Starting From Scratch

Building Place Attachment Through Active Urban Exploration for Newcomers to Toronto

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Abstract

"Starting from Scratch" explores how a mobile tool can help newcomers develop a sense of belonging in their new city by encouraging active exploration and reflection. Drawing from personal experiences of relocation, the research examines the challenges of forming connections with unfamiliar places and proposes a mobile tool to support this process.

The study investigates how the tool influences cognitive, behavioral, and emotional dimensions of place attachment. Additionally, it draws on psychogeography to highlight how wandering and breaking routines can encourage deeper connection with the city.

Combining the double diamond of design thinking with research-creation methodologies, the study incorporates literature review, iterative prototyping, and user testing that inform the tool's design while assessing the user experience.

The proposed GPS-enabled, browser-based tool overlays the city map with an opaque hexagonal grid. As users navigate, their movement gradually scratches off the map, prompting exploration beyond familiar routes. Users assign personalized meanings to locations through color-based tagging, turning the map into a visual record of their relationship with the city. While initially designed for Downtown Toronto, it is adaptable to any walkable urban environment.

This study contributes to urban studies and human-computer interaction by introducing an interactive digital tool for place-making and place attachment.

Keywords : Place attachment, Urban exploration, Newcomers, Belonging, Psychogeography, Human-Computer Interaction (HCI), Interactive mapping, GPS-enabled tools, Mobile interaction design, Research through design (RtD), Double diamond framework, Toronto, Location-based experience, Urban Studies, User Experience Design

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1. Introduction

This thesis documents the design and development of Starting from Scratch, a mobile tool, created to support newcomers in actively exploring and connecting with unfamiliar urban environments. As cities become increasingly shaped by digital infrastructures, there is a growing need to understand how technology can enhance rather than replace physical experiences. This study contributes to this discussion by exploring how mobile web platforms, geolocation services, and interactive mapping tools can be leveraged to support urban engagement.

The following sections outline the theoretical grounding, research methods, design iterations, and insights gained through user testing, leading to the final version of the tool depicted below (see Figure 1)

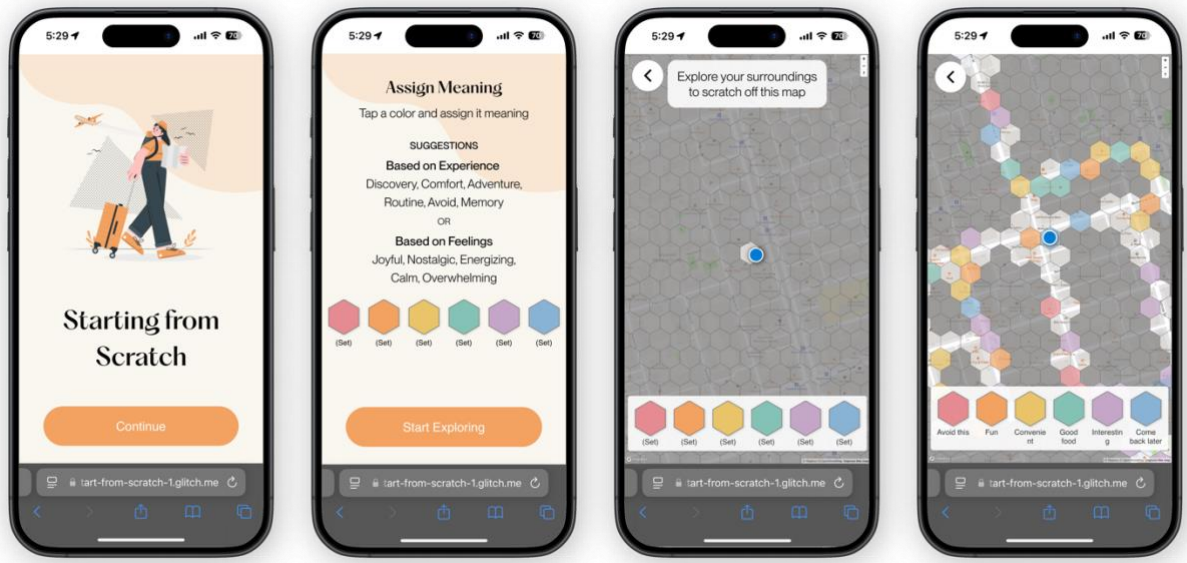

Figure 1 Starting from Scratch: Final Prototype Screenshots

1.1 Context

Moving to a new city or country involves leaving the familiar comforts of home and stepping into the unknown, where everything from the streets to the people feels unfamiliar. For many, this transition requires starting from scratch, building a new life in an unfamiliar place while navigating the challenges of adapting to a completely new environment. When I moved from Mumbai to Toronto for my master's program, I found myself in exactly this position—starting from scratch. I struggled to feel connected to my environment and to develop a sense of belonging.

In Mumbai, I was deeply attuned to the rhythms of the city. I knew exactly where to find the best vada pav or where to escape for a quiet moment amidst the chaos. My go-to cafe wasn't just a place for coffee; it was a space of comfort, where the barista greeted me by name and my usual order was always waiting. In the evenings, I would unwind at my favorite neighborhood hangout spots, surrounded by the comforting presence of familiar faces. I had the confidence to freely explore new routes and discover spontaneous events like flea markets. This intimate familiarity with Mumbai's urban spaces and social fabric gave me a strong sense of ease and belonging.

But when I arrived in Downtown Toronto, all those comforting anchors were gone. The city felt vast and unfamiliar, its streets more like a maze than a home. I didn't know which corners held the best coffee shops or which neighborhoods hosted vibrant cultural events. The sense of confidence I had in Mumbai—the ability to take a detour and stumble upon something special—was replaced with hesitation and uncertainty. I found myself walking the same few routes, sticking to places I already knew because exploring felt daunting.

Over time, I realized that adapting was not just about learning the city's layout but about actively engaging with it to form new attachments. However, this process was far from intuitive and required time, effort, and reflection. This led me to question whether a digital intervention could facilitate this process—helping newcomers explore, discover, and gradually build a sense of belonging in unfamiliar cities.

Having a background in architecture, I have always been intrigued by the ways people form connections with spaces. My transition from architecture to product design has deepened my interest in how technology can mediate these experiences. This project merges these perspectives to create meaningful interactions between people and their environments.

Moving to a new city often comes with lack of familiarity and a sense of detachment from place. By acting as a catalyst for active exploration and reflection on urban engagement, this research seeks to reframe this transitional period as an opportunity for discovery, personal connection, and building place-attachment. To explore how this transition can be supported, it is essential to examine relevant theoretical perspectives.

1.2 Theoretical Framework

This study explores *place attachment, psychogeography, and urban exploration* to examine how newcomers develop a sense of belonging in unfamiliar cities. *Place attachment theory* discusses the process of how individuals gradually develop meaningful relationships with their surroundings, and it provides a framework for understanding the emotional, cognitive, and behavioral dimensions of forming connections with urban spaces. *Urban exploration* is the intentional act of navigating and engaging with urban spaces. *Psychogeography* serves as a method for urban exploration, emphasizing wandering, discovery, and the disruption of routine pathways to build personal connections. A deeper discussion of these theoretical perspectives follows in the Literature Review.

While these theories provide insight into how people establish place-based connections, a structured mechanism to actively guide this process seems lacking. This gap presents an opportunity for a digital mobile tool designed to support place attachment by encouraging exploration and engagement designed for newcomers to a city.

This study aims to contribute *to human-computer interaction* (HCI) and *urban studies* by proposing a mobile tool to facilitate the process of place attachment. Through HCI, the study explores experience and interaction design, map visualization, and engagement mechanics, while urban studies provide insights into how personal experiences shape one's relationship with the city.

Building on these theoretical foundations, this study investigates specific research questions that explore the role of mobile tools in building place attachment in newcomers.

1.3 Research Questions

1. How can a mobile tool help newcomers develop a sense of place attachment by encouraging active, physical exploration?
2. In what ways might a mobile tool influence the emotional, cognitive, and behavioral dimensions of place attachment?

1.4 Scope and Limitations

This study examines how individuals develop personal connections to urban spaces, focusing on experiential and behavioral aspects rather than urban design or planning interventions.

While it considers newcomer experiences, it does not address migration policies, economic integration, or sociopolitical factors influencing settlement. Instead, it explores how mobile tools support engagement active engagement and emotional reflection during exploration, based on the assumption that facilitating these behaviors can significantly enhance newcomers' sense of place attachment.

The study is based in Downtown Toronto, a highly walkable and diverse environment, making it a relevant setting for studying place attachment. It is possible that findings may apply to other urban centres. However, findings may not fully apply to suburban, rural, or other urban contexts with different spatial and social dynamics.

The study incorporates game-like elements to encourage exploration but is not a primary research focus. The study does not explore game design principles such as competition or reward structures but instead applies playful interaction to enhance urban engagement. These boundaries keep the research focused on its core objectives.

2. Research Methodology

This study employs an integrated methodology that combines Research through Design (RtD) with the Double Diamond of Design Thinking, where the RtD allows a flexible approach to generate knowledge through making and iterating, and the Double Diamond provides a structured design process.

2.1 Research Approach: Research through Design (RtD)

This study adopts Research through Design (RtD) as its primary methodology, wherein knowledge is generated through the act of designing and iterating on interactive artefacts. RtD, as articulated by Christopher Frayling in *Research in Art and Design* (1993), builds on earlier concepts of practice-based research introduced by Herbert Read. (Frayling 1993) RtD frames design as inquiry, using iteration through making, prototyping, and testing to generate new knowledge.

RtD is particularly suited to this study because the proposed design solution, the mobile tool, evolves through experimentation and interaction and acts a means of analysis, offering insights into user engagement, emotional reflection, and behavioral change.

The study integrates RtD through three key strategies:

1. **Digital Medium Exploration** – Various digital mediums, including augmented reality, photogrammetry, and projection mapping, were explored to assess their potential in fostering place attachment. This process informed the selection of a mobile, GPS-enabled tool as the most effective medium.

2. **Iterative Prototyping** – Multiple versions of the tool were developed, exploring a different concept, such as emotion mapping, scratch-off map interactions, color-based logging, and the assignment of meaning to locations. Each iteration functioned as an experimental probe, revealing how different design choices influence user engagement. The iterative process also facilitated experimentation with different technologies within the mobile tool space, including variations in hosting platforms and interactive mapping integrations.

3. **User Testing and Reflection** – Structured testing session was conducted to evaluate the tool's impact on cognitive, emotional, and behavioral dimensions of place attachment. Insights gained from user interactions informed subsequent design refinements and provided insights on how a mobile tool can facilitate place attachment.

Through these strategies, this research demonstrates how design itself can function as a method of knowledge production, aligning with the core principles of Research through Design.

2.2 Structuring the Process: The Double Diamond Framework

While RtD serves as the primary methodological foundation, the Double Diamond framework provides a structured approach to the design process. Originally introduced by the UK Design Council in 2003, the Double Diamond divides the design process into four stages: Discover, Define, Develop, and Deliver. This structure ensures that the iterative nature of RtD follows a clear trajectory, highlighting the importance of divergent and convergent thinking, guiding designers through broad exploration before narrowing down solutions. (Design Council, n.d.)

This model has since been widely adopted by organizations, researchers, and design practitioners to manage complex challenges while maintaining a human-centered focus. In this study, the Double Diamond provides a roadmap for the iterative design process, ensuring that insights from each stage inform the next phase in a systematic manner.

Each stage of the Double Diamond aligns with specific phases of this research:

1. **Discover–** This phase involved exploration of digital mediums as discussed in RtD, also falls under this phase. The research also involved a comprehensive literature review covering place attachment theory, psychogeography, and urban exploration. A contextual analysis of existing applications and projects that explore these topics were examined to identify gaps.

2. **Define**– Following the exploratory phase, the research was narrowed down to specific research questions. The exploration of digital mediums also informed the selection of a mobile, GPS-enabled tool as the most effective medium. This stage also involved identifying key challenges, such as the need for a tool that balances both spontaneous exploration and reflective engagement.

3. **Develop** - With the medium selected, the project moved into the iterative prototyping phase, as discussed in RtD, where multiple iterations were developed.

4. **Deliver -** The final phase involved a user testing session and reflection as discussed in RtD, with recently relocated participants.

2.3 The Relationship Between RtD and the Double Diamond

The diagram (see Figure 2) shows the relationship between the two methodologies by showcasing how the key strategies of RtD (in red) fit within the process of Double Diamond (in grey).

Together, these methodologies reinforce the value of design as both a method of inquiry and a process of innovation, contributing to both theoretical and practical advancements in urban studies and human-computer interaction.

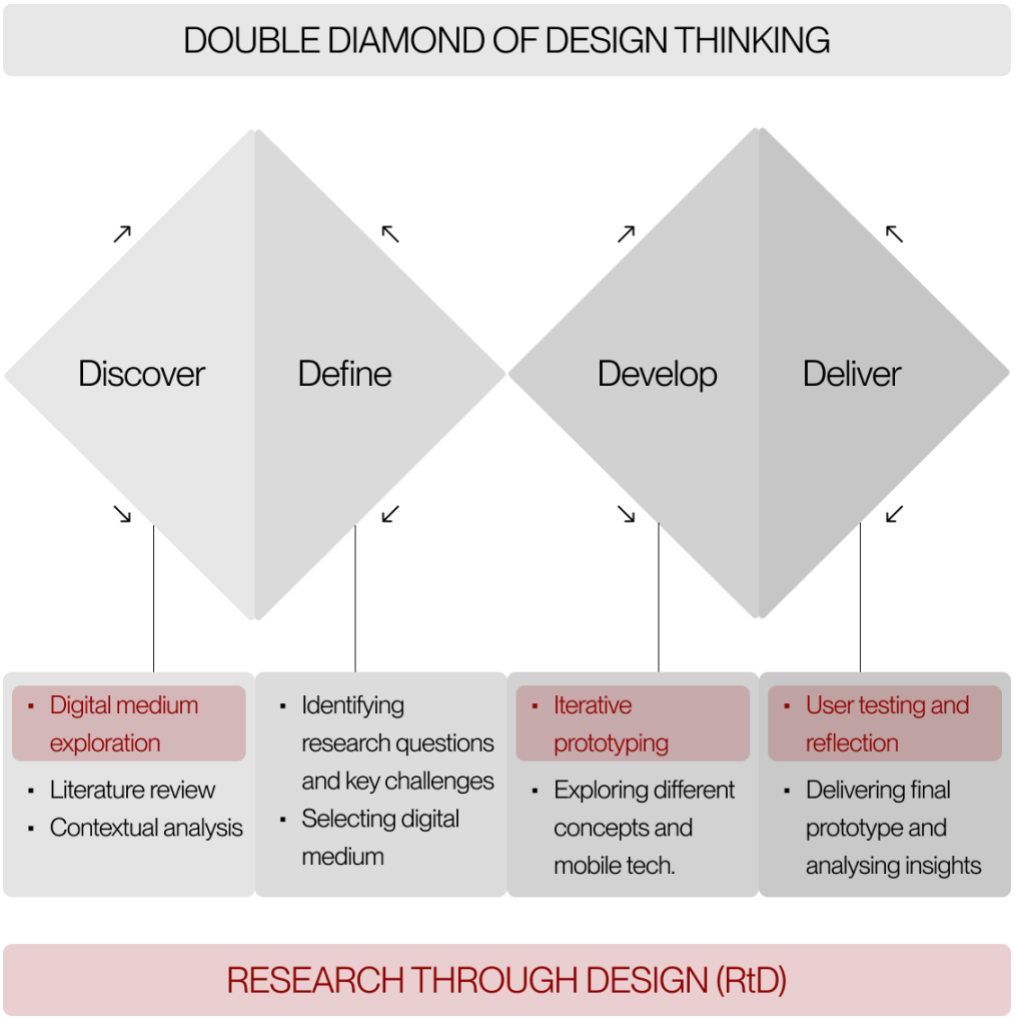

Figure 2 Relationship between RtD and Double Diamond (Diagram by Author)

2.4 Technological Implementation

A key focus of this project is mobile accessibility and rapid prototyping. Using mobile web browsers ensures easy user interaction and quick testing before investing in native app development. Additionally, cloud-based coding and hosting platforms like Glitch (“Glitch,” n.d.) enable the fast development, sharing, and deployment of web applications while running a Node.js server (“Introduction to Node.Js,” n.d.) to store and retrieve user data across sessions. By leveraging GPS technology available on most smartphones and integrating interactive mapping tools like Google Maps (“Geolocation API,” n.d.) and Mapbox (“Mapbox Maps API Docs,” n.d.), the tool enables real-time mapping and location tracking.

The study also integrates AI-assisted coding for design implementation, using ChatGPT and Claude for AI-generated code, debugging, and optimization. This approach demonstrates how AI can streamline prototyping in digital experience design.

3. Literature Review

This section reviews some existing research on place attachment, urban exploration and psychogeography. These concepts are interconnected in shaping how newcomers establish a sense of belonging in unfamiliar cities. Together, they highlight that forming attachments to a city is not just about recognizing locations but about actively interacting with them, assigning meaning, and creating personal narratives through exploration.

3.1 Place Attachment

Place attachment, a concept explored in environmental psychology, refers to the emotional, cognitive, and behavioral bonds individuals develop with places over time (Low and Altman 1992) Early research on people-place interactions primarily focused on cognition—how people perceive, navigate, and understand spaces. However, Altman and Low (1992) emphasized the affective and cultural dimensions of place attachment, recognizing that places hold deep emotional significance shaped by personal experiences, social relationships, and cultural narratives. Their interdisciplinary approach, combining psychology and anthropology, highlighted the importance of attachment in stability, identity, and well-being, particularly in the face of mobility and displacement.

For newcomers, forming place attachment is critical yet complex. Moving to an unfamiliar city often results in disruptions in rootedness, alienation, and emotional detachment from surroundings. Maria Lewicka, a psychologist, in the chapter "In Search of Roots: Restoring Continuity in a Mobile World" of the book *Place Attachment*, explores this issue in the context of increasing global mobility (Lewicka 2020). She argues that while migration opens new opportunities, it often weakens rootedness—a deep-seated connection to place that provides a sense of stability and identity. She highlights that people with stronger place attachments tend to experience greater psychological well-being, while those who frequently relocate may struggle to develop the same sense of belonging. For newcomers, this lack of attachment can lead to emotional distress and identity instability, making it difficult to integrate into new communities.

If place attachment is essential for stability, identity, and well-being, how does it develop? Understanding its underlying mechanisms requires a structured approach. To explore this, I turned to the People-Place-Process Framework introduced by Scannell & Gifford (2010)

3.1.1 People-Place-Process Framework

A widely used model for understanding place attachment is the tripartite organizing framework, which categorizes attachment into three interrelated dimensions (Scannell and Gifford 2010):

1. **Person Dimension** – This dimension highlights how memories, identity, and interpersonal connections contribute to an individual's bond with a place. Strong social connections build a sense of belonging, reinforcing emotional ties to a place.

2. **Place Dimension** – The physical and symbolic qualities of a place influence attachment by providing familiarity, comfort, and meaning. Certain locations—such as landmarks, cultural sites, and public spaces—become significant as individuals engage with them repeatedly. The authors note that attachment is not just about physical surroundings but also the meanings ascribed to places.

   Having a background in architecture and urban design, I have engaged with the concept of place attachment in my practice, particularly in designing spaces that foster belonging, comfort, and identity**.** In my work, I have applied architectural and interior design principles to create spaces that support both individual and collective experiences. In residential design, this means crafting adaptable, familiar spaces that promote a sense of security and ownership. In public environments like transportation hubs and hospitals, the emphasis shifts to intuitive wayfinding, spatial organization, and sensory comfort—ensuring that users feel oriented and at ease in complex, high-traffic settings. The way light fills a space, the flow between different zones, and the integration of materials that evoke warmth or stability all contribute encouraging natural interactions, social connection, and a sense of attachment. These experiences shaped my understanding of how the built environment influences emotions, behaviors, and social connections.

3. **Process Dimension** – Attachment develops through cognitive, emotional, and behavioral interactions with a place.
   a. **Cognitive interactions** involve developing mental maps, familiarity, and knowledge about a location, enabling individuals to navigate and recognize meaningful spaces.
   b. **Emotional interactions** refer to the affective bonds individuals create, such as feelings of comfort, nostalgia, or belonging tied to specific places.
   c. **Behavioral interactions** occur through routines, exploration, and participation in activities, reinforcing attachment by physically engaging with the environment.

   It is this process dimension, which encompasses cognitive, emotional, and behavioral interactions, that I aim to explore through my research. By examining how individuals engage with their environment—I seek to understand how these interactions contribute to the formation and strengthening of place attachment.

While this framework provides a conceptual understanding of place attachment, the challenge remains: how can these interactions be observed, measured, and analyzed in real-world contexts? Traditional studies often rely on qualitative methods such as surveys and interviews, which offer insights into how people feel about places but fail to capture the spatial distribution of attachment. This raises the need for spatially explicit methods to assess where and how attachment forms.

3.1.2 Map Based Place Attachment Index (MBPAI)

One method that addresses this need is the Map-Based Place Attachment Index (MBPAI), introduced by Brown and Raymond (2007, 2015). It is a GIS-based approach that quantifies place attachment by allowing individuals to spatially identify locations of significance on a map (Brown, Raymond, and Corcoran 2015). The MPPAI outlines a methodology where participants are asked to digitally or physically mark places, they feel attached to, providing a geospatial representation of their emotional bonds with different environments.

The MBPAI consists of two key datasets:

1. **Spatial Data from Mapping Exercises** – Participants are asked to identify "special places" on a map, assigning specific values (e.g., aesthetic, recreational, spiritual) to each location. This spatial mapping provides insights into the geographic distribution of significant places and allows researchers to analyze how place attachment is spatially represented across different urban or natural settings

2. **Quantitative Data from Psychometric Measures** –Using a two-dimensional scale, participants rate their place attachment based on:
    - Place Identity – The emotional bonds and sense of belonging they associate with specific places.
    - Place Dependence – The functional reliance on a location for daily activities, recreation, or essential services.

By integrating these two datasets, MBPAI enables researchers to rank the strength of place attachment at different locations and compare how spatial and psychological factors interact in shaping attachment patterns.

One of the key strengths of the MBPAI is its ability to leverage Public Participation GIS (PPGIS) and crowdsourced mapping, making it a highly scalable and adaptable method for assessing place attachment across diverse contexts. PPGIS methods are digital and can be easily adapted for different geographic scales, cultural contexts, and research objectives. Whether applied in urban planning, conservation, or community engagement initiatives, MBPAI's participatory nature ensures that local knowledge and lived experiences shape the understanding of place attachment, making it a powerful tool for research.

3.1.3 Building upon this approach

While MBPAI focuses on digitally mapping spatial patterns of attachment through the identification of significant places and their associated values, I hope to build on these methods by integrating the process dimension of place attachment—encompassing cognitive, emotional, and behavioral interactions—which is central to my research.

However, place attachment is not a passive process—research suggests that active engagement with the environment—through exploration, social interaction, and personal reflection—can accelerate the process of developing attachments and turning unfamiliar spaces into places of belonging.

As Lewicka (2020) notes, *"while high mobility can weaken the sense of rootedness, active participation in local life, the development of personal routines, and direct interactions with the environment can help foster a renewed sense of place attachment"* (p. 53). Similarly, Scannell & Gifford (2010) argue that place attachment is reinforced through *"repeated behavioral engagement with a place, which strengthens cognitive familiarity and emotional connection over time"* (p. 3).

To extend the capabilities of MBPAI, my research seeks to go beyond simply identifying significant places by also encouraging active urban engagement. This emphasis on active engagement naturally leads to the concept of urban exploration. The next section explores urban exploration as a method for facilitating the process of place attachment.

3.2 Urban Exploration

In this study, urban exploration refers to the intentional act of navigating and engaging with urban spaces in a way that creates awareness, discovery, and interaction. Unlike routine travel, which follows predefined routes for efficiency or necessity, urban exploration involves a deliberate effort to observe, experience, and connect with different aspects of the city. This includes exploring streets, public spaces, neighborhoods, and everyday environments with a sense of curiosity, paying attention to spatial dynamics, architectural forms, and social interactions. This approach to urban exploration emphasizes active engagement rather than passive movement.

3.2.1 Challenges for urban exploration in the digital age

The way individuals navigate a city significantly shapes their experience of urban exploration. A study on how visitors navigate unfamiliar urban environments using different navigational aids revealed the impact of technology on movement patterns, spatial awareness, and engagement with an unfamiliar place (Vaez, Burke, and Yu 2020). The study revealed the following findings:

1. **Wayfinding Performance:** Visitors using digital navigation tools, such as Google Maps, followed predefined routes with high efficiency but had limited spatial recall of the areas they traversed. In contrast, those using paper maps or no navigation aids relied on landmarks and environmental cues, leading to better long-term wayfinding abilities.

2. **Spatial Awareness:** Participants who depended on digital navigation were less engaged with their surroundings, focusing primarily on their screens rather than the urban environment.

Without digital aids, visitors paid closer attention to spatial details, improving their ability to recall street patterns and landmarks.

3. **Exploratory Behavior:** Digital navigation encouraged structured movement, reducing opportunities for spontaneous exploration. Visitors using paper maps or self-navigation deviated from planned routes more often, leading to unexpected discoveries and richer urban experiences.

The study highlights a key challenge for urban exploration in the digital age: While navigation apps increase efficiency, they may limit visitors' ability to form mental maps, engage with the city, and develop a deeper connection to their surroundings. Alternative navigation strategies—such as limiting digital reliance or combining multiple wayfinding methods—could enhance urban exploration and spatial learning.

To address these challenges**,** I turned to psychogeography as a method to encourage urban exploration beyond structured navigation. Psychogeography emphasizes wandering, disrupting routine movement, and engaging with urban spaces in an unstructured and reflective manner and explores the emotional and psychological effects of urban environments on individuals.

3.2.2 Psychogeography

Psychogeography is an approach that examines the influence of urban environments on individuals' emotions and behaviors. Originating in the 1950s with the Situationists, a group of radical artists and theorists in Paris, psychogeography seeks to understand how different places evoke specific feelings and reactions. Guy Debord, a prominent figure in this movement, described it as the study of the "*specific effects of the geographical environment...on the emotions and behavior of individuals*." (Reader 2021)

A central practice in psychogeography is the *dérive*, or "*drift*," which involves wandering through urban areas without a predetermined route, allowing the surroundings to guide one's journey. This method encourages participants to experience the city in new and unanticipated ways, breaking free from habitual paths and routines. By engaging in a dérive, individuals can uncover the hidden emotional landscapes of urban spaces, gaining insights into how different areas influence their thoughts and feelings.

In my research, I aim to leverage psychogeographic techniques to facilitate place attachment for newcomers navigating unfamiliar urban environments. By integrating dérives, interactive mapping, and reflective documentation, I seek to develop a tool that encourages individuals to actively explore, disrupt routine movement, and engage emotionally with their surroundings. This approach will provide an alternative to purely functional navigation, creating a more meaningful and personalized connection to urban spaces.

3.2.3 Psychogeography in Toronto

In the context of Toronto, writer and psychogeographer Shawn Micallef has applied psychogeographic principles to explore the city's diverse neighborhoods. His work, "Stroll: Psychogeographic Walking Tours of Toronto," offers readers guided walks that delve into the unique character and history of various urban areas. Micallef's practice of wandering the city as a flâneur—an observer and explorer without a set destination—revealed how walking can transform unfamiliar urban spaces into places of personal meaning. His reflections on Toronto's hidden layers—the overlooked architecture, street names, and forgotten histories—emphasized that understanding a city requires more than maps or guidebooks; it demands active, sensory, and emotional engagement (Micallef 2024).

One chapter that particularly caught my attention was the one on Spadina Avenue. Having walked along the Spadina Avenue many times over the past year as a newcomer, the book answered questions that had lingered in my mind about the smaller, nuanced details of the street (see Figure 3-6), such as:

Grad House: The controversy and eventual acceptance of its bold architectural overhang

Spadina Wave Deck: The striking sidewalk design broke conventional norms, shocking the city with its bold, rule-bending aesthetics.

Cameron House Ants: The intriguing backstory of the giant "ten ants" on the building's façade and the building "tenants".

Bronze Words on the Sidewalk: They trace Spadina's development and significance.

These details transformed the street from a familiar route into a route filled with rich history and meaning. It showcased how seemingly ordinary urban spaces are imbued with narratives and significance when viewed through a psychogeographic lens. Inspired by this, I began to see my own walks through Toronto differently, allowing curiosity and observation to guide me. This ultimately led me to create a personal psychogeographic map of Toronto, through my first prototype, "*Emotion Mapping Tool*", which I will talk about in Chapter 5.

3.3 Urban exploration in HCI

The field of Human-Computer Interaction (HCI) has increasingly explored urban exploration as an interactive and computational experience, designing tools that encourage alternative forms of navigation, sensory augmentation, and engagement with urban spaces. Rather than focusing on efficiency-driven travel, many HCI studies have sought to reimagine the ways individuals experience cities through augmented reality (AR), artificial intelligence (AI), participatory mapping, and embodied interactions.

3.3.1 Review of Existing HCI Projects on Urban Exploration

Emotional Cartography: Greenwich Emotion Map

Christian Nold's *Emotional Cartography (2009)* based primarily in European cities, falls under urban design and affective computing disciplines, and explores how biometric data and GPS tracking can be used to map the emotional landscapes of cities. Participants wore Galvanic Skin Response (GSR) sensors to record physiological reactions while walking through urban spaces. The collected data was visualized as emotion maps, revealing hotspots of emotional intensity. (Nold 2006)

This approach highlights how individuals' emotional responses to urban environments can be visualized and analyzed, offering new ways to reflect on personal experiences in the city and redefine urban engagement beyond navigation and landmarks.

[murmur]: A Location-Based Mobile Documentary for Urban Storytelling

[murmur] is a location based mobile documentary project that explores the impact of narratives on physical spaces by collecting and sharing stories tied to specific urban locations. Created in 2003 by Shawn Micallef, James Roussel, and Gabe Sawhney, it uses mobile phones as a medium for oral history, allowing individuals to engage with their surroundings through firsthand narratives. The project was first launched in Toronto's Kensington Market, Vancouver's Chinatown, and Montreal's St. Laurent Boulevard, and has since expanded to Calgary, San Jose, Edinburgh, and beyond. The project records firsthand accounts of places from individuals with a personal connection to those locations, ranging from intimate memories to broader civic and historical narratives. (Michallef 2007)

The project involved an ear shaped signage with a phone number and location code at key sites. Visitors can dial in to hear recorded stories. Beyond its impact on public spaces, *[murmur]* has also been adapted to institutional settings, such as Hart House at the University of Toronto, (Rundle 2006) where it helps connect students and visitors to the building's transient yet rich history. By recording and sharing personal anecdotes, *[murmur]* transforms large, impersonal spaces into intimate, human-scaled experiences.

While *[murmur]* employs mobile technology, the design ensures that technology remains secondary to the experience, allowing personal devices to act as seamless conduits between storyteller and listener.

Designing Ambient Wanderer: Mobile Recommendations for Urban Exploration

Ambient Wanderer was developed at Naver Labs in France, and falls under HCI and mobile computing, investigating how adaptive mobile guidance can shape urban discovery. It explores a mobile recommendation system designed for newcomers to cities. (Viswanathan et al. 2020)

The research highlights that newcomers often default to familiar routes rather than venturing into unfamiliar areas, stating: "*In the few months they had spent in their new home, our participants had started revisiting the same bars, restaurants, and parks, hanging out frequently in a limited number of places. They were bored with frequenting the same POIs and wanted to find something new from their routines"*

To address this, Ambient Wanderer nudging users toward new discoveries by leveraging real-time data on preferences, location, and environmental factors to suggest relevant Points of Interest (POIs). Instead of relying on traditional search-based navigation, users select from predefined "mindsets", such as Surprise Me or Hidden Gems, which tailor recommendations based on situational needs and exploratory intent.

The project demonstrates that multimodal, contextual recommendations can positively influence exploratory behaviors, supporting more intuitive and enjoyable city navigation. The study contributes to the broader discourse on how intelligent recommender systems can shape urban mobility and engagement, particularly for new residents seeking to build familiarity with their environment.

Ageing Clouds: A Novel Support for Urban Exploration

Another project from Naver Labs in France exploring HCI and mobile computing, A*geing Clouds* proposes a visual exploration aid that overlays dynamic cloud-like representations of urban neighborhoods on mobile maps. As users explore different areas, the clouds "age" and turn gray, marking already-visited places while preserving the element of surprise in new locations. (Viswanathan, Boulard, and Grasso 2019)

This concept supports gradual, memory-enhanced urban exploration, shifting away from rigid, destination-based navigation toward strategic wandering. It demonstrates how visual metaphors can encourage individuals to venture beyond their routine spaces while retaining an intuitive sense of past exploration.

The prototype of Ageing Clouds showing the user moving from one cloud to another. Here, the previously visited cloud is greyed in the parts traversed by the user.

3.3.2 Key Insights from HCI Research on Urban Exploration

The reviewed HCI projects illustrate how technology can shape urban exploration by influencing movement, engagement, and emotional connections to place. The table below compares these projects to understand how they differ in how they engage users, deliver information in real time or asynchronously, structure exploration, and the level of user attention required.

Project	**Emotional Cartography**	**[murmur]**	**Ambient Wanderer**	**Ageing Clouds**
Type of User Interaction	**Active** Users initiate data collection by wearing biometric sensors and reflecting later.	**Active** Users choose which stories to engage with but do not modify the dataset.	**Mixed** Users make an initial decision then the system takes over by dynamically providing POI suggestions.	**Passive** Users do not interact directly; the system subtly influences movement.
Timing of Data & Feedback	**Asynchronous** Users analyze past biometric data rather than receiving real-time feedback.	**Asynchronous** Pre-recorded narratives provide historical and reflective engagement.	**Synchronous** Dynamically suggests POIs based on real-time location and other factors.	**Synchronous** Visual overlays update dynamically as users move, offering real-time feedback.
Mode of Exploration	**Unstructured** Users walk freely while physiological responses are tracked.	**Unstructured** Users explore independently and listen to pre-recorded narratives.	**Structured** Users select an exploration 'mindset' and receive POI suggestions.	**Unstructured** Users explore freely while the interface passively adapts.
Level of Attention	**High** Requires active monitoring of biometric data and later reflection.	**Moderate** Requires periodic listening but minimal screen interaction.	**Moderate** Requires occasional interaction to select POIs.	**Low** Minimal interaction required, as exploration is subtly guided.

Table 1 Comparative Analysis of the projects

The reviewed HCI projects demonstrate varied strategies for navigation, engagement, and information delivery, offering insights into designing digital exploration tools:

1. **Interaction Models:** Some systems rely on direct user engagement (*Emotional Cartography, murmur*), while others subtly guide behavior (*Ambient Wanderer, Ageing Clouds*), suggesting a need for designs that accommodate both intentional input and passive discovery.

2. **Feedback Models:** While certain tools provide real-time feedback to influence immediate movement (*Ambient Wanderer, Ageing Clouds*), others facilitate asynchronous reflection through recorded data or narratives (*murmur, Emotional Cartography*), highlighting different modes of urban interaction.

3. **Exploration Frameworks:** Some approaches aim at structuring discovery through guided recommendations (*Ambient Wanderer*), whereas others allow open-ended wandering (*Ageing Clouds, murmur*), emphasizing the importance of flexibility in urban interfaces.

4. **Cognitive Considerations:** Tools requiring high engagement (*Emotional Cartography*) may shift attention away from the physical environment, while low-attention designs (*Ageing Clouds*) integrate seamlessly into real-world exploration, underscoring the value of ambient, non-intrusive interactions.

This suggests that urban exploration technologies should integrate both structured and spontaneous engagement models, while balancing real-time adaptability with reflective depth to enhance place attachment and discovery.

3.3.3 Research Gap and Positioning

While these HCI projects introduce new methods for urban exploration, but they do not explicitly aim to foster place attachment, particularly for newcomers, and lack mechanisms that help individuals develop long-term emotional and behavioral connections with urban environments.

My research seeks to bridge this gap by integrating psychogeographic principles with interactive digital tools, enabling newcomers to develop meaningful place attachments through active engagement. I propose a digital mapping mobile tool designed to encourage active urban exploration while impacting the emotional, cognitive, and behavioral interactions with places. By incorporating dérives, interactive mapping, and personal documentation, this system moves beyond wayfinding and perception shifts to support deep, experiential connections to urban spaces.

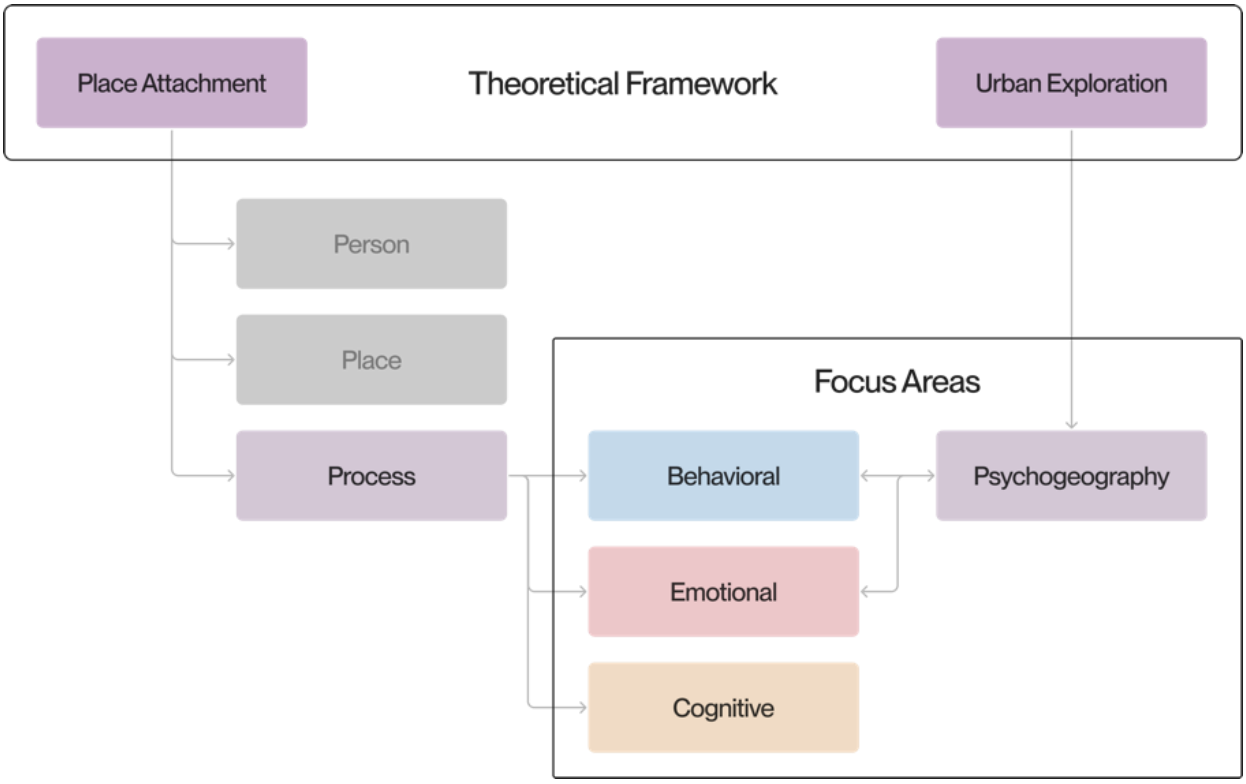

Figure 3 Theoretical Framework Focus Areas for this thesis (Diagram by Author)

4. Analysing Approaches to Urban Exploration

4.1 Framework for Analysis

To evaluate existing tools that intersect with urban exploration, I have adapted the framework introduced in the paper "*A Preliminary Design Vocabulary for Interactive Urban Play*" (Chew, Loke, and Hespanhol 2020) The paper examines how digital tools and interactive systems transform urban environments into spaces for playful, meaningful engagement. It identifies six dimensions of analysis—Distribution, Public Setting, Playability, Purpose, Activity and Experience—to assess how various urban play projects create interaction, engagement, and transformation of urban spaces. This structured approach provides an understanding of how technology mediates urban play and exploration.

The paper proposes a designer visual iconography as a tool (see Figure 12) to represent the dimensional properties of the analytic system, enabling designers to visually generate, explain, and customize solutions for interactive urban play by assembling and recombining key design qualities across the six dimensions. While this framework is designed for general urban play projects, I am adapting it to suit my research focus on helping newcomers explore and form connections with urban environments.

4.2 Commercial Applications

Several existing applications were analyzed using this adapted framework to identify their strengths, limitations, and relevance to my project. These tools include:

Google Maps Timeline

It is a personal mapping feature of the Google Maps app that automatically creates a digital record of your movements and places visited. (Google, n.d.) By visualizing your Location History data, it creates a detailed chronological map of your daily routes, visited locations, and travel patterns.

Strava

Strava is a social fitness platform that combines workout tracking, route discovery, and community engagement in one hub. (Strava 2025) The app records various activities, like runs, rides, hikes, yoga, etc. and supports discovery of routes based on community data or creating your own.

Dérive app

It is a platform that encourages users to explore urban spaces randomly and playfully, merging Situationist principles with digital technology. (Dérive app, n.d.) It aims to break people out of

their repetitive urban routines by suggesting alternative paths and perspectives, allowing them to discover new experiences in familiar spaces.

Run an Empire

This is a location-based game that turns city streets into a competitive battleground. Players walk or run to capture territory, expanding their digital empire while exploring their surroundings. (Run An Empire, n.d.) By combining fitness tracking with strategy and gamification, it encourages physical activity and playful urban engagement.

4.2.1 Analysis

The table below provides a detailed analysis of four tools—Google Maps Timeline, Strava, Dérive App, and Run an Empire. They are evaluated across dimensions adapted from the paper "A Preliminary Design Vocabulary for Interactive Urban Play" (Chew, Loke, and Hespanhol 2020) - distribution, playability, purpose, activity, experience.

Dimension	**Google Maps Timeline**	**Strava**	**Dérive**	**Run an Empire**
Distribution	**Along the way:** records and maps users' journeys, connecting visited locations.	**Along the Way**: Focuses on routes and paths that guide users for fitness and exploration.	**Scattered Stops:** Suggests unstructured exploration across urban locations, disrupting routine pathways.	**Scattered Stops:** Uses scattered territories as interaction points, gamifying the urban environment.
Playability	**Augmentation**: Adds layers of personal meaning to places by allowing users to annotate and revisit spaces.	**Appropriation:** Users actively engage with routes, creating their own paths or contributing to a shared dataset.	**Appropriation:** Encourages users to reinterpret spaces by assigning personal meaning through random prompts.	**Reconfiguration**: Gamifies urban environments, turning spaces into virtual territories for strategic play.
Purpose	Documenting journeys, mapping spatial memories	Track and visualise activities, discover routes	Explore places, disrupt routine	Explore places, gamify running
Activity	Revisiting places, adding personalized notes or pins to locations.	Running, cycling, hiking, and sharing routes or fitness achievements.	Wandering and responding to randomized prompts	Running or walking to capture, defend, or expand territories.
Experience	Cognitive Reflection Through Spatial Memory	Social Cohesiveness and Intellectual Stimulation	Emotional Curiosity and Playfulness	Social Cohesiveness and Gamified Exploration

Table 2 Comparative Analysis of the four applications

4.2.2 Takeaways

The comparative analysis of Google Maps Timeline, Strava, Dérive App, and Run an Empire highlights distinct approaches to urban exploration, engagement, and playability. While each tool offers strengths in tracking movement, gamifying activity, or disrupting routine, they also present opportunities for enhancement—particularly in fostering curiosity, emotional connection, and reflective engagement with urban spaces.

This section outlines key takeaways from the analysis, identifying potential design directions for creating more immersive, personalized, and meaningful urban exploration experiences.

	Google Maps Timeline	**Strava**	**Dérive**	**Run an Empire**
Strengths	Helps users visually track and revisit places, providing spatial memory map.	Encourages exploration of new routes through data, heat maps of activity provide a good visual element	Provides fun tasks that help rediscover familiar spaces by disrupting routines.	Encourages running and makes being active fun through gamification and competitive elements.
Weakness / Opportunities	Visual for places not explored, limited spontaneous discoveries	Heat maps focus on activity but can be adapted to focus on emotions logged.	Experience submitted isn't geo-tagged on the map to provide a visual of all experiences.	Focuses on running and not reflective engagement with the places while walking

Table 3 Strengths and weakness or opportunities of the four applications

4.3 Non-Commercial Projects

Beyond commercial applications, several non-commercial projects have explored urban exploration through interactive, artistic, and participatory methods. These projects transform urban spaces into playgrounds, artistic canvases, and sites of personal memory, offering alternative ways of engaging with cities beyond conventional navigation tools. Some of the selected projects are:

Energy Harvesting Dérive

Energy Harvesting Dérive, created by interactive designer and researcher X.N. Croft in collaboration with Kate Hartman, is an experimental urban mobility project that modifies Heelys wheeled sneakers to generate electricity from movement. The system captures kinetic energy as users navigate urban spaces, blending physical exploration with sustainable energy practices. (Croft, n.d.) This project explores how movement can be transformed into an energy-conscious act of engagement with the city.

Come Out & Play Festival

The Come Out & Play Festival, first launched in New York City in 2006, is an urban game festival that turns city streets into interactive playgrounds. It features games designed by artists, designers, and technologists to encourage public participation and playful engagement with urban spaces. (Come Out & Play, n.d.) This project falls within the discipline of game design and urban public space activation, emphasizing collaborative, social, and site-specific play to reimagine urban environments.

Big Urban Game

Big Urban Game (B.U.G.), created by game designer Katie Salen and the University of Minnesota's Design Institute, was a city-wide interactive play experiment conducted in 2003. The project involved moving three 25-foot inflatable game pieces through the streets of Minneapolis, Saint Paul, and Bloomington. Participants worked together to strategically transport the game pieces, creating a large-scale interactive urban mapping experiment. (Salen 2003) The project encourages city residents to actively reimagine urban environments.

Me, You, and Everywhere We Go

Initiated in 2003, *Me, You, and Everywhere We Go* is an ongoing GPS-based mapping project by the British performance duo Plan b (Sophia New & Daniel Belasco Rogers). The artists, based in Berlin and London, have been continuously tracking their movements with GPS, creating intricate visual records of their daily routes. Their work explores personal spatial memory, habitual patterns, and the documentation of lived experiences in urban space. (New and Rogers 2010) This project transforms daily movement into a form of self-reflection and spatial storytelling.

4.3.1 Analysis

The table below provides a detailed analysis of four projects evaluated across dimensions adapted from the paper "A Preliminary Design Vocabulary for Interactive Urban Play" (Chew, Loke, and Hespanhol 2020) - distribution, playability, purpose, activity, experience.

Dimension	**Energy Harvesting Dérive**	**Come Out & Play Festival**	**Big Urban Game**	**Me, You, and Everywhere We Go (plan b)**
Distribution	**Along the way**: Movement is unrestricted, exploration is tied to generating energy.	**Scattered stops**: Games are set in various urban locations, activating multiple sites.	**Scattered stops:** Large-scale objects move through the city, encouraging participation.	**Along the way**: Participants track and map movement as a form of self-documentation.
Playability	**Augmentation:** Enhances movement by adding a functional layer—energy harvesting.	**Appropriation:** Transforms urban spaces into interactive game zones.	**Reconfiguration:** The city becomes a dynamic game board for collective play.	**Augmentation:** Uses GPS tracking to turn everyday movement into an artistic map.
Purpose	Combining physical movement with sustainable energy generation.	Creating social and playful engagement in urban environments.	Encouraging public participation in urban design and city-wide awareness.	Documenting movement patterns as a way of understanding place and personal geography.
Activity	Navigating the city while generating power through movement.	Participating in various games, interacting with public spaces.	Moving oversized game pieces through the city to shape urban perception.	Tracking personal movement patterns and visualizing daily routines through GPS.
Experience	Sensory awareness and sustainability-focused exploration.	Social cohesion and spontaneous public engagement.	Visualizing and reinterpreting urban environments through large-scale play.	Personal reflection, memory formation, and intimate mapping of everyday journeys.

Table 4 Comparative Analysis of Non-Commercial Projects

4.3.2 Takeaways

These projects showcase diverse ways of engaging with urban spaces, yet they do not explicitly address how newcomers develop long-term place attachment**.** The following insights inform my tool's design by highlighting opportunities to build deeper emotional, cognitive, and behavioral connections to a place.

	Energy Harvesting Dérive	**Come Out & Play Festival**	**Big Urban Game**	**Me, You, and Everywhere We Go (plan b)**
Strengths	Encourages energy-conscious movement, offering a new perspective on urban mobility.	Engages communities through physical, participatory, and site-specific play.	Creates large-scale, city-wide engagement, drawing public attention to urban design.	Highlights the overlap between personal movement, spatial memory, and artistic representation.
Weaknesses / Opportunities	Focuses on energy use but lacks elements that reinforce memory-building of places.	Event-based, meaning engagement is temporary rather than long-term.	Limited replayability; engagement is tied to specific moments.	Primarily focused on self-reflection rather than encouraging new exploration.

Table 5 Strengths and Weakness or Opportunities for Non-Commercial projects

4.4 Synthesis

The comparative analysis of commercial and non-commercial tools highlights distinct approaches to urban exploration. While commercial applications prioritize efficiency, navigation, and gamification, non-commercial projects focus on play, memory, and personal engagement with space**.** However, most existing tools emphasize short-term interactions rather than building long-term place attachment, particularly for newcomers**.** This gap presents an opportunity to design a tool that supports both spontaneous discovery and sustained engagement, encouraging users to develop deeper cognitive, emotional, and behavioral connections to place over time.

5. Exploration of Mediums and Interfaces

As part of the Research through Design (RtD) approach and the Discover phase of the Double Diamond framework, this phase involved an iterative process of exploring various digital mediums and interfaces to assess their potential for supporting place attachment through urban exploration**.** This divergent approach embraces exploratory making as a way of uncovering insights about user experience, engagement, and interaction.

5.1 Initial explorations

The investigation included photogrammetry, augmented reality (AR), projection mapping, and mobile interfaces, each representing a different level of digital intervention in the exploration of place. By building and testing low-fidelity prototypes, this phase examined how these mediums influence cognitive, emotional, and behavioral interactions with physical spaces. This section summaries the learning from prototyping with mediums which I did not move forward with but provided valuable insights in digital interactions with physical spaces.

Photogrammetry: Examines how 3D spatial reconstructions from photographs can preserve and visualize urban environments. The findings highlight photogrammetry's potential for archival documentation but also its limitations in fostering active user engagement.

Augmented Reality (AR): Explores AR's role in overlaying digital information onto real-world environments, allowing interactive spatial experiences. However, the study identifies challenges related to screen reliance and accessibility.

Projection Mapping: Investigates spatial augmented reality through projection-based interactions, removing the need for personal screens. This method enhances public engagement but requires controlled environments and specialized equipment.

A detailed examination of these prototypes and mediums explored can be found in the *Appendix A: Exploration of Mediums*. Building on these learnings, the next section focuses on mobile interfaces as a medium for urban exploration.

5.2 Mobile Interface

Returning to a familiar, portable, and adaptable platform, I explored mobile interfaces as a means of facilitating real-time interaction with urban environments. Mobile interfaces refer to user interactions through smartphones and tablets, utilizing touchscreens, sensors, and real-time connectivity to provide location-based and context-aware engagement. Unlike AR, which requires continuous visual focus, mobile interfaces allow for intermittent screen engagement, ensuring that users remain present in their surroundings while interacting with digital content.

Inspired by psychogeographic principles and Shawn Micallef's *Stroll* (2010), I developed an Emotion Mapping Tool to document emotional responses to urban spaces. Similar to Micallef's use of walking as a means of reading and interpreting the city, this tool enabled users to log their thoughts, feelings, and observations at specific locations.

The tool allowed for:

- Logging experiences by tagging emotions, views, and reflections at precise locations.
- Color-coded markers on an interactive map, where each color corresponded to a logged emotion.
- A timeline slider to track experiences over time, uncovering patterns between environment and well-being.
- Implementation using HTML, CSS, Google Maps API, and GPS tracking, hosted on GitHub.
- Logged data storage within the browser and accessible through a link.

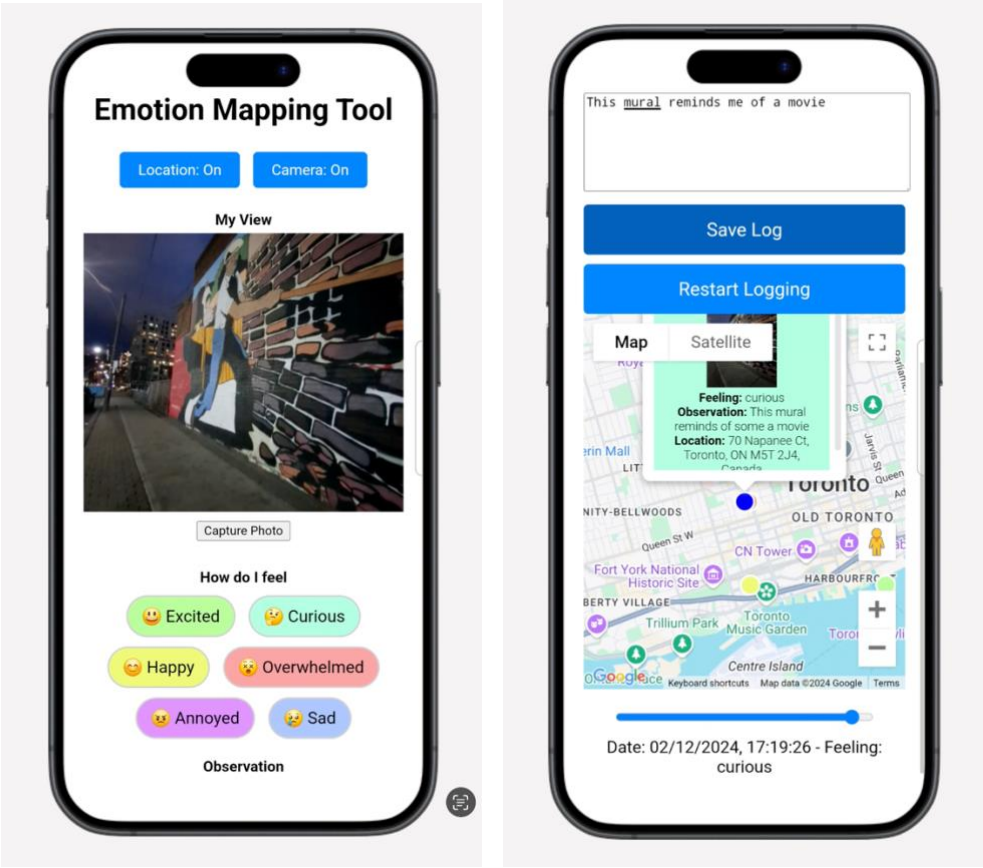

Figure 4 Snapshots of Emotional Mapping Tool

Link: Screen recording video of [Emotion Mapping Tool]

Takeaways

My takeaways as a user of this tool were:

- Logging emotions increased attentiveness to surroundings, revealing spatial patterns previously unnoticed.
- The tool presented a paradoxical effect, where a digital medium enhanced real-world presence rather than detracting from it.

- Unlike AR, which demands continuous screen focus, the mobile interface allowed for engagement at specific moments only, balancing interaction with presence in physical space.

5.3 Conclusion

This phase of exploration provided critical insights into the potential and limitations of various digital mediums. While photogrammetry, AR, and projection mapping each offered unique ways of engaging with urban space, mobile interfaces emerged as the most effective for enabling personalized, real-time reflection and exploration. The balance between interactivity, accessibility, and contextual engagement made mobile interfaces the most suitable foundation for the next phase of development.

6. Project Making

6.1 Defining goals, challenges and interaction model

After the Discover phase, which encompassed literature review, comparative analysis, and exploration of digital mediums, the Define phase synthesized key insights to establish the project direction, objectives, and technical approach. This phase clarified the goals, challenges, and core interaction model that would shape the Develop phase that involves the iterative prototyping process.

6.1.1 Project Goals

The project aimed to develop a tool that supports newcomers in exploring and connecting with unfamiliar urban environments. It encourages urban exploration to facilitate place attachment by integrating the process dimension that engages the behavioral, emotional and cognitive interactions (see Figure 22) to deepen attachment with urban spaces. Unlike other tools and projects this project prioritizes discovery, personalized interactions, and engagement**,** helping newcomers build familiarity and confidence in their surroundings.

Figure 5 Project Goals for this thesis (Diagram by Author)

6.1.2 Key Design Challenges

Insights from existing tools and projects and exploration of mediums revealed several challenges that needed to be addressed:

Interaction and Engagement

- Balancing structured interaction with open-ended exploration, allowing users to engage at their own pace rather than following rigid prompts or predefined routes.
- Minimizing screen reliance while maintaining meaningful digital interaction to ensure direct sensory engagement with the physical environment.

Accessibility and Usability

- Encouraging long-term engagement by ensuring interactions are not limited to a single-use experience but evolve over time, reinforcing personal connections to space.
- Ensuring ease of use by avoiding reliance on specialized hardware, external apps, or complex interactions that could create barriers to engagement.

Documentation and Reflection

- Bridging spontaneous exploration with memory-building, allowing users to engage in real-time while also creating a record of their interactions for future reflection.
- Making spatial data meaningful, ensuring that location-based documentation provides insights into patterns, relationships, and personal experiences with place rather than becoming a passive activity.

6.1.3 Core Interaction Model

Based on these goals and challenges, the interaction model was structured as a browser-based mobile interface integrating location-based logging and visualization. This decision was informed by:

Location-Based Exploration and Documentation

- GPS-based spatial tracking to enable real-time logging of experiences.
- A map-based interface to visually represent movement, emotional responses, and spatial interactions over time.

Scalability and Adaptability

- Designed for flexible use across different locations and contexts, without requiring pre-existing datasets or fixed points of interest.
- Browser-based implementation for rapid prototyping, enabling quick iteration and testing before transitioning to a more robust native application.

6.2 Iterative Prototyping

With the project goals, challenges and interaction model established, the project moved into the Develop phase of the Double Diamond framework, where concepts were refined through iterative prototyping. This phase followed a Research through Design (RtD) approach, using continuous cycles of prototyping, testing, and evaluation to explore how users interact with the tool and how the interface could be improved. Figure 23 illustrates the evolution of the interface across three prototype iterations, showcasing progressive refinements in design and functionality.

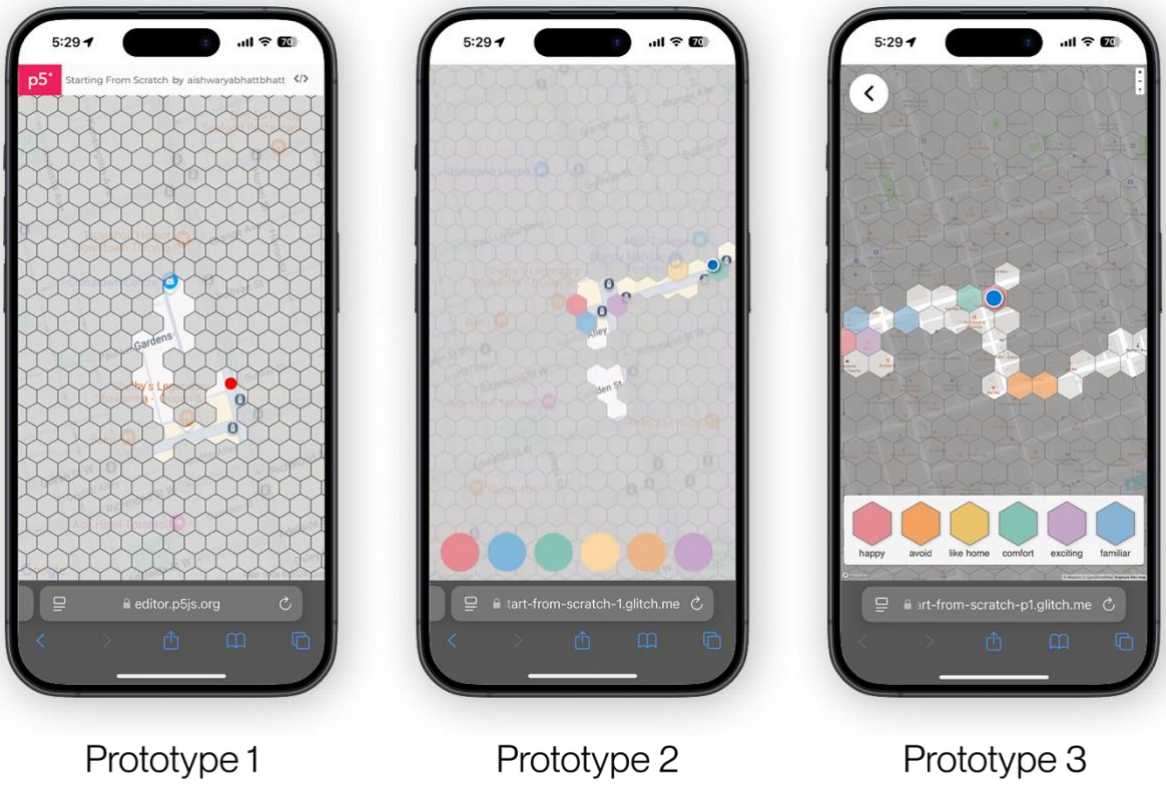

Figure 6 Evolution of the interface across three prototype iterations

6.2.1 Prototype 1

With the Emotion Mapping Tool addressing the emotional interactions with a place, the next step was to incorporate the behavioral dimension by encouraging active movement and exploration. For newcomers, navigating a new city often means starting from scratch, with a blank map. The process of building familiarity requires active engagement with the environment rather than passive observation. To reflect this process, I introduced the virtual scratch card concept, which overlays the city map with an opaque, interactive grid that reveals the underlying map only through movement.

Virtual Scratch Card Concept

A scratch card, commonly used in lotteries and promotional offers, consists of a concealed surface that can be physically scratched off, usually using a coin, to reveal hidden content underneath. This mechanic creates a sense of anticipation and reward, as the act of revealing the hidden content becomes an interactive experience.

Figure 7 Example of a Scratch Card

Inspired by the way newcomers gradually uncover their city; this metaphor was applied to urban exploration by transforming the map into a concealed, interactive surface. (line to be removed – reworked line below) For newcomers, navigating a new city often means starting with a blank mental map that is gradually filled with experience over time. To reflect this experience visually, the tool applies the scratch-off metaphor, where movement reveals sections of an initially obscured digital map.

Users would "scratch off" covered map sections by physically moving through the physical places, reinforcing the connection between active exploration and place attachment. Just as a scratch card rewards the user for engaging with it, this prototype aimed to make movement a more intentional and engaging process. The intention was to introduce an element of playfulness by encouraging users to move beyond paths that are already explored while engaging more actively with their surroundings.

Hexagonal Grid Overlay

To implement the scratch card metaphor effectively, the interactive map overlay was structured using a hexagonal tessellating grid, chosen for its advantages in spatial representation and movement tracking. Unlike square grids, which create distortions and unequal distances between adjacent cells, hexagonal grids provide seamless omnidirectional movement, ensuring that areas revealed through exploration align naturally with real-world navigation. (McKenzie 2009)(McKenzie 2009) Each hexagonal cell maintains equal distance to its neighbors, offering a more balanced and continuous spatial representation.

Beyond its geometric advantages, hexagonal grids are widely used in geospatial analytics due to their ability to minimize edge effects and gaps, creating smoother transitions between explored and unexplored areas. (McKenzie 2009) In this prototype, the hexagonal tiling system helps visualize exploration more organically, ensuring that discovered areas expand naturally as users move through the city.

Additionally, the system aligns with global hierarchical grids like H3, a spatial indexing framework developed by Uber, designed to map movement patterns at multiple resolutions. Unlike traditional grid systems, H3 enables scalable data storage and efficient geospatial computations, making it an effective model for tracking and visualizing real-time exploration. By leveraging this structure, the prototype benefits from enhanced spatial accuracy and adaptability, ensuring that the interface can evolve with future iterations.

Moving to p5.js

To implement the scratch card concept and the hexagonal grid, I transitioned from the HTML-based webpage hosted on GitHub for the Emotion Mapping Tool to p5.js, a JavaScript library designed for creative coding and rapid prototyping. The decision to use p5.js was driven by its simplicity and flexibility, allowing for rapid iteration and real-time adjustments to both functionality and design. Unlike static mapping solutions, p5.js enabled dynamic interaction, ensuring that movement through the city translated directly into an evolving visual experience.

The integration of the p5 geolocation library further enhanced the prototype by providing lightweight and efficient user tracking. This allowed for precise geographical positioning, making it possible to have an interactive overlay that progressively revealed the city as users moved. By removing deployment overhead and enabling direct in-browser testing, this workflow facilitated faster experimentation, allowing the focus to remain on refining the interaction.

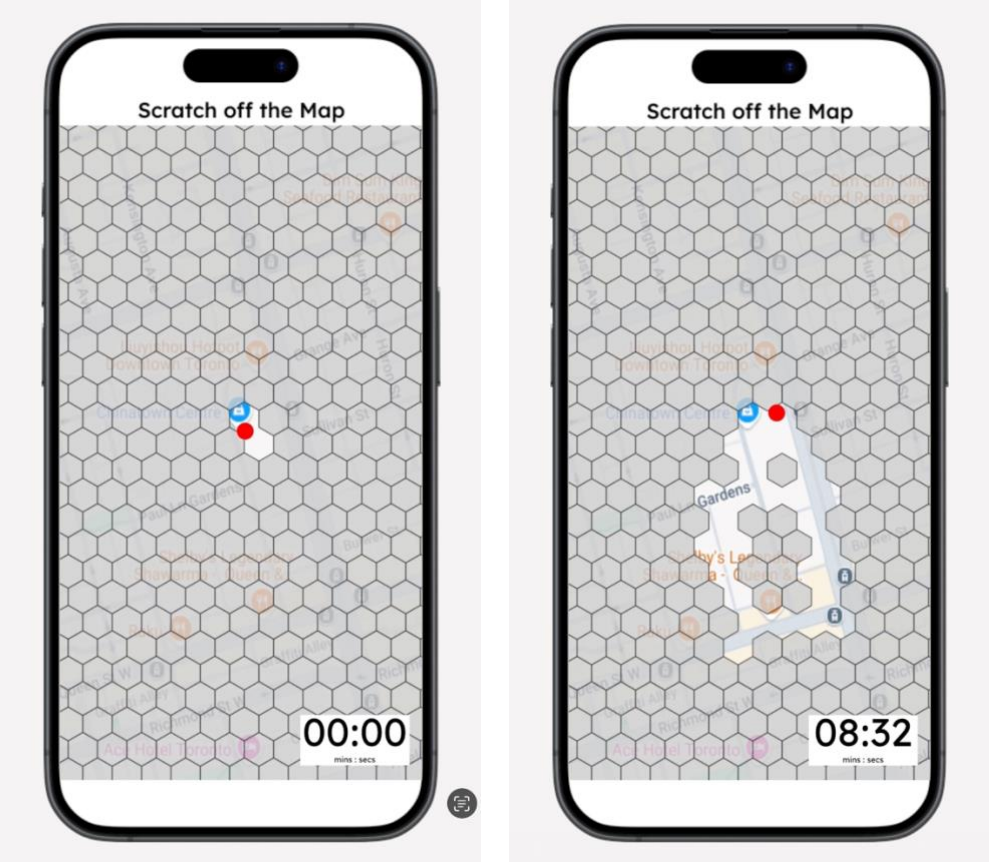

Figure 8 Prototype 1: Scratch off the Map

Link: Screen recording video of Prototype 1

Limitations

This initial prototype demonstrated the potential of movement-based interaction in urban exploration. However, its implementation revealed key limitation that needed to be addressed for a more seamless experience:

Screen Persistence: As the prototype is browser-based, the phone screen must remain on continuously for movement tracking, which may interfere with natural exploration habits.

Screen Boundaries: The prototype centers the user's starting location, but due to the use of a static Google Maps API, once the user moves beyond the initial viewport, the interaction becomes hidden, restricting continuous engagement.

Key Insights

The prototype highlighted areas for refinement:

Beyond Movement: While the scratch card metaphor encouraged exploration, it lacked deeper engagement with place-based experiences. Future iterations could integrate emotional or reflective inputs to add personal meaning.

Visual Refinements: There were opportunities to refine how it displayed exploration progress. Adjusting color, opacity, or data layers could make the visual feedback more intuitive, helping users understand their movement patterns at a glance.

Saving data: The prototype provided immediate feedback but did not allow users to track evolving connections to places over time by saving the logged location data. Future iterations could preserve past journeys for reflection.

6.2.2 Prototype 2

Building on the insights from Prototype 1, the next iteration aimed to integrate emotional interactions alongside behavioral exploration. To address this, the second prototype introduced emotional logging, allowing users to record their emotions at specific points during their exploration. (see Figure 26-27)

Integrating Emotional Logging

In this iteration, users could log emotions by selecting from predefined categories, each represented by a distinct color. When an emotion was recorded, the hexagonal grid cell at the user's location was filled with the corresponding color, visually linking spatial movement with emotional responses. For example:

- A park evoking calmness could be shaded blue.
- A bustling public square inducing overwhelm might be marked red.

This addition helped integrate the emotional and behavioral dimensions of place attachment, allowing the prototype to capture not only where users moved but also how they experienced those places.

Moving from p5.js Editor to Glitch

To enhance functionality and streamline the iterative process, I hosted the p5.js sketch on Glitch, an accessible platform for deploying and testing web-based applications. One could access the prototype through a web link. Hosting the prototype on Glitch introduced:

- A server-based structure, allowing logged colors and locations to be saved in JSON files which can be reloaded when the project is refreshed.
- Session continuity, enabling users to accumulate data over multiple interactions rather than starting fresh each time.
- Scalability, creating a more adaptable foundation for future iterations.

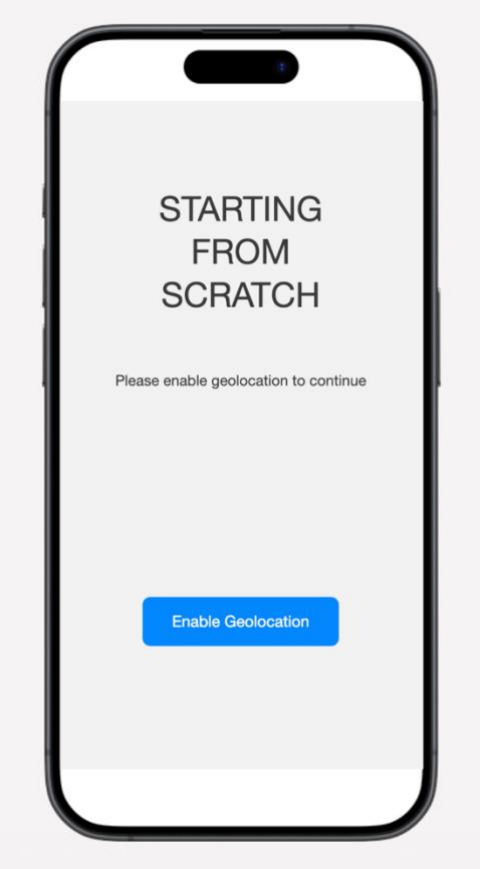

Figure 9 Prototype 2: Home Page

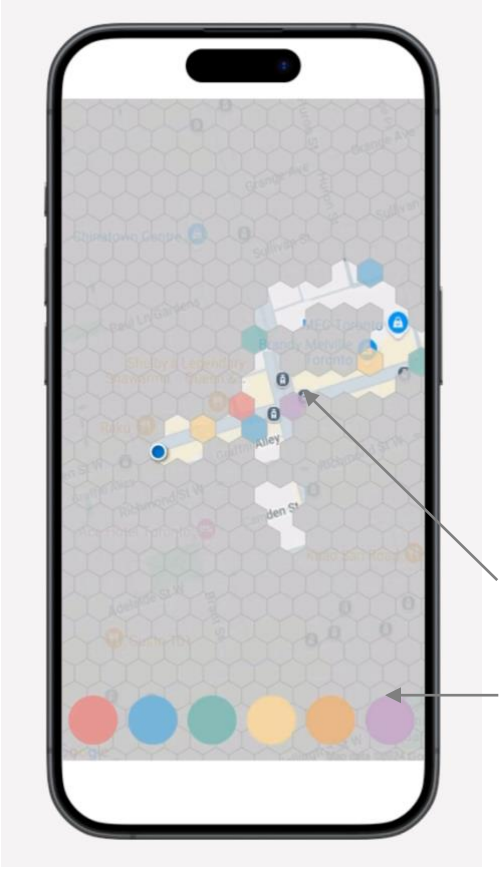

Figure 10 Prototype 2: Map Page

Link: Screen recording video of Prototype 2

Limitations

While this iteration introduced emotional logging, it revealed several technical and design challenges that needed refinement:

Limited Emotional Nuance: Emotions were logged as single, discrete values rather than allowing users to express varying intensities or evolving feelings over time. This reduced the depth of emotional representation, making it difficult to capture how a user's perception of a place might change throughout their exploration.

Grid and Map Misalignment: The grid was drawn on the canvas, while the map was positioned based on geographic coordinates, causing a misalignment between the two. This issue became more pronounced when loading the project in a new location, as the grid remained fixed on the screen while the map repositioned itself dynamically, leading to inaccurate tracking of explored areas.

Fixed Screen Position: The map and grid remained static, meaning users could not pan or navigate beyond the initial screen viewport. As a result, once users moved beyond the visible portion of the map, their exploration progress became inaccessible, limiting the continuity of engagement and restricting interactions to a confined space.

Key Insights

While this iteration successfully integrated emotional logging, several insights emerged that shaped the direction of the next prototype. These insights highlighted the need for greater personalization, deeper reflection, and contextual awareness in capturing users' emotional experiences with place.

Personalized Emotional Representation: While the colors representing emotions were yet to be defined in this prototype, it became evident that not all users experience places through a fixed set of predefined emotions. This highlighted the opportunity to allow users to assign their own meanings to colors, creating a more personalized and flexible emotional mapping system.

Deeper Reflection and Engagement: The prototype primarily focused on logging emotions, but there was potential to deepen user engagement by integrating reflection prompts. These prompts could encourage users to think more critically about their experiences and provide richer insights into their emotional connections to different locations.

6.2.3 Prototype 3

While the previous version allowed users to record emotions at specific locations, it became evident that a predefined set of emotions might not fully capture individual experiences. To address this, this prototype introduced the ability for users to assign personal meaning to colors, allowing them to log such associations and experience to places and not just emotions.

By enabling users to define their own emotional representations, this iteration not only made emotional mapping more flexible and user-driven but also aligned with the Research through Design (RtD) approach. It created an opportunity to generate new knowledge about the diverse ways individuals interpret and experience place attachment.

Moving from Google Maps API to Mapbox API

To address the technical limitations of grid and map misalignment and the inability to pan the map, this iteration transitioned from Google Maps API to Mapbox API. While Google Maps API provides a robust mapping service, its default implementation is optimized for standard navigation rather than custom overlays or interactive modifications. The static nature of Google Maps tiles made it difficult to align the hexagonal grid precisely with geospatial coordinates, leading to distortions when users moved beyond the initial viewport.

Mapbox API was selected for its greater flexibility in customizing map layers and interactions. Unlike Google Maps, Mapbox supports custom tile layers, allowing the hexagonal grid to be directly integrated with the map in a way that ensures consistent alignment across different locations. Additionally, Mapbox provides native support for panning and zooming, enabling a more fluid user experience where exploration is not restricted to the initial screen view.

By switching to Mapbox, this iteration resolved previous constraints on spatial accuracy and movement tracking, ensuring that the explored areas remained visible and that the grid system adapted dynamically to user movement. This change provided a more scalable foundation for future iterations.

Refining Data Storage: Consolidating Logged Data

In Prototype 2, the prototype stored logged colors and hidden hexagons in separate JSON files, which led to misinterpretations and inaccuracies when loading the map. This resulted in instances where certain hexagons failed to load with the correct colors or where the hidden and revealed areas did not align properly.

To address this issue, Prototype 3 consolidates all logged data, including color assignments and hidden/revealed states, into a single JSON file. This adjustment ensures that every hexagon retains both its visibility state and assigned meaning, preventing inconsistencies. It also streamlines the loading process by reducing errors in rendering the correct color and exploration state when users return to their maps. Additionally, maintaining a unified data structure improves overall data management, making it easier to process, edit, and expand the dataset for future iterations. By merging all data into a single source, Prototype 3 enhances reliability, ensuring that users' recorded experiences remain intact and accurately represented.

Introducing Onboarding Screens

In the previous prototype, the user experience began with a home screen that simply requested geolocation permissions, after which the user was taken to the map screen. However, this iteration introduces onboarding screens to guide first-time users through the core functionalities of the tool. These screens help users understand how the tool encourages urban exploration, interactive mapping, and personal meaning-making.

The onboarding flow (see Figure 28-32) includes:

1. **Home page** – Introduces the tool name “Starting from Scratch”
2. **Welcome Screen** – Introduces the concept of urban exploration and personal storytelling.
3. **Scratch Off the Map** – Explains the movement-based interaction, where walking reveals parts of the map.
4. **Tag Places with Meaning** – Describes how users can mark locations with personalized colors, shaping their own experience-based maps.

Figure 11 Prototype 3: Page 1- Home Page

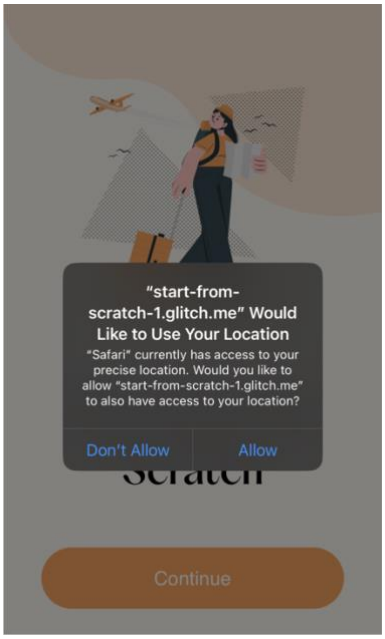

Figure 12 Prototype 3: Page 1- Geolocation Permissions

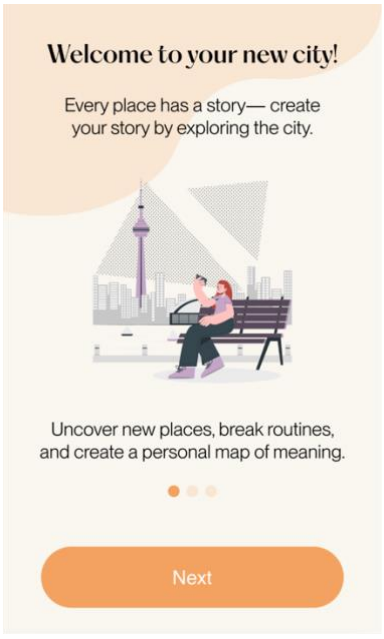

Figure 13 Prototype 3: Page 2- Onboarding 1

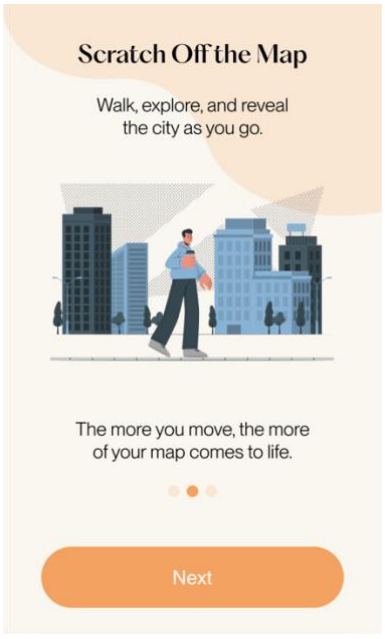

Figure 14 Prototype 3: Page 2- Onboarding 2

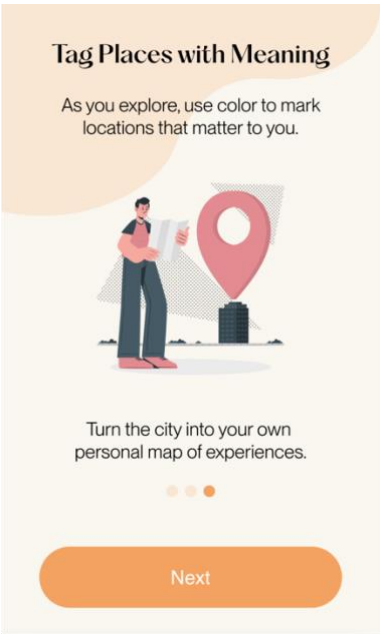

Figure 15 Prototype 3: Page 2- Onboarding 3

Assign Meaning Screen

A new screen was introduced to support assigning personal meaning to locations. (see Figure 33-34) This feature expands on the color-based tagging system, allowing users to define their own interpretations for different locations. Instead of being confined to predefined emotions, users can select colors based on either emotions or experiences. This customization process is designed to support a more flexible, personal engagement with place attachment. When users select a color, the assigned meaning is saved into a separate JSON file, enabling persistent logging of place-based experiences.

Figure 16 Prototype 3: Page 3- Assign Meaning

Figure 17 Prototype 3: Page 3-Input Option

Map Screen

The map screen in Prototype 3 features the dynamic hexagonal grid overlay, that reveals as users physically move through space. Built with Mapbox API**,** the map ensures accurate alignment of the grid with real-world locations, allowing panning and zooming of the map. At the bottom of the screen, color-coded buttons display the meanings assigned in the previous “Assign Meaning” step. Clicking a button assigns its color to the hexagon at the user's current location, and selecting a different color updates it. The logged data, including assigned colors and revealed hexagons, is saved in a JSON file for future use. (see Figure 35-37)

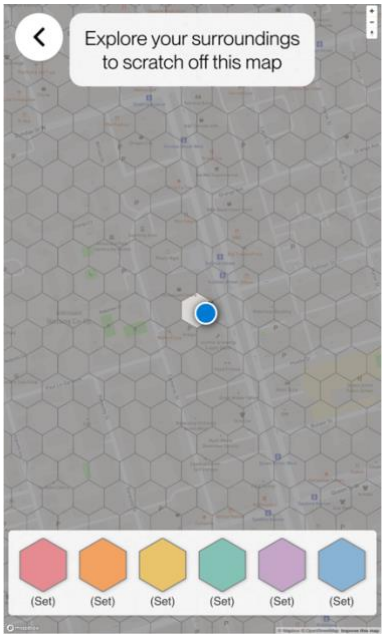

Figure 18 Prototype 3: Page 4- Map Page with prompt

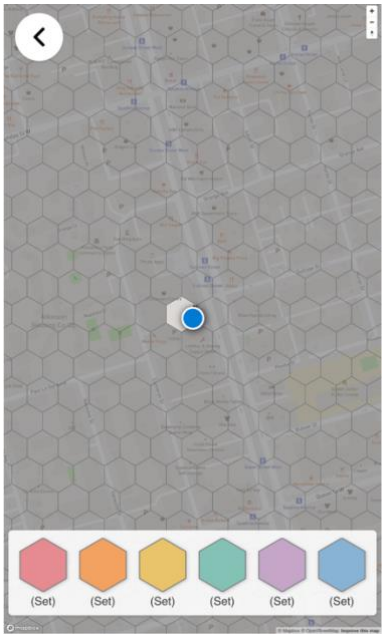

Figure 19 Prototype 3: Page 4-Map Page (Initial State)

Figure 20 Prototype 3: Page 4- Map Page (Post-Exploration)

Refining UI Elements for Intuitive Interaction

Several refinements were introduced to improve usability and engagement:

- Added illustrations to the onboarding flow, making the interface more visually engaging and welcoming.
- A back button was added to the Map screen, allowing users to go back to the Assign meaning screen to revisit and change their assigned meanings
- Added contextual prompts, such as a note on the map screen encouraging users to explore to "scratch off" hidden areas.
- Introduced loading messages in areas where content takes time to load, improving feedback and preventing confusion.

This prototype is designed for mobile browsers. While it functions well on Safari, Edge, and Firefox, it may occasionally encounter map and geolocation issues on Chrome.

Link: Screen recording video of Prototype 3

7. User Testing

With the iterative refinements implemented in Prototype 3, the next step was to test the prototype with newcomers to gain user insights on how they interacted with the tool. Since the project aimed to support place attachment through urban exploration, testing with individuals who were still in the process of familiarizing themselves with a new city was essential.

This section outlines the user testing conducted to evaluate the tool's effectiveness in supporting urban exploration and place attachment among newcomers. It covers purpose and the testing procedure, including pre-exploration setup, the exploration phase, and post-exploration reflections. The participants and eligibility criteria ensure the study remains focused on individuals who recently relocated. Additionally, preparations such as scheduling, tool setup, and participant accommodations are detailed. Finally, the findings and results highlight user interactions, challenges, and insights for future refinements.

7.1 Description of the user testing

7.1.1 Purpose

User testing was a crucial phase of this study, examining how newcomers to a city engaged with the tool to support exploration and place attachment. By understanding how participants interacted with the tool during their exploration of a neighborhood in Downtown Toronto, the study assessed its usability, preferred features and the impact of the tool on the behavioural, emotional and cognitive interactions of the participants with the physical surroundings.

7.1.2 Participants

This study included eight individuals who had recently relocated to Toronto, providing qualitative insights into how newcomers form attachments to unfamiliar urban spaces. Participants had moved to the city within the past two years, ensuring relevance to the study's focus on early place attachment. They were comfortable spending approximately one hour exploring their neighborhood on foot and were willing to grant necessary phone permissions for location tracking to enable tool functionality. Basic familiarity with smartphones was also considered to ensure a smooth interaction with the digital interface.

7.1.3 Structure

The study was conducted in a user testing session, where participants explored a designated neighborhood in downtown Toronto for 30 mins – 1 hour while using the tool. The session followed a three-part structure: pre-exploration, exploration, and post-exploration.

1. **Pre-exploration Phase:** Participants were introduced to the study and given a brief demonstration of the tool. They were informed about the objectives of the session, which

included navigating their assigned neighborhood and using the tool to log the meanings to location. A pre-session survey was conducted to capture baseline data.
2. **Exploration Phase:** Participants independently explored the neighborhood while engaging with the tool. They paused and reflected on their physical surroundings and logged their experiences or meanings to create a visual record of their journey.
3. **Post-exploration Phase**: A short interview and a survey was conducted to assess the tool's usability, effectiveness, and impact on place attachment. Participants reflected on their experience and provided feedback on the emotional, cognitive, and behavioral aspects of their engagement with the environment. This feedback informed potential refinements and future iterations of the tool.

7.1.4 Preparation

Creating Individual Instances for Participants: To accommodate multiple participants while ensuring that each user's interactions remained distinct, I remixed the base project I developed on Glitch, creating multiple instances of the project on Glitch. This approach allowed participants to log their personal experiences without interference from others' data, enabling a clearer analysis of usage patterns and variations in how participants assigned meaning to locations.

Coordinating Participant Schedules: To facilitate the testing process, I coordinated time slots with participants to ensure availability at a mutually convenient time. Since the study required them to meet at a specific location before embarking on their walk and returning for the post-exploration discussion, scheduling was done in advance to streamline the process.

Creating a Structured Testing Guide: To maintain structure during the session, I prepared a presentation that guided me through the testing process. The presentation included an introduction to my study, QR codes for pre- and post-exploration surveys, and setup instructions such as adjusting phone display settings to remain on for continuous tracking. Additionally, a QR code linking directly to the tool was provided to simplify access.

Addressing Limitations: Since the tool required the phone screen to remain on, I provided a power bank to mitigate battery drainage concerns. Additionally, due to the extremely cold weather, I supplied touch pens so that participants wearing gloves could still interact with the tool effectively without needing to remove them.

Post-Exploration Refreshments: After their exploration, participants returned to the meeting point for the post-exploration phase. To create a more comfortable and welcoming environment, I provided light refreshments, including snack bars and peppermint tea, ensuring they had a moment to warm up and reflect on their experience before proceeding with the feedback session.

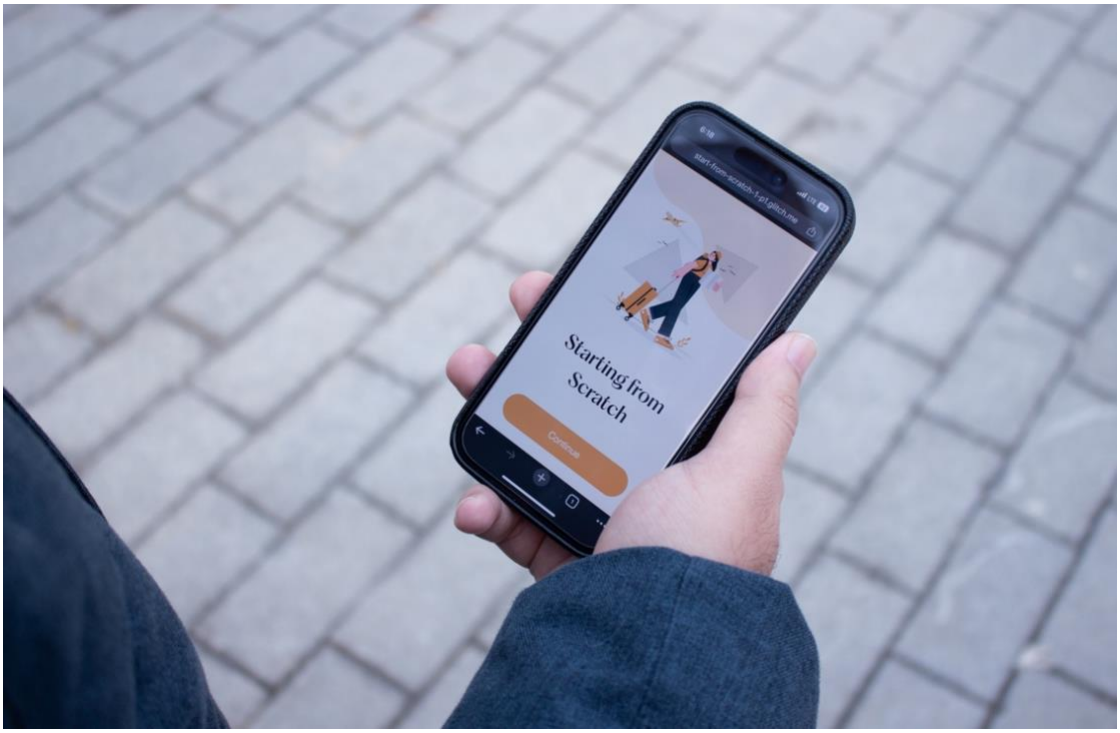

Figure 21 Participant opening the Home Page of the tool

Figure 22 Participant assigning meanings to the colors

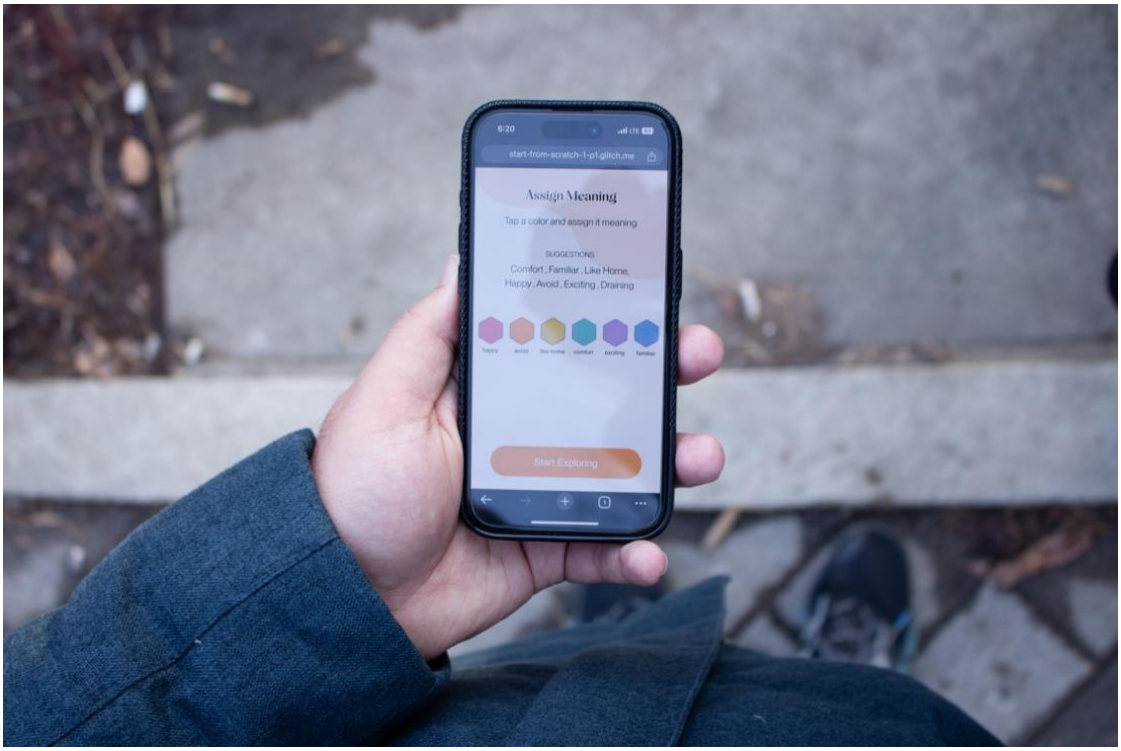

Figure 23 Meanings assigned by the participant

Figure 24 Participant's map after exploration

7.2 Findings

7.2.1 Participants overview

To contextualize the findings, it is essential to examine the 8 participants' backgrounds, length of residency in Toronto, and their existing relationship with the city and neighborhood**.** The study included individuals who had recently relocated to Toronto, with participants having lived in the city for a period ranging from 14 months to 2 years, with an average residency of approximately 1.6 years. This suggests that the participants were still in the adjustment phase of forming place attachment. Most participants had regular interaction with the neighborhood in which the user testing was conducted, suggesting that they had an existing, functional relationship with the neighbourhood.

Despite frequent visitation, participants' self-reported familiarity with the neighborhood varied. In terms of movement patterns, habitual navigation was dominant. Seventy-five percent (75%) of participants reported following mostly or entirely set routes.

The spatial data collected from participant interactions with the mobile tool reveals how individuals navigated urban space, assigned meaning to places, and engaged with their environment. This analysis examines two key datasets: **(1) Meaning Assigned** using the six colors**,** where participants categorized locations based on emotional and cognitive perceptions, and (2) **Participant-Generated Maps**, which illustrate movement patterns, areas of exploration, and clustering of meaningful spaces.

7.2.2 Meanings Assigned

The Assign Meaning feature was designed to encourage personalized experience allowing users to categorize locations through experience-based (e.g., discovery, routine, memory) or emotion-based (e.g., joyful, nostalgic, overwhelming) prompts. While these suggestions provided a structured starting point, I found that participants adapted the categories to their own interpretations, using them in unexpected and deeply personal ways. Some labeled places based on practical significance, such as a location their partner would enjoy, while others attached emotional weight to spaces, marking them as safe, overwhelming, or nostalgic. Seeing participants reinterpret the prompts to fit their own narratives reinforced my belief that place attachment is highly subjective, and that digital tools should be adaptable rather than prescriptive.

The table below (see Figure 43) shows the meanings assigned by the 8 participants to the different colors to tag physical locations.

Participant						
1	Happy	Avoid	Like Home	Comfort	Exciting	Familiar
2	Feeling responsible	Feeling happy	Feeling nervous	Feeling safe	Feeling tired	Feeling unsafe
3	Danger / Unfamiliar	Memorable	Exciting place	Peaceful trees	Unexplored yet	Familiar
4	Don't like this place	Great place to eat	Would like to try this place	Can have a picnic here	Great artwork I spot	Partner would like this place
5	Nostalgic food	Health	Joyful	Familiar	Tasks	Calm
6	Danger danger	Not sure	Discover	Fun / entertaining	Memory / Visit again	Calm and comforting
7	Avoid this	Fun	Convenient	Good food	Interesting	Come back later
8	Avoid	Joyful	Calm	Overwhelming	Adventure	Nostalgia

Figure 25 Meanings Assigned to Colors by Participants (by Author)

To better understand how participants assigned meaning to places, I analyzed their responses in two ways: feelings vs. experiences and positive, negative, or neutral associations. First, I separated meanings based on whether they described an emotion (e.g., "joyful," "overwhelming," "calm") or an experience (e.g., "great place to eat," "discover," "memory/visit again"). This helped show whether participants connected with places through personal feelings or through actions and interactions. (see Figure 44)

Participant						
1	Happy	Avoid	Like Home	Comfort	Exciting	Familiar
2	Feeling responsible	Feeling happy	Feeling nervous	Feeling safe	Feeling tired	Feeling unsafe
3	Danger / Unfamiliar	Memorable	Exciting place	Peaceful trees	Unexplored yet	Familiar
4	Don't like this place	Great place to eat	Would like to try this place	Can have a picnic here	Great artwork I spot	Partner would like this place
5	Nostalgic food	Health	Joyful	Familiar	Tasks	Calm
6	Danger danger	Not sure	Discover	Fun / entertaining	Memory / Visit again	Calm and comforting
7	Avoid this	Fun	Convenient	Good food	Interesting	Come back later
8	Avoid	Joyful	Calm	Overwhelming	Adventure	Nostalgia

Based on feelings
Based on experiences

Figure 26 Categorizing meanings based on feelings and experiences (by Author)

Next, I categorized the meanings as positive, negative, or neutral to see overall trends in how places were perceived (see Figure 45). Most places were labeled as positive or neutral, suggesting that participants were generally open to exploring and engaging with their surroundings. However, some locations were marked as negative (e.g., "avoid," "danger"), often indicating discomfort or unfamiliarity. This analysis shows that the tool helped participants reflect on both emotional and practical connections to places, shaping how they navigated and engaged with their environment.

Participant						
1	Happy	Avoid	Like Home	Comfort	Exciting	Familiar
2	Feeling responsible	Feeling happy	Feeling nervous	Feeling safe	Feeling tired	Feeling unsafe
3	Danger / Unfamiliar	Memorable	Exciting place	Peaceful trees	Unexplored yet	Familiar
4	Don't like this place	Great place to eat	Would like to try this place	Can have a picnic here	Great artwork I spot	Partner would like this place
5	Nostalgic food	Health	Joyful	Familiar	Tasks	Calm
6	Danger danger	Not sure	Discover	Fun / entertaining	Memory / Visit again	Calm and comforting
7	Avoid this	Fun	Convenient	Good food	Interesting	Come back later
8	Avoid	Joyful	Calm	Overwhelming	Adventure	Nostalgia

Positive
Negative
Neutral

Figure 27 Categorizing meanings based on positive, negative, neutral connotation

7.2.3 Participant Generated Maps

The maps generated by participants provide a visual representation of their movement patterns and meaning assignments, offering insights into how they explored and engaged with their surroundings. By examining these spatial patterns, we can better understand how the tool influenced exploration behavior, emotional connections to places, and the diversity of experiences across different locations. The following screenshots illustrate these individual exploration paths, showing how meanings were distributed across the mapped areas. (see Figure 46)

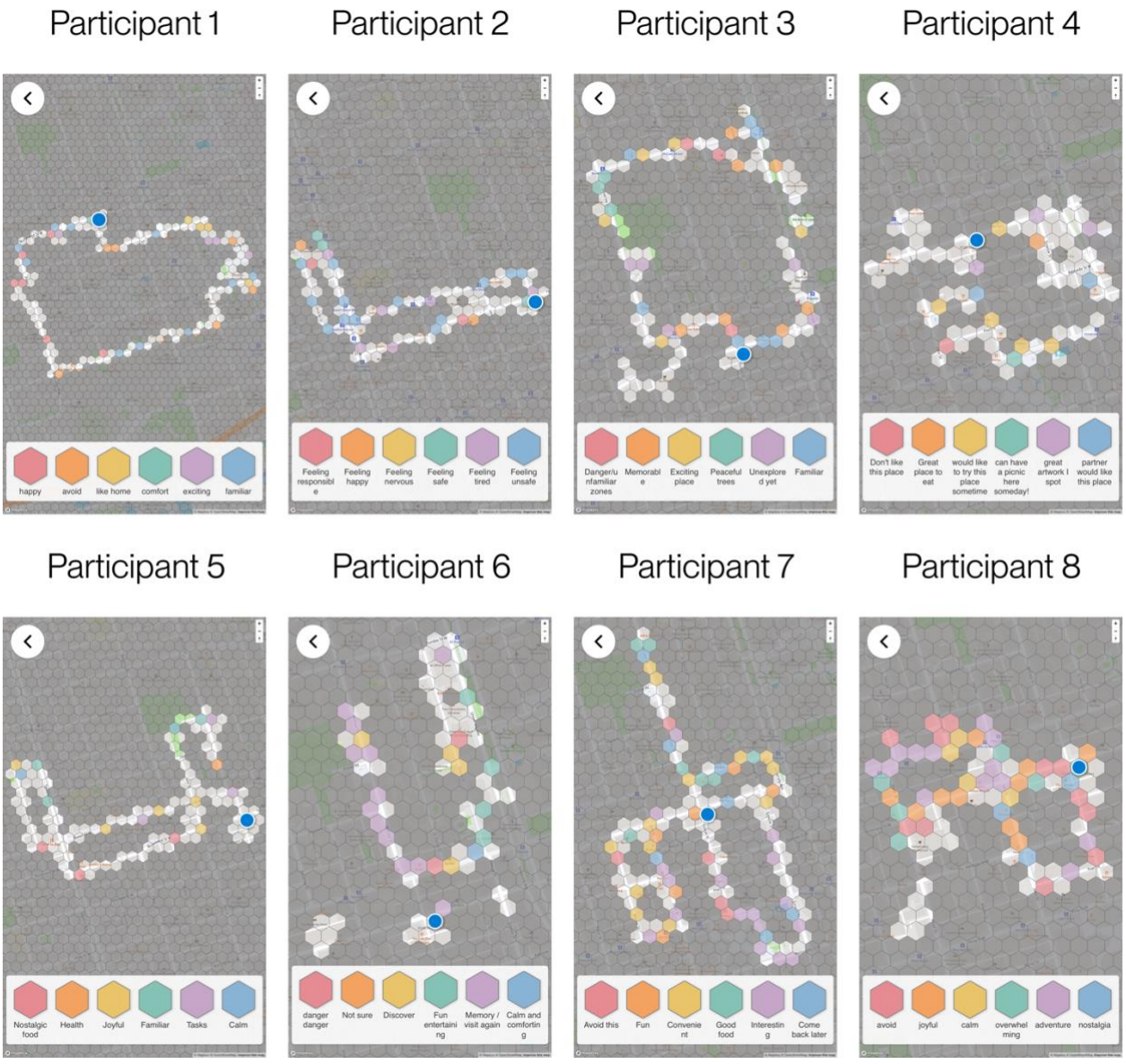

Figure 28 Screenshot of participant's maps after exploration

7.2.4 Impact on the Place Attachment

This section evaluates how the tool influenced participants' behavioral, emotional, and cognitive dimensions of place attachment, combining qualitative insights from the post-exploration survey data as well as interviews. While the survey asked participants to rate some statements based on a Likert scale to capture how much they agree or disagree with the statement, the semi-structured interview focused on asking more open-ended questions about their experiences using the tool.

To analyze the interview transcripts, data was categorized using six predefined codes, which also structure the following section. The codes were:

1. Behavioural Interactions: (A) Initial, (B) While using the tool
2. Emotional Interactions: (A) Initial, (B) While using the tool
3. Cognitive Interactions: (A) Initial, (B)While using the tool
4. Usability Feedback
5. Preferred Features
6. Technical Issues

Alongside the interview data, results from the post-exploration survey (C) and personal takeaways (D) were incorporated into sections 1–3 to provide a comprehensive analysis.

1. Behavioral Interactions

A. Initial interactions

Participants primarily followed routine-driven, goal-oriented movement patterns, using fixed routes for commuting to work, university, or essential locations. Even when visiting new places, they would go directly to their destination and return without further exploration, reinforcing a passive approach to movement.

One participant summarized this pattern, stating, *"Mostly when I walk around my neighborhoods, it's because I have to... like college or work. Not because I want to."* Another explained how their movement was largely passive, noting, *"I usually just go to university, follow the same routine and route every day."* This highlights how newcomers often experience the city through repetitive, task-driven movement, with little intentional exploration.

B. Interactions while using the tool

While using the tool, participants became more intentional in their exploration, actively choosing alternative routes and unfamiliar places, deliberately visiting areas they had previously ignored. Some described a shift to curiosity-driven movement, taking specific routes to discover unknown spaces.

During the interview, one participant reflected, *"I explored something I haven't before. Took a specific route back just to see an alternative."* The tool also introduced a game-like element of scratching off the map which motivated participants to "complete" or visit unexplored areas. As

one participant described, *"It almost feels like gamification... 'Oh, this is not explored, I have to go there.'"* This shift demonstrates how the tool encouraged users to break routine, step outside their comfort zones, and view exploration as a deliberate and enjoyable activity.

C. Survey Results

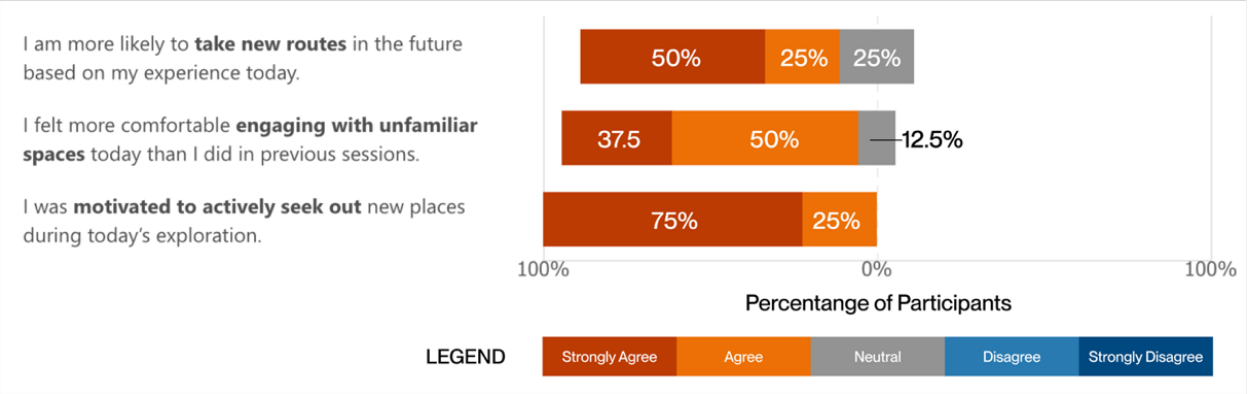

Figure 29 Post exploration survey results on Behavioral Interactions

D. Takeaways

The tool effectively encouraged active engagement with surroundings, prompting users to step beyond their usual routes and seek out unfamiliar places. The game-like effect of scratching off the map or revealing of the map worked well in motivating them to explore. The tool transformed exploration into a deliberate and enjoyable activity, reinforcing a sense of agency.

2. Emotional Interactions

A. Initial interactions

Before using the tool, newcomers displayed limited emotional engagement with their surroundings. Most of them shared that they rarely associated locations with personal meaning, and emotional awareness of their environment was generally low.

One participant expressed this detachment, stating, *"Normally, I'd just be focused on reaching one place, not really thinking about emotional connections."* This indicates that participants did not actively reflect on their emotional connections to spaces. For some, emotional connections to places existed but were not consciously acknowledged. One participant mentioned, *"I don't think it's about building a connection because the connection is already there. I was definitely more aware of it."*

B. Interactions while using the tool

While using the tool, participants became more emotionally aware of their surroundings. The act of categorizing places by emotions encouraged them to reflect on how spaces made them feel, leading to a stronger sense of connection to their neighborhood.

One participant described this shift, saying, *"It did make me feel a little closer to the neighborhood."* Another explained, *"The categorization helped me be more aware. I was able to make associations… good food here, avoid this area."* The process of assigning emotions or meanings to places made them more conscious of how they perceived their environment.

C. Survey Results

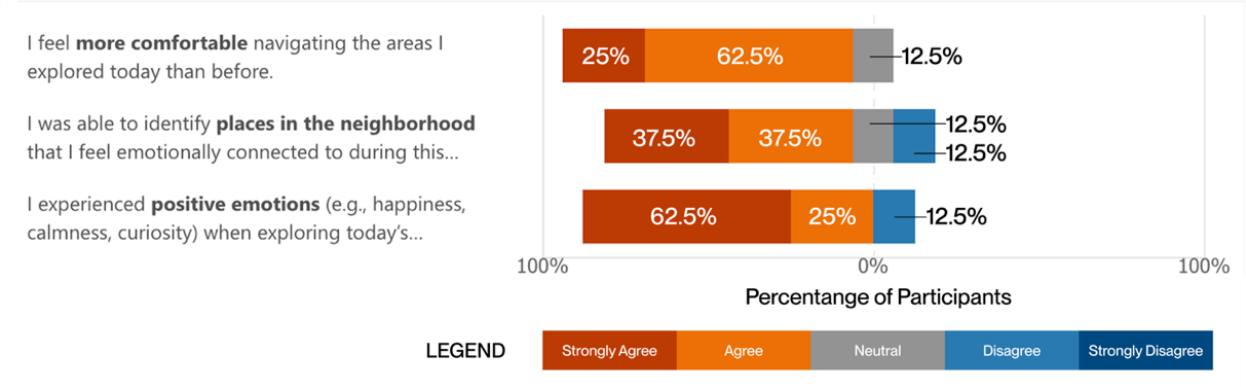

Figure 30 Post exploration survey results on Emotional Interactions

D. Takeaways

The tool transformed exploration from a neutral, task-driven activity into a reflective, emotionally engaging experience. By encouraging categorization of place- based experiences, the tool helped users form better personal connections with their surroundings, making the city feel more familiar and meaningful.

3. Cognitive Interactions

A. Initial Cognitive Interactions

Before using the tool, participants demonstrated low cognitive engagement with their surroundings. Many described their movement as habitual, often passing through places without noticing details or reflecting. Their exploration was largely passive, with some acknowledging that they did not actively think about their surroundings while commuting.

One participant reflected on their lack of awareness, stating, *"I realized I've been here but don't actually know this place."* This suggests that many individuals relied on autopilot navigation**,** moving through the city without actively processing what they saw. Some even expressed surprise upon realizing how much they overlooked familiar spaces**,** with one participant stating, *"I walk by every day but don't notice the buildings.".* For some, cognitive awareness depended on external factors such as mood.

B. Interactions While Using the Tool

While using the tool, participants became more observant and reflective, actively processing details of their surroundings. Many described noticing small details they had previously ignored, such as artwork, graffiti, and unique architectural features.

The tool encouraged users to categorize and mentally organize their surroundings, leading to greater awareness. A participant noted, *"I started looking more—objects, people, experiences—rather than just walking straight."* Another described an increased appreciation for their surroundings, stating, *"I actually noticed things across the street."* One participant stated, *"I explored somewhere and thought I have to remember this place."*

C. Survey Results

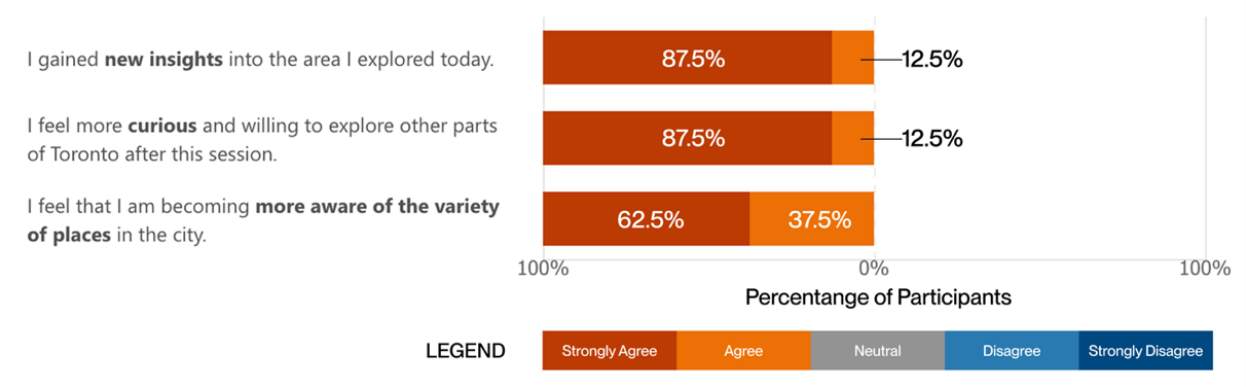

Figure 31 Post exploration survey results on Cognitive Interactions

D. Takeaways

The interactive scratching off process not only encouraged participants to take new routes but also helped them mentally register the places they had been to. The act of logging meanings to locations facilitated memory-building, prompting users to notice, categorize, and reflect on their surroundings more deeply. While the tool managed to enhance cognitive engagement, its impact could be further strengthened by allowing additional contextual details, such as adding images or notes, to create a more personalized record of experiences.

4. Usability Feedback

Intuitive Interaction and Low Cognitive Load

Participants shared that the tool has an intuitive interaction design, highlighting that its simplicity allowed them to engage with the experience without cognitive overload. One participant noted, *"Since we had limited choices for assigning colors, it wasn't overwhelming for me."* The system's constrained flexibility with limited number of color categories was seen as an effective design choice, making the tool easy to navigate. This aligns with my goal of creating a

tool that allows users to focus on exploration rather than interface complexity, ensuring an engaging user experience.

Engaging and Motivating Exploration

The tool effectively introduced game-like interaction to sustain user engagement. Many participants described an increased motivation to explore, with one stating, *"It almost feels like gamification... 'Oh, this is not explored, I have to go there.'"* The real-time feedback loop created by the map-revealing mechanism encouraged users to continue engaging with the tool, making exploration feel active and intentional. This aligns with my goal of designing a system that ensures that movement through the city is driven by curiosity and deliberate choices rather than routine navigation.

Effective Spatial Awareness

The tool successfully enhanced spatial awareness, helping users form stronger place-based associations. The process of logging locations created a meaningful connection to physical spaces, as one participant described, *"I explored somewhere and thought, 'I have to remember this place.'"* By visually associating locations with specific experiences, users were able to internalize their environment more effectively. This aligns with my goal of facilitating users to retain spatial knowledge more effectively by documenting personal experiences associated with places.

Minimal Screen Dependence and Responsive Logging

Participants found the interaction flow to be smooth and unobtrusive, allowing them to remain engaged with their surroundings rather than being overly focused on their screens. While the tool required the screen to remain on, users noted that they did not need to constantly look at the phone, enabling them to stay present in their environment. One participant shared, *"I was mostly looking around; I only checked my phone when I needed to."* Another noted, *"I didn't feel the need to constantly check the screen."* This aligns with my goal of building a tool which has digital engagement alongside physical experiences rather than replacing them.

5. Preferred Features

Assigning Multiple Colors to a Single Location

Six out of eight participants expressed a need to log multiple emotions or experiences for a single location, as places often evoke more than one feeling. One participant noted, *"There were two or three colors I wanted to use, but I had to pick just one."* Another suggested, *"I felt multiple things there... would prefer multiple emotions logged."* Additionally, one participant mentioned wanting to assign different colors to the left and right sides of the street, stating, *"When I walk, I notice different things on my left and right... I would have liked to mark those separately."*

Furthermore, another participant suggested showing a history of logged emotions at the same location to track how feelings towards a place change over time, noting, *"It would be interesting to see if my emotions about a place change when I come back later."* Allowing multiple colors per hexagon, differentiating sides of the street, and incorporating an emotion history feature would enable more nuanced reflections on experiences and improve accuracy in emotional tagging.

Adding Photos and Notes to Logged Locations

Some participants suggested attaching photos or notes to locations for a richer memory association. One participant mentioned, *"Logging text and images along with colors would be pretty cool."* Another added, *"Would be nice to see a small note when clicking a spot."* The ability to add personal annotations would enhance the tool's role as a memory-building aid, allowing users to revisit places with more context beyond color coding.

Customizable Color Shades for More Nuanced Tags

While the existing color categories were appreciated, some participants wanted greater flexibility by introducing different shades of the same color to indicate varying intensities of emotions or experiences. One participant suggested, *"Different shades of red would be nice—dark red could mean 'danger,' and light red could mean 'too busy.'"* This feature would provide subtler distinctions between experiences while keeping the interface intuitive and structured.

Filtering Logged Locations by Color

Four out of eight participants requested the ability to filter logged locations by specific colors, allowing them to navigate back to places associated with emotions or experiences. One participant stated, *"It would be nice to see only the places I marked as memorable, so I can revisit them later."* Another mentioned, *"A filter would help me see all the places I marked in one color instead of searching manually."* This feature would provide a structured way to revisit significant locations and support place attachment over time.

Sharing Map with Friends

Some participants were interested in a social sharing feature, enabling them to compare exploration data or view others' maps. One participant mentioned, *"It would be really nice if you added a sharing option so I could compare my map with friends."* Another added, *"Maybe a way to share logs or see other people's maps."* This feature could enhance collaborative exploration, making it easier for users to recommend locations or plan visits based on shared experiences.

Scavenger Hunt or Prompt-Based Exploration

Some participants suggested incorporating prompts or challenges to encourage exploration beyond routine routes. One participant noted, *"Prompting areas to explore would be great."* Another mentioned, *"It would be fun if the app prompted something instead of just*

user input". Adding exploration challenges could provide gentle nudges, especially for newcomers, making the experience feel more engaging.

6. Technical Issues

High Battery Consumption and Screen Persistence for Tracking

Almost all participants reported that the tool drained battery quickly, primarily due to constant screen activity and location updates. Additionally, the tool stopped tracking if the screen was turned off, requiring users to keep the device active throughout the session.

Being aware of limitation of the tool's continuous screen-on requirement and high battery consumption, I provided portable chargers during the exploration sessions. This limitation arises from the tool being browser-based, as web browsers do not support continuous background location tracking. Developing the tool as a native app or progressive web app (PWA) would resolve both issues by enabling background location tracking and reducing battery consumption through optimized power management.

Map Related Limitations

Participants encountered navigation challenges while interacting with the map, particularly with zooming, panning, and directional accuracy. Some reported that zoom and panning didn't always work smoothly, making it difficult to navigate the map effectively. Additionally, the users' location would go off-screen, requiring manual panning to keep track of their position. Addressing these map-related issues by improving zoom responsiveness, recalibrating directional tracking, and implementing auto-centering for user location would enhance overall usability.

7.3 Takeaways

Conducting user testing for *Starting from Scratch* was not just about validating the tool—it was about witnessing how place attachment is not just a passive process, but rather something that unfolds through active engagement. It also provided valuable insights into how the tool could be improved to better support place attachment and meaningful exploration.

One of the most rewarding findings was seeing how the tool encouraged users to break away from habitual navigation. Many participants realized how limited their movement patterns had been, often confined to functional, goal-driven routes. Through the tool, exploration became a deliberate and enjoyable activity, leading participants to take alternate routes, seek out unfamiliar spaces.

The process of assigning meanings to places also proved to be more than just a digital interaction—it became a mechanism for storytelling, personal reflection, and knowledge generation. It revealed how personal and collective narratives shape urban experiences and how places hold different meanings for different individuals.

Perhaps most interesting was how the tool functioned as a bridge between digital engagement and physical presence. Despite requiring an active phone screen, participants engaged with it only peripherally, allowing the tool to be a supporting layer rather than the primary focus of their exploration.

Something that surprised me the most was seeing how participants engaged with the tool in entirely different ways. Some used it like a scavenger hunt game, treating it as a challenge to uncover and complete new areas. Others approached it as a journal on a map, using it to document their thoughts and emotions in relation to places. Some used it to record and share their experience in a new city, turning it into a tool for storytelling and memory-building.

Ultimately, the user testing confirmed that the tool has the potential to facilitate a sense of place attachment by inviting users to move, observe, and document their evolving relationship with a city.

8. Conclusion

8.1 Outcomes

This research explored how a mobile tool can facilitate place attachment for newcomers by integrating behavioral, emotional, and cognitive interactions with urban spaces (see Figure 50) While addressing the limitations of existing exploration tools, the project combines dérives, interactive mapping, and personal documentation, to allow newcomers to beyond passive navigation and construct their own evolving relationship with the city.

Figure 32 Project outcomes illustrating behavioral, emotional, and cognitive interactions

To contextualize the designed tool within existing frameworks, it has been analyzed using the same interaction categories as other tools previously studied in Section 3.3.2

Type of User Interaction: Mixed (Active & Passive)

The tool balances passive and active interaction where it passively encourages active urban exploration and behavioral interaction by revealing new areas as users move through the city. Simultaneously, it provides an active role by allowing users to assign personal meanings to locations, reinforcing emotional and cognitive connections to place.

Timing of Data & Feedback: Synchronous

The tool provides immediate visual feedback by revealing hexagons as users explore new areas, mirroring the psychogeographic dérive. Users can log emotions or meanings in real-time, reinforcing place-based associations as they move.

Mode of Exploration: Unstructured

By avoiding predefined paths, the tool aligns with psychogeographic principles of spontaneous urban engagement. Users define their own routes, facilitating organic discoveries that help build a deeper personal relationship with the city.

Level of Attention: Moderate

The interface is designed to complement exploration rather than distract from it, allowing users to remain present in their environment. Users interact with the tool periodically to log experiences but do not need to constantly check their screens.

These outcomes validate the research hypothesis that digital interventions can facilitate place attachment for newcomers through active urban engagement. The findings suggest potential for further development in areas such as exploration prompts, collective mapping, and extended studies on long-term user engagement.

8.2 Exhibition

The Digital Futures Exhibition (DFX) turned out to be a deeply rewarding experience for both the project and my own learning. The tool was made accessible through a QR code, allowing a diverse group of visitors to engage with it directly on their phones. This ease of access brought in a wider range of feedback, ranging from personal reflections to practical suggestions.

Many visitors related strongly to the concept and shared personal stories about their own experiences of moving to new cities and building attachments to unfamiliar places. One of the most common questions that surfaced was, "Can I share my map with others?", highlighting a potential direction for expanding the tool's capabilities toward more social experience.

Participants who had experienced immigration or relocation firsthand suggested features like multilingual support, highlighting ethnic neighborhoods and food spots, and connecting users who assign similar meanings to places. The idea of using shared tagging as a way to build social connections between newcomers seemed unique.

Visitors also drew creative parallels between the tool and existing references:

- Some compared it to the "fog of war" mechanic seen in video games, where unexplored areas remain hidden.
- Others likened it to a mood journaling app but mapped across physical space.
- A few were reminded of Strava’s running art, where users map out creative shapes through their movement across cities.

There were also more practical suggestions for expanding the tool:

- Allowing users to input the amount of time they have for exploration and offering dynamic, time-sensitive place recommendations.
- Museums, restaurants, and local businesses could participate by promoting their spaces through the tool.
- Scaling the tool to a global map, allowing users to visualize all the cities and places they have explored over time.

Overall, the DFX exhibition validated the emotional and practical relevance of the project, while also surfacing rich new possibilities for future development.

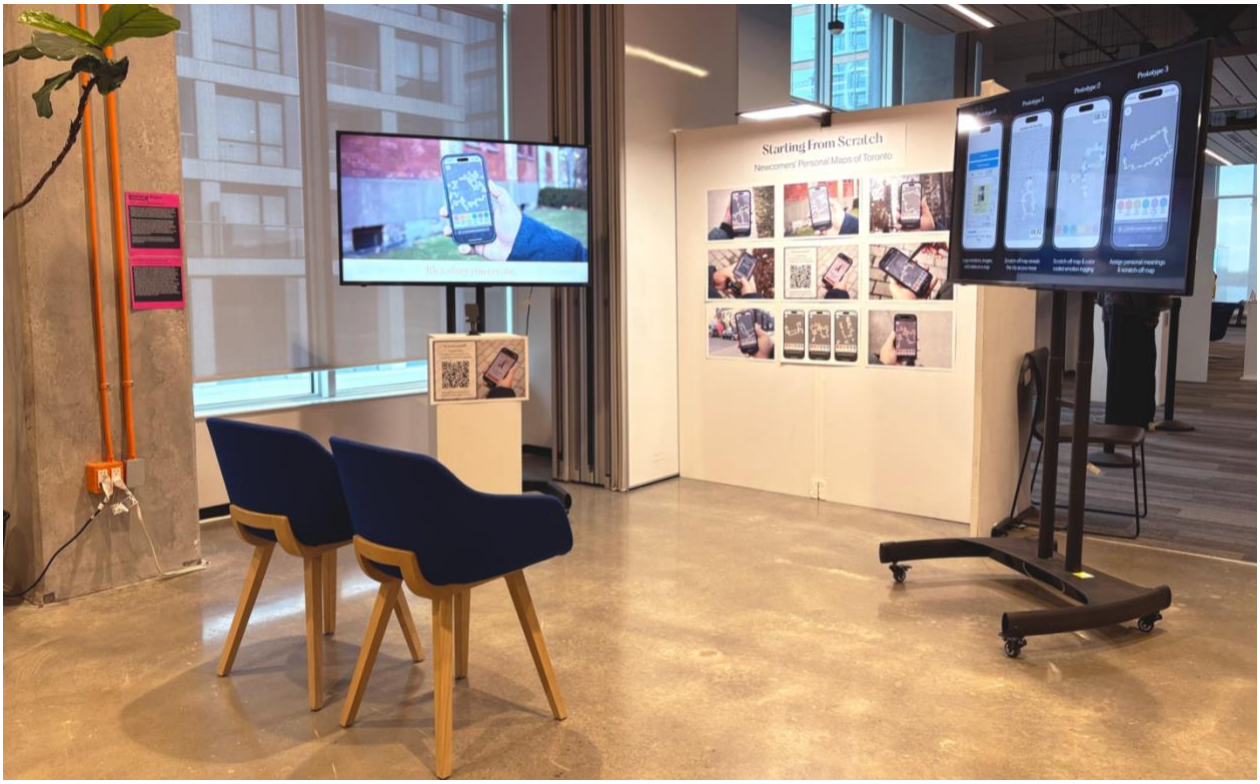

Figure 33 Exhibition Setup with 2 TVs with videos and a photo wall in the center

2 Videos that played on the TVs:

- Video 1: Introducing Starting From Scratch
- Video 2: Prototyping Starting From Scratch

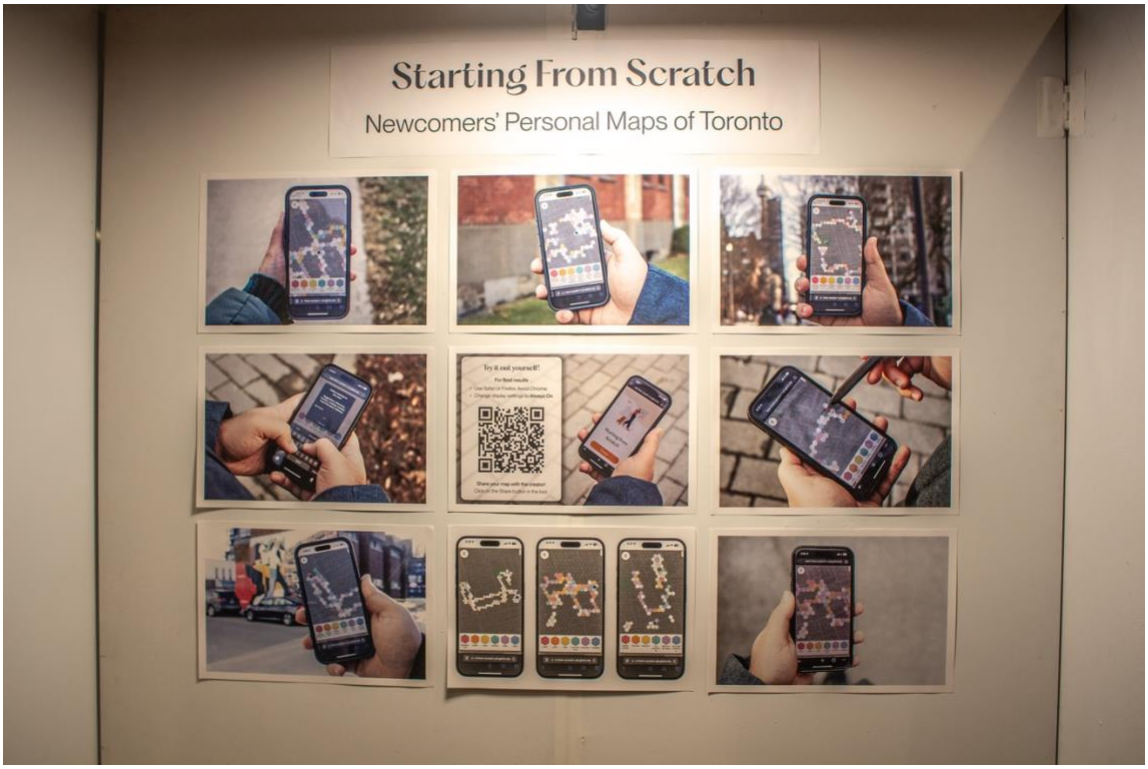

Figure 34 Photo wall showcasing participants using the tool

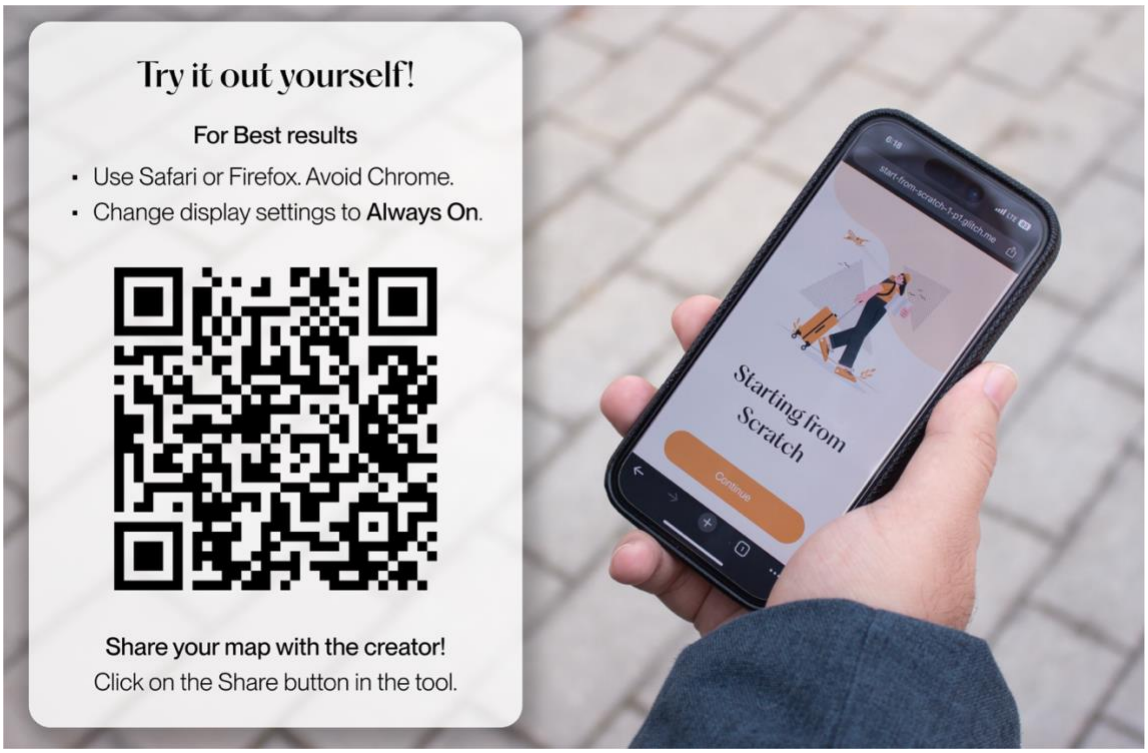

Figure 35 Poster with QR Code for trying the tool

8.3 Future Work

Moving forward, I hope to incorporate user feedback for the testing process and exhibition to develop the preferred features and resolving technical issues. Beyond user-requested enhancements, I also see opportunities to introduce new features that could further support engagement and exploration. A progress bar to track the percentage of an area covered could help users visualize their journey and motivate them to explore new spaces. Additionally, audio prompts suggesting nearby places or giving exploration challenges could provide gentle guidance without requiring users to check their screens frequently. These additions would help make the tool more interactive and intuitive way.

One of the biggest limitations of this testing phase was that weather conditions restricted testing to a single round. While the results were insightful, they only captured short-term interactions. Moving forward, I hope to conduct longitudinal testing, where participants use the tool over an extended period and provide feedback on how it shapes their exploration habits and attachment to the city.

8.4 Learnings and Reflections

Learnings from AI-assisted coding

Much like the name of the project, *Starting from Scratch*, the development of this tool using AI-assisted coding often required me to start from scratch during prompt engineering. Through experimentation, I observed that when multiple complex instructions were given to AI tools simultaneously, they often failed to execute them accurately, and debugging attempts proved ineffective. As a result, each transition between platforms—whether shifting from HTML to p5.js, migrating from GitHub to Glitch, or replacing Google Maps with Mapbox—necessitated rebuilding the tool from the ground up. This trial-and-error process reinforced the importance of adaptive iteration, where breaking tasks down into smaller, incremental steps yielded better results in AI-assisted development. In the process, I developed prompt engineering as a key skill for design implementation, learning how to refine AI-generated code iteratively.

User Experience and HCI

Through this process, I developed a stronger appreciation for user-centered design, especially in the context of human-computer interaction (HCI) and urban exploration. By balancing interaction with minimal screen dependence, the tool integrates digital engagement seamlessly into physical navigation. I also learned how to translate qualitative feedback into actionable improvements, balancing structure with flexibility—allowing for guided interaction while still leaving space for personal interpretation. This experience has shaped not only my understanding of place attachment but also my approach to problem-solving and iteration.

Overall reflection

In an era of unprecedented mobility, where people are constantly on the move, cities often become transient backdrops rather than places of belonging for newcomers. Through this project, I have learned that a sense of belonging, and place attachment is not just about knowing how to navigate a city—it is about personal agency, the ability to actively shape one's relationship with it and learn how to belong. This process unfolds over time, and is shaped by the places we return to, the paths we carve out, and the meanings we assign along the way.

Yet, as technology advances, digital maps and navigation tools continue to prioritize efficiency and convenience, often overlooking the deeper, more personal ways we connect with places. In a world increasingly shaped by digital interfaces, this project highlights the importance of preserving physical experiences within our digital interactions. Perhaps there's a need for shift in focus toward designing digital tools that not only provide directions but also generate curiosity, invite reflection, and meaningfully bridge our digital and physical realms. If such tools can encourage newcomers to move beyond habitual routes and into personal meaning-making, then we may not just navigate cities—we may truly become part of them.

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Appendix A: Exploration of Mediums

1. Photogrammetry

To design a place-based experience, it was necessary to examine contemporary methods for digitally documenting and preserving places. Photogrammetry, a technique that reconstructs 3D spatial data from 2D images, has been widely used since the mid-19th century in cartography, surveying, and digital

With advancements in computer vision and AI, photogrammetry now plays a central role in urban mapping, game development, and augmented reality applications, enabling highly detailed digital reconstructions of physical environments. This technology provides precise spatial capture, supporting interactive exploration and digital overlays that enhance spatial awareness.

To explore the capabilities of photogrammetry, I documented my visit to Tobermory and Bruce Peninsula National Park, using Luma Labs' Interactive Scenes app (Luma AI, n.d.) to generate textured 3D models from video footage. This method allowed for interactive digital exploration of real-world spaces, assessing how accurately a location could be preserved in a digital format and whether it could evoke a sense of familiarity and attachment.

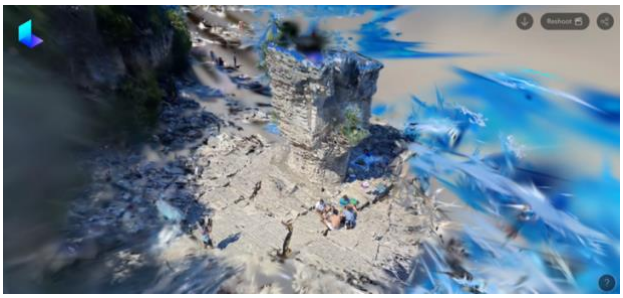

Figure 36 Snapshot of photogrammetric reconstruction of the Flowerpot Island on Luma Labs' Interactive Scenes

Figure 37 Photograph of Flowerpot Island

Challenges and Takeaways

While the resulting 3D models were visually impressive, the experience remained static, focusing more on capturing and archiving than active interaction. To explore how photogrammetric reconstructions could be made interactive, I turned to Augmented Reality (AR), which enables real-time engagement with 3D models through mobile devices.

2. Augmented Reality (AR)

Augmented Reality (AR) offers a means to overlay digital content onto the real-world environment in real-time, enhancing how users perceive and interact with their surroundings.

Initially developed in experimental research settings, AR has expanded into mainstream applications with the advancement of mobile devices, AR headsets, smart glasses and wearable interfaces. These devices enable AR experiences across education, healthcare, entertainment, and industry, allowing users to engage with digital overlays in physical spaces. The integration of computer vision, real-time processing, and sensor technology has further increased AR's accessibility, making it a key tool for interactive and location-based experiences (Cipresso et al. 2018)

Building on my exploration of photogrammetry, I sought to introduce interactivity to 3D spatial reconstructions by integrating them into an AR environment. Using Vuforia's Area Target Generator, I scanned a living room space, utilizing LiDAR technology to create a 3D spatial model. This scan was then imported into Unity, where virtual objects were added to create an interactive AR experience. The goal was to explore how digital overlays could transform a user's understanding of place and encourage active exploration.

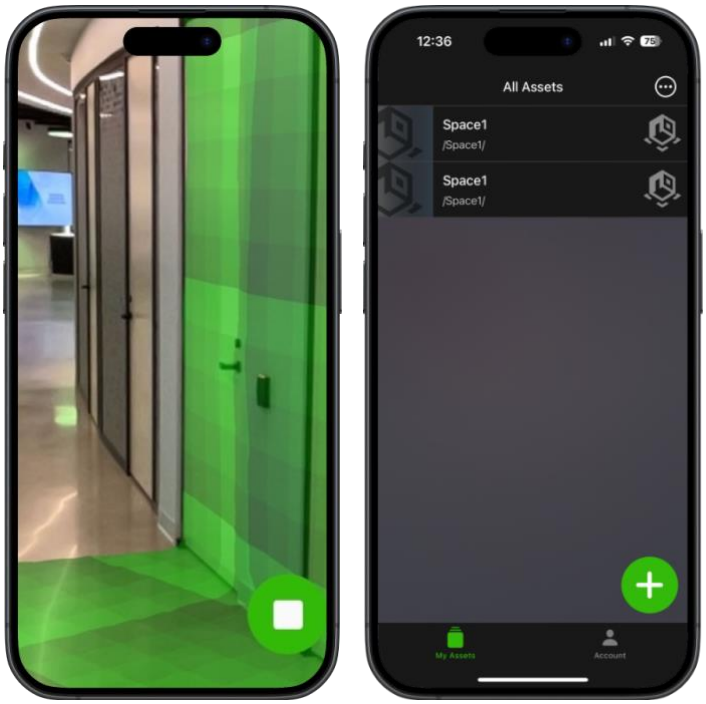

Figure 38 Snapshot of Vuforia's Area Target Generator (by Author)

After scanning the space through Vuforia, I connected it to my Unity project to load the scanned space and add virtual objects. Deploying the project and viewing it on my phone allowed me to see the virtual objects, showcasing the various possibilities.

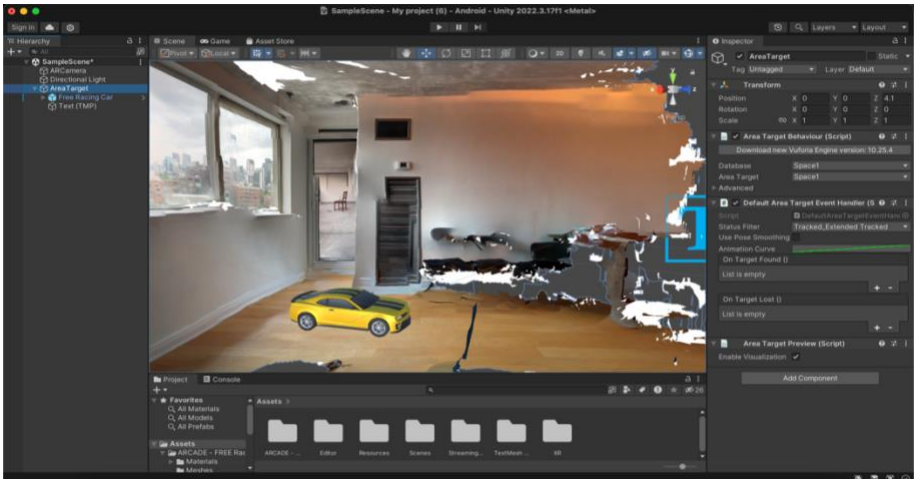

Figure 39 Snapshot of author's Unity project integrating the scanned space and virtual objects

The below sketches show the possibilities:

- Augmenting on a miniature 3D model of a place - with additional content to learn more about the stories associated to that place.
- Augmenting a physical space with people and activities, information about objects and materials or data, furniture name or history - giving options to users to select interest

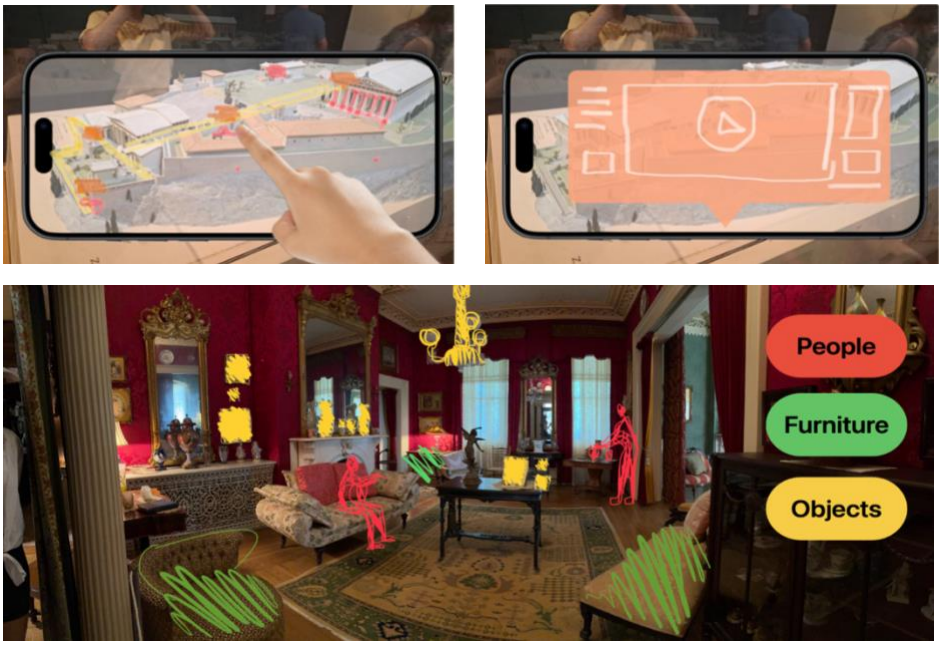

Figure 40 Sketches showing possibilities through AR (by Author)

Challenges and Takeaways

While AR provided immersive and interactive overlays, the experience required continuous visual focus on the screen, reducing direct engagement with the physical environment. Additionally, technical constraints, such as device compatibility and user familiarity with AR interfaces, made it less accessible for spontaneous exploration. Recognizing the limitations of screen reliance, I turned to spatial augmented reality (SAR) through projection mapping, which enables interaction with digital content without the need for a mobile screen.

3. Projection Mapping

To address the limitations of screen reliance, I explored projection mapping, a technique that projects computer-generated imagery onto physical surfaces, seamlessly merging digital and real-world environments. Originally developed in the 1960s and refined in the 1980s, projection mapping is now widely used in advertising, entertainment, urban storytelling, and interactive installations. Unlike AR, which requires individual screen interaction, projection mapping enables shared, immersive experiences in public spaces. (Iwai 2024)

Building on the interactive potential of AR but removing the dependence on handheld devices, I conducted a small-scale projection mapping experiment, projecting visuals onto a shoebox model to explore spatial augmentation possibilities.

Figure 41 Projection Mapping Experiment with Shoe Box by Author

Through this prototype, I considered several potential applications:

- Tabletop interfaces that allow users to reinterpret physical spaces.
- Tangible objects as interactive components in projection-based environments.
- Computer vision integration for generative artwork and real-time tracking.

Figure 42 Sketches showing possibilities through tangible interactions and projection mapping (by Author)

Challenges and Takeaways

While projection mapping successfully created visually striking and interactive experiences, it required specialized equipment and controlled conditions, limiting its portability and adaptability for spontaneous exploration. Furthermore, its reliance on predefined visual narratives restricted user-driven input, prompting an exploration of more flexible and personalized interaction models. This led me to reconsider mobile interfaces, which provide real-time interaction, portability, and accessibility while still enabling engagement with the urban environment.

Appendix B: User Testing Material

1. Invitation Email (Participant Recruitment)

Hello,

You are invited to participate in a research study titled **"Starting from Scratch: Building Place Attachment Through Active Urban Exploration for Newcomers to Toronto"**.

PURPOSE

This study aims to examine how active urban exploration, facilitated by a digital tool, can help newcomers develop a deeper sense of attachment to Toronto. The results will inform the development of the tool and help us better understand how newcomers connect with their new urban environments.

This study is part of my Master of Design Thesis in the Digital Futures program at OCAD University and will contribute to my thesis research.

WHAT'S INVOLVED

As a participant, you will engage in **two separate sessions**, spaced 1–2 weeks apart. Each session consists of pre-exploration activities, an exploration phase, and post-exploration activities. The total time commitment is approximately **1.5 hours per session**, totaling **3 hours** for all sessions.

The tool that you will use, and test is a web-based tool that will function on your smartphone via a browser link.

1. Pre-Exploration Activities (15–20 Minutes)

- **Meet me on the 7th Floor, 205 Richmond Street**, on the scheduled date and time.
- **Complete a Pre-Exploration Baseline Survey**: Share your initial thoughts, expectations, and emotional state regarding the neighborhood.
- **Access the tool** through the link provided on your phone browser.
- **Grant Permissions**: Enable location, camera, and microphone access on the tool to ensure it functions properly during exploration.
- **Change Display settings to Always On** or for that duration.

2. Exploration Phase (30 mins - 1 Hour)

- **Explore the City**: Walk through the designated neighborhood, while keeping the phone in your pocket with the screen on, allowing the tool to track your progress and reveal parts of the map.
- **Log Moments**: Stop occasionally, taking out your phone and record emotions about specific locations using buttons (e.g., calm, excited).
- **After 20-30 mins, start walking back:** Walk back to the original location. You could use a different route this time while continuing logging your experience.

3. Post-Exploration Activities (15–20 Minutes)

- Complete a short post-exploration survey and participate in a brief interview to provide reflections on your exploration and feedback on the tool

INTERESTED?

If you are interested in participating, please fill out the form below: Eligibility Criteria Form

Once submitted, I will contact you using the contact email address provided in the form and share the **Consent form, Tool and Study Information letter** describing the tool and study in detail and share a **Microsoft form to collect participants' availability** for two sessions spaced 1–2 weeks apart and schedule sessions accordingly. Each participant will be scheduled for an individual session such that the participants will not be present together.

QUESTIONS?

If you have any questions about this study or require further information, please contact the Graduate Student Researcher, **Aishwarya Bhattbhatt**, at aishwaryab@ocadu.ca or by replying to this email. This study has been reviewed and received ethics clearance through the Research Ethics Board at OCAD University **2024-74**. If you have any comments or concerns, please contact the Research Ethics Office at research@ocadu.ca.

GRADUATE STUDENT RESEARCHER
Aishwarya Bhattbhatt
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FACULTY SUPERVISOR
Kate Hartman
Associate Professor, Digital Futures
OCAD University
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2. Eligibility Criteria Form

Starting From Scratch: Eligibility Criteria Form

Student Researcher: Aishwarya Bhattbhatt (Contact: aishwaryab@ocadu.ca)
Primary Supervisor: Kate Hartman (Contact: khartman@ocadu.ca)

This study, **"Starting from Scratch: Building Place Attachment Through Active Urban Exploration for Newcomers to Toronto,"** aims to examine how active urban exploration, facilitated by a digital tool, can help newcomers develop a deeper sense of place attachment and connection to Toronto. The results will inform the development of the tool and help us better understand how newcomers connect with their new urban environments.

This study will be conducted between February 5th and March 1st, 2025.

If you're interested in participating in this study, please answer the following questions to confirm your eligibility. Your responses will only be used for screening purposes and will remain confidential.

Required

1.Have relocated to Toronto **within the past 2 years**?

Yes

No

2.Are you willing and able to physically explore the neighborhood via sidewalk for 1 hour during each of the 2 sessions?

Yes

No

3.Are you comfortable granting **location, camera, and microphone permissions** on your phone for data collection during exploration?

Yes

No

4.Are you familiar with basic smartphone functions, such as accessing web links and using apps?

Yes

No

5.Please enter your contact email address

3. Follow Up Email

Subject: Next Steps for "Starting from Scratch" Research Study

Hello,

Thank you so much for your interest in participating in my thesis research study *Starting from Scratch*!

To proceed, please complete the following steps:

1. **Review & Sign the Consent Form**
   The attached consent form outlines the study details, participant rights, and confidentiality measures. Please sign and return it via email at your earliest convenience to confirm your participation.
2. **Device Requirements**
   During the exploration phase (30 minutes – 1 hour), your phone display will need to remain on. **If you require a portable charger** for the session, kindly let me know your device's charging port type in advance.
3. **Schedule Your First Session**
   Please book a time slot for the first session on **February 14th or 15th** between **10:30 AM – 3:30 PM (start time)** using the following link: Starting From Scratch : Research Study (Session 1)
   Location : 701, 7th Floor, 205 Richmond St W

If you have any questions, feel free to reach out at **aishwaryab@ocadu.ca**. Looking forward to your participation!

Best,
Aishwarya

3. Consent Form

Project - Starting from Scratch: Building Place Attachment Through Active Urban Exploration for Newcomers to Toronto

Graduate Student Researcher:
Aishwarya Bhattbhatt
OCAD University
aishwaryab@ocadu.ca

Faculty Supervisor:
Kate Hartman
Associate Professor, Digital Futures
OCAD University
khartman@ocadu.ca

PURPOSE

This study aims to examine how active urban exploration, facilitated by a digital tool, can help newcomers develop a deeper sense of place attachment and connection to Toronto. The results will inform the development of the digital exploration tool and help us better understand how newcomers connect with their new urban environments.

This study is part of my Master of Design Thesis in the Digital Futures program at OCAD University and will contribute to my thesis research.

WHAT'S INVOLVED

As a participant, you will engage in **two separate sessions**, spaced 1–2 weeks apart. Each session consists of pre-exploration activities, an exploration phase, and post-exploration activities. The total time commitment is approximately **1.5 hours per session**, totaling **3 hours** for all sessions.

The tool that you will use, and test is a web-based tool that will function on your smartphone via a browser link which will be provided.

1. Pre-Exploration Activities (15–20 Minutes)

- **Meet me on the 7th Floor, 205 Richmond Street,** on the scheduled date and time.
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- **Log Moments:** Stop occasionally, taking out your phone and record emotions about specific locations using buttons (e.g., calm, excited).
- **After 20-30 mins:** Start walking back to the original location. Use a different route this time while continuing logging your experience.

3. Post - Exploration Phase (15-20 mins)

- Complete a short post-exploration survey and participate in a brief interview to provide reflections on your exploration and feedback on the tool

POTENTIAL BENEFITS

By participating, you may gain a deeper sense of connection to the neighbourhood and a better understanding of your emotional responses to new urban spaces.

POTENTIAL RISKS

There is a minimal physical risk of accidents from walking on the sidewalk while using the digital tool. Participants may experience distractions from focusing on the phone, which could increase the risk of tripping or colliding with obstacles in the environment.

Reflecting on personal experiences and exploring unfamiliar areas may cause discomfort. Participants may skip activities they find distressing.

CONFIDENTIALITY

All information collected will be kept confidential. Your name will not be linked to any data or findings in the final report. Only the research team will have access to the raw data.

- **Audio- or recording: Interviews will be recorded.** The recordings will be stored securely and destroyed after the study.
- All data will be stored securely on a password-protected OCAD U OneDrive account, accessible only to the research team.
- Data collected using the digital tool (e.g., geolocation data, photos, text entries, and emotional responses) will initially be stored temporarily on a secure Glitch server in the form of JSON files. These files will be transferred to OCAD U OneDrive after the final session.
- Audio recordings of interviews and survey responses will be stored on OCAD U OneDrive.

- All the above data will be retained until **April 30, 2025**, after which all identifiable data will be securely deleted.
- **Screenshots of the tool and photos of participants' hands using the tool may be retained** beyond this period for project documentation and dissemination purposes.

VOLUNTARY PARTICIPATION

Participation in this study is voluntary. You may withdraw from the study at any time before **February 28, 2025.** To withdraw from the study, simply email the Graduate Student Researcher. The data collected prior to that point will be removed and securely destroyed.

PUBLICATION OF RESULTS

The results of this study may be published in the thesis document, or presentations. In any publication, all data will be presented in aggregate form, and no personal identifiers will be used. Results will be made available after the completion of the research.

AUDIO RECORDING

To document the data collected, interviews and sessions may be audio-recorded. These recordings will be used solely for the purposes of this study, stored securely, and destroyed after analysis. Please indicate your consent below:

☐ **I agree to be audio -recorded** for the purposes of this study. I understand how these recordings will be stored and destroyed.

☐ **I do not agree to be recorded** for the purposes of this study.

PHOTOGRAPHY CONSENT

To document tool usage, photos of participants' hands holding their phone with the tool open may be taken. These photos will be used solely for the purposes of this study, stored securely, and will be retained for documentation purpose. Please indicate your consent below:

☐ **I agree** to have photos of my hands holding my phone with the tool open taken for the purposes of this study. I understand how these photos will be stored and deleted.

☐ **I do not agree** to have photos taken for the purposes of this study.

CONTACT INFORMATION AND ETHICS CLEARANCE

If you have any questions or concerns about this study, please feel free to contact me, Aishwarya Bhattbhatt, at aishwaryab@ocadu.ca.

This study has been reviewed and received ethics clearance through the Research Ethics Board at OCAD University **#2024-74**

If you have questions about your rights as a participant, please contact:
Research Ethics Board, OCAD University, 100 McCaul Street, Toronto, M5T 1W1
Phone: (416) 977-6000 Ext. 417
Email: research@ocadu.ca

AGREEMENT

By signing below, I agree to participate in this study. I have read the information provided and understand the details of my involvement. I understand that I may withdraw my consent at any time.

Participant's Name: _____

Signature: _____

Date: _____

4. Post Exploration Interview Questions

The following questions were posed to participants during the semi-structured interview to understand their experiences with the tool and its impact on their exploration behavior. The interviews were audio recorded and transcribed for further analysis to capture detailed insights into their interactions with the tool.

1. How did using the tool compare to how you would normally explore a new place? Did it surprise you or help you notice things you might have overlooked?
2. When assigning meanings to places, did you feel like it helped you build a personal connection to the city? Was there anything missing in how you could capture those feelings?
3. Did the way the map revealed itself as you walked affect how you explored? Did it make you want to go further or change where you went?
4. If this tool were designed specifically for newcomers like you, what would you change or add to make it more useful?
5. Looking back, do you feel like the tool helped you see the city differently? And if anything, what shifted in your perspective?

5. Survey Results

Two surveys were conducted to assess participants' relationship with the city before and after using the tool:

5.1 Pre Exploration Survey

Pre-Exploration Survey: Understanding Baseline Relationship with Surroundings

8 Responses 11:08 Average time to complete Closed Status

1. Participant Number

8
Responses

Latest Responses
"8"
"7"
"6"

2. How long have you been living in Toronto?

8
Responses

Latest Responses
"2 years"
"14 months"
"1.5 years "

3. How frequently do you visit /spend time in this neighborhood?

Daily	5
2-3 times a week	1
3-4 times a month	1
Once a month	1
Rarely	0

4. How would you describe your overall connection to this neighborhood? Please explain why you visit this neighborhood and what makes it significant or meaningful to you.

8
Responses

Latest Responses

"I frequently visit this neighborhood since my university is ...

"I study here at OCAD U."

"I live here "

5. How familiar are you with the places around you (e.g., parks, shops, landmarks)?

Very familiar	3
Somewhat familiar	3
Neutral	1
Not very familiar	1
Not familiar at all	0

6. How comfortable do you feel walking around, and exploring new areas in this neighborhood?

Very comfortable	5
Somewhat comfortable	2
Neutral	1
Somewhat uncomfortable	0
Very uncomfortable	0

7. Do you typically follow a set route when walking around this neighborhood?

I always stick to familiar routes.	2
I mostly stick to familiar route...	4
I follow some set routes but e...	2
I often explore new routes but...	0
I prefer to explore new routes ...	0

8. Do you notice or reflect on how certain spaces make you feel emotionally (e.g., happy, curious, energized, drained)?

I never notice or reflect	0
I rarely notice or reflect	0
I notice or reflect sometimes.	5
I often notice and reflect	2
I always notice and reflect	1

5.2 Post Exploration Survey

Responses Overview Active

Responses	Average Time	Duration
8	48:02	47 Days

1. Participant number

8
Responses

Latest Responses
"6"
"7"
"8"
...

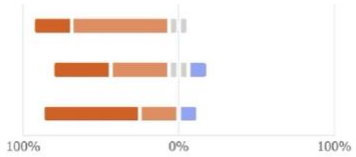
2. **Emotional Aspects of Place Attachment**

Strongly Agree · Agree · Neutral · Disagree · Strongly disagree

I feel **more comfortable** navigating the areas I explored today than before.

I was able to identify **places in the neighborhood** that I feel emotionally connected to during this session.

I experienced **positive emotions** (e.g., happiness, calmness, curiosity) when exploring today's neighborhood.



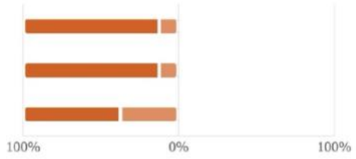
3. **Cognitive Aspects of Place Attachment**

Strongly Agree · Agree · Neutral · Disagree · Strongly disagree

I gained **new insights** into the area I explored today.

I feel more **curious** and willing to explore other parts of Toronto after this session.

I feel that I am becoming **more aware of the variety of places** in the city.



4. **Behavioral Aspects of Place Attachment**

Strongly Agree · Agree · Neutral · Disagree · Strongly disagree

I am more likely to **take new routes** in the future based on my experience today.

I felt more comfortable **engaging with unfamiliar spaces** today than I did in previous sessions.

I was **motivated to actively seek out** new places during today's exploration.