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# The Design of a Location-Based Transit Game for Digital Placemaking

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**ABSTRACT**

Urban residents often use public transit to travel throughout the city; yet find it difficult to learn about events in one's neighborhood. Transit rides can also be isolating and routine, despite seeing the same people regularly. As a result, there are opportunities to connect with others on the same route.

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*CSCW'20 Companion, October 17-22, 2020, Virtual Event, USA.*

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ACM ISBN 978-1-4503-8059-1/20/10. DOI: <http://dx.doi.org/10.1145/XXXXXXX.XXXXXXX>

## **KEYWORDS**

Community; people; public transport; transit; mobile technologies; urban computing; location-based games; Internet of Places

While digital technologies such as community systems, social media, and public displays have been studied to understand how people engage with each other in their community, little is known about the challenges people face when searching for local information while commuting. Our research explores how one form of technology, location-based games (LBGs), supports urban commuters in digital placemaking. We present a prototype of an LBG, City Explorer, that allows riders to maintain an awareness of location-specific events and to support the sharing of community information. City Explorer is designed for public transit riders in a metropolitan city to collaborate with other riders, supporting community awareness, and facilitating discussions related to places on their transit route.

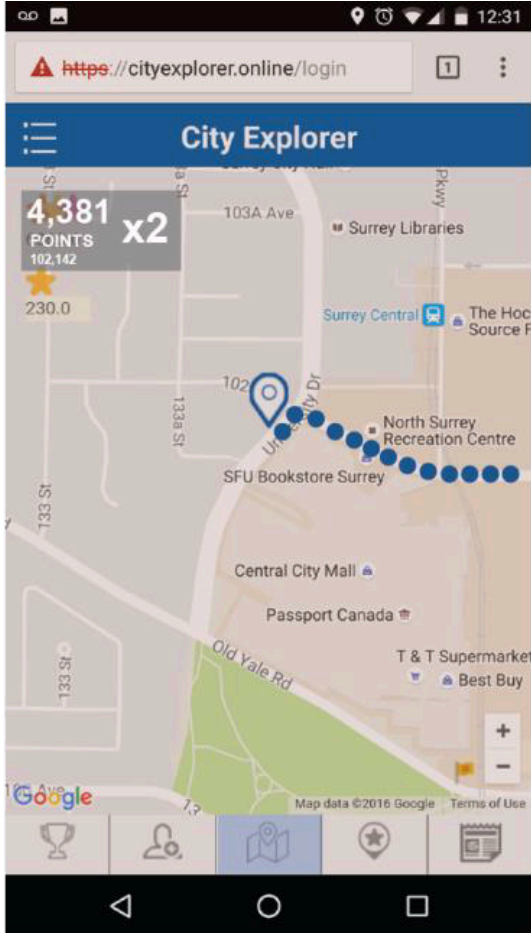
## **INTRODUCTION**

Public transit within urban cities forms a network that connects suburbs within a metropolitan region and can move many people within confined spaces. Within this network and spaces exists opportunities for people to interact with each other. Given this, we chose to design a transit-based location-based game (LBG) as it offered opportunities to rethink ways in which people playfully engaged with others in their community. LBGs are games played on mobile devices where content is tied to specific locations and accessed by players when they are there [9][10][15]. By connecting people with others in their community, LBGs could act as a catalyst in placemaking. Placemaking is broadly defined as the shaping of an environment to facilitate social interaction with the intention of creating public spaces that promote people's quality of life [5][6][7][12]. It describes the role that people play in turning public spaces into socially and culturally meaningful places [5]. Our goal was to understand the challenges people face in learning about their communities tied to public places along an urban transit network.

## **RELATED WORK**

The term Internet of Places was introduced as an extension of the Internet of Things. Where the Internet of Things makes the Internet accessible through physical objects, the Internet of Places aims to support awareness, engagement, and interaction related to human experiences in places [1][11]. Because mobile devices are constantly connected to the Internet, the boundaries between physical and digital spaces are often seamless, creating a hybrid urban space [3][4]. Cities have now become hybrid spaces with physical buildings, people, and social structures where location-based applications have become increasingly pervasive in our everyday lives. As such, opportunities exist for the exploration and sharing in the everyday activities that people encounter as they move around public spaces.

Digital placemaking explores the combination of location-based digital technologies in urban spaces to foster a connection to community and a sense of belonging, encouraging residents to value, cherish, and experience where they live [5][7]. Within the field of HCI, we have seen examples of digital placemaking where researchers have explored public displays, digital kiosks,



**Figure 1: City Explorer's default home screen for the game includes a map and auto-detected geo-tagged location.**

and connected street furniture [2][6][10][11]. Yet, placemaking can be challenging in loosely connected neighborhoods [7][8]. Play in communities can be used as a formative element to bring people together through a productive element of culture and defining strategies for city exploration.

## GAME DESIGN

We designed a location-based game for urban residents that would focus on supporting community awareness and engagement in public spaces along a public transit network. We derived four game features based on prior work around domestic routines, ICT for community awareness and engagement, and public spaces and placemaking.

### Location Sharing

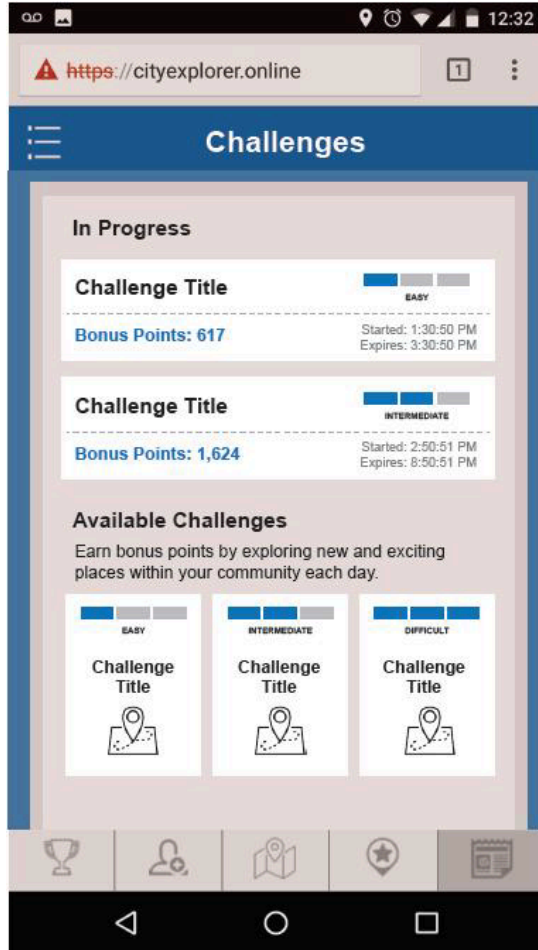
We incorporated location awareness to provide personalized, context-relevant information. With people particularly interested in locally relevant news and events [2], it was important to incorporate location sharing and geotagging of community information to offer a more tailored, personalized experience for the user by only presenting information relevant to one's location [13]. City Explorer's map is the default screen for the game (Figure 1). Once signed in, a player's location and nearby transit stops are detected within a 100 m radius. Each transit stop offers potential points that can be earned by passing by the transit stop. Once the player passes the stop, the flag disappears, and the player earns the marked points. A player can only earn points for a stop every 30 min. This parameter was set to restrict players from earning duplicate points for the same stop while waiting for transit to arrive. We determined the expected maximum wait time for transit to be 30 min. As the player moves, their route is tracked with a series of blue dots on the map.

### User-Generated Content

We provided local, curated news and user-generated content to offer a breadth of community information based on the needs explored from prior work [9]. Players were able to add content (text, links, photos, videos) to a location within a 150 m radius of their physical location. Information surfaced to players in the game when they were within 150 m from it, making it geographically relevant. Because posts are geo-tagged and related to the players' locations (e.g. traffic condition, road detours, or construction, etc.), we set a default expiry period of one hour for all posts. Content was not moderated, though, players were able to "boost" a post to keep it active for another hour. This allowed any players to determine the value of community information and whether it needed to remain available for others to view past the hour.

### Game Challenges

We also wanted to challenge players to explore nearby areas, atypical of their daily routine to help enhance aspects of digital playmaking for users. City Explorer offered destination challenges to players based on their geographic location (Figure 2). A destination challenge is a pre-determined route to a community center, building or park that a player needed to take to score additional points. Challenges included routes with multiple stops and were predetermined in the game's



**Figure 2: Challenges in City Explorer are based on players' geographic location and encouraged players to explore new destinations.**

design by us where we created challenges around community centers, libraries, and public parks located in each of the suburbs within the city.

City Explorer automatically determines the difficulty of challenges based on a player's current location and a calculation of the number of vehicles (buses, trains) required for the player to arrive at the destination. An "Easy" challenge requires a player to use one transit vehicle (e.g., one bus) within a single trip. An "Intermediate" challenge requires more transit vehicles (e.g., one bus and one train) to complete the challenge. A "Difficult" challenge contains more transfers and changes of vehicles (e.g., two buses and two trains). For example, a park in the city's downtown core may be "Easy" for a player currently located downtown as it is within 10 km away, but it may be "Difficult" for a player located in a suburb 40 km away as the routes may involve the use of multiple vehicles.

### Privacy

Lastly, we offered privacy mechanisms to support partial and anonymous identities. Privacy plays a central role in our society, and an important aspect of managing one's privacy is the ability to control access to information about oneself [14]. The Friends feature was designed to support awareness of other players within a 150 m range. We wanted to explore whether such a feature would strengthen existing ties or create new relationships with other transit riders. If a player set their game visibility to "ON", all players within a 150 m range were able to see them in the All Players list. To connect with them, one needs to click on the 'Add' player button. Thus, players can connect with other players who are strangers to them. If they wanted to connect with a player who was further away than 150 m, they were able to type in their email address and select Add Friend.

### DISCUSSION

Overall, our design of City Explorer focused on digital placemaking by augmenting physical places with location-specific services to create informal, playful, and meaningful opportunities for participation. Following our deployment, we found players valued the fun, competition, and rewards afforded through play in public spaces, creating opportunities for placemaking through location services and knowledge sharing. The gamification aspects were positive and contributed to digital placemaking and the exploration of new areas.

We also saw an unanticipated use of our game where people used City Explorer as a means of tracking their daily transit commutes and routine travel. Players wanted additional knowledge about their transit commutes, including data about the frequency and routines of their transit rides. Collectively, such ridership data can provide insights into the performance of the transit service. These results illustrate that careful design considerations are required to balance people's needs for play, personal data, privacy, and community information acquisition.

Through our work, we begin to understand and analyze community information needs and play, where technology can be used not just as a means to improve existing communications, but also as an unprecedented opportunity to improve the lives of urban residents through community engagement and attachment.

## ACKNOWLEDGMENTS

This work was supported by the National Sciences and Engineering Research Council (NSERC).

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