Geolocated Casual Gaming in a Mobile and Social Context

(Independent Study Report - 2011 Semester 1)

309248434 Hanley Weng hwen6932@uni.sydney.edu.au
supervised by Rob Saunders

Abstract

The rise of the smart-phone has lead to an increase in the popularity of casual games, often with social aspects, and has enabled the idea of geolocated social networks. As more mobile games introduce social components, geolocated social networks are augmenting themselves with indirect game mechanics. In this paper we explore the intersection of these two areas through the design of a geolocated casual game that facilitates both the creation and play of geolocated levels. Throughout development, we describe key findings that result from iterative cycles of user feedback.

Introduction

The rise of smart-phones has promoted higher quantities of momentary interactions with mobile devices and has also resulted in more accurate levels of geolocation (Counts, 2007). This has lead to an increase in the popularity of casual games, and has enabled the idea of geolocated social networks (Sotamaa, 2002). Along with the increase in consumption of mobile casual game play in short bursts, developers are incorporating social aspects to create networks of players. This retains engagement and relevancy to the player, promoting prolonged game-life. At the other end of the spectrum, geolocated social networks are attempting to retain and appeal to larger audiences by augmenting themselves with indirect game mechanics.

Social casual games often neglect users' real world environments in favour of complete and virtual social arenas with no contextual ties (Bogost, 2004). Whereas the use of geolocated social networks are often driven by the convenience these services provides, leaving their utilization of game mechanics relatively unexplored and weak in comparison to casual games. Beyond the novelty factor, the success of these geolocated social networks are also heavily reliant on existing social graphs (Cranshaw et. al., 2011).

We intend to explore the intersection of social mobile casual games and geolocated social networks through a geolocated casual game that facilitates both game creation and play. Through this mobile application, we explore users' relationships with their surroundings and how this can effect their interactions with the game. Its game mechanics would be social, reliant on location, and casually simple. Attributes of the game would also be chosen in order to encourage user engagement and increase the longevity of the geolocated social networks that are formed.

Throughout the design of such a game, its clarity will be continuously assessed through user interactions and perceptions. In doing so, the different relationships that players have with the application and the environment can also be observed. Observations will consist of the different user-scenarios that may arise from the application, how it integrates with the players' routines, and the different motivations that may encourage user interactions. The observations and feedback will cyclically contribute to the development process.

The principle aim of this report is to investigate the potential for geolocated casual gaming through the design of a casual, location-based game for a mobile device. In doing so, we will explore the relationship between different users and their social and physical environments.

Our objectives are as follows:

1. To review the current state of social interaction in casual games and the gaming aspects present within geolocated social networks.
2. To design an initial prototype of a geolocated casual game.
3. To observe and acquire user feedback throughout the development of the game and adjust accordingly.
4. To finalise a high-fidelity prototype of the geolocated casual game.

Related Work

Geolocated social networks within Location Based Services (LBS) have been found to augment themselves with minor game mechanics. Services such as Foursquare strategically provides multiple functions for the user, each complementing one another, ranging from personal location tracking, maintaining social connections, and incentives for indirect play (e.g. mayor-ships). Weak game mechanics such as badges in foursquare aid in strongly motivating players to interact with such services whilst they build their social graph within the service (Cranshaw et. al., 2011). For the casual user, after a prolonged amount of time, temporal functions such as incentives and games give way to more long-term uses of LBS such as keeping a historical record of places for reflection, and interacting uniquely with social connections. FIASCO (Chang et. al., 2004) is a location based street game based on claiming turf. It highlights the significance of a collective map and shows that a space can be personally, and communally appropriated through accumulated transformative experiences (from the game and external factors). This re-appropriation of space, can also be observed in another LBS; Connecto, whereby players have used place-naming to communicate spatial stories. This sense of commonality over a public space, strengthened through the sharing and exchange of information through mobile social networks, has also been found in services such as Dodgeball, and is termed by Humphreys (2010) as the Parochialization of a space. It is a welcome counter to the privatisation of many urban spaces due to technological developments (such as automated mail delivery systems, vehicles etc.) (Lofland, 1998).

Casual games often seek out and foster optimal places of social interactions. Oldenburg (1991) defines such sites, where people can come to casually socialize without any obligations, as ‘third places’. Facebook and its casual games work well together to provide such places (Rao, 2008), even though in-game communication channels are preferred (Jarvinen, 2010). These parochialized spaces do not have to be a result of direct social connections, they can also emerge amongst massive multi-player online games, whereby being “alone together” (Ducheneaut et. al., 2006), the act of simply being proximal to other players, is sufficiently compelling. In most games, these ‘third places’ are often completely virtual, but Ondrejka (2004) states that, for casual games, “strong connections to the real world are critical to the growth and success of these worlds.” This can be observed in casual games such as Animal Crossing whoms events such as Halloween and game-clock are synchronized with the real world (i.e. virtual shops will close up for the night). Such worlds provide common references for real world discussions, encouraging both virtual and real social communications (Bogost, 2004). Casual games differ from their traditional cousins as they often have much lower barriers of entry and typical session lengths are much shorter in comparison. These games have been rising in the mobile domain, where they are often designed successfully with asynchronous play, quick access and forgiveness to user attention (Korhonene, 2008). Asynchronous multi-player mobile casual games are a strong contender to future gaming, often being more engaging than their single-player counterparts. This hearkens back to the arcade game Asteroids, which introduced high-score listings that promoted local asynchronous competition. Games such as ‘MoMENTus’, a casual multi-player brain teaser game (Counts, 2007), and ‘Mythical, the Awakening’ (Korhonene, 2009) show that directly team playing with others does not work well for casually located games, rather it is better that the game facilitate players playing in parallel to one another (Jarvinen, 2010).

Instead of attempting to sever ties to time and space, location-based games attempt to create new meanings to familiar locations. Such games like Fiasco and Botfighers (Sotamaa, 2002) are often inspired by Situationist methods such as the derive, whereby individuals abandon normal routines for alternate acts that are driven by the surrounding terrain and resulting encounters. CloudMade

(.com) provides geolocated services in the form of APIs and maps. Some concepts produced with CloudMade include games like ‘Jumping in the Rain’, a platformer that changes the game world based on the weather, a simple and effective geolocated characteristic. On the other hand, games like ‘Murder in your City‘, ‘Dokobots’(.com) and more traditional geolocated games, may encourage deviations from a user’s normal routines. When this deviation is a focus of game-play, these products are no longer viewed as casual forms of play as they are not primarily integrated with a person’s daily routine. Regardless of the geolocated characteristics utilized, it is crucial that the identified context and relation to game play should be made clear to players (Korhonene, 2009). This awareness strengthens the contextual ties between the digital and analogue worlds, bringing solidity to digital spaces.

User generated content and their exchange strengthens the parochialization of spaces. The participatory culture that results is also important to human development (Clinton et. al., 2006). User generated content can range from whole games to levels or objects. There are various products that attempt to simplify design process for the end-user. Gamesoup (Baeker, 2010) splits game development into highly expressive programming and a simple visually connection-based ‘game assembly’ with a canvas. Kodu (MacLaurin, 2011) targets young children with a visual programming language of cartoon icons that allows players to create rules made of ‘conditions’ and ‘actions’. The majority of games that facilitate in-game content generation have editors that consist of streamlined, restricted options in the form of lists, tables, or step-by-step wizards. Julien Llans tested Little Big Planet on high-school students for approximately twelve months, found that there exists the problem that if players are given too much flexibility without much of a guideline, the levels or game worlds produced will be of little “enjoyment” (Alvarez et. al., 2010). This is often less of an issue on portable devices that permit user contributions to a game world, as the mobile nature of the product forces it’s own restrictions on user development. These restrictions result in a streamlined process (similar to existing successful end-user game editors), that are further simplified by the mobile, to the extent that there may be only one input to game-play. The Nintendo DS game; WarioWare: Do It Yourself, consist of micro-games that take a few seconds to complete by tapping the screen (the only mechanic), and can be constructed by the end-user through a game editor. This game editor has three components, a rule-based coding system, music editor, and visual editor. Though there are very few portable systems that contain adequate design tools (the majority on consoles, followed by the personal computer), similar minimalistic interaction metaphors can be found in games such as Crayon-Physics, Scribblenauts, and (the not yet officially released) Minecraft’s iPhone application. Gaming culture encourages creation and cultural economies (Sotamaa, 2002), with user generated worlds being even more efficient at content generation (Ondrejka, 2004). Given the right tools, people will create and share content with great satisfaction, producing communities such as Sodaplay(.com) and product successes (as observed by the positive feedback of WarioWare D.I.Y.).

Process

Process Overview

Development of the geolocated casual social game for this paper consists of a few cycles of user testing. These cycles involve of user feedback and observation of arising use-case scenarios, analysis of feedback, and resulting concept development.

The concept is kept relatively simple in comparison to existing mobile games, with less of a focus on game-play mechanics. Keeping in nature with the casual aspect of the game, this simplicity also allows for rapid prototyping and fast development cycles.

Process Methodology

After changes are made to a concept, testing is done to; assess the acceptance of opinions of different aspects of the concept, observe how it can integrate into a person's life and environments, and assess the usability of the application. Prototypes of the game and mockups are used to represent the concept.

Testing is done with mainly new users, with a few previous users of a concept (to judge its progressive evolution). Each cycle of user tests involves 5 to 10 persons aged 16 to 30, and approximately equal ratios of females to males.

User testing is done on a per person basis. It involves observations of the user performing certain usability tasks, questioning the user's comprehension on different aspects of the application and concept, and explanations of the application (sometimes physically walking with the user to different environments) through different location-based scenarios. Finally open-ended responses, such as personal use-cases for the application, are also noted.

The resulting responses are aggregated to determine the focus of changes for the next iteration of a concept.

Preliminary Interviews

Initial exploration of potential users' perspectives of social and game interactions on mobile devices, found that there was a desire to facilitate the casual, temporal nature of such games whilst prolonging their life through aesthetics and rewards. It was also noted that a player's ability to be aware of other players, (mainly) close or otherwise, their immediate status' as well as an offline presence, was a strong sentiment to the player's bond with an application. Another strong motivator for users was the mutual unification of players through shared activities or spaces that could act as common reference points.

Initial Concept & Development (I)

The concept of the game is relatively simple. A player has to get a ball on a certain level from point a to point b, amongst a block-filled world, using the mobile device's gyroscope to tilt the game world. The game editor allows players to create levels and populate it with blocks. Players can only play levels within their current location, and create levels for their location.

In developing the application, the iOS platform, coupled with libraries and APIs such as PixelWave (for the game engine) and ASIHTTPRequest (a wrapper around the CFNetwork API), were chosen for quick mobile development. Google App Engine (GAE), is used, with python, as an international way of storing and retrieving data in a geographically scalable manner. Game levels are stored as dictionaries of obstacles.

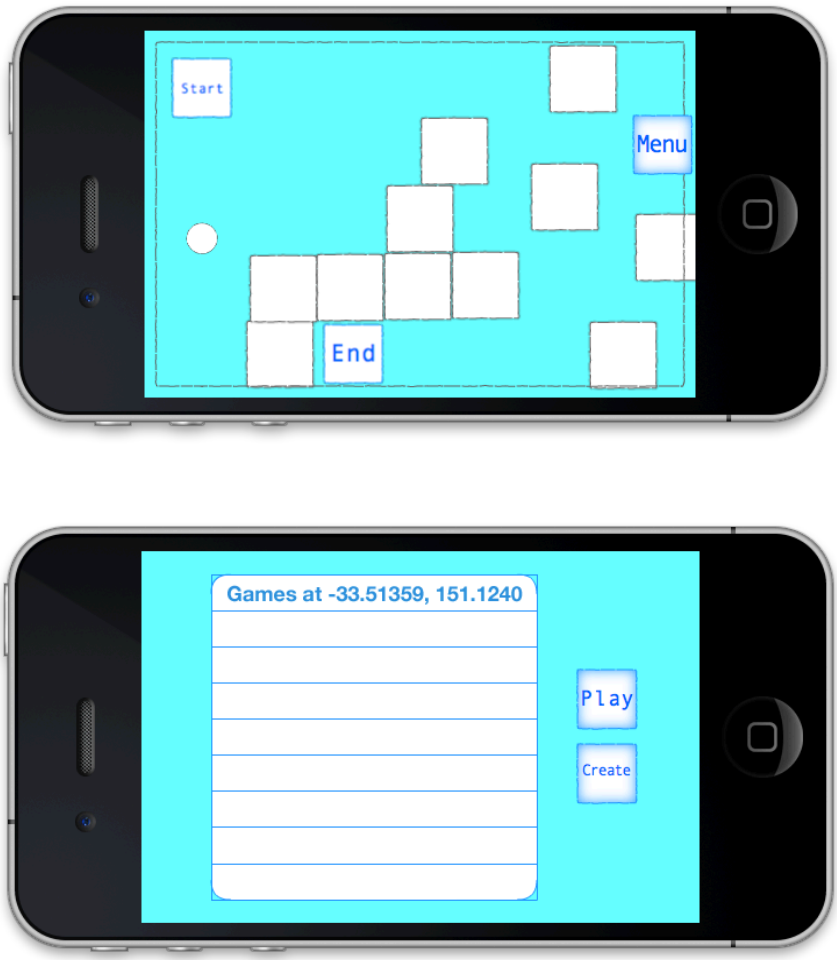

Figure 1. – Top: Snapshot of the game. The player controls the ball by tilting the screen, navigating the square blocks to arrive from the 'Start' block to the 'End' block.
Bottom: Snapshot of the Menu Screen, showing location, (empty) list, and options to create or play levels.

Initial Feedback (I)

Nine participants aided in individually assessing the game. An evaluation of their responses highlighted a few concerns. Most notable were the accessibility of levels, amongst different areas, at different times, etc. Issues with the representation of levels, and how to browse them were also raised, with requests for additional attributes such as (by frequency) popularity, ratings, ease of play, high-score tables, personal statistics and so on. Most viewed the community aspect of the

application to have a far greater potential than was initially intended, with suggestions of reinforcing the community through chatrooms, discussion boards, spectatorship, multiplay, and the simple location-grounded awareness of others in realtime or otherwise. Beyond these findings, were simply mentions of issues that could be solved with tweaks to game dynamics like friction of a surface, and the game's visual aesthetics.

These concerns were taken into account and addressed in the next iteration of the concept. The technical prototype will be developed, but remain a subset of the full concept (which will be explained in full to users during sessions), allowing for faster cycles of development and modifications.

Concept & Development (II)

In constructing the second iteration of the concept, initial feedback indicated a significant need to represent level selection. As such, this was the primary focus of this iteration, whilst general aesthetics were improved to enhance the affordances of the game.

Taking a visual form similar to Apple's app store, local levels were represented in list-form, filterable by difficulty and completion. The lists were 'Popular', which presented the most liked levels first, 'New', which showed off the newest created levels in the area, and 'Relevant' which found levels that were closest to the attributes associated with the current location and were also at least somewhat popular. Player's could also conceptually access a 'Ranks' section, showing off high-score tables for the area, or a 'Chat' section, where local users could leave comments and socialize.

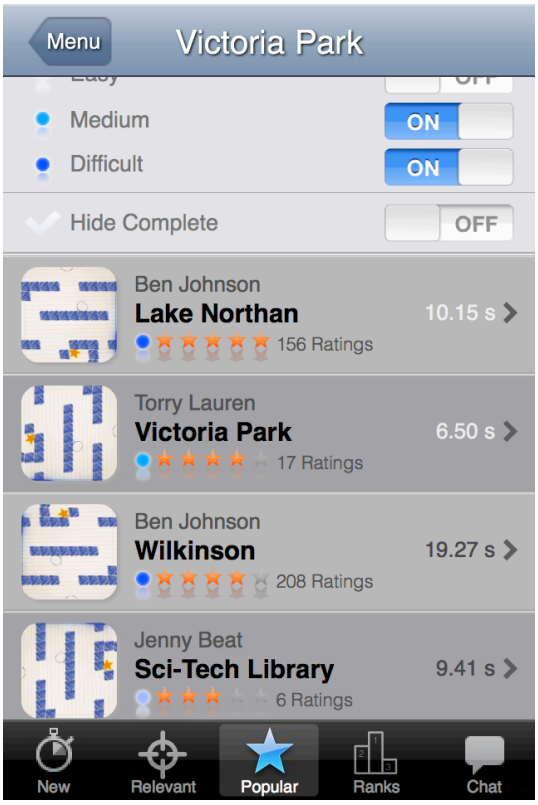

Figure 2 – A mockup of the 'Popular' listing of local levels.

A menu screen was introduced, allowing players to change their located area by selecting a cousin location (a required compensation to the potential inaccuracies of location-based technologies), or a different area zone (e.g. ‘Lake Northan’ or ‘Sydney’ instead of ‘Victoria Park’).

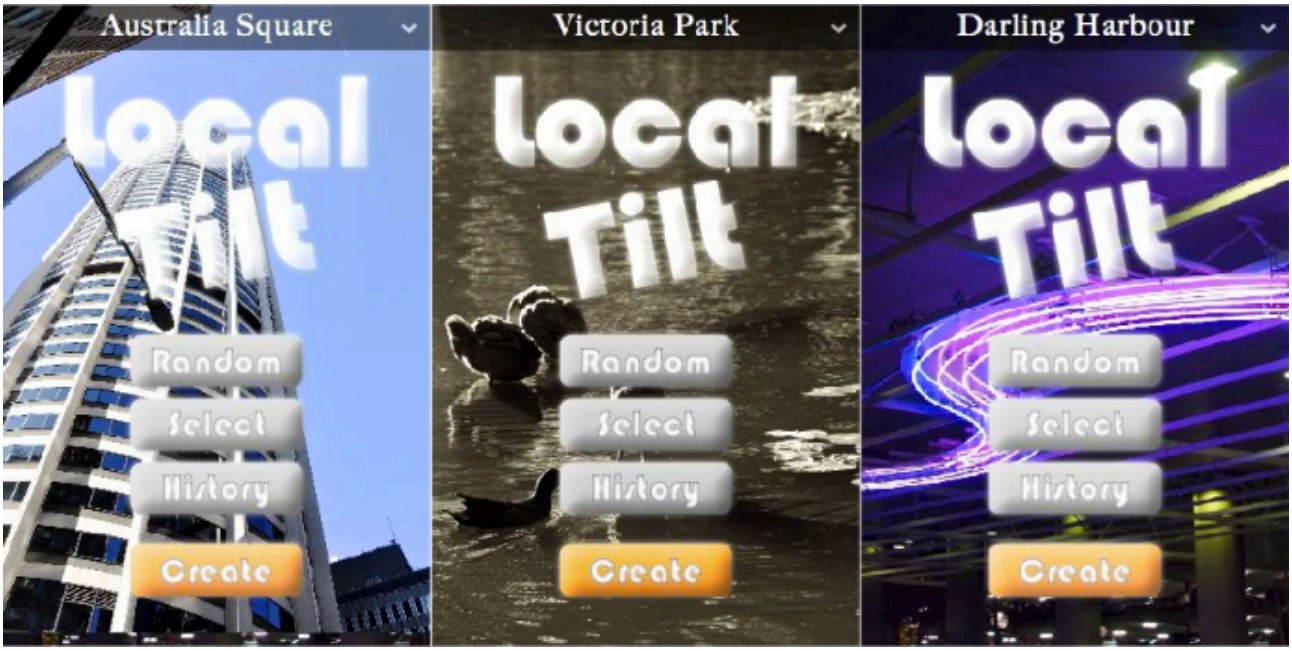

Figure 3 – Snapshots of the menu screen at different locations.

Selecting levels from list views reveals information that was present in their thumbnails, the location, creator, rating and difficulty. Also presented were personal rankings, characteristics, and access to level-based comments and a high score table.

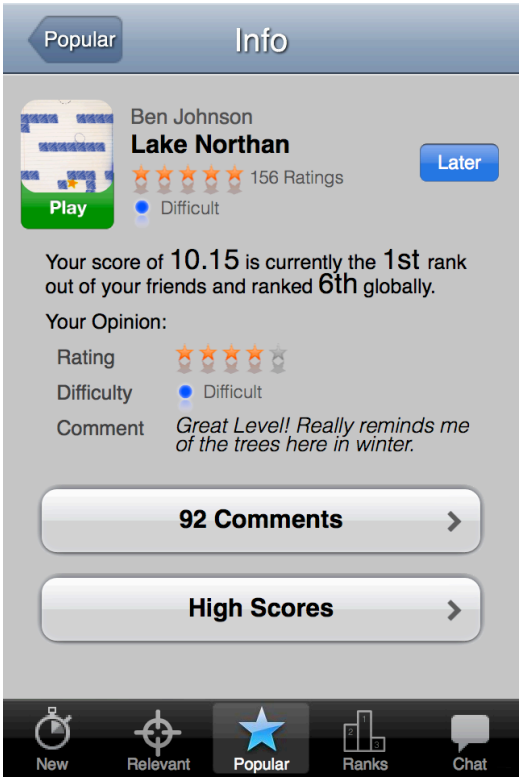

Figure 4 – Mockup of the Information Screen of a specific level.

Historic access to levels were handled under a ‘history’ view, where players could access information such as ratings, comments, highscores, personal statistics, etc. Players are allowed to replay recent levels (within the last day), or unlock access to older levels through the use of points. Points are equivalent to the number of stars people have given to rate the games the player has created.

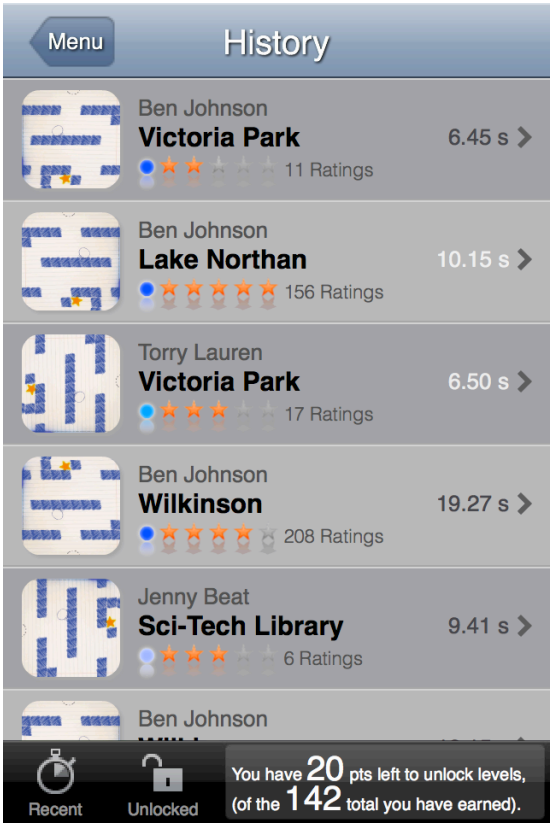

Figure 5 – Mockup of the History Screen.

In terms of development, whilst the majority of the conceptual changes mentioned above were simply represented by mockup images, the level editor of the game was adjusted so blocks could be added via touching a toggle-able gridded tile as opposed to tediously dragging blocks around. Along with the aesthetic changes, mockup elements were implemented so the concept could be better represented to testing users.

Feedback (II)

The user testing conducted for this iteration was similar to that of the previous version, involving five new users and a couple who have been introduced to the concept during the first iteration of tests. Along with allowing users to use the prototype on a smartphone amongst different scenarios, mockup images accompanied with descriptions were also used to explain the concept in full.

The changes to aesthetics did solve most of the problems related to unclear affordances. Though more unified aesthetic styles were desired (e.g. amongst different history, menu screen). Access to historic items via a point-based system was also observed to be too complicated. Further conceptual suggestions involved simply extending the game mechanics and making them more complex (e.g. with more dynamic obstacles). The feedback to levels of social awareness and community as

contributed by highscore tables and chat forums was adequate, but could be stronger, especially during level selection. There was a strong desire to highlight the relation of an area with a specific game level, a relation that was not supported by the tools of the game. Desire for a higher focus on personal customization during level design was also signalled, the ability to provide more flexible tools to better portray how a casual level designed in a specific location is linked to an area, potentially utilizing the player's surroundings as more evident inspiration to a level.

These concerns were taken into account to be addressed in future iterations of the concept. The full concept would be altered, represented through mockup images, but the technical implementation would remain mostly unadjusted (with the exception a few aesthetic changes to facilitate a better understanding of the concept). New users would be able to experience a subset of the concept through a rough technical implementation of the application, whilst the full concept was enacted out to them.

Further Concept Changes (III)

Following the previous rounds of user feedback, a few smaller cycles were undertaken to improve general affordances and aesthetics of the game. Also, the maturity of the concept was exploited to better assess the application as a geolocated casual gaming platform and editor. The methodology was simplified to primarily consist of quick series' of instructions and questions to users that addressed affordances and observed personal use-case scenarios.

The concept was altered based off feedback. Beyond general improvements to clarity (such as the visual hierarchy of information), additional mockups were created representing highscores. 'Ghosting' was also added to enforce competitiveness and community, allowing players' to replay their own, or others (especially those who rank highly) play sessions. The history screen was altered to be a simpler system consisting of a list of previously played games, but only actually playable within a certain time frame (as opposed to a point-based system, since it was determined that such a system was not required to ensure levels would be created). The home screen was eliminated in favour of a 'Main' view which allowed the player to access 'Creating a Level', a 'Random Level' and a 'Best of the Week'. The 'Main' view also presented the player's position (alterable by location sectors), along with an interactive geolocated view of their current location and surrounding levels. The selection of levels was also altered to facilitate a map representation as well as lists. With a finite number of levels being shown in the level selection based directly on the player's position, as opposed to a 'closest-levels' distance, parameters like 'Popular' and 'New' acted as filters instead of ordering agents. This decision was mainly due to findings of people desiring a closer relation to their current areas, certain peoples' willingness to create for an area, and the implemented ability for players to alter their location sector.

Final Concept

Below is the description of the final informed concept of a geolocated casual game that facilitates level design and incorporates both social and mobile attributes. It is a result of the research done into the current state of geolocated social networks and casual games, and iterative cycles of user testing.

The gameplay is relatively simple, based off a physics engine, and using the tilt of a mobile device to get a ball from point a to point b amongst a level of obstacles. Conceptually, more complex obstacles could exist such as boosts, traps, puzzle elements (e.g. key and door object pairs), etc. Objects are collect-able and (like different levels) are rooted to locations. Objects can be placed on a level in the game editor by selecting on them and then tapping on the gridded blocks of a level. The player has the ability to test and save their levels. There are automatic mechanisms to ensure a level is completable before submission into the community. Levels can be assigned to a player's current or neighboring area sector (sectors can exist within sectors, e.g. Sydney is inside Australia, Lake Northan is inside Victoria Park).

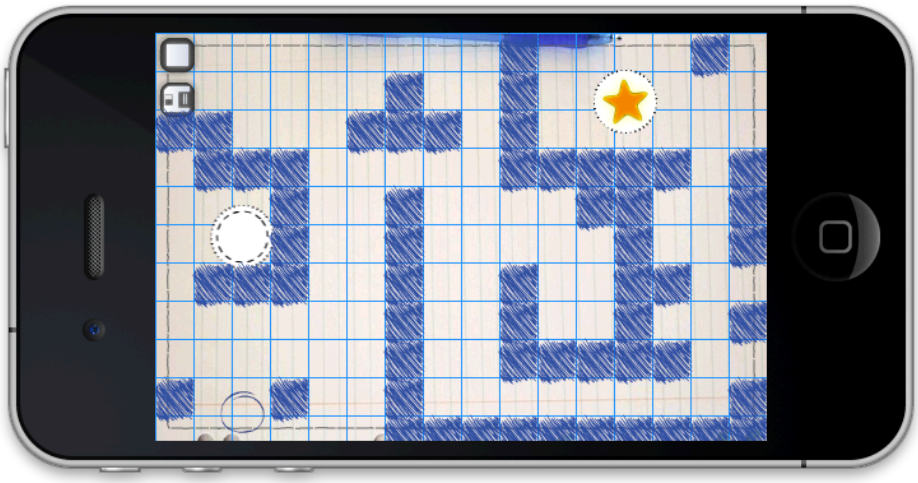

Figure 6 – Game Editor of the Prototype.

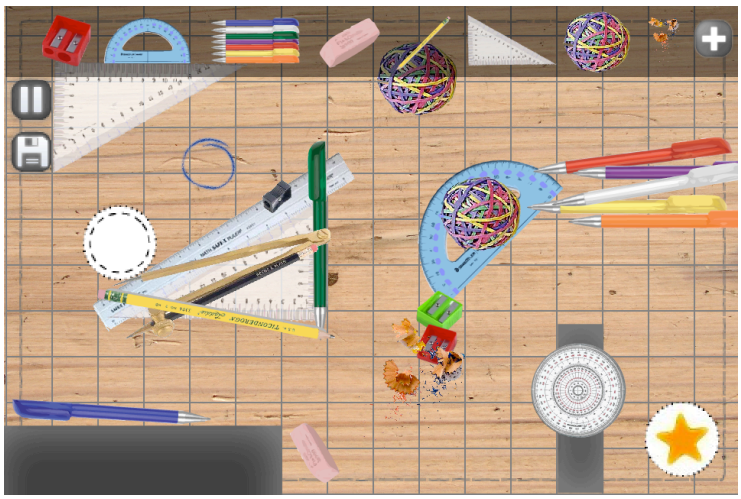

Figure 7 – Ideal mockup of the Game Editor (currently in a school-based context).

The root view of the application consists of a lower bar that provides access to five views. These are; ‘Main’, ‘History’, ‘Browse’, ‘Ranks’ and ‘Chat’. All five views are based on the player’s current location, the first three in particular are different representations of the current surrounding levels whilst the last two encourage asynchronous multiplay and the parochialization of spaces through local points of reference.

The main screen consists of three buttons. The first is ‘Create’, and allows a player to create a level, tagged with their current location. The latter two are subject to change, and are ‘Random’ and ‘Best of the Week’. An interactive map dominates the centre of this view, allowing a player to contextualize themselves within an area and select specific levels for further information or play. Most importantly, the player is shown the current location that is registered by the application as a button that can be toggled to a larger or smaller area sector (e.g. Lake Northan is a different area sector to Victoria Park, but Lake Northan is in Victoria Park, just like Victoria Park is in Sydney), or neighboring sectors (due to possibly inaccurate location technologies).

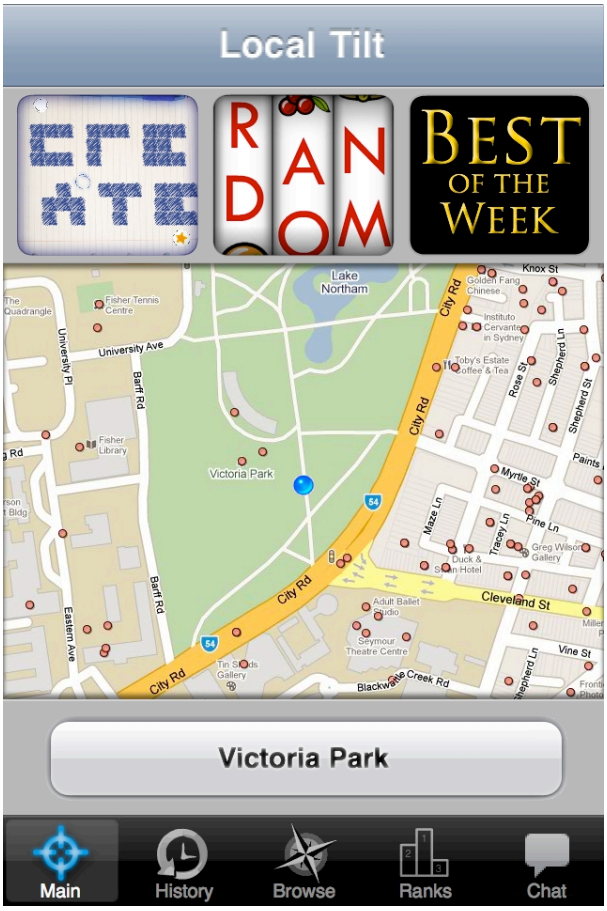

Figure 8 – Mockup image of the main screen.

Players can browse for geolocated levels via the ‘Browse’ view where levels can be viewed as a list or as a map (like the map in main view). Under list view, levels are ordered by popularity or creation date, and filtered by difficulty and completion. Each row on the list shows a level’s thumbnail view, the player’s score (or highest score if not yet played), author, area name, number of ratings and overall ranking (number of stars). There is another ‘Create’ button at the end of a listing of the area’s levels so a player can contribute a level to this area from here.

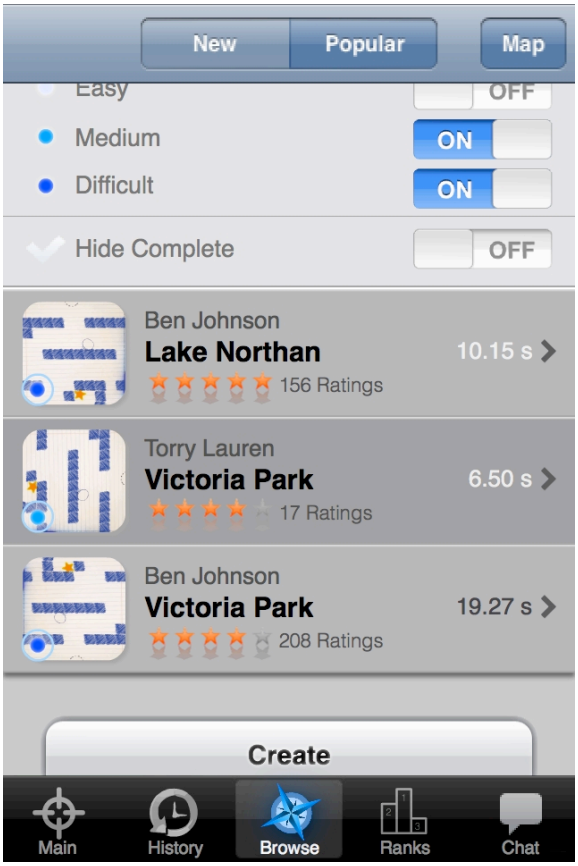

Figure 9 – Mockup Image of the Browse screen in list mode.

The history screen is very similar to the browse screen, except everything is ordered by date (can’t be ordered by new or popular). Like the browser view, it can be filtered by difficulty and can be represented in both map and list views. This personal place-tracking feature is another strongly cited use-case for location-based services.

Selecting a level provides a more in depth view of it. It shows the same information as when it is in list view (thumbnail, author, location, ratings, difficulty), as well as personal statistics; personal opinions of the level, score and rank. Players can play the level from here or mark for later. Additional buttons allows users to check out replays of this level from themselves and others, read through comments on this level, or check out the rankings tied to this specific level.

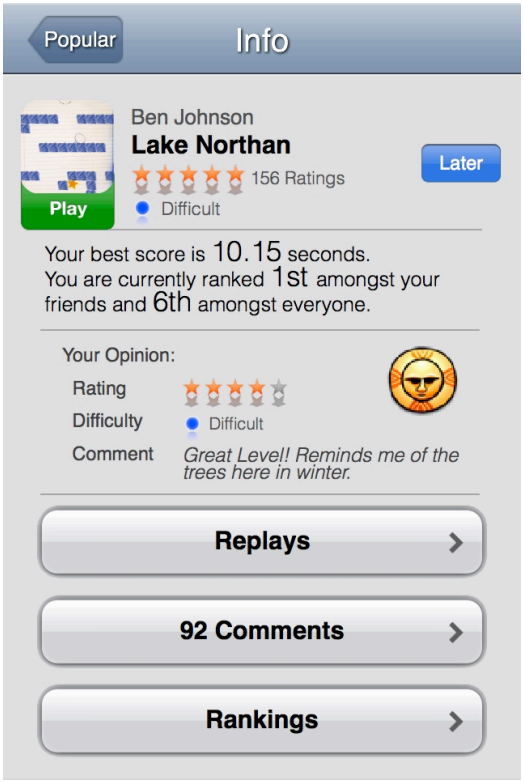

Figure 10 – Mockup Image of the Game Information Screen.

Selecting ‘Rankings’ from a level’s information view, reveals a view that is similar to the ‘Ranks’ in the root view. Ranking scoreboards help facilitate asynchronous competitive multiplay in gaming communities. They are represented here as a list view with a player’s icon, name and score, and are initially listed amongst friends, then amongst everyone else. Ranked scores can be filtered by dates (‘all time’, ‘today’ and ‘this week’). The player can dwell into these rankings of other players to reveal more information about the player in this area, games they’ve played along with their scores, as well as watch their replays. Due to the different difficulties of different levels, ranks are determined by pareto optimality, so users are ranked in comparison to one another, as opposed to specific plays.

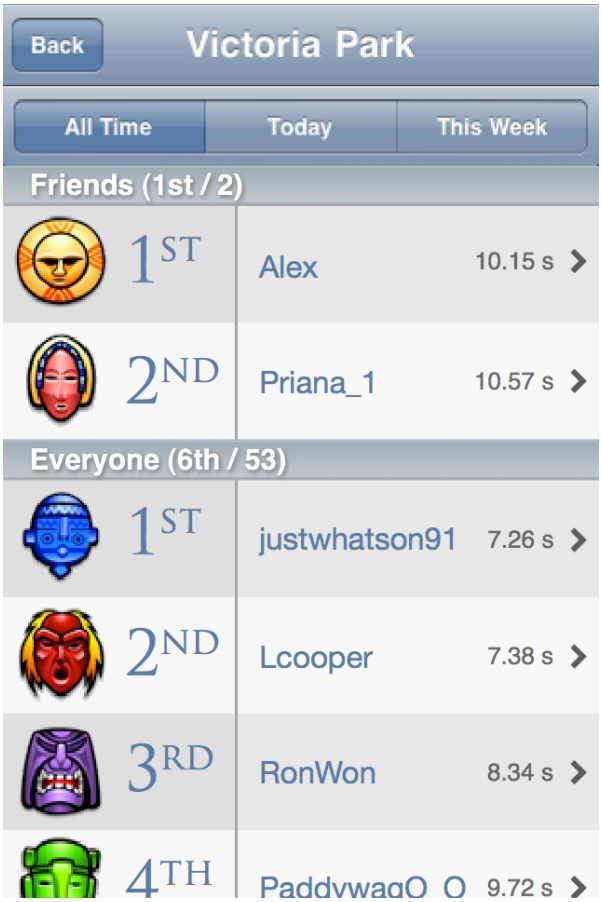

Figure 11 – Mockup Image of the Rankings Screen.

The chat view essentially allows people to comment on the specific area sector they are in, aesthetically very simple and similar to existing commenting systems used in services such as news sites, blogs and youtube. Though simple, the unrestricted nature of such services allows users to communally re-appropriate a space in many different ways.

Informed by the current state of game mechanics within geolocated social networks and the social interactions found in casual games, this hi-fidelity prototype has arisen from iterated cycles of user research. This geolocated casual mobile game incorporates location-based characteristics, strong game mechanics and various tools mechanics fostering social geolocated spaces and interactions therein.

Overall Findings

Overall, the concept holds strong potential amongst users and was well received. A prominent request to game mechanics was more complex obstacles (such as ‘door and key’ object pairs, speed boosts, swings etc. rather than static obstacles), facilitated by more flexible game design tools. However, this issue can result in bad creations if users are given too many tools, and requires caution (Alvarez, 2010). It is interesting to note that females were more inclined to create games for an area rather than play, and vice-versa for males. A high majority of people saw potential in utilizing the geolocated mobile application as an agent to strengthen relationships between the player and local environment, or between the player and the surrounding community, establishing routinely accessed parochialized spaces. Potential for a location-based community was seen through various game elements (different types and aesthetics of obstacles), statistics, player profiles, and forums.

For a simple, casual game, aesthetics solved many initial affordance issues, whilst facilitating the longevity of the game. The use of maps, though not always functional, helped many people contextualize scenes amongst the area. Handling locations was quite difficult, most people preferred locations to be sectioned off into named sectors, as opposed to utilizing a ‘closest-distance’ based measure to predict items within the same area.

Future Work

The submission of a geolocated casual game to a global market (e.g. the app store) will allow for extended user studies accessible by a much wider audience. This availability can be used to observe the social growth and the acceptance of this concept amongst a broader audience and their long-term experience with the application can be assessed along with the communities and relationships that are formed around different people and environments. Such observations would also assist in evaluating the temporal (or persistent) nature of levels, as allowed by their accessibility.

The ideal flexibility of design tools on a mobile device could also be explored in the game editor. Exploring this process can also promote the application to facilitate the discovery of hidden attributes of an area via various environmental characteristics (e.g. using the texture of a nearby plant as a mechanic).

User engagement within levels can be further augmented via more complex objects. These objects can potentially be personally created through object creation which could introduce an additional community, one focused on object design, to compliment level designers and players as well as the economic transfer of objects amongst different persons, locations and groups. Though such creative flexibility promotes higher forms of personal expression, with any such freedom, there also arises the issues of moderation and ownership of user generated content.

Aspects of a geolocated casual concept that enhances relations amongst people and communities could be further explored, such as the nature of spectatorship through mechanics like replays and ghosting (translucent views of self or others during gameplay). Realtime multiplayer game mechanics can also be introduced to explore more geolocated social aspects of the concept whilst reducing casual play.

The flexibility of the level editors could also be expanded in complexity, in such a way that they become akin to game editors, so different game types such as role playing games, first person shooters, platformers, etc. can also be created. In doing so, the consequences of more complex and diverse gameplay can be explored, especially in regards to the communities formed around specific areas and their published statistics (e.g. individual ‘champion’ statures of specific games in a certain area).

Beyond the community aspect of the concept, the management of named location sectors is also another issue that warrants exploration. Whilst location-based themes can help contextualize the application, naming different sectors of varying sizes during different timeframes still needs to be more fully addressed, whether it be via auto-generated methods, crowd-sourced methods or various mixtures of both.

Conclusion

Investigation into the intersection of geolocated social networks and casual games, facilitated by the flexibility afforded by a mobile platform, has revealed that applications such as the hi-fi design iteratively developed here hold much potential. Through aesthetics, geolocated user engagement, and mobile user-content generation, concepts such as geolocated casual games can grow strong communities through the local parochialization of spaces.

References

Alvarez, J., Djaouti, D., Jessel, J. (2010) *Can "Gaming 2.0" help design "Serious Games"?: a comparative study.* Proceedings of the 5th ACM SIGGRAPH Symposium on Video Games.

Baeker, R., Tonon, H. (2010) *GameSoup: a two-stage game development environment.* Proceedings of the International Academic Conference on the Future of Game Design and Technology, May 06-07, 2010, Vancouver, British Columbia, Canada

Bogost, I. (2004) *Asynchronous Multiplayer: Futures for Casual Multiplayer Experience.* Proceedings at the Other Players conference, Centre for Computer Games Research, IT University of Copenhagen, Denmark. 6-8 December 2004.

Chang, M., Goodman, E. (2004) *FIASCO: Game Interface for Location-Based Play.* Cambridge, Massachusetts. ACM.

Chen G., Li, N. (2010) *Sharing Location in Online Social Networks.* IEEE 2010.

Clinton, K., Jenkins. H., Purushotma, R., Robison, A. J., Weigel, M. (2006) *Confronting the Challenges of Participatory Culture: Media Education for the 21st Century*. The MacArthur Foundation.

Counts, S., Li, K. A. (2007) *Exploring Social Interactions and Attributes of Casual Multiplayer Mobile Gaming.* Proceedings of the 4th international conference on mobile technology, applications, and systems and the 1st international symposium on Computer human interaction in mobile technology, September 10-12, 2007, Singapore

Cranshaw, J., Lindqvist, J., Hong, J., Wiese, J., Zimmerman, J. (2011) *I'm the Mayor of My House: Examining Why People Use foursquare - a Social-Driven Location Sharing Application.* CHI 2011, May 7-12, 2011. ACM, 2011.

Ducheneaut, N., Moore, R.J., Nickell, E., Yee, N. (2006). '*Alone Together?' Exploring the Social Dynamics of massively Multiplayer Online Games.* Proceedings of CHI 2006.

Humphreys, L., (2010) *Mobile social networks and urban public space.* SAGE

Jarvinen, A. (2010) '*The State of Social in Social Games'*. Gamasutra.com, October 19, 2010,<http://www.gamasutra.com/view/feature/6177/the_state_of_social_in_social_games.php>

Korhonene H., Saarenpaa H., Paavilainen J. (2008) *Pervasive Mobile Games – a New Mindset for Players and Developers.* Fun and Games 2008, LNCS 5294, pp. 21-32.

Korhonene H., Saarenpaa H., Paavilainen J. (2009) *Asynchronous Gameplay in Pervasive Multiplayer Mobile Games.* CHI 2009.

Lambiotte, R., Mascolo, C., Noulas, A., Scellato, S. (2011) *Socio-spatial Properties of Online Location-based Social Networks*. Association for the Advancement of Artificial Intelligence.

Lofland, L.H., (1998) *The Public Realm: Exploring the City's Quintessential Social Territory.* New York: Aldine de Gruyter.

MacLaurin, M. (2011)*The design of kodu: a tiny visual programming language for children on the Xbox 360.* Proceedings of the 38th annual ACM SIGPLAN-SIGACT symposium on Principles of programming languages.

Oldenburg, R. (1991) *The Great Good Place: Cafes, Coffee Shops, Community Centers, Beauty Parlors, General Stores, Bars, Hangouts and How They Get You Through the Day.* New York: Paragon House.

Ondrejka, C. R. (2004) *Living on the Edge: Digital Worlds Which Embrace the Real World.* University of Southern California Press.

Rao, V., (2008) *Facebook Applications and Playful Mood: the Construction of Facebook as a "Third Place"*. Proceedings of the 12th international conference on Entertainment and media in the ubiquitous era, October 07-09, 2008, Tampere, Finland

Sotamaa, O. (2002) *All the World's A Botfighter Stage: Notes on Location-based Multi-User Gaming.* Tampere University Press.

Appendix

Game source code available on request.