
Exploring Location Histories as a Design Material for Reflection with Memory Compass & Memory Tracer

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Position Statement and Background

Previous work has shown location data can aid in recall of memories [11], this abundance of location history data presents new challenges for the HCI community. This data is largely invisible, often buried in large software applications. This makes it hard for people to get a “grasp” on what is in their location history data. Its lack of material presence also restricts people’s ability to casually engage with it as a resource for reflecting on past life experiences [16]. There is an opportunity to engage with these challenges through the creation of new design artifacts that explore how rich engagements with location metadata can be better supported.

What opportunities are there to use this metadata as a way to reflect on one’s past? How might curious interactions be supported as people’s location history archive grows over time? Our ongoing RtD work explores these questions through the creation of *Memory Compass*, an application that allows a user to explore moments from their past based on their current location and *Memory Tracer* a device that occasionally surfaces a moment from this date in a user’s location history. Several related approaches, including Ludic

design [5], reflective design [22], and slow technology [8,17] shaped our design-led inquiry.

Methodologically, our work builds on research that emphasize the development of new knowledge through design proposals and practice (e.g., [1,4,9,19,20,23]). Our process is equally influenced by a designer-researcher position that gives prominence to first-hand insights that emerge through the creation of real things that materially ground conceptual ideas through their actual existence—“a process of moving from the particular, general and universal to the ultimate particular – the specific design” [13 p.33] In our experience, the designer-research approach functions as a small but multi-disciplinary team that is reflexively focused on the experimental and novel outcomes of the design process that are critically and reflectively arrived at through design practice. The designer-research approach can contribute a highly insightful, first-hand, and reflexive view of practices of making design

artifacts in relation to higher-level concepts framing key decisions in the design process and in light of attendant materials, tools, methods, and competencies.

Next, we provide more details on our design artifacts. Then we reflect on our ongoing RtD process. Our goal is to engage in dialogue with key concerns of the workshop that include: *RtD as an ongoing process with a site* and *RtD things as situated knowledge*.

Memory Compass and Memory Tracer

Memory Compass and Memory Tracer work by leveraging the metadata from Google Maps Timeline. Timeline is a feature of Google Maps that allows continually record of a person’s location at all times. This data is securely kept in the person’s Google account, though the entire history can be exported and downloaded in JSON format. The first author had recorded their location via Timeline for the past 4 years, which we directly draw on to support our design research inquiry. The entire archive consists of a single array of objects that we dubbed “*moments*”. For each *moment* there is a timestamp, latitude, longitude, and accuracy value. Some *moments* also have an estimation of the activity that was occurring, velocity, altitude, and vertical accuracy. The first author had 31 months of recorded data, with the dataset containing 70,293 *moments*. After downloading the dataset, we developed numerous Python scripts to get a handle on the data as a material in our design process. Using this underlying infrastructure, we have developed Memory Compass and Memory Tracer which are featured in a design provocation publication at DIS 2020 [26] and that we describe in more detail next.

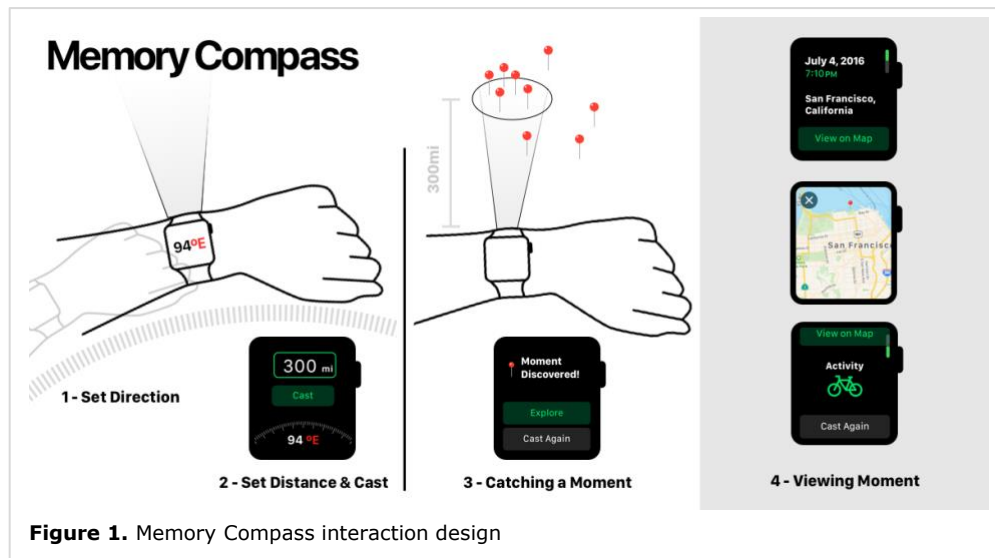


Figure 1. Memory Compass interaction design

Memory Compass

Memory Compass enables a person to explore their location history based on where they are currently located on the globe. First, the user points their wrist towards the direction they want to explore, then sets the distance they want to “cast out.” Upon “casting,” Memory Compass finds all *moments* within a 10% radius of the casted point (see **Figure 1**). For example, if a person “casts” while facing 94°E with a distance of 300miles, it will find the exact location 300mi away, then retrieve all *moments* within a 30-mile radius. The farther the cast in any direction, the higher the chance there won’t be any *moments* returned, forcing the user to try multiple times before a successful cast. If there are multiple *moments*, it will randomly choose one to return. Once a *moment* is retrieved, the user is able to scroll through a series of information about the *moment*: time, city, location name, activity, and a map.

The design balances precision in the underlying software with a degree of unpredictability through the

interaction. Our intention is that through using Memory Compass one will gain greater situational awareness and understanding of their location history and reflect on moments from their past that they may have not otherwise re-encountered. Future versions could integrate photos taken at the location or songs listened to by cross referencing the timestamp of the *moment* with a listening history archive [14].

Memory Tracer

Memory Tracer is an in-home device that combines and connects two people’s location history to surface shared *moments* from today’s date in history (i.e., the calendar day of today’s date). The device uses a diffused 16x16 LED grid as a display. When Memory Tracer finds a shared *moment* on this day in history, it begins a slow animation while that *moment* is being surfaced. For each year in the past, it takes 1hr to surface; e.g., a *moment* from 2016 would take 4hrs to surface. Once the animation stops and the display is filled, it lightly pulsates. The same length of time it took for the *moment* to surface, the user has to engage with it. By rotating the device, the user can see information about the *moment*. A touch sensor allows tapping through details: year, distance away, city, activity (if available), and location name. When all details have been viewed, the grid goes empty and the device waits to surface another memory. Memory Tracer’s design aims to spark reflection on a shared moment between two people. Through providing a slow expression of information that signals a memory is emerging, time is provided for the user to contemplate what happened on this day in the past, prior to interacting with it. Time also moves through Memory Tracer as it surfaces new *moments* as its owner’s location history data grows over time.

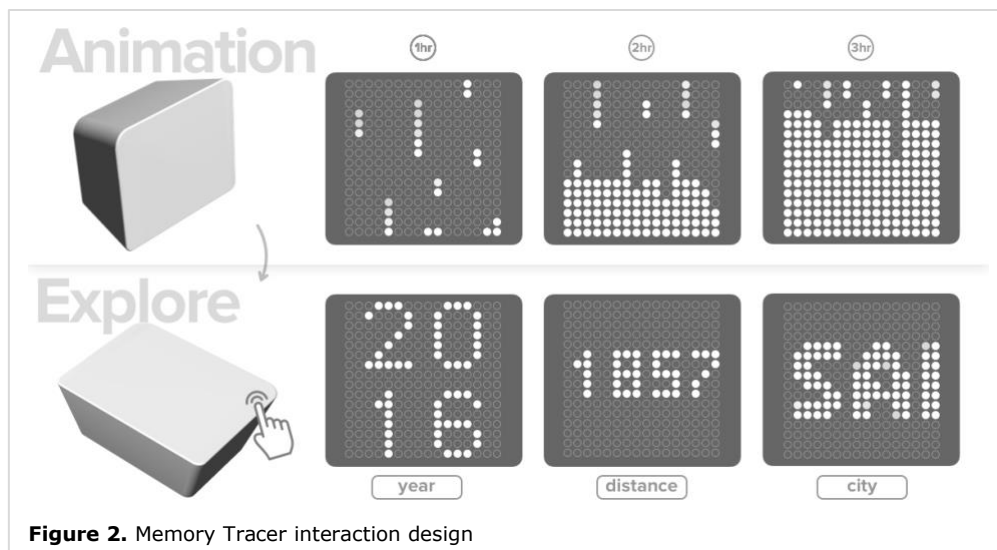


Figure 2. Memory Tracer interaction design

Reflections on our RtD process

Next we reflect on our RtD process of creating the Memory Compass and Memory Tracer in relation to workshop's concerns of *RtD as an ongoing process with a site* and *RtD things as situated knowledge*.

Our practice of adopting an RtD approach to explore how location history data can be a resource for supporting reflective experiences has revealed both strengths and weaknesses of the method. When designing for highly personal, unique, and idiosyncratic experiences, such as reflection and memories, adopting a first person designer-research approach is highly valuable. Testing out simple prototypes and experiments with your own data is necessary. Otherwise it is difficult to gain insights into whether specific techniques, forms, and interactions may or may not offer a bridge to reflective experiences. While small demos could be designed and user tested, the speed and agility of the design team is greatly limited when not testing on themselves.

"Did this spark a reflection? Why or why not?" – these simple questions can quickly help a design research team evaluate an early prototype. More importantly, there is a greater chance to find inspiration and possibilities in unexpected areas. For example, things that would not have ever been tested or tried on a participant but end up sparking a reflective thought.

There are a couple of practical benefits as well. The polish on a concept or prototype can be substantially less while generating and testing ideas on oneself. Additionally, using highly personal or private data can feel less contentious.

A limitation of a first-person designer-researcher RtD approach is that making generalizable claims can be challenging. Is this experience interesting to most people, or is there some specific memory or fact about my data that makes it interesting? In our case, location data is specific to one's travel history. An issue we have grappled with is thinking about how these concepts would work for someone who has lived in the same town their whole life and rarely traveled. Are we designing systems that only work for a well-traveled person? The type of ideas and experiences developed would probably greatly differ had the first author's previous travel history been different. Clearly, we cannot and should aim to design for 'everyone.' Yet it is a challenge that the design team ought to be aware of as they design experiences drawing on their own personal data as a design resource.

Situated Knowledge

Through designing Memory Tracer and Memory Compass, we have questioned what the benefit of a RtD product is to the broader community? Is it mainly to serve as an exemplar of deeper findings from the design team, that were only discovered through the making of a fully functional system? Or is the main benefit the inspiration that comes from seeing form of interaction embodied in the completed design artifact? For example, Memory Compass only exists in a prototype state right now. However, it speaks to the possibilities that exist for using location data in novel ways for reflection. However, we can't actually experience it yet. Does that matter? In this workshop, we hope to engage in a dialogue around the questions mentioned here and more broadly the role of RtD things in design research practice.

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