vibe” and how it’s identified or categorized by users. The survey was done as part of our preliminary research prior to designing, so we know how to best incorporate the “vibe” of a place into our application.

Participants: We had 8 total participants, however after 3 days we did have to open the survey up to participants outside of Depaul in order to get enough data to analyze and stay on schedule. This was not a concern however, because our application is meant to be by audiences both in and outside of Depaul.

What the Participants Did: The participant’s only task was to complete the survey.

Overview: The survey had 4 parts. The first part was screener to exclude anyone who was not 18 years or older, did not live or spend time in an urban environment, or were not familiar with the word “vibe”. In the second part, we asked those who passed the screener to define the word “vibe” in their own words and pick a word they felt was most closely associated with the word. In the third part of the survey, participants were given pictures of different locations with varying levels and types of activity. They were asked to determine if the vibe was good or bad and explain why. In the fourth part of the survey, participants were given pictures of different locations with varying levels and types of activity, different from that of section two. They were asked to pick a word that most closely aligned with the vibe in the photo or submit a word of their own, then explain why they chose that word. Finally, in the fifth section of the survey, participants were given pictures of different locations with varying levels and types of activity, different from that of section three. They were asked only to submit a word that best

fit the vibe in the photo, then explain why they chose that word. This data gave us a sense of how people generally define a vibe and how closely people align on what vibe a location is given. It also told us if the categories provided were adequately descriptive enough to define the vibe.

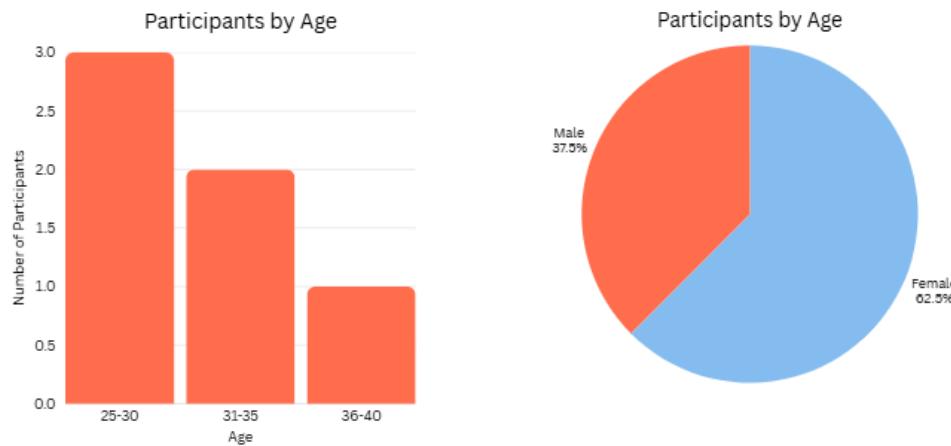
Findings: Overall, our survey was successful. From it, we were able to agree upon a loose definition of the word ‘vibe’ and explore how people evaluate it and whether that process is consistent across individuals. Because ‘vibe’ is an abstract concept, we were concerned that it may be hard to understand and that participants would interpret the word differently. This proved not to be the case. Most of our participants defined “vibe” similarly as an intrinsic property of a person, place, or experience — something that is projected, perceived, and intuitively interpreted. They aligned the word with “feeling”, “mood”, or “ambiance”, indicating its abstract nature that has the potential to be interpreted differently by person.

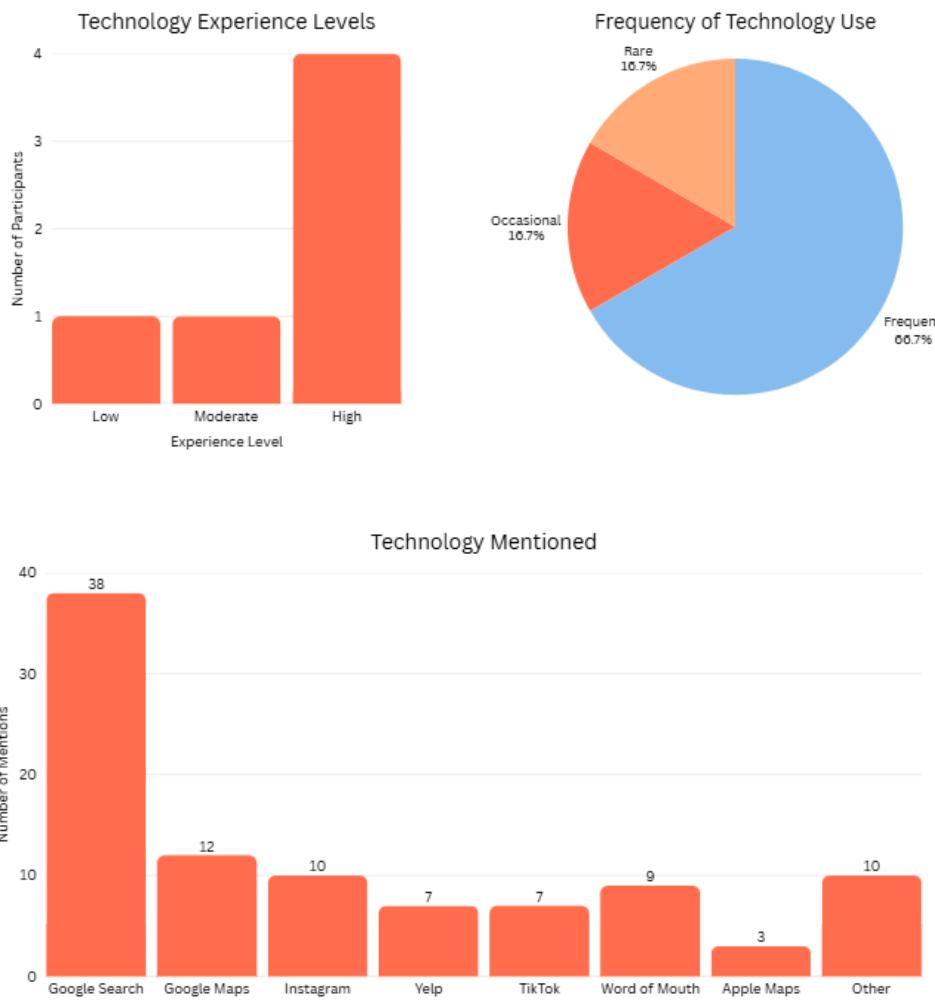
This became clear when participants evaluated the vibe of a location based on its image. While most participants were aligned when determining what characteristics of a location gave them the impression of vibe - pointing to body language, colors, and activities or even objects in the image - there were some variances in what word best defined the vibe. In two out of three images, all participants were aligned on whether a location illustrated a good or bad vibe – with the exception of one image. But when defining what that vibe was, participants were often split between 2-3 options for most images, with “chill” almost always being included as a chosen option. It seemed that images were on a spectrum with one end being loud, vibrant, and exciting, and the other being serious or sterile. If an image could fit somewhere in between, its vibe was “chill”. This may mean that a “chill” vibe could take on another definition depending on the participants preferences. Whatever its meaning, it’s clear that a vibe can be very loosely agreed upon but is always subjective.

Results for Method 4: User Interview and Task Observation

Goal of the Activity: The goal of this activity was to understand how people currently discover places to go out and what tools they rely on to make those decisions. This insight will help us identify common behaviors, preferences, and challenges in the process of choosing a place to spend time.

Participants: We completed 8 interviews with 8 participants.





What the Participants Did: Each session was conducted either over a video call or in person with a phone or computer present. Participants first completed an interview where they were asked questions about their current habits and decision-making methods for finding places to go out. Afterward, they were given a task in which they were asked to find a location to hang out while the researcher observed how they approached the task and what tools they used.

Tasks:

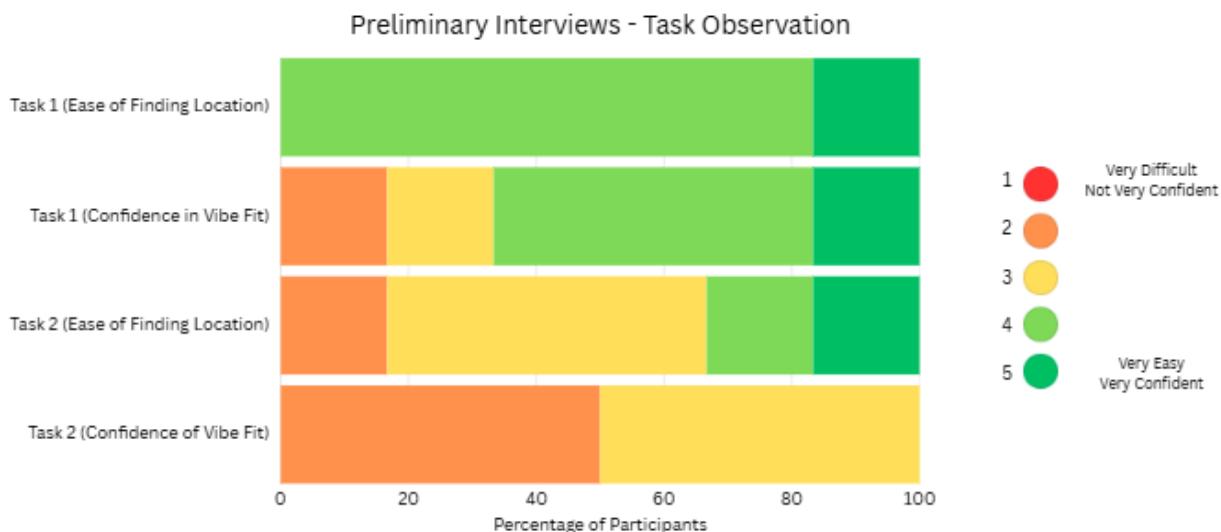
Task 1 - It's Friday night and you want to go out with friends. Please walk me through how you would go about deciding where to go.

Task 2 - You want to find a quiet cafe to study or work from in the afternoon. Please walk me through how you would find a place to go.

Overview: This interview and task observation provided both qualitative insights from participant's reflections during interviews and practical observations of their real-time decision-making process. Together, these findings offered a clearer picture of how people search for and evaluate locations.

Findings: Google Search and Google Maps were the most frequently mentioned tools across interviews showing their central role in location discovery. Instagram, Yelp, and TikTok were also recurring, while other tools were mentioned occasionally. However, the interviews revealed that while people regularly use these digital tools to discover new places, they often fall short in providing the information users value most. Participants reported that reviews, proximity, and price strongly influence their decisions, but that practical details such as parking, seating and crowd levels are often missing or unreliable. Most importantly, these platforms struggle to capture the less tangible but critical factor of “vibe,” leaving users uncertain about what to expect until they arrive. This highlights a gap between the functional convenience of existing tools and the qualities people seek when deciding where to go.

At the same time, the findings show that vibe, though subjective and difficult to define, has a major impact on decision-making, especially for social occasions such as a date night or group outing. Even participants who claimed not to care much about vibe still referenced elements tied to ambience, suggesting its influence is often implied. The desire for real-time crowd data, personalized recommendations, and possibly live video feeds points to a growing need for technology that helps users feel more confident about both the practical and emotional fit of a location. The results suggest an opportunity to design solutions that go beyond helping users find places, and instead help them predict how those places feel, making choices more aligned with their intentions.



For task 1, which involved finding an ideal social space, most participants reported that locating a suitable place was moderately easy. Confidence in the vibe of the location was moderately high, as 5 participants rated their confidence between 3 and 5. In contrast, task 2 focused on finding a quiet cafe for remote work or studying, and participants found this slightly more challenging. 3 participants rated the ease of finding a location as neutral (3), and overall confidence in the location’s vibe was lower, with all 6 participants rating between 1 and 3. Participants frequently noted difficulty in assessing quietness, often relying on prior knowledge or visiting the location in person to confirm.

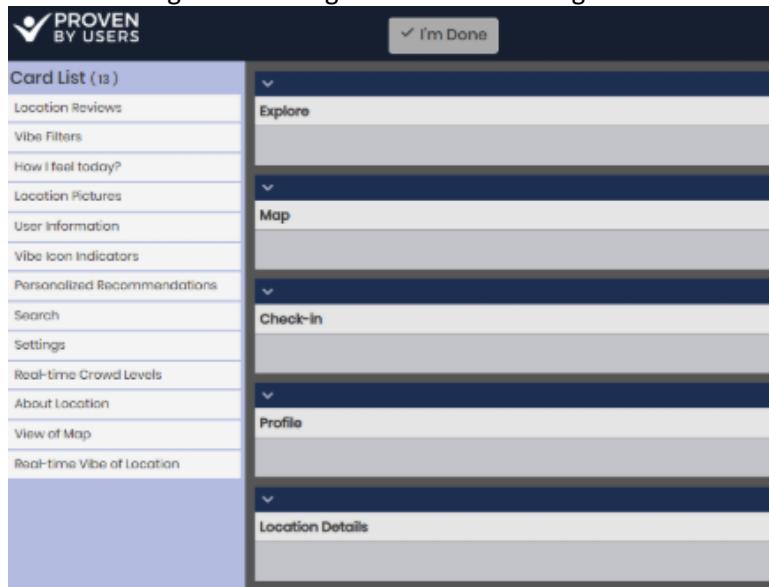
Results for Method 5: Card Sort

Goal of the Activity: The goal of our card sort was to understand how users naturally categorize content, to inform us of a logical and user-friendly hierarchy for our mobile application. We chose to perform a closed card sort with predetermined categories.

Participants: We had 7 completed sorts and 3 incomplete sorts. We wanted 8 completed sorts, however “Proven By Users” only allows 10 participants per test, and it counts incomplete tests in this number.

What the Participants Did: Participants were given 13 cards on the left of their screen and 5 category groups on the right. Participants dragged each card into one of the categories.

Overview: We conducted a card sort to better understand how users group content, with the goal of creating an intuitive and user-friendly navigation structure for our mobile application. This activity helped us uncover users' mental models and informed the categories and hierarchy used in the app. We used was a closed card sort, providing participants with predefined categories. This activity provided valuable insights into which items fit naturally within our proposed structure and which ones caused confusion. The results helped us validate and adjust our app's navigation and information hierarchy before moving into creating our wireframe designs.

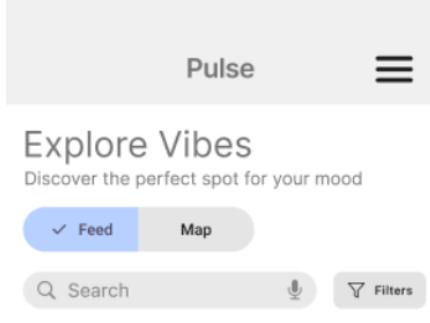


Findings: From the card sort test, we observed that participants showed strong agreement on several cards, particularly within the “Explore,” “Location Details,” “Map,” and “Check-in” categories. Cards like “Search,” “Location Pictures,” “View of Map,” and “User Information” had high agreement percentages (85.7-100%), indicating that participants have a consistent understanding of where those features belong. This suggests these elements are clearly labeled and intuitive to users.

However, there was more inconsistency in areas like “Vibe Icon Indicators” (57.1%) and some of the real-time features like “Vibe of Location” and “Crowd Levels” (both 71.4%). These features may need clearer naming or onboarding to help users understand their purposes.

Our card sort test helped inform us of changes to make to our app hierarchy and rethink where the location of some of these features should go based on these results. A major change we made was

combining the “Explore” and “Map” categories into one section with a toggle between a feed view (AI suggested personalized recommendations based on user’s actions) and map view (map of locations nearby). “Search” and “Filters” will be available on both views, rather than on one view, as seen below:



We also further developed our “Check-In” page and what options would be available on the check-in form, as well as planned the sitemap to create our next test, a Tree Test. A key takeaway for this project is that while core navigation elements are intuitive, anything involving “real-time” data, vibes, or personalization might benefit from improved explanation or clearer context in the UI.

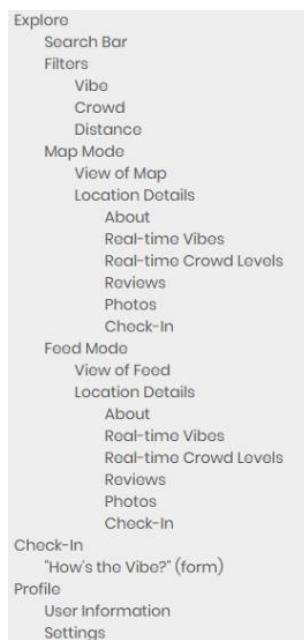
Results for Method 6: Tree Test

Goal of the Activity: The goal of our tree test was to help our team explore how users interpret and navigate our information architecture, and to identify whether our content categories and feature labels align with user expectations. It allowed us to test assumptions about how people would find key features and gave us insight into where confusion and misclassification might occur. This tree test supported the mid stage of the design process, particularly in refining our app navigation before creating high fidelity designs.

Participants: We had 9 completed tree tests. We wanted 8 completed tests.

What the Participants Did: Participants were given 5 tasks to complete with randomized task order. Participants were given the sitemap hierarchy and could click through to find the answer they believed to be correct. Once they found that answer, the participant clicked “Here” button to submit.

Overview: We used this tree test activity to evaluate how well users could navigate a proposed content hierarchy without the aid of visual UI elements. By testing our hierarchy in this simple format, we were able to assess whether users intuitively understood where to find specific features based solely on labels and menu organization. This activity supports our project by identifying strengths and weaknesses in our information architecture. It helps ensure that key features are discoverable and logically placed from the user’s perspective. It also allowed us to measure both task success and hesitation points, informing improvements in our navigation design before full UI development begins.



Tasks: Below are the 5 tasks and correct answers to each task:

Task	Instructions	Correct Answer
1	You're looking for a place nearby that matches your current mood. Where would you go?	Vibe
2	You want to log how you're feeling right now at a specific location. Where would you go?	"How's the Vibe? (form)"
3	You want to see all available locations on a map. Where would you go?	View of Map
4	You want to find a nearby park and would like to know the overall vibe before going. Where would you find that information?	Real-time Vibes
5	You want to check out trending or popular places in your area that match your style.	View of Food

Findings: From the tree test activity, we learned that while some areas of our site structure were intuitive, others caused confusion among participants. Users were highly successful with tasks involving visual navigation, for example, 100% correctly found the map when asked to see available locations, and

nearly 89% knew where to log how they were feeling. This indicates that primary navigation categories like “Map” and “Check-in” are well-labeled and intuitive for users.

However, there was noticeable confusion around tasks that involved more subjective or exploratory actions, such as finding nearby locations with a certain vibe or browsing places that match a user’s style. These had the lowest success rates (55.6%), suggesting that users struggled to connect those goals to the “Explore”>“Filters” or “Explore”>“Feed Mode” structure. A key takeaway is that users may not fully grasp how features related to mood are organized, especially if labels aren’t immediately clear. This may also imply that some features will be more reliant on visual aids and UI elements, such as icons, images, preview cards, or buttons, to help users better understand the structure and navigate more intuitively within the experience we’re designing.

Results for Method 7: Vibe Filter Survey

Goal of the Activity: The goal of this survey was to refine and validate the list of vibe filter and tag options for our application. Because “vibe” is subjective and sometimes difficult to define, the survey aimed to identify which descriptors resonate most clearly with users and feel useful in helping them decide on a place to go. By understanding which words participants prefer, the team can build filters that are intuitive and aligned with how people naturally talk about atmospheres.

Participants: We received 6 completed surveys.

What the Participants Did: Participants completed an online survey where they were presented with a variety of potential vibe tags. They were asked to indicate which words they liked, disliked, or felt neutral about, and to provide feedback on clarity and usefulness. This process gave insight into how participants interpret specific words and whether terms matched their own understanding of a location’s “vibe.” The survey included a variety of descriptors, allowing the team to compare reactions across a broad set.

Overview: This survey served as a way to test the vocabulary users would find most meaningful for vibe filters and tags. It helped to uncover the language that feels natural and relevant in this context. The results offered a snapshot of which descriptors work best, which are confusing or redundant, and which should be revised or removed. This provided a foundation for creating a filter system that users can easily understand and apply.

Findings: The results suggest that clear, straightforward descriptors are favored most by participants. Words like “lively,” “quiet,” “romantic,” “cozy,” “upscale,” “casual,” and “party” stood out as strong options because they were easy to understand and immediately conveyed a distinct type of atmosphere. In contrast, more abstract terms such as “exciting,” “aesthetic,” “trendy,” and “artsy” were consistently viewed as unclear or unhelpful. This indicates that while users want to categorize places by vibe, they prefer simple, concrete words over ones that could be interpreted in multiple ways.

There were also tags that received mixed responses, such as “chill,” “cool,” “productive,” and “hidden gem.” These results highlight opportunities to refine or rename certain categories so they feel more precise, like using “relaxing” instead of “chill.” Some terms, like “outdoors” or “productive,” may also represent attributes other than vibe, suggesting they might be better captured as separate filters or metadata. Overall, the findings show the importance of selecting vocabulary that is both meaningful and practical for users, ensuring the final filter system feels intuitive while avoiding redundancy.

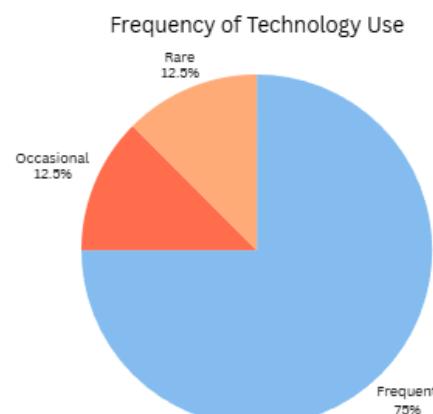
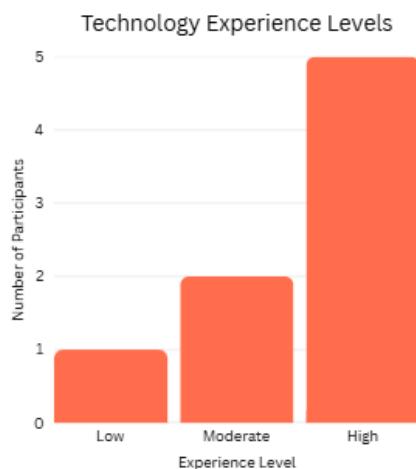
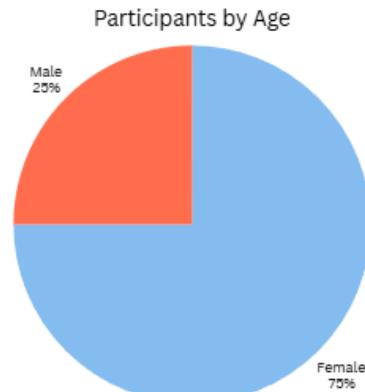
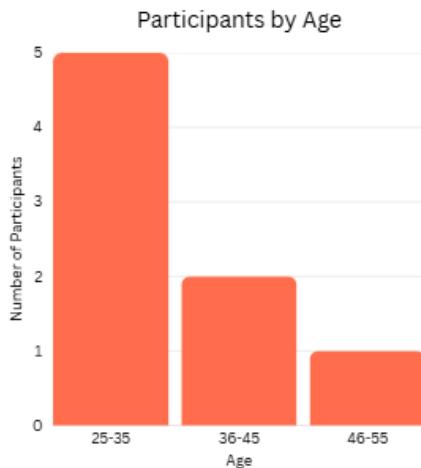
Results for Method 8: First-Click Test (wireframe)

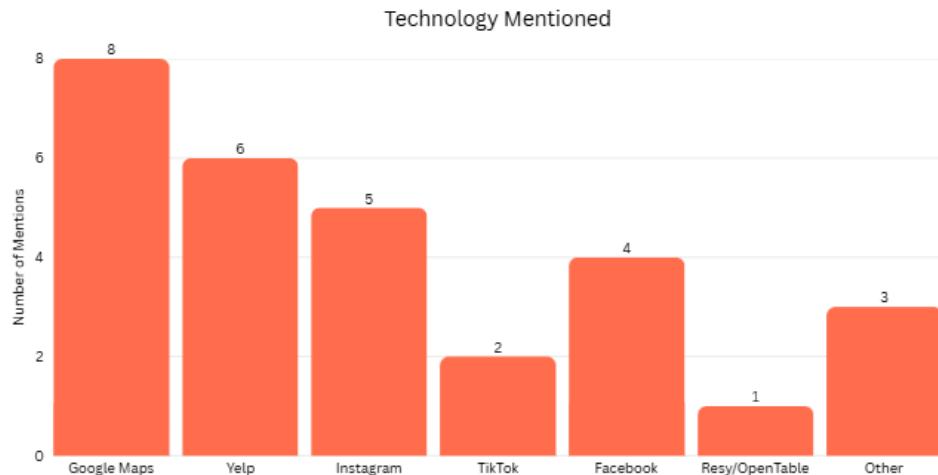
This method was omitted from testing.

Results for Method 9: Exploratory Prototype Evaluation

Goal of the Activity: The goal of this prototype evaluation was to gather participants' general impression of our mid-fi prototype. Since interactivity was limited, the focus was on understanding general impressions of the layout, page options, and potential functionality rather than task completion. The evaluation aimed to uncover behavioral insights regarding the app's core concept, including how users perceive the check-in process, map and feed navigation, and location details. This provided insights into potential pain points, trust concerns, and areas where features or information were unclear or overwhelming.

Participants: We interviewed 8 participants.





What the Participants Did: Participants were guided through an online prototype while being interviewed in a moderated video call. They explored the app's main pages, including the Check-in page, the Explore page with feed and map views, and Location Details page. During the session, participants were asked to share their thoughts, reactions, and questions as they were shown each feature. They provided feedback on iconography, sliders, data transparency, and the potential utility of AI-driven summaries and recommendations.

Overview: The testing was designed to simulate a natural exploration of the app without requiring participants to complete structured tasks. By observing and discussing participants' reactions and opinions in real time, the team gathered insights on what aspects of the interface were intuitive or confusing, which features generated trust or skepticism, and what information participants considered essential for decision-making. This approach enabled the identification of both immediate usability issues and longer-term conceptual considerations for the app's design.

Findings: Round 1 testing revealed strong enthusiasm for our app's major concept of providing real-time vibe and crowd information. Participants consistently valued visual representations of atmosphere, such as graphs, sliders, and icons, and expressed interest in AI-generated summaries to streamline information consumption. However, several areas of concern emerged, particularly around trust in recent data, the clarity and usability of the check-in process, and the potential overload of information on the Explore and Location Details pages. Participants highlighted discomfort with the audio recording for ambient noise, a desire for clearer iconography and legends, and the need for transparent permissions and opt-in controls for sensor data. Social features, personalized recommendations, and incentives were discussed as potential areas to encourage engagement.

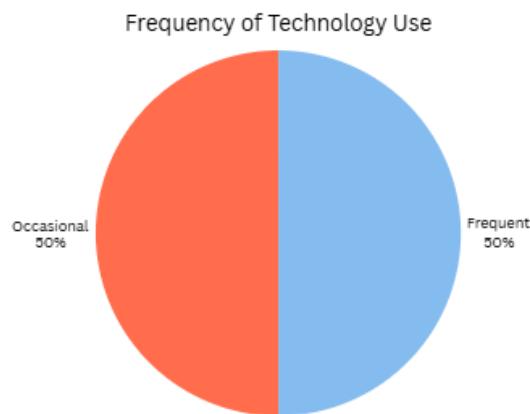
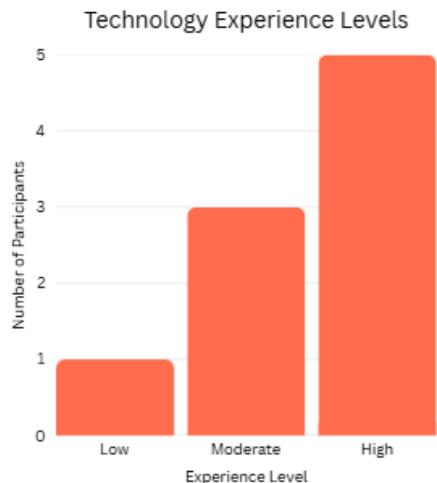
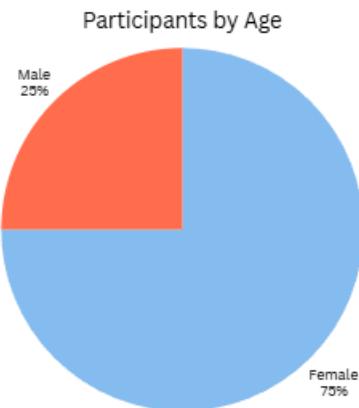
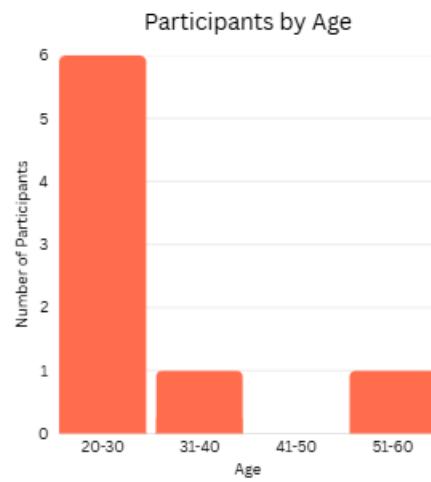
Based on these findings, we made several targeted changes to the prototype. The Check-in page was simplified with refined vibe categories, better organization, and a clearer distinction between required and optional inputs, while reviews and additional details were removed. The map view in the Explore page received a legend, clearer icons for the vibe tags, expanded filters, while adding more filter options. The Explore feed view received specific subcategory lists, and we further discussed how the recommendation algorithm would work. The Location Details page now prioritizes vibe information, incorporates AI descriptions, displays key practical information in the header, and improves chart visibility. We will explore a few features in our future work on the app such as social integration,

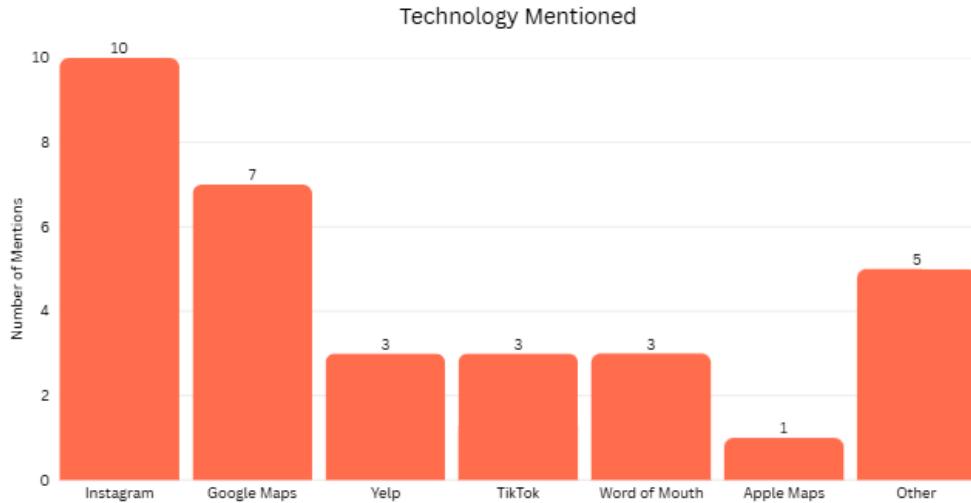
bookmarking, and transparency in permission and opt-ins. These changes aim to enhance usability, trust, and engagement, addressing the key pain points recognized in this first round of testing.

Results for Method 10: Moderated Usability Testing

Goal of the Activity: The goal of this moderated usability testing round was to observe participants interacting with our interactive mid-fi prototype to identify usability challenges, assess how users navigate and complete tasks, and gather feedback on the app's main features. The session aimed to uncover pain points, focusing on interactivity, ease of use, and user experience.

Participants: We interviewed 8 participants.





What the Participants Did: Participants were guided through a series of tasks using the interactive prototype, including exploring the feed, applying filters, checking real-time vibe data, viewing the map, and completing a check-in. Moderators observed participants' interactions, noted areas of hesitation or confusion, and prompted users for explanations about their choices.

Overview: Round 2 of the usability testing aimed to understand participants' natural navigation patterns, find pain points, and collect feedback on key features. Insights from this session helped to inform future design implications, ensuring the app is intuitive, engaging, and meets user needs.

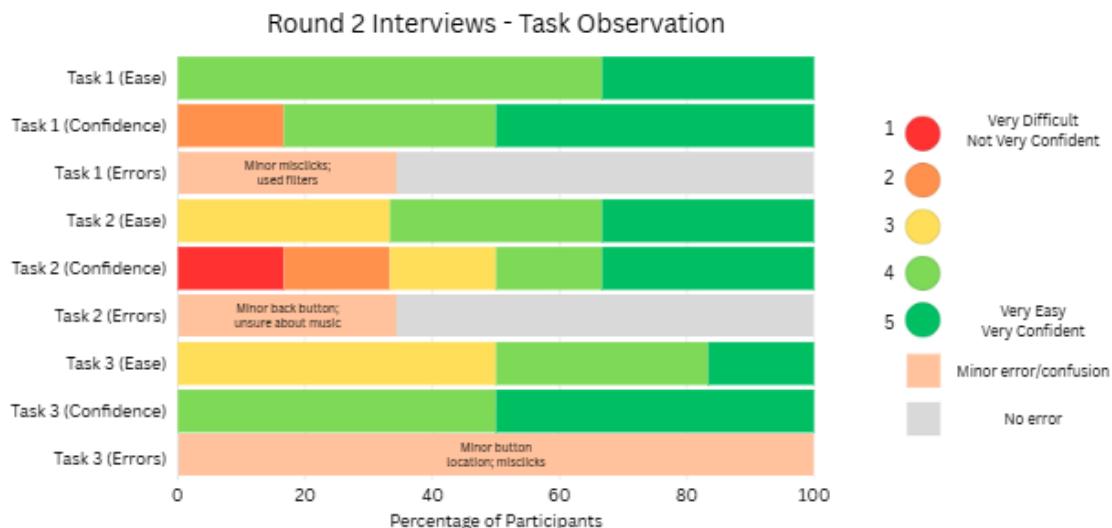
Tasks:

Task 1: It's a Tuesday at lunchtime and you've been working from home all morning. You want a change of scenery but still need to be focused on work for the rest of the afternoon. Use the feed view of the explore page to browse "relaxing places" and select a cafe to look at its details and see if it fits your needs.

Task 2: It's Friday night and you're at dinner with some friends. You want to go out and listen to live music. Use the map view of the explore page to filter by live music, find a lively bar nearby and select it to view its details.

Task 3: You've just arrived at a lively park to hang out on a Saturday afternoon. Use the app to check in to your location and provide real-time vibe information.

Findings: Participants generally responded positively to our app, appreciating features like real-time vibe data, personalized recommendations, and the vibe visuals. These features made participants feel more confident if they had to plan outings through the app. Most participants indicated they would use the app regularly and were interested in contributing to real-time vibe information, showing engagement with interactive elements.



Task 1 – Browse Feed and Select a Cafe:

Most participants were able to successfully complete Task 1, using the feed view to browse relaxing places and select a cafe. Alison, Gina, Miranda, Stephan, and Krista completed the task without significant issues, while Joseph initially tried using filters incorrectly but successfully selected a cafe on his second attempt. Overall, participants found this task easy and intuitive, with ease ratings mostly between 1 and 2, describing the experience as “point-and-click,” “like Instagram,” or “straightforward.” Confidence was high, with most participants rating 4–5, although Krista expressed slightly lower confidence (2). Minor errors included brief hesitation when interpreting filters or initial misclicks.

Task 2 – Use Map View to Filter and Select a Lively Bar:

Task 2 required participants to switch to the map view, filter by criteria like live music and lively vibe, and select a bar. All participants completed the task successfully, though some, like Miranda and Krista, hesitated due to unclear filter naming or placement. Ease ratings ranged from 1–3, with most participants finding the map view straightforward after initial exploration. Confidence ratings were generally high (3–5), but Joseph and Krista expressed lower confidence due to uncertainty about whether the selected locations actually had live music. Stephan noted minor confusion with the back button behavior.

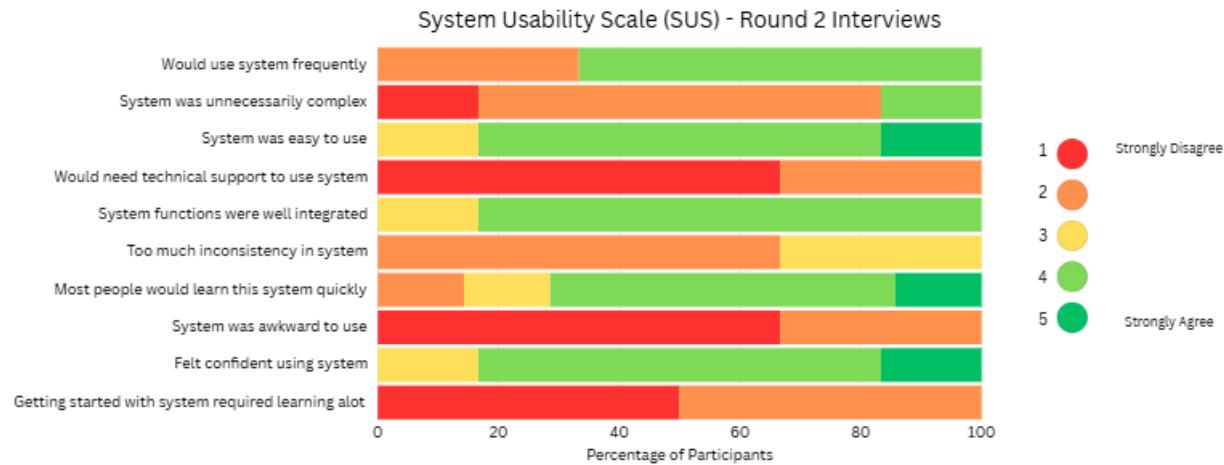
Task 3 – Check-In and Provide Real-Time Vibe Information:

All participants were able to complete Task 3, though finding the check-in button caused the most difficulty. Alison, Miranda, Gina, Joseph, and Krista initially struggled to locate the check-in feature, with Joseph needing some guidance. Ease ratings ranged from 1–3, with participants noting that once the check-in button was found, using the sliders and vibe tags was straightforward. Confidence was high overall (4–5), indicating that participants felt capable once they navigated to the correct feature. Walkthrough-only participants, Cheryl and Jackie, reported similar impressions, finding the sliders intuitive and the vibe tags helpful for understanding location ambiance.

Overall Task Observations:

Across all tasks, participants were able to complete core interactions successfully, with minimal errors and generally high confidence. However, several usability challenges were observed. The check-in button was often difficult to locate, filters were not always intuitive, and certain terminology, such as “feed,” conflicted with participant expectations. Users highlighted the need for clear trust indicators for

real-time data, including data source information, how recent data was updated, and volume of data. Privacy concerns were raised around features like ambient noise, suggesting the need for opt-in controls and clear explanations. Participants also emphasized the importance of visual and contextual information, such as photos and reviews, requested remembered preferences to streamline their experience, and recommended the use of onboarding or tutorials when first opening the app.

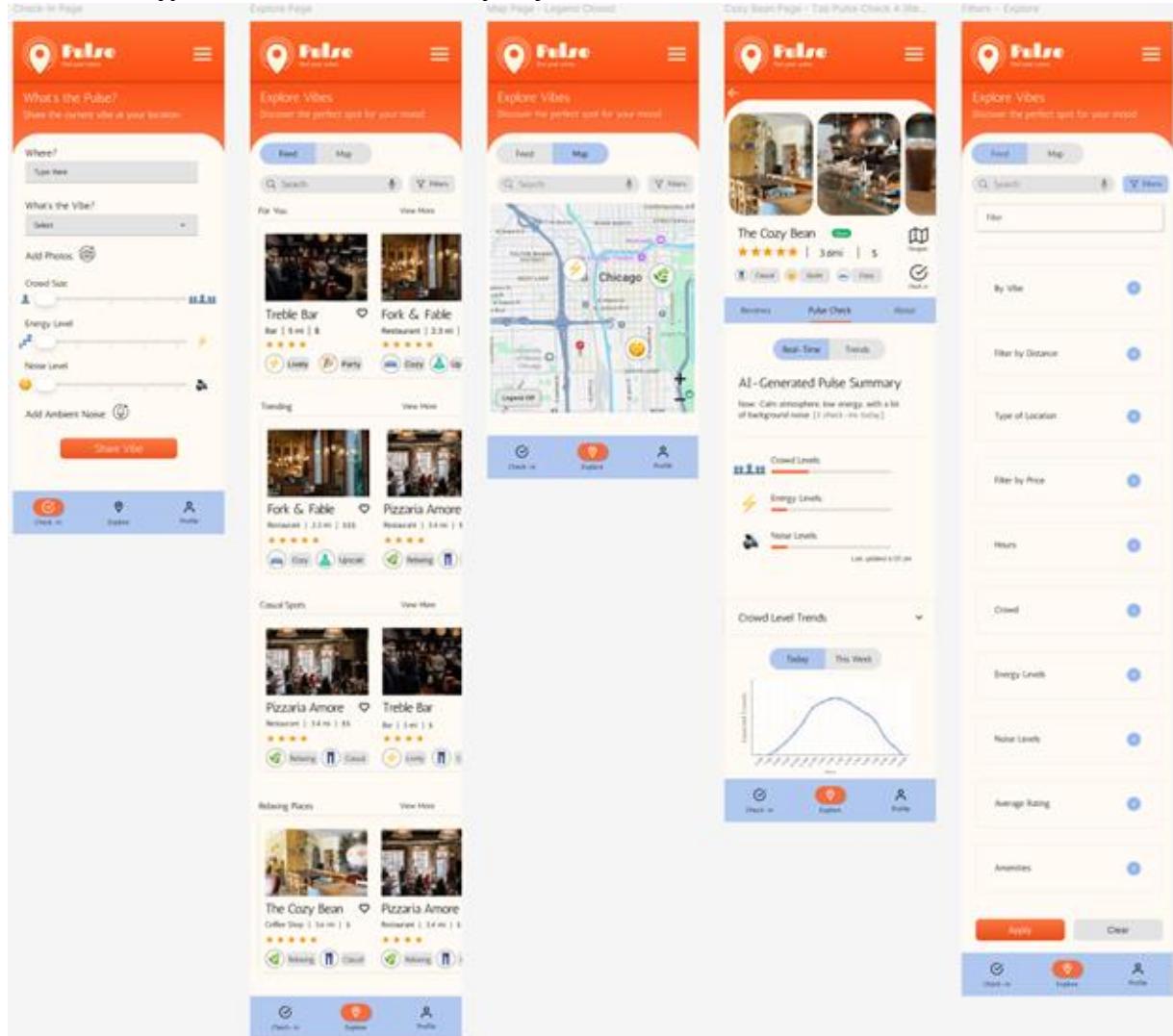


According to our System Usability Scale Survey, participants found the prototype easy to use, well-integrated, and relatively intuitive, with most reporting high confidence and minimal need for technical support. Scores indicate a low learning curve, as participants generally felt that most people would learn to use the system quickly, and they themselves did not need to learn many things before getting started. The system was also perceived as consistent and not overly complex, which contributed to positive usability impressions.

A few participants rated learnability and ease of use slightly lower, and minor inconsistencies were noted, suggesting that small refinements could further improve the user experience, especially for less confident users. The SUS results suggest the prototype is usable and learnable, with good potential for adoption, while highlighting opportunities for minor adjustments to enhance usability for everyone.

Following our final usability testing, we learned that while the concept resonates strongly with users, these findings pinpoint areas for refinement in navigation, usability, and trust-building for future iterations.

Hi-Fi Prototype Iteration and Usability Adjustments



The high-fidelity prototype builds on the mid-fi testing results by addressing key usability challenges and incorporating exploratory visual design directions. One significant refinement was the addition of labels to the footer navigation icons, which clarifies their functions and makes the check-in feature easier to locate. Another adjustment was the inclusion of the number of recent check-ins displayed alongside in the location details page. This provides users with context about how many people contributed to the AI-generated vibe summary, responding to feedback that emphasized the need for clearer information about data sources and recency.

Some suggestions raised during testing, such as refining filter clarity or developing onboarding and tutorial flows, were identified as valuable but remain outside the scope of the current prototype. These recommendations are documented as opportunities for future work and further testing.

This version of our hi-fi prototype introduces color, branding, and preliminary typography explorations. These updates are intended as early visual mockups that demonstrate potential directions for brand identity and overall style, rather than finalized design decisions. Typography and other stylistic choices would require additional discussion, and this hi-fi version has not yet undergone usability testing. By

layering these exploratory design elements with the functional refinements, our prototype begins to illustrate how usability improvements and visual identity could evolve together in future iterations.

Final Concept & Model

Features

Using the results obtained from our research, we designed a well-received mapping application called *Pulse*, which delivers real-time crowd and vibe data. The name *Pulse* evokes a heartbeat—symbolizing a platform that lets users gauge the energy or “pulse” of a location. The app blends the intuitiveness and familiarity of popular mapping tools with the personalized, trustworthy recommendations found on highly used social and review platforms.

One of Pulse’s standout features is its vibe-centric filtering, allowing users to search for locations based on the atmosphere they’re seeking—whether lively, relaxing, romantic, or anything in between. Each location is tagged with one or more vibe indicators, offering an at-a-glance view of its current overall vibe both on the map and within its profile. Additional features include:

- A dynamic map with contextual search and filters
- A feed of AI-curated point-of-interest recommendations based on user behavior
- Rich location profiles with real-time and historical data on crowd density, noise levels, and overall energy
- Reviews and business information
- A brief check-in survey called *Pulse Check*, allowing users to contribute their own vibe assessments of their current location

Our final design has 4 pages to highlight the main features of our application.

Explore Page: Map View

This page offers a familiar point-of-interest search experience, enabling users to explore locations contextually and refine results using filters. Search and filtering options mirror those on the Explore Feed, including vibe, distance, price, hours, crowd density, noise and energy levels, average rating, and amenities. Results display key details at-a-glance—such as name, estimated cost, open status, and primary vibe indicators. Users can view results as a list or directly on the interactive map, which supports panning and zooming. Each location is marked by its dominant vibe to support quick, informed decision-making.

Explore Page: Feed View

This page showcases location recommendations curated by our algorithm and AI service. To simplify discovery, locations are grouped into personalized sub-categories based on the user’s interests and preferences. Users can also browse using built-in filters for vibe, distance, price, operating hours, crowd density, noise and energy levels, average rating, and common amenities. Search functionality is available here as well, with more advanced options detailed on the Map page.

Location Details Page

Each location has its own dedicated page offering a deeper look at the point of interest. In addition to the vibe, average rating, and cost estimate shown on the Map view, users can see real-time data on

crowd density, noise, and energy levels—alongside historical averages. A graph visualizes crowd trends over the past week and month, and an AI-generated summary provides a quick snapshot of the current vibe.

Users can browse past ratings and reviews, skim the AI summary or post their own. A final tab includes business details such as hours, amenities, and pricing. From this page, users can also submit a Pulse Check or get directions via their preferred navigation app.

Pulse Check (Location Check-In) Page

This page allows users to check in at their current location and share their impressions of the vibe. Users can select one or more vibe descriptors from a dropdown menu, adjust sliders to indicate crowd density, noise level, and overall energy, and optionally upload photos or a brief ambient sound recording to enhance accuracy and context. The data collected on this page

For added visual context, each feature is also represented in the high-fidelity prototype included in [Appendix 2](#).

Concept Model

To better organize the concept of our application and underlying services, we developed a concept model. This model outlines each part of the application and defines their relationship with each other and the end user. The model has three layers: The data layer, the service layer, the application layer. A description of each layer and its components are provided below. A visual model can be found in the [Appendix 2](#).

Data Layer

The data layer is composed of the data sources, and a high-level overview of how this data will be used in the app. Pulse is designed to collect data from three sources: user Pulse-Check interactions, the Google Places API, and native smartphone sensors.

Pulse Check Interaction

Users at points of interest can actively contribute to the Pulse dataset through our Pulse Check feature. This allows them to provide real-time assessments of:

- Vibe – the emotional or social feel of the space
- Crowd density – how busy or spacious the location feels
- Noise level – from quiet and calm to loud and energetic
- Energy – the overall intensity or liveliness of the environment

In addition, users can enrich the platform by submitting:

- Reviews – personal reflections or recommendations
- Photos – visual snapshots of the location and its atmosphere
- Ambient audio – short clips capturing the soundscape

These contributions supplement our existing data sources and help build a richer, more responsive ecosystem. By sharing their experiences, users support the Pulse platform and help others make informed decisions about where to go and what to expect.

Google Places API

Google's Places API enables users to query a rich database for location information, including business details (hours, address, price range), reviews, and photos (2025). By leveraging this API, Pulse can deliver a robust and comprehensive dataset from day one—without relying on initial user engagement. This

jumpstart helps instill trust and confidence in the app's recommendations while supporting vibe-centric features and contextual discovery.

Native Smartphone Sensors

Pulse utilizes sensors commonly native modern smartphones—particularly those running Android and iOS—to support real-time contextual data collection at various locations. These include:

- Location, Cellular, and Wi-Fi Services: Used to determine user location and estimate crowd density by assessing the number of active devices in a given area.
- Accelerometers: Capture user movement patterns to infer energy levels or activity intensity at a location.
- Microphones: Periodically sample ambient sound to assess noise levels, contributing to the overall vibe profile.

These data sources are only activated with explicit user consent, following transparent disclosures about their purpose and usage. Pulse adheres to strict ethical standards and secure data practices, ensuring user privacy and safety.

Service Layer

The service layer defines the service the app uses to parse and operationalize the data we receive. As of now, it only contains one service: the AI Service.

AI Service

Pulse will integrate an AI service to enhance the user experience by intelligently parsing data from both individual users and external sources. This system will be used to:

- Analyze user interactions – including Pulse Checks and in-app engagement
- Interpret real-time and historical data – from reviews, ambient inputs, and third-party sources
- Curate personalized recommendations – dynamically generating point-of-interest lists tailored to each user's preferences, behaviors, and context

While the technical implementation is still in development, our goal is to use AI to make Pulse feel more intuitive, responsive, and personally relevant—helping users discover places that match their unique rhythms and routines.

Application Layer

The application layer describes the Pulse App interface that users interact with. Pulse is a mapping application that enables users to explore and engage with locations through a dynamic, mood-aware interface. It allows users to:

- Search for points of interest based on their current mood or intent
- Browse curated recommendations for future outings
- Analyze real-time and historical data, including vibe, reviews, and business details
- Contribute to the ecosystem by checking in and sharing live vibe assessment.

Pulse bridges the gap between traditional mapping tools and experiential decision-making, offering a richer, more personalized way to navigate the world.

Discussion

The project set out to design a mobile application that delivers real-time crowd and vibe intelligence to support urban decision-making. The team's primary goals were to improve decision-making in the urban

landscape by identifying gaps in current mapping tools, improving user trust in real-time data, and testing whether subjective experiences such as “vibe” could be presented in a usable interface. To address these goals, we completed a competitive analysis to understand current offerings in this space. We found that while some apps allow users to search for points of interest or discover new locations, none effectively combined both functionalities. Moreover, only a limited number of these apps provided real-time data or vibe-related information—and those that did focused narrowly on specific venue types, such as restaurants and clubs. We aimed to transcend these limitations by creating a platform that felt familiar and intuitive, while offering a broader and more dynamic range of insights.

This ambition quickly surfaced two critical questions:

1. How will we collect real-time data?
2. How will we determine vibe from that data?

Additionally, given the current technological landscape, a third question emerged: How can AI enhance our goals?

To explore these questions, we conducted a literature review. Miluzzo et al.’s work on *Vibn* (2011) became a guiding reference, demonstrating how the sensors embedded in everyday smartphones can be leveraged to collect in-context data about a location. However, this approach raised important concerns around privacy and user trust—prompting us to make trust-building a core objective of our project.

Li & Kang’s 2025 study on using AI to mitigate decision fatigue offered valuable insights into how our app could personalize recommendations while preserving user agency. Finally, Santani & Gatica-Perez’s (2014) research on “location ambiance” provided a practical framework for assessing vibe and categorizing it in a way that could be meaningfully integrated into our interface.

Our next step was to define the concept of *vibe*. While our team shared a general understanding of the term, its abstract nature made it clear that interpretations could vary widely from person to person. To explore this, we conducted a survey with our class to assess how individuals define and recognize vibes. The results confirmed its subjective and elusive qualities—often shaped by personal perception—yet also validated our decision to frame it in terms of ambience or overall feeling, which proved to be the most universally understood approach.

The research and design methods that followed continued to help us learn about our intended users’ behaviors and refine our design to both meet their needs and our goals. Exploratory behavioral interviews gave us insight into users’ current behaviors when searching for and exploring new locations. Google Maps emerged as the most commonly used platform for contextual search, while social media helped participants discover places they might want to visit in the future. However, both platforms lacked real-time information. Although photos and videos offered a glimpse of a location’s vibe, participants expressed skepticism about their reliability, noting that they would still need to visit the location to confirm its atmosphere.

As a design implication, we aimed not to reinvent the wheel. Google Maps is already a trusted and widely used tool for finding points of interest, yet it falls short when it comes to discovering new places. Conversely, social media excels at surfacing novel locations but lacks the robust search capabilities of mapping tools. By combining the strengths of both platforms, our app seeks to offer users the best of both worlds—delivering a familiar, intuitive experience enriched with real-time vibe intelligence. Our

information architecture tests supported this approach, validating the concept through the app's navigation and site map.

The findings in our prototype interviews and tests provided a balanced view of what worked well and what required further refinement. Users responded positively to familiar features such as maps, search, and check-ins, which validated their inclusion in the prototype. However, tasks involving vibe tagging and abstract social features generated confusion. Round 1 of the mid-fi prototype evaluation revealed challenges, including issues with navigation, unclear labeling, privacy concerns, and data trust. These insights guided the next iteration of our mid-fi prototype, continuing to focus on the UX of its features rather than branding and visual design. We refined vibe categories and labelling for clarity, improved navigation – particularly across pages with multiple views - added more of the information participants wanted to see, removed less relevant elements, and clarified how user data would be collected and presented to build transparency and trust.

By Round 2, confidence improved, especially for core navigation flows. With access to an interactive version of the prototype, participants continued to enjoy the real-time vibe data and now found the app intuitive to use and explore. The integrated map and exploration feed stood out as particularly well-received features for discovering new locations. One participant remarked, "Oh this is nice. I'd use the map for sure. I like the idea of seeing what's around me. The feed is interesting too. Maybe like TikTok for places," affirming one of the core design intents.

Despite these gains, Round 2 also revealed areas for continued refinement. The most notable challenge was locating the check-in page—a key feature—during the final task, where participants were asked to check in to their current location. Some interface elements remained ambiguous, and concerns around privacy and data trust persisted. These insights offer clear direction for future iterations, should we move forward with Pulse's development, and some of these items were explored briefly in the hi-fi prototype.

The implications of these results extend beyond the immediate scope of the prototype, however. The results highlight an enduring HCI challenge: how to represent subjective or social experiences in a way that users find intuitive and trustworthy. Although our project goals were partially met, particularly in validating concrete features and improving usability through iteration, the findings suggest that onboarding flows, more transparent labeling, and stronger visual cues are necessary to help users interpret less tangible features. Moreover, given the exchange of personal data inherent to the app's functionality, transparency and user control over that data remain paramount to building trust and long-term engagement.

Looking back, if given more time, the team would have benefited from a larger participant pool and earlier refinement of onboarding strategies, which might have reduced user confusion in Round 2 of the prototype evaluation. A more clearly defined and focused scope would have enabled us to identify our core features sooner and allow more time for their refinement and for measuring task performance effectively. Overall, the project demonstrated the value of iterative, multi-method testing and underscored how even limited-scope academic projects can surface lessons for real-world interface design.

Future Works

Although this project concludes with the class, several directions could be pursued if the study were to continue:

- Deeper analysis of additional usability testing results with a larger sample
- Further development of a high-fidelity prototype with stronger branding and improved visual design
- Exploration of minimum viable product (MVP) development
- Testing of added features such as social integration, bookmarking, and list creation
- Design of onboarding experiences that tailor the app to users' preferences
- Incentive systems to encourage user check-ins and data contributions

Conclusion

This project demonstrated how real-time crowd and vibe intelligence can be explored through iterative HCI methods. By grounding design decisions in user research and usability testing, the team validated core features such as maps, search, and check-ins, while identifying persistent challenges in translating subjective experiences like vibe into clear and usable interactions. Round 2 usability testing confirmed that iterative redesign improved navigation and user confidence, yet also revealed ongoing difficulties with check-in discoverability, filter clarity, and terminology, as well as unresolved concerns about data trust and privacy.

Reflecting on the work, the team achieved its central goal of creating and evaluating a prototype that bridged gaps in existing mapping and social discovery tools. At the same time, the findings highlighted the need for stronger onboarding, clearer labeling, and transparent data practices to support adoption. Future development opportunities include advancing a high-fidelity prototype, refining onboarding flows, and exploring features such as social integration, bookmarking, and incentivized check-ins.

Overall, the project underscored the value of iterative, multi-method testing and confirmed the critical role of user feedback in shaping innovative digital tools. Even within the constraints of an academic project, Pulse demonstrated how HCI practice can transform abstract ideas into usable concepts while surfacing design implications for real-world applications.

References

- App Store. (2008, November 15). *OpenTable*. <https://apps.apple.com/us/app/opentable/id296581815>
- App Store. (2010, October 6). *Instagram*. <https://apps.apple.com/us/app/instagram/id389801252>
- App Store. (2012, December 13). *Google Maps*. <https://apps.apple.com/us/app/google-maps/id585027354>
- App Store. (2014a, April 2). *TikTok - Videos, shop & LIVE*. <https://apps.apple.com/us/app/tiktok-videos-shop-live/id835599320>

- App Store. (2014b, June 4). *Resy*. <https://apps.apple.com/us/app/resy/id866163372>
- App Store. (2018, February 23). *Waitz University*. <https://apps.apple.com/us/app/waitz-university/id1346827447>
- App Store. (2019, February 11). *Yelp: Food, delivery & Reviews*. <https://apps.apple.com/us/app/yelp-food-delivery-reviews/id284910350>
- App Store. (2020, October 8). *Crowd alerts*. <https://apps.apple.com/us/app/crowd-alerts/id1512524098>
- App Store. (2023, September 14). *CYZL*. <https://apps.apple.com/us/app/cyzl/id6448448669>
- Bar Peak App / iOS App Store / Check Your Vibe / Bar Finder*. (2021, June 26). Bar Peak: Check Your Vibe. <https://barpeak.com/>
- Crowd Alerts - apps on Google Play*. (n.d.).
https://play.google.com/store/apps/details?id=com.jonajo.crowdalerts&hl=en_US
- Crowd Alerts - Avoid Crowds like a Pro*. (n.d.). <https://crowdalerts.webflow.io/>
- CYZL - Apps on Google Play*. (n.d.).
https://play.google.com/store/apps/details?id=app.cyzl.cyzlmobile&hl=en_US
- CYZL App. (2025, May 22). *Home / CYZL APP*. CYZL APP. <https://cylz.app/>
- Filingeri, V., Eason, K., Waterson, P., & Haslam, R. (2016). Factors influencing experience in crowds – The participant perspective. *Applied Ergonomics*, 59, 431–441.
<https://doi.org/10.1016/j.apergo.2016.09.009>
- Google. (2025, August 14). *Places API overview*. Google for Developers.
<https://developers.google.com/maps/documentation/places/web-service/overview>
- Google Maps*. (n.d.). Google Maps. <https://www.google.com/maps>
- Google Maps - apps on Google Play*. (n.d.).
https://play.google.com/store/apps/details?id=com.google.android.apps.maps&hl=en_US
- Instagram*. (n.d.). <https://www.instagram.com/>
- Instagram - apps on Google Play*. (n.d.).
https://play.google.com/store/apps/details?id=com.instagram.android&hl=en_US
- Kendrick, V. L., & Haslam, R. A. (2010). The user experience of crowds — a human factors challenge. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 54(23), 2000–2004.
<https://doi.org/10.1177/154193121005402320>

Miluzzo, E., Papandrea, M., Lane, N. D., Sarroff, A. M., Giordano, S., & Campbell, A. T. (2011). Tapping into the vibe of the city using VIBN, a continuous sensing application for smartphones. In *SCI '11: Proceedings of 1st international symposium on From digital footprints to social and community intelligence* (pp. 13–18). Association for Computing Machinery.
<https://doi.org/10.1145/2030066.2030071>

OpenTable. (n.d.). *Restaurants and restaurant bookings / OpenTable*. <https://www.opentable.com/opentable - Android Apps on Google Play>. (n.d.).
https://play.google.com/store/search?q=opentable&c=apps&hl=en_US

Proven By Users. (n.d.) <https://provenbyusers.com/>

Resy | Right this way. (2025, June 30). Resy. <https://resy.com/?date=2025-06-30&seats=2>
Resy - apps on Google Play. (n.d.).
https://play.google.com/store/apps/details?id=com.resy.android.prod&hl=en_US

Szabo, R. (2020). The Design of a Crowd Density Checker App in Android with People Localization Using the GPS from the Mobile Device. *2022 International Symposium on Electronics and Telecommunications (ISETC)*, 1–4. <https://doi.org/10.1109/isetc50328.2020.9301042>

TikTok - Apps on Google Play. (n.d.).
https://play.google.com/store/apps/details?id=com.zhiliaoapp.musically&hl=en_US

TikTok - Make your day. (n.d.). <https://www.tiktok.com/en/>

Waitz. (n.d.). <https://waitz.io/>

Waitz University - apps on Google Play. (n.d.).
https://play.google.com/store/apps/details?id=com.waitz.university&hl=en_US

Wirz, M., Franke, T., Roggen, D., Mitleton-Kelly, E., Lukowicz, P., & Tröster, G. (2013). Probing crowd density through smartphones in city-scale mass gatherings. *EPJ Data Science*, 2(1).
<https://doi.org/10.1140/epjds17>

Yelp: Food, delivery & Reviews - apps on Google Play. (n.d.).
https://play.google.com/store/apps/details?id=com.yelp.android&hl=en_US

Yelp, Inc. (2004). Yelp. Yelp. Retrieved June 28, 2025, from <https://www.yelp.com/>

Appendix 1: Supporting Material

Detailed Competitive analysis

Direct Competitors

	Bar Peak	CYZL	Crowd Alerts	Waitz
Real-Time Crowd Data? (data)	Yes (user-reported)	Yes (by partnering venues)	Yes (by users)	Yes (sensor-based: Wi-

aggregation method)				Fi/Bluetooth signal aggregation)
Real-Time Vibe Data? (data aggregation method)	No	Yes	No	No
Focus of Venues	Nightlife	Nightlife, restaurant and bars in South Florida	All location types	Campus facilities (libraries, gyms, dining halls)
Visual Content (photo/video)	User Photos, Photos pulled from other sources	Limited – user photos only	none	none
Social Features	Limited	Post photos with tags	None	None
Privacy	Anonymous Reporting	Anonymous data collection	Opt-in to location, disable background usage	Anonymous data collection (no personal tracking)
Venue Discovery Method	Map + Filters	Search, map	Search, map	Map view of campus spaces
Monetization	Unconfirmed, likely advertising, in-app purchases, affiliate marketing	Unconfirmed – may charge venues a fee to partner	None	B2B model (campus licensing); no consumer monetization
Strengths	Niche focus on nightlife Shows real-time crowd information Offers a map and filters	Map to explore what's nearby, with a "hot" indicator; offers dashboard for venue to monitor visitor engagement; simple to use and similar to other apps; venue promoted perks	Tracks crowd levels over a variety of locations, shows usual crowd levels, shows information about the location, color coded	Accurate real-time occupancy; passive data collection; institutional trust
Weaknesses	Limited venues (nightlife focus) Limited social content	Based in South Florida only; focuses on nightclubs, restaurants, and bars	Based only off other users, unsure how accurate data collection is from app, limited number of users,	Limited to campuses; no vibe or social features; not consumer-facing

			limited input from users (no mood or vibe),	
Opportunities for Improvement	Offer more social opportunities in-app and expand to other venue types	Expand to other areas and venue types	Give more input options for users including mood or vibes of location, fix update or interface issues (some users have reported issues with the app)	Expand to public venues; add mood tags, social coordination, waitlists

Indirect Competitors

	Yelp	Google Maps	Instagram/TikTok	Open Table/Resy
Real-Time Crowd Data? (data aggregation method)	No	Yes	No	No
Real-Time Vibe Data? (data aggregation method)	No	No	No	No
Focus of Venues	All businesses	All businesses	No, focus on user accounts	Partner restaurants only
Visual Content	User and venue posted photos	User and venue posted photos	Photos and videos	Static photos, menus, reviews
Social Features	Review postings, likes and community questions	Review postings and liking	Yes	Minimal (reviews only)
Privacy	User can opt-in varying levels of exposed data on their reviews	Opt-in to location tracking	Enable/disable location, can optionally tag locations	Standard booking data; no personal tracking
Venue Discovery Method	Map exploration and search	Map exploration and search	Search	Search filters (time, cuisine, location); partner-only
Monetization	Ads	Ads	Ad and data monetization; no user monetization	B2B; no user monetization
Strengths	Provides user-generated reviews and ratings	Provides route planning and navigation to locations; Crowd-	Widely used and readily available; high usage means many posts may	Reliable reservations; streamlined

	Provides visuals (photo & video) High user engagement	meter for all locations User photos and reviews; Crowd sourced business information – high user engagement	be available for locations; search feature is helpful to filter posts by hashtag or location; posts may help users get “vibe” of location	booking; rich venue info
Weaknesses	Can be out of date Not a lot of real-time feedback	Navigation/route planning is primary focus; Comprehensive coverage of all business distracts from socially driven venues; “Vibe” indicated by user or venue photos and reviews only/limited vibe information; Location inaccuracies, especially in small towns/remote locations	Algorithm-based – may miss some posts; limited availability of posts unless followed by user or algorithm picks it up; oversaturation of posts	No real-time vibe/crowd data; limited discovery; lacks social component
Opportunities for Improvement	Offer real-time data points, or at least ensure all data is up to date	Real time “vibe” information	Help users find posts based more on their location (if enabled) or mood	Add live vibe/crowd signals; expand beyond partners; mood-based filters; social features

Direct Competitors

Bar Peaks

<https://barpeak.com/>

Mobile app focused on providing information about local bars and restaurants. Users can find real-time crowd information and wait times. They can engage in reviews and check in to venues.

What it does well

- Niche focus on nightlife
- Shows real-time crowd information
- Offers a map and filters

Where it falls short

- Limited venues (nightlife focus)

- Limited social content

CYZL

<https://cyzl.app/>

Mobile app for iOS and Android that provides insights into “local area hotspots.” Users answer a questionnaire to assess their mood for the evening and the app provides suggestions. There’s map for users to explore what’s nearby and each location contains information about wait times and seating, reviews, and photos. Users are rewarded for sharing their own experiences in app.

What it does well

- Map to explore what’s nearby, with a “hot” indicator
- Offers dashboard for venue to monitor visitor engagement
- Simple to use and similar to other apps

Where it falls short

- Based in South Florida
- Focuses on nightclubs, restaurants, and bars

Crowd Alerts

<https://crowdalerts.webflow.io/>

Crowd Alerts is an Apple iOS and Android application that lets the user be proactive when making decisions about where to go based on crowds. It shows how busy a place is before the user goes out. Crowd Alerts gives real-time information and suggestions about places located near the user.

What it does well

- Track crowds in real time at variety of location types
- Choose places based off desired crowd levels
- Gives color coded levels based off amount of people
- Shows usual crowd levels based off historical app data
- Shows information about the location, while letting the user also get directions, save to favorites, and find similar places

Where it falls short

- Based off other users and contributors only
- Unsure how accurate data collection is from app
- Limited number of users may skew results of crowd level determinations
- Limited input from user on crowd levels – choose 1 out of 5 rating and does not give the option to give more in-depth information about the mood of the location

Waitz

<https://waitz.io/>

Mobile app and web platform that delivers real-time crowd density insights for campus spaces like libraries, gyms, and dining halls. Data is passively collected through Wi-Fi and Bluetooth sensors that estimate how busy each location is. Users can view simple occupancy visuals to help plan their visits, without needing to log in or share personal information. The app is primarily deployed through university partnerships.

What it does well

- Passive, sensor-based crowd tracking that’s highly accurate
- Trusted by universities; no user effort required
- Clean, minimalist interface that reduces friction

Where it falls short

- Limited to campus venues; not designed for public use

- No vibe, mood, or social insight—just raw occupancy
- Lacks personalization, notifications, or interactive features

Indirect Competitors

Yelp

<https://www.yelp.com/>

A review platform that allows users to discover and review a wide range of local services. It offers millions of user-generated reviews, photos, and ratings. It is widely used and reviews many different businesses.

What it does well

- Provides user-generated reviews and ratings
- Provides visuals (photo & video)
- High user engagement

Where it falls short

- Can be out of date
- Not a lot of real-time feedback

Google Maps

<https://maps.google.com/>

A map and navigation application that offers detailed information about locations worldwide. It features satellite, topographical, and real-time traffic imagery, route-planning, and business information.

Business information includes reviews, user photos, and crowd meter with both real-time and historical trends.

What it does well

- Provides route planning and navigation to locations
- Crowd-meter for all locations
- User photos and reviews
- Crowd sourced business information – high user engagement

Where it falls short

- Navigation/route planning is primary focus
- Comprehensive coverage of all business distracts from socially driven venues
- “Vibe” indicated by user or venue photos and reviews only/limited vibe information
- Location inaccuracies, especially in small towns/remote locations

Instagram/TikTok

<https://www.instagram.com/>

<https://www.tiktok.com/en/>

Both Instagram and TikTok are popular mobile applications where users can upload photos and videos to their profiles. This media can be seen by other users based on either following, using hashtags, or by searching.

What they do well

- Both applications are popular and widely used, so they are readily available to many users
- Search feature is helpful to filter posts by hashtag or location, which can give insight into vibes of a location

Where they fall short

- If not following the user, then the algorithm or search controls rather or not another user sees the media – limits availability unless it is being actively looked for by user

- Both applications are oversaturated with posts, making it hard for users to find specific media

Open Table/Resy

<https://www.opentable.com/>

<https://resy.com/>

Mobile apps and websites that let users discover restaurants, view business info, and make reservations or join digital waitlists. Both platforms partner directly with restaurants to provide availability, manage bookings, and offer promotions. Users can filter by time, party size, and cuisine, but there's no insight into vibe, atmosphere, or real-time crowd conditions.

What it does well

- Reliable reservation system for partner restaurants
- Streamlined waitlist and booking management
- Detailed business listings with menus, hours, and reviews

Where it falls short

- No real-time vibe or crowd-level data
- Only works with partner venues, limited discovery
- Doesn't help users choose based on mood or social scene

Detailed Literature Review

Factors influencing experience in crowds – The participant perspective

Filingeri, V., Eason, K., Waterson, P., & Haslam, R. (2016). Factors influencing experience in crowds – The participant perspective. *Applied Ergonomics*, 59, 431–441.

<https://doi.org/10.1016/j.apergo.2016.09.009>

The peer reviewed study “Factors Influencing experience in crowds – The participant perspective” by Filingeri et al. explores what contributes to the satisfaction or dissatisfaction of “crowd users,” or members of a crowd at a venue or event. They used focus groups and observational studies to determine the influencing factors and their level of impact. It was found that factors such as the physical design of crowd spaces and facilities, crowd movement, communication, comfort and welfare, and public order were key contributors to users’ satisfaction or dissatisfaction. It also suggested that satisfaction and dissatisfaction should not be assessed as opposite ends of a single spectrum, but distinctly. Thus, “attending to aspects that result in a negative experience for crowd participants may reduce dissatisfaction but is unlikely to result in satisfaction.”

For the purposes of Pulse, the findings and discussion of this study can play a significant role in determining the atmosphere of a location. A crowded location is not inherently negative but may be expected depending on the event or venue, such as a concert, or night club. Other factors, as highlighted above, must be considered, as a crowded night club, for example, with adequate crowd control may still result in an overall positive experience for attendees compared to a crowded night club with little crowd control, or a relatively empty night club void of energy and excitement.

Tapping into the vibe of the city using VIBN, a continuous sensing application for smartphones

Miluzzo, E., Papandrea, M., Lane, N. D., Sarroff, A. M., Giordano, S., & Campbell, A. T. (2011). Tapping into the vibe of the city using VIBN, a continuous sensing application for smartphones. In *SCI '11: Proceedings of 1st international symposium on From digital footprints to social and community*

intelligence (pp. 13–18). Association for Computing Machinery.
<https://doi.org/10.1145/2030066.2030071>

“Tapping into the Vibe of the City Using VibN, a Continuous Sensing Application for Smartphones”, discusses the design and implementation of the VibN smartphone application. The application was created to help users find venues and locations in their cities that match their mood for the occasion. As outlined in the article, the application relies on sensors in the smartphone to detect the current location and atmosphere of the user's location. The nature of this sensory feedback and data collection are discussed in detail in this peer reviewed article.

As a direct competitor to Pulse, this article provides a rare insight into the design of an application that is no longer available. This article can be used to extract both the strengths and shortcomings of their application, allowing us to both build and improve upon their mistakes

Probing crowd density through smartphones in city-scale mass gatherings

Wirz, M., Franke, T., Roggen, D., Mitleton-Kelly, E., Lukowicz, P., & Tröster, G. (2013). Probing crowd density through smartphones in city-scale mass gatherings. *EPJ Data Science*, 2(1).
<https://doi.org/10.1140/epjds17>

Wirz et al. (2013) investigated how smartphones could help estimate crowd density at large urban events using participatory sensing. By collecting real-time GPS data from volunteers during a city-wide music festival, they were able to map crowd flow and density patterns. Their method highlights the potential of mobile devices as affordable, scalable alternatives to fixed sensor networks. Additionally, they stressed the need to calibrate GPS data with ground-truth sources such as aerial photos and manual headcounts to correct issues like sampling bias and location inaccuracies.

This study resonates with Pulse's goals by showing how user-generated location data can support real-time crowd intelligence. It also provides practical insight into how to manage data quality and interpret patterns in live urban environments.

The User Experience of Crowds – A Human Factors Challenge

Kendrick, V. L., & Haslam, R. A. (2010). The user experience of crowds — a human factors challenge. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 54(23), 2000–2004.
<https://doi.org/10.1177/154193121005402320>

Kendrick and Haslam (2010) explore the field of crowd user experience from a human factors perspective. In their study, they emphasize safety, comfort, performance, and satisfaction. Through a literature review and five focus groups, the authors identify key themes (ex. stress, environmental design, control, prior expectations) that significantly impact how different demographics perceive and navigate crowds. The study highlights how individual characteristics like age, mobility, and prior experience influence crowd tolerance and stress levels. Findings suggest the need for more holistic and inclusive models of crowd behavior and experience, which would offer valuable insights for the design and management of crowded spaces like retail centers, transportation hubs, and public events.

The Design of a Crowd Density Checker App in Android with People Localization Using the GPS from the Mobile Device

Szabo, R. (2020). The Design of a Crowd Density Checker App in Android with People Localization Using the GPS from the Mobile Device. *2022 International Symposium on Electronics and Telecommunications (ISETC)*, 1–4. <https://doi.org/10.1109/isetc50328.2020.9301042>

Szabo's paper looks at creating a crowd density app and various ways to collect this data. The main way Szabo wants to collect this data is from GPS data, explaining that many people currently carry a device that tracks GPS coordinates and this may be a way to easily collect data needed for a crowd density app. Szabo's paper also shows how this may work with a variety of prototype images and any privacy concerns from the user related to this data collection.

This research paper gives insight into how crowd density applications could be used, how GPS coordinates could provide this information, ways to use GPS in this type of application, and how to address privacy concerns. The information from this paper could be used as a starting point for research of various data point collection possibilities for our own crowd app, Pulse.

Annotated Bibliography (reading summary articles)

Li, J., & Kang, J. (2025). Less stress, fewer delays: The role of sophisticated AI in mitigating decision fatigue and purchase postponement in luxury retail. *Journal of Retailing and Consumer Services*, 85, Article 104268. <https://doi.org/10.1016/j.jretconser.2025.104268>

Li and Kang investigate how sophisticated AI reduces decision fatigue and purchase postponement in luxury retail settings. Through two experimental studies, they demonstrate that emotionally aware AI enhances consumers' trust and empathy, increasing perceived agency and reducing cognitive strain. Study 1 manipulated AI sophistication to assess its effect on purchase delays across different goal orientations, distinguishing between those satisfied with "good enough" outcomes and high achievers who deliberate extensively. Study 2 employed serial mediation analysis, grounded in the stressor-strain-outcome framework and the theory of mind perception, confirming that sophisticated AI reduces decision fatigue by fostering trust and empathic connection. These benefits were moderated by service embarrassment, with lower embarrassment levels amplifying the positive effects of AI. The research is credible, supported by rigorous design, validated manipulation checks, and statistically significant findings that align with existing consumer behavior theory. This study informs the Pulse app by showing how AI can simplify complex decisions in socially dynamic contexts. Like luxury shoppers delaying purchases due to overwhelming options, city-goers hesitate to commit to plans when choices feel fragmented or impersonal. Embedding trust, empathy, and emotional awareness into Pulse's interface could encourage confident, low-effort decisions. Tailoring recommendations for different goal orientations, such as offering curated versus casual suggestions, may enhance usability. Additionally, addressing social discomfort, similar to service embarrassment, through private modes and anonymous prompts could help build trust and increase user engagement, supporting Pulse's goal of gathering rich, real-time data on user sentiment.

Miluzzo, E., Papandrea, M., Sarroff, A., Giordano, S., & Campbell, A. (2011). Tapping into the vibe of the city using VibN, a continuous sensing application for smartphones. In SCI'11 – Proceedings of the 1st International Symposium on From Digital Footprints to Social and Community Intelligence (pp. 13–18). <https://doi.org/10.1145/2030066.2030071>

Miluzzo and colleagues introduce VibN, a mobile sensing application designed to continuously collect smartphone data, capturing how people interact with urban environments. They argue that smartphones can passively and actively sense community behaviors while preserving privacy through

anonymized audio, encryption, and user-controlled settings. VibN optimizes battery consumption with time-based sensing cycles, accommodates cross-platform differences, and detects personal and community points of interest using density-based clustering techniques such as DBSCAN. User participation enhances contextual accuracy, and cloud scalability via Amazon EC2 ensures the app performs effectively under varying loads. The study's evidence stems from a six-month deployment involving 1,000 users, supported by technical details of the system architecture; however, it lacks longitudinal behavioral analysis. This research is beneficial for the Pulse app because it demonstrates how hybrid sensing models integrate passive data collection with user-driven reflections while maintaining user privacy. VibN's anonymization approach and its "Vibe it!" feature, which allows users to contribute insights without disrupting their social experience, inform Pulse's strategy for balancing data richness with user comfort. While complex clustering algorithms like DBSCAN may exceed Pulse's current scope, the concept of detecting community hotspots aligns closely with its goal of surfacing meaningful, real-time insights into crowd and vibe. The paper also highlights the importance of addressing platform constraints and backend scalability for sustainable, cross-platform user experiences.

Santani, D., & Gatica-Perez, D. (2014). Loud and trendy: Crowdsourcing impressions of social ambiance in popular indoor urban places. Proceedings of the 23rd ACM International Conference on Conference on Information and Knowledge Management (CIKM '14).
<https://doi.org/10.1145/2733373.2806277>

Santani and Gatica-Perez examine how social media images can be used to crowdsource perceptions of ambiance in indoor urban venues. They conducted two large-scale crowdsourcing experiments using 50,000 Foursquare images from 300 venues in six cities. The first experiment compared curated images, which showed clear views of physical environments, with random user images of food or people, and found that curated images conveyed ambiance more effectively. In the second experiment, workers rated venues across thirteen ambiance dimensions, including trendy, romantic, and loud, with strong inter-rater reliability even for abstract qualities. Statistical analysis revealed minimal differences in ambiance perceptions across cities, suggesting that visual cues in social media images consistently support place impressions. The authors validated their findings by benchmarking them against prior in-person studies, confirming the reliability of remote, image-based methods. This paper is credible due to its large dataset, robust methodology, and statistical rigor. Its insights support Pulse's goal of delivering real-time vibe intelligence by showing how curated venue images and crowdsourced ambiance tags can reliably communicate mood and atmosphere. For Pulse, emphasizing clear environmental visuals over arbitrary snapshots can help users quickly assess a venue's vibe. Encouraging users to share simple tags, such as "lively" or "quiet," alongside contextual photos could generate a trustworthy, dynamic layer of ambiance information. These findings align with Pulse's mission to simplify urban decision-making through mood-oriented insights rather than static reviews.

Appendix 2: Additional Report Sections

Design Brief

Narrative

Urban life offers endless choices, but with that comes decision fatigue. Pulse is a mobile app designed to reduce the stress of choosing where to go by providing real-time crowd and vibe data for restaurants, bars, parks, and other local hotspots. While current apps show general business info, Pulse fills the experience gap helping users pick places not just based on what or where, but on how it feels right now. Our goal is to create an intuitive tool that fits into daily routines, supports spontaneous decisions, and makes every outing feel like the right call.

Target Users

Socially active adult urban dwellers who love trying new places but often feel overwhelmed by too many options, especially when time, mood, or social plans are in play.

Platforms and Form Factors

Primary platform: Mobile application (iOS & Android)

Form factors: Optimized for on-the-go use, quick decision-making, and real-time updates.

Needs and Motivations

- Reduce decision fatigue
- Avoid empty or overcrowded places
- Discover spots that match their mood
- Coordinate easily with friends
- Feel confident about spontaneous plans

Key User Tasks

- View real-time crowd and vibe data on a map
- Filter venues by mood, wait time, or crowd size
- Check in and tag current vibe at a location
- Save and track favorite spots
- Get alerts when places calm down or get lively
- See where friends are and coordinate plans
- Earn points for contributing and redeem for perks

Site Map and Flow Diagram

Site Map (Current)	Annotations
<pre> graph TD Pulse[Pulse Mobile Application] --> Explore[Explore] Pulse --> CheckIn[Check-In (form)] Pulse --> Profile[Profile] Explore --> SearchBar[Search Bar] SearchBar --> FilterOptions[Filter Options] CheckIn --> ConfirmationPage[Confirmation Page] ConfirmationPage -- "Action: Fills form & submits" --> ConfirmationPage Profile --> UserInfo1[User Info] UserInfo1 --> UserInfo2[User Info] FilterOptions -.-> Feed[Feed] FilterOptions -.-> Map[Map] Feed --> LocationsCategories[Locations by Categories] Map --> ViewMap[View of Map with pin/vibe icon indicators] LocationsCategories -.-> ClickLocation[Action: Click on a location] ClickLocation --> LocationDetails[Location Details] LocationDetails --> ReviewsTab[Reviews Tab] ReviewsTab --> PulseCheckTab[Pulse Check Tab] PulseCheckTab --> AboutTab[About Tab] </pre> <p>Legend:</p> <ul style="list-style-type: none"> Aa Home Page Aa Top Level Navigation Aa 2nd Level Navigation Aa 3rd Level Navigation Aa 4th Level Navigation >Action User Action 	<p>The site map organizes the system into three main areas: Explore, Check-in, and Profile.</p> <p>Explore serves as the primary entry point, offering both map-based and feed-based navigation to discover locations, with filtering options to refine searches. Users can view detailed information about each location and quickly check in using shortcuts.</p> <p>Check-in provides a dedicated path to fill out a form about a location's vibe, while Profile allows users to manage personal information and settings.</p> <p>This organization ensures that navigation is intuitive, with clear separation between discovering, checking into a location, and managing personal account details, providing context for the wireframes and prototypes that follow.</p>

Site Map

1. Explore (Main Page)

- **Search Bar** – Allows users to search for specific locations or events.
- **Filters** – Users can filter results by:
 - **Vibe** – Type or mood of the location (e.g., chill, lively).
 - **Distance** – Slider filter in miles.
 - **Type of Location** – Categories of different location types (e.g., food & drink, entertainment)
 - **Price** – Slider filer in dollars.
 - **Hours** – Organized by time of day (e.g., morning, afternoon)
 - **Crowd** – Expected crowd size.
 - **Energy** – Expected energy levels.
 - **Noise** - Expected noise levels.
 - **Average Rating** – Select from 1 to 5 stars.
 - **Amenities** – Select various features about the location (e.g., wi-fi, pet-friendly)
- **Map Mode (toggle)** – Interactive map view:
 - **View of Map** – Pins/vibe icon indicators for locations.
 - **Location Details** – Clicking a location shows:
 - About the location
 - Real-time vibes
 - Real-time crowds
 - Reviews
 - Photos
 - Check-in (shortcut to form)
 - Navigate button (shortcut to copy address or open a maps app)
- **Feed Mode (toggle)** – Stream-style view of locations based on categories and past user interests.
 - **View of Feed** – Scrollable feed of categories. Each category is a horizontal scroll and includes a view more button.
 - **Location Details** – Clicking a location shows:
 - About the location
 - Real-time vibes
 - Real-time crowds
 - Reviews
 - Photos
 - Check-in (shortcut to form)
 - Navigate button (shortcut to copy address or open a maps app)

2. Check-in

- **Form to Check In** – Allows user to submit their presence at their location and update crowd/vibe information.

3. Profile

- **User Info** – Name, profile picture, activity history.
- **Settings** – Preferences, account settings, privacy controls.

Interactive Prototype

Prototype Low-Fi Links/Instructions

Prototype link: [Low-Fi Figma Link Here](#)

Prototype Mid-Fi Links/Instructions

Prototype link: [Mid-Fi V1 Figma Link Here](#)

Prototype Mid-Fi Final Version Links/Instructions

Prototype link: [Mid-Fi V2 Figma Link Here](#)

Prototype present link: [Mid-Fi Prototype Present Link Here](#)

Prototype instructions: Interactive prototype can be viewed in the above link.

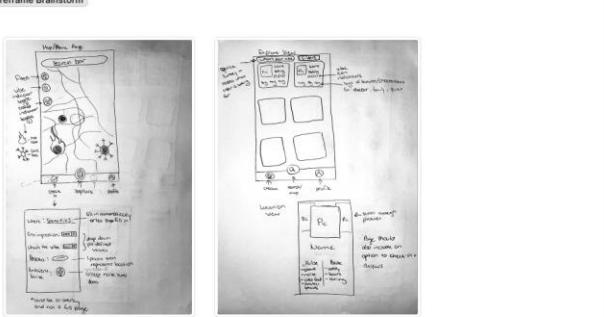
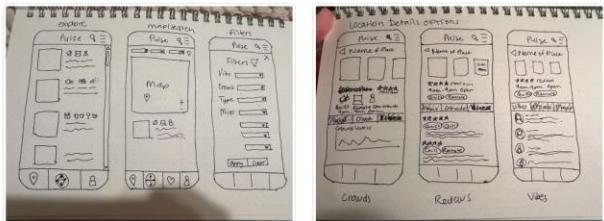
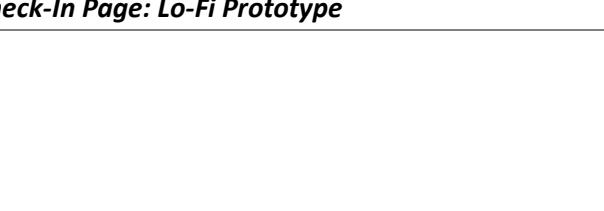
Prototype Hi-Fi Final Version Links/Instructions

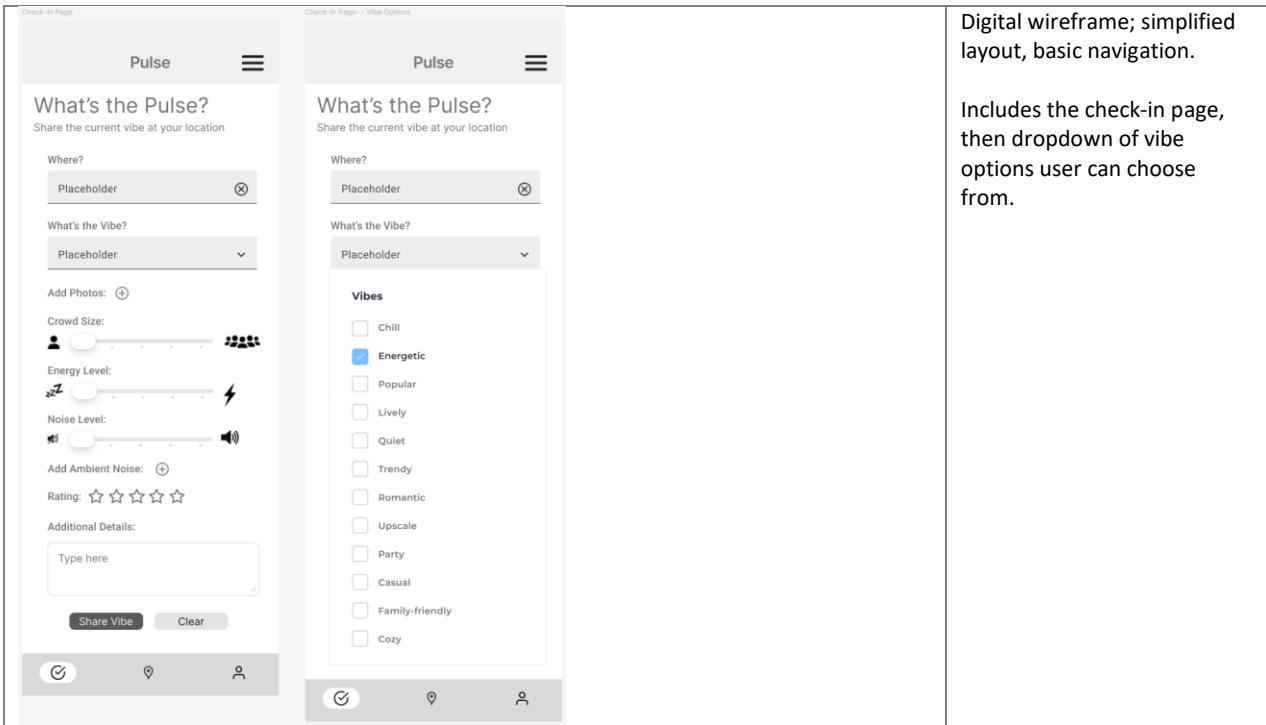
Prototype link: [Hi-Fi V2 Figma Link Here](#)

Prototype present link: [Hi-Fi Prototype Present Link Here](#)

Prototype instructions: Interactive prototype can be viewed in the above link.

Prototype Main Elements

Prototype Screen	Annotations
Check-In Page: Brainstorming Sketches 	Early concept ideas; rough layouts of map, explore, filters, check-in, and location details.
Check-In Page: Lo-Fi Prototype 	
Check-In Page: High-Fidelity Prototype 	



Digital wireframe; simplified layout, basic navigation.

Includes the check-in page, then dropdown of vibe options user can choose from.

Check-In Page: Mid-Fi Prototype

This section displays four screens of a mid-fidelity prototype. The first screen is the 'Check-In Page' with placeholder text in the input fields. The second screen is 'Check-In Page - Vibe Options' with a dropdown menu showing various vibes. The third screen is 'Check-In Page - Vibe Selected' where 'Lively' is chosen. The fourth screen is 'Check-In Page - Confirmed' showing a large orange checkmark, the message 'Pulse Checked!', and the date/time 'August 9 at 3:45 PM'. A note says 'Vibes are feeling 🌞 Lively right now.'

Added 2 more screen views and interactions.

1. Check-in page:

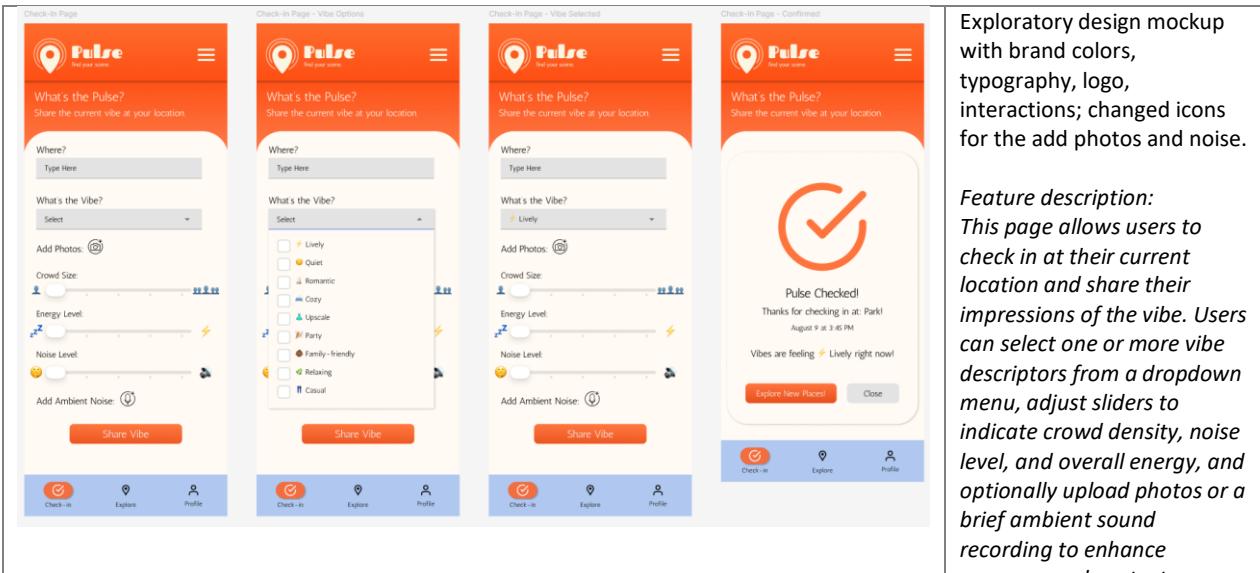
- Placeholder text updated
- Icons for add photos and noise changed to upload symbols
- Icons for sliders updated to emojis
- Removed clear button

2. Vibe dropdown open:

- Updated which vibes to include based off Vibe Survey results
- Add emojis for each vibe

3. Shows selected vibe in field
4. Confirmation Page

Check-In Page: Hi-Fi Prototype

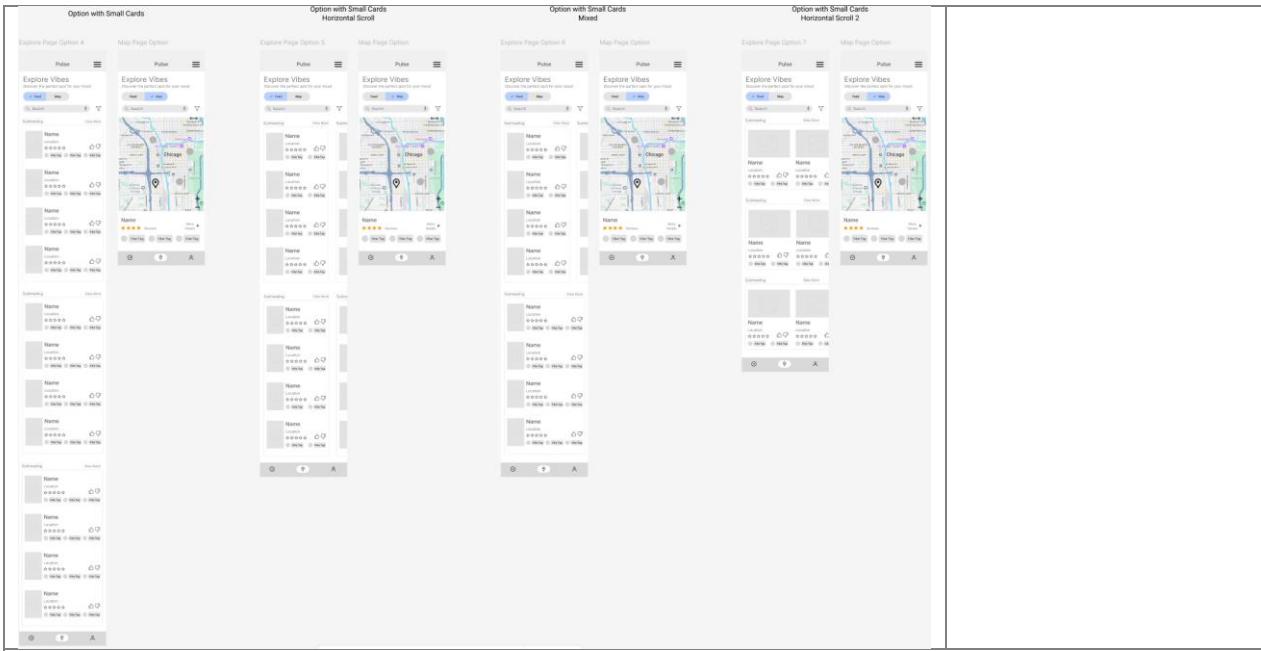


Exploratory design mockup with brand colors, typography, logo, interactions; changed icons for the add photos and noise.

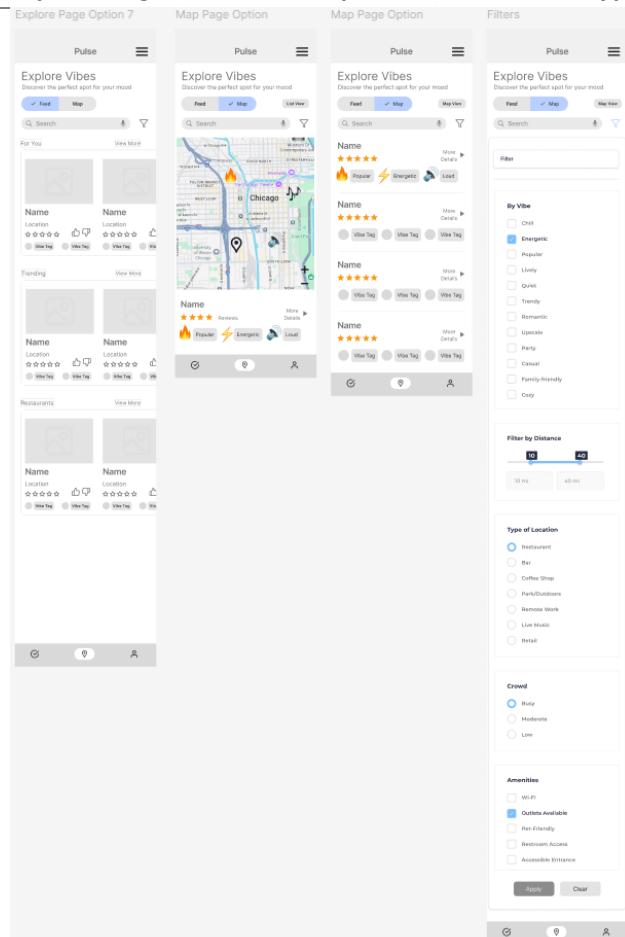
Feature description:
This page allows users to check in at their current location and share their impressions of the vibe. Users can select one or more vibe descriptors from a dropdown menu, adjust sliders to indicate crowd density, noise level, and overall energy, and optionally upload photos or a brief ambient sound recording to enhance accuracy and context.

Explore Page (Feed and Map Mode): Lo-Fi Prototype Options

Option with Center Toggle and Two-Column Feed	Option with Different Toggle and Two-Column Feed	Option with Large Cards	Digital wireframe; simplified layout, basic navigation.
			Seven different variations of the feed view were developed to explore how users might best browse and discover new locations.
			Each version tested the type of toggle button to use and alternatives for feed layouts. These variations included differences in card design, the type and amount of information shown for each location, the use of horizontal scroll within sections.



Explore Page (Feed and Map Mode): Lo-Fi Prototype

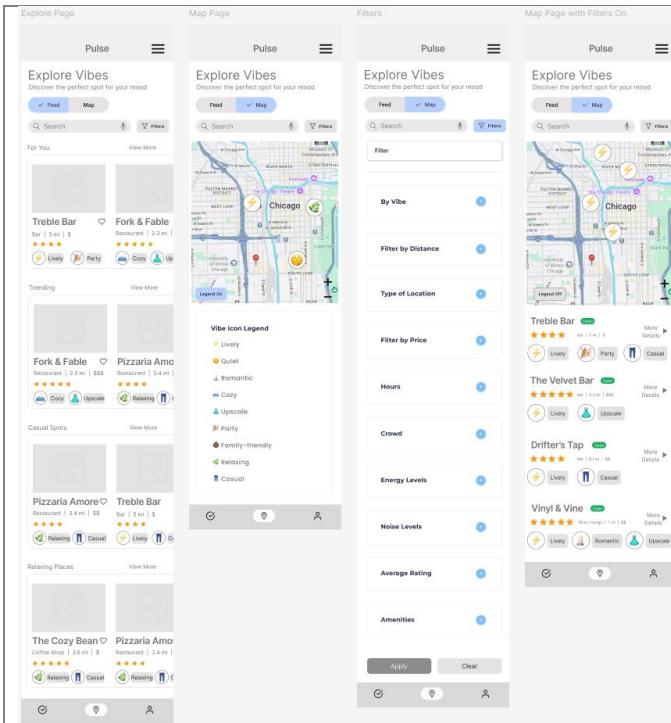


The decision was made to use categories with a horizontal scroll on the feed view page.

Icons were added to the map view, and a filter page was created.

This version includes the feed view of the explore page, map view of the explore page, location list, and filters.

Explore Page (Feed and Map Mode): Mid-Fi Prototype



Interactivity was built into this version.

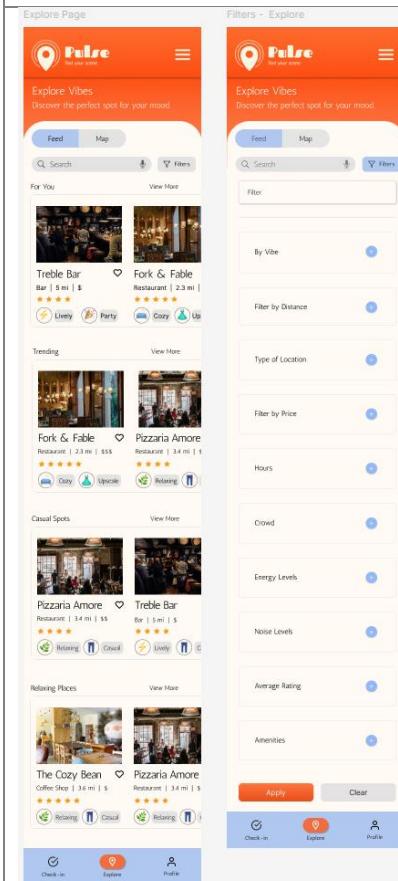
Icons and vibe tags were added to each location card for consistency.

More filter options were added, along with an expandable interaction.

Location list was removed as a feature and button from the map view. It was updated to appear below the map where user can scroll to view list.

Legend and legend button were added to the map to view vibe icons.

Explore Page (Feed Mode): Hi-Fi Prototype



Exploratory design mockup with brand colors, typography, logo, interactions. Pictures were added to each location.

Feature description:
This page showcases location recommendations curated by our algorithm and AI service. To simplify discovery, locations are grouped into personalized sub-categories based on the user's interests and preferences. Search and filtering options—identical to those available on the Map page—are also accessible here for quick browsing.

Explore Page (Map Mode): Hi-Fi Prototype

The image displays four wireframe prototypes of a mobile application's search interface. Each prototype shows a map of Chicago with various location markers. The top row shows 'Map Page - Legend Closed' and 'Map Page - Legend Open'. The bottom row shows 'Filters - Map' and 'Map Page with Filters On'. The 'Filters - Map' prototype includes a sidebar with a 'Vibe Icon Legend' containing icons for 'Lively', 'Quiet', 'Romantic', 'Cozy', 'Upbeat', 'Party', 'Family-friendly', 'Relaxing', and 'Casual'. The 'Map Page with Filters On' prototype shows a list of filtered results with details like name, reviews, and vibe tags.

Exploratory design mockup with brand colors, typography, logo, interactions.

Feature Description:
This page offers a familiar point-of-interest search experience, enabling users to explore locations contextually and refine results using filters. Search and filtering options mirror those on the Explore Feed, including vibe, distance, price, hours, crowd density, noise and energy levels, average rating, and amenities. Results display key details at a glance—such as name, estimated cost, open status, and primary vibe indicators. Users can view results as a list or directly on the interactive map, which supports panning and zooming. Each location is marked by its dominant vibe to support quick, informed decision-making.

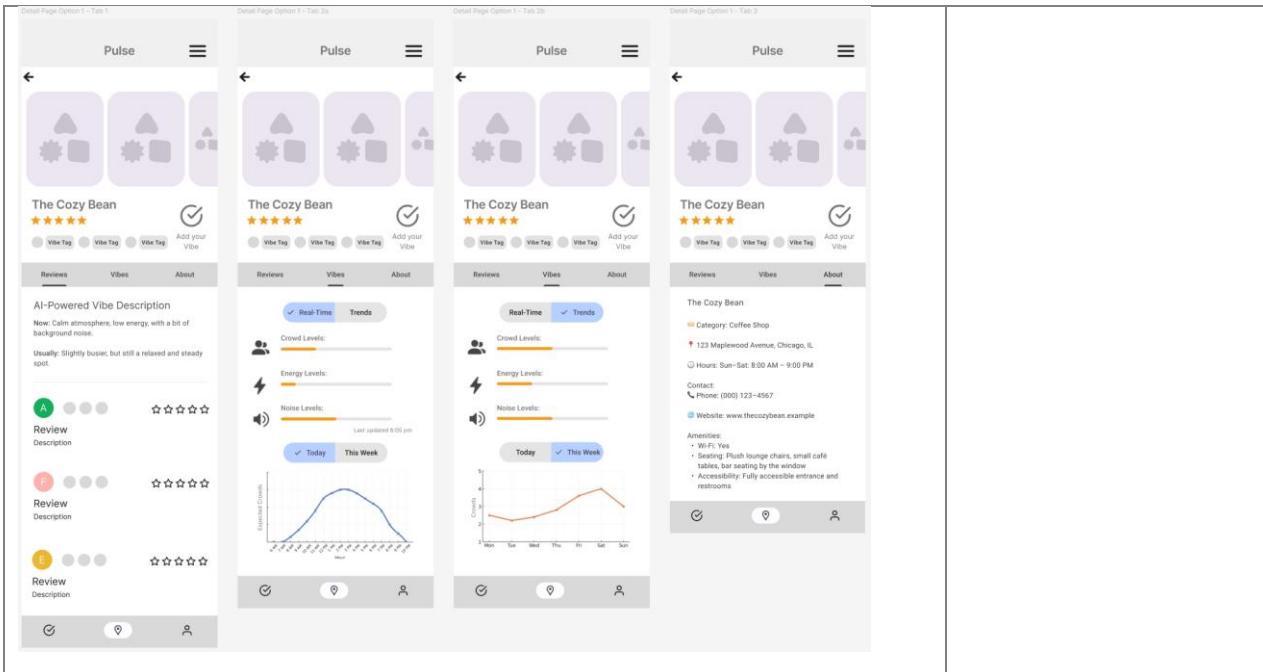
Location Details Page (The Cozy Bean): Lo-Fi Prototype Options

The image shows two digital wireframes for the 'Location Details Page (The Cozy Bean)'. Both versions feature a header with tabs for 'Pulse' and 'About'. The left version has a 'Reviews' section with a star rating and three 'Vibe Tag' buttons. Below it are sections for 'Recent Vibes', 'Crowd Levels', 'Video Feed', and 'Events'. The right version has a similar layout but with a larger 'About' tab selected, displaying a placeholder text area labeled 'About Location Placeholder'.

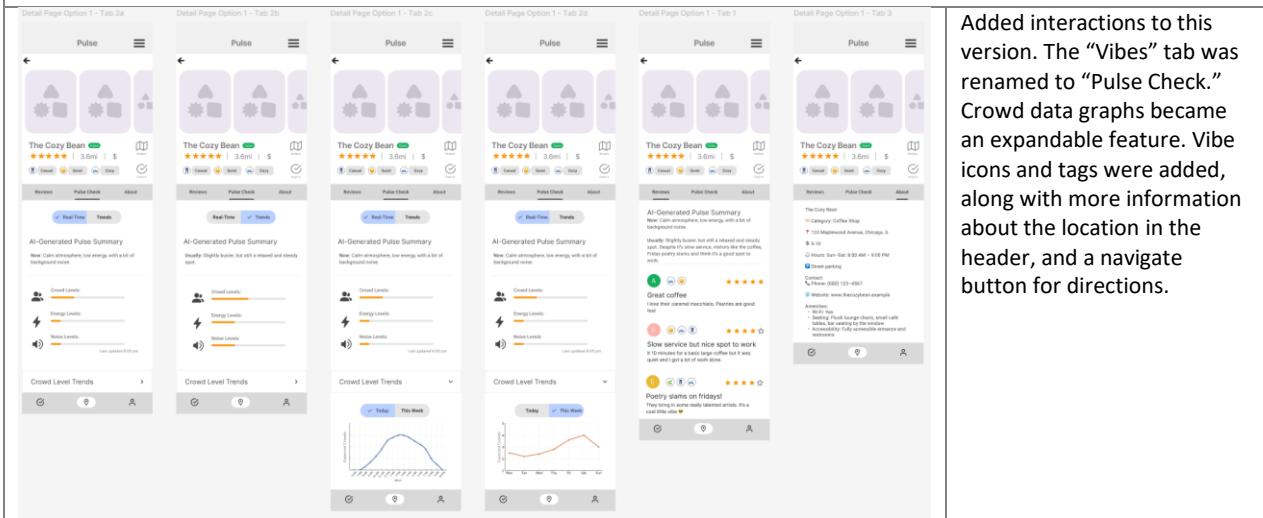
Digital wireframe; simplified layout, basic navigation.

We had two initial options for the location view decision. The first one had two tabs on the page, "Pulse" and "About." The pulse tab contained expandable options to view vibe information about the location.

The second option has three tabs, "Reviews," "Vibes," and "About." This is the version we chose for the lo-fi prototype. The vibes tab includes real-time and trends of crowd, energy, and noise data.



Location Details Page (The Cozy Bean): Mid-Fi Prototype



Added interactions to this version. The “Vibes” tab was renamed to “Pulse Check.” Crowd data graphs became an expandable feature. Vibe icons and tags were added, along with more information about the location in the header, and a navigate button for directions.

Location Details Page (The Cozy Bean): Hi-Fi Prototype

Exploratory design mockup
with brand colors, typography, logo, interactions. Pictures were at to the location.

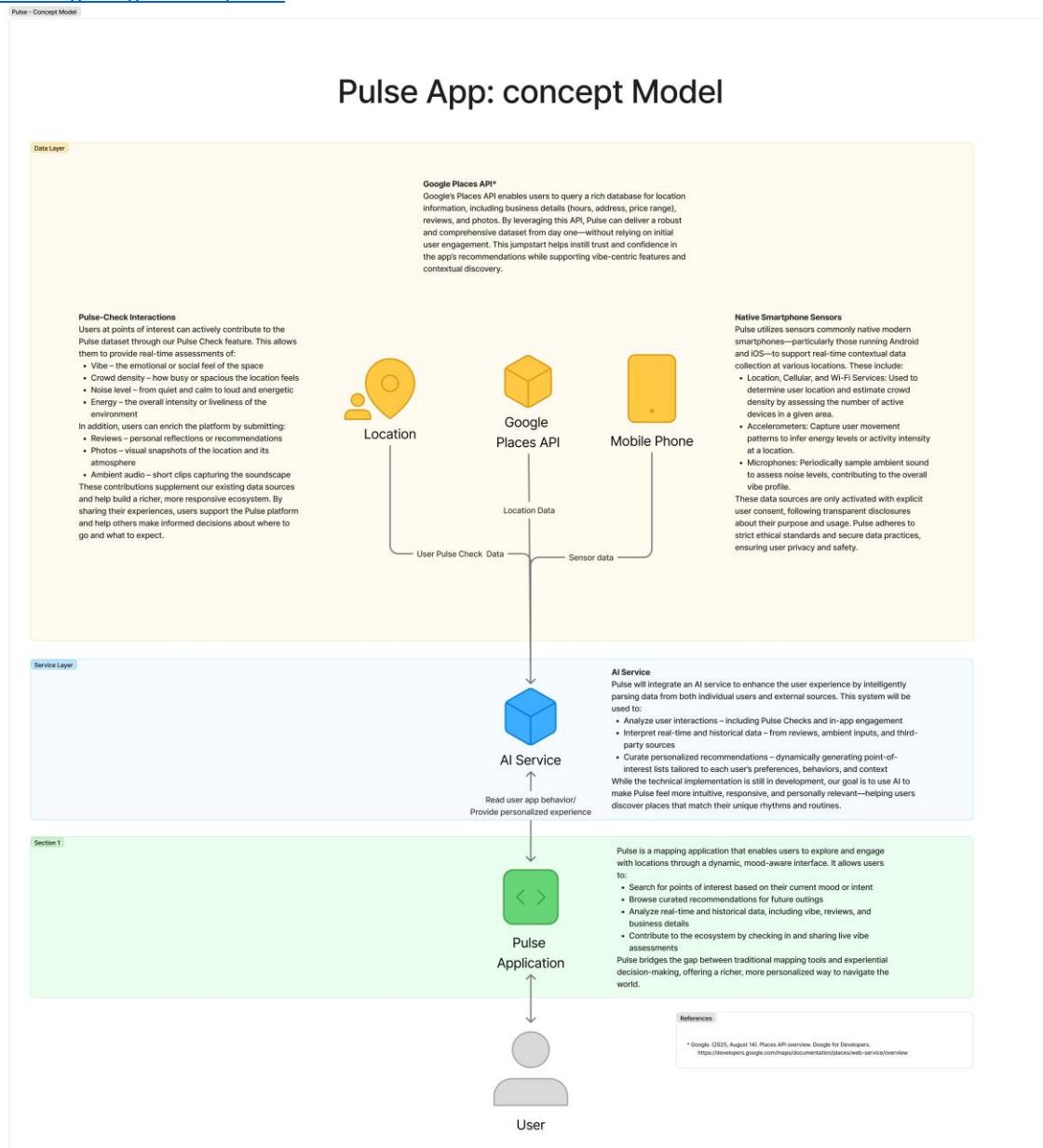
Feature Description:
Each location has its own dedicated page offering a deeper look at the point of interest. In addition to the vibe, average rating, and cost estimate shown on the Map view, users can see real-time data on crowd density, noise, and energy levels—alongside historical averages. A graph visualizes crowd trends over the past week and month, and an AI-generated summary provides a quick snapshot of the current vibe. Users can browse past ratings and reviews or revisit the AI summary for context. A final tab includes business details such as hours, amenities, and pricing. From this page, users can also submit a Pulse Check or get directions via their preferred navigation app.

Location Details Page (Drifter's Tap): Mid-Fi Prototype

This interactive location details page for Drifter's Tap was created for task completion in our usability testing. A hi-fi prototype version has not been created for this location at this time.

Concept Model

Figma link: <https://www.figma.com/board/t3nMWalBmE6alrYItvsemV/Pulse-Concept-Model?node-id=1-98&t=ogw0HgvONTiavpoC-4>



Personas

Persona 1. Zara Patel – Explorer of New Spots

Zara Patel Explorer of New Spots



Age 29
Occupation Marketing Manager
Location Chicago

Background

- Find off-the-beaten-path venues with a strong vibe and good reviews
- Discover new experiences each weekend—from art openings to live music

Frustrations

- Info overload with generic reviews

Pulse

Scenario 1 Zara opens Pulse on Friday evening hoping to find a new speakeasy-style lounge to find a new speakeasy-style lounge. The “New Spots” to see interesting rated venues with vibe tags.

Scenario 2. Zara plans a Saturday day-date with a friend, using Pulse’s “Trending This Weekend” list to pick a unique brunch spot with outdoor seating and relaxed vibes.

Age: 29 • **Occupation:** Marketing Manager • **Location:** Chicago (urban)

Background:

- Lives alone in an apartment in Logan Square.
- Enjoys solo weekends exploring cafés, galleries, and hidden rooftops.
- Uses Instagram and Yelp to discover trending local places.

Goals:

- Find off-the-beaten-path venues with a strong vibe and good reviews.
- Discover new experiences each weekend — from art openings to live music.
- Avoid tourist-heavy spots; wants authenticity.

Frustrations:

- Info overload with generic reviews.
- Hard to tell if a place fits her mood or aesthetic.
- Wastes time visiting spots that don’t match expectations.

Pulse Use Scenarios:

Scenario 1:

After a hectic week, Zara opens Pulse on Friday evening hoping to find a new speakeasy-style lounge in her area. The “New Spots” feature shows recently rated venues, complete with vibe tags and quick snapshots. She locks in one with a 4.8 rating and “intimate • jazz” vibes, reads a few vibe-based comments (“cozy and moody”), and heads out with confidence.

Scenario 2:

Zara plans a Saturday day-date with a friend. She browses Pulse’s “Trending This Weekend” list to pick a unique brunch spot with outdoor seating and a relaxed atmosphere. Tags like “greenery” and “brunchable” help her narrow it down to a delightful, under-the-radar café with aesthetic patio space.

Persona 2. Marcus Rivera – Vibe Checker of Routine Spots or The Seasoned Sightseer

Marcus Hill The Seasoned Sightseer



Age 55
Occupation Financial Advisor
Location Atlanta

Background

- Married with grown children
- Enjoys weekend urban getaways with his wife

Goals

- Explore cities' cultural and historical offerings
- Avoid chain restaurants for local cuisine
- Minimize planning time

Frustrations

- Overly touristy attractions
- Some places are off high radar despite being highly rated

Pulse

Scenario 1 Couple consider reviews re Washington DC on anniversary trip. They instead choose a niche science museum and stroll around a historic neighborhood.

Scenario 2 Pulse recommends Pulse looks noteworthy local restaurants in Savannah following afternoon Pulse recommends noteworthies local restaurants all from-the usual tourist-hotspots

Age: 42 • **Occupation:** IT Specialist • **Location:** Suburbs (Naperville, IL)

Background:

- Commuter dad with 2 kids, spends weekday mornings at the same coffee shop and evenings at the local playground.
- Seeks consistency and comfort in his routines.
- Appreciates knowing exactly what vibe each familiar place offers on any given day.

Goals:

- Know if his goto spots (coffee shop, playground) feel right before committing time.
- Share honest vibe feedback with his family and community.
- Discover subtle changes—crowds, music, mood—that affect his routines.

Frustrations:

- Shows up to energy-draining atmospheres unexpectedly.
- Music too loud for morning work sessions at the café.
- Swings in crowd size on weekends when he wants quiet.

Pulse Use Scenarios:

Scenario 1:

On a Tuesday morning, Marcus opens Pulse while driving to his regular coffee shop. The app shows a live “calm” atmosphere rating (3.5/5) with a note that it’s unusually quiet, thanks to local schools still being in session. He decides it’s a great day to stay for a quick catch-up on emails.

Scenario 2:

On Saturday afternoon, before heading to the park for family playtime, he checks Pulse. The app indicates a higher than usual crowd (4.7/5 boisterous energy) and kids’ chatter. He opts instead for a quieter nearby playground that often goes unnoticed—and flags the usual one to warn other Pulse users of high energy today.

Vibe Categories Planning

Energy Level

(How lively or calm the place feels)

- Chill (quiet, laid-back)
- Moderate (steady hum of activity)
- Lively (bustling, vibrant)
- Packed (high energy, crowded)

Ambiance / Atmosphere

(The "feel" of the space)

- Cozy/Naturey
- Trendy/Modern
- Musical/Performance-heavy
- Romantic/Intimate
- Artsy/Creative
- Outdoor/Open-air

Social Vibe

(Who's there and what's happening)

- Family-friendly
- Mixed crowd
- Solo/Remote-work friendly
- Date night vibe
- Party scene

Soundscape

(Noise level & music)

- Quiet
- Background chatter
- Live DJ / Loud music

Tagging Interaction Model

How will users see & engage with vibes?

- Stackable tags under each location card (e.g., *Chill* • *Cozy* • *Family-friendly*)
- Quick tap voting → Users can confirm or adjust vibe tags in real time (like emoji reactions).
- Color-coded vibe rings around the venue photo:
 - Green = calm
 - Yellow = moderate
 - Red = packed

Quick Example

"Harbor Café"

- Pulse shows:
 - Cozy • Moderate energy • Mixed crowd • Background chatter
 - Icons: coffee cup, leaf, 3 soundwaves
- Real-time update: "Currently: Quiet, 12/40 seats filled"

Pulse Vibe Tag Library

Energy Level Tags

(How busy or calm the venue feels)

Icon	Label	Microcopy
	Chill	Quiet & relaxed, plenty of space
	Steady	Moderate buzz, not too crowded
	Lively	Busy & energetic, lots of movement
	Packed	High-energy crowd, expect a wait

Energy Level Tags

(How busy or calm the venue feels)

Icon	Label	Microcopy
	Cozy	Warm, comfy, low-light setting
	Trendy	Modern design & Instagram-worthy
	Musical	Live tunes or curated playlists
	Romantic	Intimate lighting & soft mood
	Artsy	Creative decor, gallery-like
	Outdoor	Open-air or scenic outdoor area

Social Vibe Tags

(Who's around & what kind of crowd it attracts)

Icon	Label	Microcopy
	Family-Friendly	Kids & parents welcome
	Mixed Crowd	Balanced blend of people
	Work-Friendly	Good for laptops & focus
	Date Night	Romantic or couple-oriented
	Party Scene	Dancing, drinks, and nightlife energy

Sound Tags

(Noise level & audio vibe)

Icon	Label	Microcopy
	Quiet	Soft background sounds
	Buzz	Steady chatter & casual music
	Loud	DJ, live music, or party volume

User Interview Template and Scripts

Preliminary User Research Interview Template

Screener

Thank you for your interest in participating in our study!

We are interested in learning more about how people choose venues (restaurants, museums, bars, parks, cafes, etc.) around them in which to spend time. Your responses to the following questions will help us determine if you are right for our study.

1. Are you 18 years of age or older?

- Yes
- No

- 2. Do you live or spend time in an urban environment?**
 - Yes
 - No
- 3. Have you ever used technology (apps, websites, etc.) to discover and choose venues to visit?**
 - Yes
 - No

Thank You!

If selected, we will contact you with more information about scheduling your session.

Adult Study Consent Form

Study Name: Preliminary User Research for Pulse Mobile Application

Principal Investigators: Mackenzie Bogart, Jodie Eiler, Dawn Grossenbacher, Jordyn Parker

Institution: DePaul University, Chicago, Illinois, USA

Department: Human Computer Interaction (HCI) Program

College: Jarvis College of Computing and Digital Media

Faculty Advisor: Joseph Wanka

Key Information

What is the purpose of this research?

This preliminary research will examine how participants use their current technology to choose locations to visit. This research will help inform design of a mobile application for urban dwellers making decisions about where to visit based on vibes and crowd level of the location.

Why are you being asked to participate in the research?

We are seeking individuals who live or are near urban environments and use technology such as mobile applications or websites to choose locations to visit.

What is involved in this research study?

If you agree to participate in this study, you will be asked interview questions about your experiences with using current technology to find locations to visit. You will also be asked to perform a task on your device while the researcher observes and takes notes. Follow-up questions may be asked about how you completed the task. We kindly ask that your video camera remain on during the session and that the session be recorded. This allows us to take more detailed notes after the session ends

Are there any risks involved in participating in this study?

There are no inherent risks involved with participating in this study. Participating is voluntary and you may change your mind about participation at any time.

Are there any benefits to participating in this study?

You may not personally benefit from being in this study. However, your participation in this study may aid in our investigation of design implications for a mobile application for urban dwellers making decisions about where to visit based on vibes and crowd level of the location.

How much time will this take?

This study will take about 30-45 minutes to complete.

Other Important Information about Research Participation

Can you decide not to participate?

Your participation is voluntary, which means you can choose not to participate. There will be no negative consequences, penalties, or loss of benefits if you decide not to participate or change your mind later and withdraw from the research after you begin participating.

You may withdraw from the research at any time.

Who will see my study information and how will the confidentiality of the information collected for the research be protected?

The research recordings will be kept and stored securely. Your information will be combined with information from other people taking part in the study. We will not include your name or any information that will directly identify you.

Who should be contacted for more information about the research?

Before you decide whether to accept this invitation to take part in the study, please ask any questions that might come to mind now. Later, if you have questions, suggestions, concerns, or complaints about the study or you want to get additional information or provide input about this research, you can contact the researchers at:

Mackenzie Bogart - Mbogart2@depaul.edu

Jodie Eiler - Jeiler@depaul.edu

Dawn Grossenbacher - Dgrossen@depaul.edu

Jordyn Parker - Jsmit371@depaul.edu

Statement of Consent from the Subject

The participant has been provided with the above information. The participant's questions and concerns have been answered. Through this verbal consent, the participant agrees to be in this research.

Name of Participant: _____

Date of Verbal Consent: _____

Test Session Guide

Greeting Script

Hello, my name is [____], and I am a graduate student at DePaul University. Thank you for agreeing to participate in this interview and observational study.

I am working on a group project that explores how to create a better experience for urban users making decisions about locations to visit based on vibe and crowd level.

This interview will take approximately 45 minutes and will be recorded for research purposes only.

There are no right or wrong answers. Your participation is voluntary, and your responses will be confidential.

- Do you have any questions about the consent form or the study?
- Do I have your verbal consent to participate and record this session?

Interview Questions

We will begin the study with an interview about your behaviors, needs, and goals surrounding choosing locations to visit. Do you have any questions before we begin?

Warm-Up Questions

1. Tell me about some of the places you have visited over the last week.
 - a. Where did you go? Why?
 - b. How did you discover these places?
 - c. Did the places you went meet your expectations?
2. How do you typically find or hear about places to visit?
 - a. How do you decide which place will be "right" for that moment?
3. Do you ever feel overwhelmed at having too many options for places to visit?
 - a. If so, how do you deal with that?
4. Tell me about a time when you were disappointed in a place you visited.
 - a. Why were you disappointed?
 - b. How did you find the place?
 - c. Did you leave and change plans?

Deep Focus Questions

Current Behaviors/Routines

1. Tell me about the last time you used technology to find a place to visit.
 - a. What technology did you use?
 - b. What information did you use to decide where to visit?
 - c. About how many places did you consider?
 - d. Were you looking by yourself or coordinating with other people?
2. What type of information is most important to you when deciding on a place to visit?
 - a. Ex. Location, crowd density, noise level, overall vibe/mood, etc.
 - b. How do you find this information?
 - c. Is there any information you want that is hard or impossible for you to find?
3. With your current technology, do you think finding a social location is easy or hard to do?
 - a. If hard, what were some of the challenges you faced?
 - b. Do you think there are any ways that could have made it easier for you?
4. With your current technology, do you think finding a quiet location is easy or hard to do?
 - a. If hard, what were some of the challenges you faced?
 - b. Do you think there are any ways that could have made it easier for you?
5. How much do you trust apps or other platforms to inform you about places to visit?

Real-Time Crowd Data

1. Does any of your current technology show real-time crowds or busy levels?
 - a. If yes, does that influence your decision to go to that place?
2. Would having data about current crowd levels and vibe change the way you make decisions about where to go?

Interest In Proposed App Features

Please tell me if any of the following features would affect the way you discover and select locations to visit and why:

1. Real-time crowd density
2. Real-time vibe/mood indication
3. Wait-time estimates
4. Personalized recommendations based on past preferences
5. Creation of custom lists of locations/venues
6. Points system to earn rewards for checking in at & reviewing venues
7. Social aspect to coordinate plans with friends
8. User reviews

Task Observation Guide

[Moderators to fill out & follow the Task Observation Notes Sheets]

Let's move on to the task completion portion of the study. I'm going to give you two tasks to complete. Please show me how you would complete them using any technology you might regularly use. While completing each task, tell me about what you are doing and why you are doing it, walking me through any decisions you make and thoughts you have along the way. Do you have any questions before we begin?

Task 1

It's Friday night and you want to go out with friends. Please walk me through how you would go about deciding where to go.

Task 2

You want to find a quiet cafe to study or work from in the afternoon. Please walk me through how you would find a place to go.

Wrap-Up Questions

I just have a few more questions to wrap up our session.

Retrospective Questions

1. What would an ideal experience look like for you when deciding on a place to go?
2. During the tasks, how confident did you feel with your method of finding places to visit?
3. In a perfect world, which features would make choosing locations easier?

Demographic Questions

The following questions are demographic questions and are optional. Feel free to skip any questions you are not comfortable answering.

1. What is your age?
2. What gender do you identify with?
3. Where are you currently located?
4. What is your highest level of education?
5. What is your occupation?

Debrief Script

Closing

That concludes all the questions I have for you today.

- Do you have any final thoughts you would like to share or any questions that you would like to ask at this time?
- Can I reach out to you in the future with more questions?

I appreciate you taking the time to speak with me today. If you have any questions, I can be reached at:

Mackenzie Bogart - Mbogart2@depaul.edu

Jodie Eiler - Jeiler@depaul.edu

Dawn Grossenbacher - Dgrossen@depaul.edu

Jordyn Parker - Jsmit371@depaul.edu

Task Observation Notes Sheets

Task Sheet 1

Task

It's Friday night and you want to go out with friends. Please walk me through how you would go about deciding where to go.

Path

Fill out the steps the participant takes to complete the task

1. _____
2. _____
3. _____
4. _____
5. _____

Follow-Up Questions

1. What made you choose this place to go out with friends?
2. What type of information were you looking for to inform your decision?
3. Was there any information that you wanted but couldn't find?

Likert Scales

On a scale of 1 to 5, 1 being easy, 5 being hard, how would you rate finding the location?	1 (easy)	2	3	4	5 (hard)
Why?					

On a scale of 1 to 5, 1 being not confident, 5 being confident, how would you rate your surety that the location fits the vibe you're looking for?	1 (not confident)	2	3	4	5 (confident)
Why?					

Task Sheet 2

Task

You want to find a quiet cafe to study or work from in the afternoon. Please walk me through how you would find a place to go.

Path

Fill out the steps the participant takes to complete the task

1. _____
2. _____
3. _____
4. _____
5. _____

Follow-Up Questions

1. What made you choose this place to study or work?
2. How did you know it would be quiet?
3. What type of information were you looking for to inform your decision?
4. Was there any information that you wanted but couldn't find?

Likert Scales

On a scale of 1 to 5, 1 being easy, 5 being hard, how would you rate finding the location?	1 (easy)	2	3	4	5 (hard)
Why?					
On a scale of 1 to 5, 1 being not confident, 5 being confident, how would you rate your surety that the location fits the vibe you're looking for?	1 (not confident)	2	3	4	5 (confident)
Why?					

Usability Testing Round 1 Interview Template

Screener

Thank you for your interest in participating in our study!

We are interested in learning more about potential user impressions about our prototype and overall idea for Pulse, the real-time crowd info app. Your responses to the following questions will help us determine if you are right for our study.

1. **Are you 18 years of age or older?**

- a. Yes
- b. No

- 2. Do you live or regularly spend time in an urban environment?**
 - a. Yes
 - b. No
- 3. Have you ever used technology (apps, websites, etc.) to discover and choose venues to visit?**
 - a. Yes
 - b. No
- 4. Have you participated in any testing for this project (interviews, card sorts, tee tests, surveys, etc.) before?**
 - a. Yes
 - b. No

Thank you! If selected, we will contact you with more information about scheduling your session.

Adult Study Consent form

Study Name: Generative Usability Testing for Pulse Mobile Application

Principal Investigators: Mackenzie Bogart, Jodie Eiler, Dawn Grossenbacher, Jordyn Parker

Institution: DePaul University, Chicago, Illinois, USA

Department: Human Computer Interaction (HCI) Program

College: Jarvis College of Computing and Digital Media

Faculty Advisor: Joseph Wanka

Key Information

What is the purpose of this research?

This usability testing will examine how participants interact with the early prototype for the Pulse Mobile Application. The research will allow our team to gauge impressions of the application and the overall idea, offering insight for how to improve our design.

Why are you being asked to participate in the research?

We are seeking individuals who live in or near urban environments and use technology such as mobile applications or websites to choose locations to visit.

What is involved in this study?

If you agree to participate in this study, you will be shown our non-interactive mid-fidelity prototype and asked to interview questions about your impressions of the application, its described features, and the goals it seeks to achieve. Follow-up questions may be asked following your responses. We kindly ask that your video camera remain on during the session and that the session be recorded. This allows us to take more detailed notes after the session ends.

Are there any risks involved in participating in the study?

There are no inherent risks involved in participating in this study. Participation is voluntary and you may opt out of the study at any time with no explanation.

Are there any benefits to participating in this study?

You may not personally benefit from participating in this study. However, your participation may aid in our investigation of design implications for a mobile application for urban dwellers making decisions about where to visit based on vibes and crown level of venues.

How much time will this take?

This study will take about 30-45 minutes to complete.

Other Important Information about Research Participation

Can you decide not to participate?

Your participation is voluntary, and you may withdraw from the study at any time for any reason. There will be no negative consequences, penalties, or loss of benefits if you decide not to participate.

Who will see my study information and how will the confidentiality of the information collected for research be protected?

The research recordings will be kept and stored securely. Your information will be combined with information from other participants. We will not include your name or any information that will directly identify you in our report.

Who should be contacted for more information about this research?

Before you decide whether to accept this invitation to take part in the study, please ask any questions that might come to mind prior to signing this form. If you have questions, suggestions, concerns, or complaints about the study or if you want to get additional information or provide input about this research, you can contact researchers at:

Mackenzie Bogart – mbogart2@depaul.edu

Jodie Eiler – jeiler@depaul.edu

Dawn Grossenbacher – dgrossen@depaul.edu

Jordyn Parker – jsmit371@depaul.edu

Statement of Consent from the Subject

The participant has been provided with the above information. The participant's questions and concerns have been answered. Through this verbal consent, the participant agrees to be in this research.

Name of Participant: _____

Date of Verbal Consent: _____

Test Session Guide

Greeting Script

Hello, my name is [____], and I am a graduate student at DePaul University. Thank you for agreeing to participate in this interview and observational study.

I am working on the design of a mobile application called Pulse. Pulse is a mobile app that helps users discover places to go—whether to hang out, work, or relax—based on their mood and real-time data about crowd size, noise level, and overall vibe.

This interview will take approximately 45 minutes and will be recorded for research purposes only.

There are no right or wrong answers. Your participation is voluntary, and your responses will be confidential.

Do you have any questions about the consent form or the study?

Do I have your verbal consent to participate and record this session?

Interview Questions

We will begin the study with an interview about your experience with similar apps.

Warm-Up Questions

- Have you ever used an app to find a place to go to hang out, work or study, or just be in general.
 - What app did you use? Why?
 - What do you like about this app?
 - What don't you like about this app?
- When using an app to find a location what do you expect it to do?
 - What features are most important to you?
 - What app(s) do(es) this best? Why?

Prototype Questions

I'm now going to show you our current prototype. The prototype is a static digital rendering of our current design. It currently does not have any interactions.

For this part of our session, I want you to look through each page of the prototype and speak your thoughts on all that you see aloud. As you go to each page I'll describe the features and intended functionality. You can ask any questions to clarify its features. I'll then ask you questions about your impressions of the design and its intended functionality.

[Note to interviewer – DO NOT READ ALOUD]: Share the prototype on screen. Allow the participant to review the entire app at their own pace and encourage them to share their thoughts out loud and ask any questions. Read the description of each page as they get to it.

Questions are provided to ask about the app as whole, a given page, and specific features on page. The feature related questions are listed below the page description. Ask these questions in whatever order feels natural. The goal is get a full view of their impressions of the app and its feature without asking them the same questions over and over again on each page so as not to exhaust and overwhelm them. Adjust the questions as needed, removing or adding based on what feels natural for your session.

Check-In Page

This is the **Check-In page**, where users can share their first impressions of a location shortly after arriving. The goal is to contribute real-time data to help others decide where to go. On this page, users can:

- **Confirm their location**
- **Upload photos** of the space
- **Rate the crowd size** (e.g., packed, moderate, empty)
- **Rate the noise level**, including a short 10-second ambient audio clip
- **Rate the energy level**
- **Select a vibe** from a dropdown list (e.g., chill, lively, romantic, focused)

These inputs help build a live snapshot of the place's atmosphere. The vibe options are curated to reflect different moods or energy levels, and users can choose the one that best matches what they're experiencing.

- Would you be willing to check-in shortly after arriving at a location? Why or why not?
 - Would any incentives help increase your willingness such as in app rewards, privileges, or promotions at locations?
- How do you feel about rating or reviewing a location during check-in?
- Would you prefer to do this task at another time or place? Why?

Map Page

This is the **Explore page in map view**. It works like a typical map app, but with a focus on mood and atmosphere. Users can:

- **Search for locations** by name or type
- **Filter results** by vibe, cost, hours, and average rating
- **Pan and zoom** to explore nearby areas
- **View vibe indicators** on each location pin—for example:
 - A fire icon for places that are currently popular
 - A loud speaker icon for places that are noisy

The map helps users quickly assess what's happening around them and choose a spot that matches their current mood or needs. Clicking on a location allows you to view a brief overview of the location in more detail. You are also able to toggle between a list view and map view of nearby locations.

- Is there anything missing from this map view that you'd expect to see?
- Are there any features here that don't interest you? Why?

Feed Page

This is the **Explore page in feed view**, where the app recommends places based on your preferences and mood. Users can:

- **Filter by mood** to see places that match how they're feeling

- **Browse subcategories**, such as:
 - “**For You**” – personalized suggestions based on past activity
 - “**Recently Visited**” – places you’ve checked into before
 - “**Seasonal**” – limited-time events like farmers markets or pop-up shows
 - “**Location Types**” – categories like museums, sports bars, or cafes

The app uses **machine learning** to improve recommendations over time, learning from your check-ins, ratings, and browsing behavior. The goal is to make discovery feel intuitive and personalized.

- What do you think about the app learning your preferences over time?
- Do the subcategories feel useful or relevant?
- Are there any categories you’d want added?

Location Detail

This is the **Location Details page**, which provides a deep dive into a specific venue.

Users can view:

- **Basic info** like address, hours, and contact details
- **Photos and promotions** (e.g., events or deals)
- **Ratings and reviews and AI generated vibe summary**
- A **Vibes tab** that breaks down:
 - Crowd size
 - Energy level
 - Ambient noise

Vibe data is shown in **real-time**, and users can toggle to see **average** and **historical trends** using visual graphs.

The app collects this data from:

- **User check-ins**
- **Smartphone sensors**, including:
 - Location services for crowd density
 - Microphone input for noise levels
 - Accelerometer data for movement and energy

This page helps users decide whether a place fits their current mood or needs, based on both live and historical data.

- Is the data presentation clear and helpful?
- Are there any details you’d want added or removed?
- How do you feel about the app using your phone’s sensors in the background?
- What permissions would you allow or deny? Why?

General App/Page Questions

First Impression/Mental Model Questions

- [ASK BEFORE READING DESCRIPTION] Before I describe this page, what do you expect it to do?
- [ASK BEFORE READING DESCRIPTION] What is the first thing you would do on this page?
- What are your first impressions?
 - What do you like/dislike about this page/app?
 - Is there anything that immediately stands out to you about the app/page or a feature on a page? Why?
- Does this app/page fit the description I provided? Why or why not?
- Does the way information is organized on this page match how you think about...
 - [Check-In] Reviewing a location
 - [Map] Choosing a place to go
 - [Feed] Discover a new place to go

- [Location Details] Learning more information about a location

Interaction Questions

- How would you think about interacting with this page? Why?
- What is your eye first drawn to on this page? Why?
- Is anything unclear or confusing when thinking about interacting with this page?
- Would you know what to do next from this page? Why or why not?

Trust

- How would you feel about engaging or interacting with this app knowing that the app is learning from your interactions? Why?
 - What would make it more trustworthy? Why?
 - What would make that feel more useful to you? Why?
- How does this page make you feel when you imagine using it?

Final Thoughts

- Do you have any final thoughts about this app/page ?
- Is there anything missing from this app/page that you'd wish to see?
- Is there anything on this app/page you'd prefer was not there or was done differently?

Wrap-Up Questions

I just have a few more questions to wrap up our session.

Retrospective Questions

- What do you think of the application as it has been described and shown to you?
- If this application were available for use today in its current state, do you think you'd use it? Why or why not?
- Can you imagine a specific situation where you'd open this app? What would you be hoping for?
- If you had a magic wand that could change one thing about this app, what would it be?

Demographic Questions

The following questions are demographic questions and are optional. Feel free to skip any questions you are not comfortable answering.

- What is your age?
- What gender do you identify with?
- Where are you currently located?
- What is your highest level of education?
- What is your occupation?

Debrief Script

That concludes all the questions I have for you today.

- Do you have any final thoughts you would like to share or any questions that you would like to ask at this time?
- Can I reach out to you in the future with more questions?

I appreciate you taking the time to speak with me today. If you have any questions, I can be reached at:

Mackenzie Bogart - Mbogart2@depaul.edu

Jodie Eiler - Jeiler@depaul.edu

Dawn Grossenbacher - Dgrossen@depaul.edu

Jordyn Parker - Jsmit371@depaul.edu

Usability Testing Round 2 Interview Template

Screener

Thank you for your interest in participating in our study!

We are interested in learning how users complete tasks in our prototype for Pulse, the real-time crowd info app. Your responses to the following questions will help us determine if you are right for our study.

1. Are you 18 years of age or older?
 - a. Yes
 - b. No
2. Do you live or regularly spend time in an urban environment?
 - a. Yes
 - b. No
3. Have you ever used technology (apps, websites, etc.) to discover and choose venues to visit?
 - a. Yes
 - b. No
4. Have you participated in any testing for this project (interviews, card sorts, tee tests, surveys, etc.) before?
 - a. Yes
 - b. No

Thank you!

If selected, we will contact you with more information about scheduling your session.

Adult Study Consent form

Study Name: Task-Based Usability Testing for Pulse Mobile Application

Principal Investigators: Mackenzie Bogart, Jodie Eiler, Dawn Grossenbacher, Jordyn Parker

Institution: DePaul University, Chicago, Illinois, USA

Department: Human Computer Interaction (HCI) Program

College: Jarvis College of Computing and Digital Media

Faculty Advisor: Joseph Wanka

Key Information

What is the purpose of this research?

This usability testing will examine how participants interact with the functional mid-fi prototype for the Pulse Mobile Application. The research will allow our team to assess navigation efficiency and information presentation within our app, offering insight for how to improve our design.

Why are you being asked to participate in the research?

We are seeking individuals who live in or near urban environments and use technology such as mobile applications or websites to choose locations to visit.

What is involved in this study?

If you agree to participate in this study, you will be shown our functionla mid-fidelity prototype and asked to complete a short series of tasks, answering questions after each. Follow-up questions may be asked following your responses. We kindly ask that your video camera remain on during the session and that the session be recorded. This allows us to take more detailed notes after the session ends.

Are there any risks involved in participating in the study?

There are no inherent risks involved in participating in this study. Participation is voluntary and you may opt out of the study at any time with no explanation.

Are there any benefits to participating in this study?

You may not personally benefit from participating in this study. However, your participation may aid in our investigation of design implications for a mobile application for urban dwellers making decisions about where to visit based on vibes and crown level of venues.

How much time will this take?

This study will take about 30-45 minutes to complete.

Other Important Information about Research Participation

Can you decide not to participate?

Your participation is voluntary, and you may withdraw from the study at any time for any reason. There will be no negative consequences, penalties, or loss of benefits if you decide not to participate.

Who will see my study information and how will the confidentiality of the information collected for research be protected?

The research recordings will be kept and stored securely. Your information will be combined with information from other participants. We will not include your name or any information that will directly identify you in our report.

Who should be contacted for more information about this research?

Before you decide whether to accept this invitation to take part in the study, please ask any questions that might come to mind prior to signing this form. If you have questions, suggestions, concerns, or complaints about the study or if you want to get additional information or provide input about this research, you can contact researchers at:

Mackenzie Bogart – mbogart2@depaul.edu

Jodie Eiler – jeiler@depaul.edu

Dawn Grossenbacher – dgrossen@depaul.edu

Jordyn Parker – Jsmit371@depaul.edu

Statement of Consent from the Subject

The participant has been provided with the above information. The participant's questions and concerns have been answered. Through this verbal consent, the participant agrees to be in this research.

Name of Participant: _____

Date of Verbal Consent: _____

Test Session Guide

Greeting Script

Hello, my name is [____], and I am a graduate student at DePaul University. Thank you for agreeing to participate in this study.

I am working on the design of a mobile application called Pulse. Pulse enables users to find places to be based on their current mood and real-time crowd and vibe data.

This session will take approximately 45 minutes and will be recorded for research purposes only. It will consist of interview questions and task completion using a prototype I will provide for you. There are no right or wrong answers. Your participation is voluntary, and your responses will be confidential.

Do you have any questions about the consent form or the study?

Do I have your verbal consent to participate and record this session?

Introductory Questions

- Tell me about a time you used an app or website to find a place to go.
- Is that your typical experience with finding places to go? If not, what is?
- How important is the vibe of a location when determining where to go?
- How do you typically assess the vibe of a location before deciding to go there?

Task Completion

We will now begin the task completion stage of this session. I'll read the task and ask if you have any questions. You will then complete the task using this prototype, and I'll ask a few questions after you finish. While you complete the tasks, please talk about what you are doing and be vocal about what you expect, any issues that come up, what you're confused about, and anything else that comes to mind.

[SEE TASK OBSERVATION SHEETS. MODERATORS SHOULD FILL OUT SHEETS AS PARTICIPANTS COMPLETE TASKS. START TIMERS WHEN DONE READING THE TASK PROMPT. STOP TIMERS WHEN PARTICIPANTS INDICATE THEY ARE DONE.]

Wrap-Up Questions

System Usability Scale (SUS)

System Usability Scale (SUS)	1 (Strongly Disagree)	2	3	4	5 (Strongly Agree)
I think that I would like to use this system frequently.					
I found the system unnecessarily complex.					
I thought the system was easy to use.					
I think that I would need the support of a technical person to be able to use this system.					
I found the various functions in this system were well integrated.					
I thought there was too much inconsistency in this system.					
I would imagine that most people would learn to use this system very quickly.					
I found the system very awkward to use.					
I felt very confident using the system.					
I needed to learn a lot of things before I could get going with this system.					

Reflection Questions

- What did you like most about the app?
- What was the most frustrating or confusing part of the app?
- If you could change one thing about the app, what would it be?
- What would help you trust the real-time vibe data provided by the app?
- Any final thoughts?

Demographic Questions

The following questions are demographic questions and are optional. Feel free to skip any questions you are not comfortable answering.

- What is your age?
- What gender do you identify with?
- Where are you currently located?
- What is your highest level of education?
- What is your occupation?

Debrief Script

That concludes all the questions I have for you today.

- Do you have any final thoughts you would like to share or any questions that you would like to ask at this time?
- Can I reach out to you in the future with more questions?

I appreciate you taking the time to speak with me today. If you have any questions, I can be reached at:

Mackenzie Bogart - Mbogart2@depaul.edu

Jodie Eiler - Jeiler@depaul.edu

Dawn Grossenbacher - Dgrossen@depaul.edu

Jordyn Parker - Jsmit371@depaul.edu

Task Observation Sheets

Task Sheet 1

Task

It's a Tuesday at lunchtime and you've been working from home all morning. You want a change of scenery but still need to be focused on work for the rest of the afternoon. Use the feed view of the explore page to browse "relaxing places" and select a cafe to look at its details and see if it fits your needs.

Path

[Fill out the steps the participant takes to complete the task]

- 1.
- 2.
- 3.
- 4.
- 5.

Metrics

[Fill out the table]

Success or Failure	Time on Task	Errors [list all errors made]

Post-Task Ratings

On a scale of 1 to 5, 1 being easy, 5 being hard, how easy was it to complete this task? Why?	1 (easy)	2	3	4	5 (hard)
On a scale of 1 to 5, 1 being not confident, 5 being very confident, how confident are you that you completed the task successfully? Why?	1 (not confident)	2	3	4	5 (very confident)

Task Sheet 2

Task

It's Friday night and you're at dinner with some friends. You want to go out and listen to live music. Use the map view of the explore page to filter by live music, find a lively bar nearby and select it to view its details.

Path

[Fill out the steps the participant takes to complete the task]

- 1.
- 2.
- 3.
- 4.
- 5.

Metrics

[Fill out the table]

Success or Failure	Time on Task	Errors [list all errors made]

Post-Task Ratings

On a scale of 1 to 5, 1 being easy, 5 being hard, how easy was it to complete this task? Why?	1 (easy)	2	3	4	5 (hard)

On a scale of 1 to 5, 1 being not confident, 5 being very confident, how confident are you that you completed the task successfully? Why?	1 (not confident)	2	3	4	5 (very confident)

Task Sheet 3

Task

You've just arrived at a lively park to hang out on a Saturday afternoon. Use the app to check in to your location and provide real-time vibe information.

Path

[Fill out the steps the participant takes to complete the task]

- 1.
- 2.
- 3.
- 4.
- 5.

Metrics

[Fill out the table]

Success or Failure	Time on Task	Errors [list all errors made]

Post-Task Ratings

On a scale of 1 to 5, 1 being easy, 5 being hard, how easy was it to complete this task? Why?	1 (easy)	2	3	4	5 (hard)

On a scale of 1 to 5, 1 being not confident, 5 being very confident, how confident are you that you completed the task successfully? Why?	1 (not confident)	2	3	4	5 (very confident)