

# Here n' There - Location Based Mobile Game Exploring the Possibilities of Location Spoofing in Game Mechanics

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## ABSTRACT

Most location based mobile games use some form of automated locationing, GPS or A-GPS. Some classic pervasive location based games explored the possibilities of self-reported locationing, but this approach has been somewhat abandoned. In this paper, we present a game concept and a prototype based on the idea of allowing the players fake, multiply and generate their reported location data in addition to using an automated location data. We believe this prototype will reveal new issues and possibilities in designing game mechanics for location based mobile games.

## Author Keywords

location based mobile games, pervasive games, game design

## ACM Classification Keywords

• *Human-centered computing~Smartphones* • Human-centered computing~Ubiquitous and mobile computing design and evaluation methods

## INTRODUCTION AND BACKGROUND

Location based mobile games (LBMGs) are a subcategory of pervasive games, a genre of games that aim in expanding what is considered traditional gaming [5, 8]. In LBMGs the game dynamics is always at some part tied to physical locations or location data provided by ubiquitous infrastructure i.e. global positioning satellites, Wi-Fi hotspots and Bluetooth devices. The locations can be set like the coordinates of pokemon in Pokemon Go [10] or in constant motion like the coordinates of the fellow players. In game, locations can have a physical tag when they are quite accurate, a QR code or a Bluetooth device [1, 6]. They can also be based on assisted global positioning system (A-GPS) provided, somewhat inaccurate, coordinates [7, 9, 10, 12]. Both previous examples provide automated locationing for LBMGs. There is an option of using player reported locationing. Some classic LBMGs [1, 11] explored the

possibilities of self-reported, opposed to automatically received locationing data, but this approach has since been abandoned. Possibly due to the significant sizing down of the GPS locationing hardware and its integration into the current smart phones, but also because some of the early research indicated that use of automated locationing should be favored when available [2]. Most if not all current LBMGs utilize smart phone A-GPS. In fact, self-reported locationing is considered unwanted player behavior, called location spoofing especially when outside software is used to aid in the self-reporting.

The current LBMGs utilize existing application programming interfaces (APIs) for both location data, but also maps, weather or any openly accessible data that can be entwined in game mechanics [4, 12]. LBMGs like Pokemon Go, Parallel Kingdom and Ingress use a map as a basis for reporting, displaying and projecting the game reality. This kind of approach is commonplace due to locationing possibilities of modern smart phones, availability of APIs for maps and location based data e.g. Google maps API or Foursquare [3, 4, 9, 10, 12]. We are using similar map based approach to develop a game of tags where the players can chase and try to catch each other on a restricted outdoor arena. In comparison to the current and past LBMGs, in our game the players can mask, fake and multiply their location. Here n' There is a game concept and an early draft of a LBMG that is specifically designed to explore the possibilities of using self-reported locationing e.g. location spoofing in game mechanics instead of treating it as undesirable player behavior. For the evaluation of the Here n' There prototype we have two research question found from table 1.

	Research Question	Method
RQ1	What balance issues can be identified in game mechanics of a hybrid location based game which uses both user-reported and A-GPS locationing?	Constructive design research
RQ2	How do the players indirectly and directly observe other players on the field?	Formal evaluation by field trials

Table 1. The research questions we have formulated for Here n' There

In the following text, we describe our game concept in more detail.

### HERE N' THERE

Here n' There (Figure 1) takes place on a defined urban downtown. The game application itself is an Android application based on Google Maps API [4] with simple selection of creating locations by tapping on the map or using the possibility to create random location icons on the map. The view also has a timer for both allowed time to stay mobile and the time the players must place locations on the map to confuse others.



Figure 1. Here n' There concept

One of the identifiable balance issues mentioned in the RQ1 (Table 1) is the game area and how vast it needs to be when taking the location inaccuracy in consideration. Other possible balance issues are the scoring system and the game setting itself.

To aid in understanding the game dynamics we authored a detailed scenario depicting one Here n' There game-round.

### Scenario

Alice, Bob, Carlos and Charlie sign up to play Here n' There. They all have the game app installed on their Android phones, they do not know each other in beforehand. Alice walks about around the game area spanning nine blocks in urban city center. The other players cannot see her if she is moving, but she needs to decide quickly if she wants to stop for a moment, to add fake locations on the map (or tap generate button to create automatic locations). As she stops and has planted few hasty location beacons on the map view of her app, her own locations become visible to the other immobile players. They and she can then try to tap fellow players' beacons on the map to gain 4p for each fake location, but 30p for each real location and 60p for real location if they are physically at proximity. Once Alice thinks she has enough points she starts walking about in the game area again. If she stays mobile (and impossible to locate for other players) for more than one minute, her actual location becomes visible for the other players and they can immediately get the points if they spot her. She can estimate their activity from real time leaderboard at the upper corner of the app if fellow players move ahead or gain her. This

means there is no incentive for her to just try to run and hide the action. She therefore prefers to move around but take short pauses to try to catch other players. After the first 4 min into the game she thinks she has spotted another player for real. There is a guy close by, whose pattern of movement and use of mobile phone makes her think this is Bob. She knows that if one is close to other players' "real" location she can get extra points, as she taps the beacon of Bob close to her actual location she gets a notification of having gained 60 p.

### DISCUSSION AND CONCLUSIONS

There does not appear to be LBMGs, where the players are allowed, without punishment, to have the highest possible level of freedom of movement. Therefore, we have an opportunity for designing games where the core game mechanics is developed around the idea of tinkering with player location e.g. location spoofing. We note that games with self-reported player locations have already done this, but these games have not utilized both: positioning possible with smart phones and being able to self-report a location, shifting between the two; being able to be in two or more places at once and taking the "displacement" in LBMGs to the next level. In this paper, we describe the concept of a novel LBMG prototype where the purpose is to allow the players fake e.g. spoof their location on the game area that is depicted on the Here n' There mobile phone app.

### Future Work

Here n' There is clearly a work in progress, we plan to run a series of field trials with varying condition to track the modalities of on field player-player-observation for our RQ2 (Table 1). We have already begun the research on the RQ1 (Table 1) by documenting our progress through the design process. We are further interested in the map based mixed or hybrid reality location based games as an alternative to graphically heavy projections of realistic virtual environments.

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