

Urban golf

Mobile applications

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Abstract

This report is part of mobile applications course at Østfold university college. The report will describe a mobile application called Urban golf. This is a golf game that is played on and with your mobile phone. The game uses principles from regular golf and can be played everywhere. The holes and goals are displayed on a canvas from Open Streetmap. Local records, informations about courses an who are playing where are stored on a game server. The game is not fully implemented, but it has been tested using the “Wizard of Os” principle. The paper will discuss collaboration and HCI aspects of the application. The evaluation-chapter will discuss whether Urban golf and its ideas are worth pursuing into a full implementation.

Keywords: Mobile application, PyS60, Urban golf, GPS, motion sensing, Open Streetmap, collaboration

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Chapter 1

Introduction

This report is part of the course "Mobile Applications" at Oestfold University College. The course is part of a masters degree in information science. This paper will discuss a game called Urban golf which is going to be played on a mobile phone. Mobile phone applications are increasing in numbers and is big business. It is safe to predict that the future have a lot in store for the mobile platform[2].

1.1 Project title

The title of the application will be "Urban Golf". This is a golf game for mobile platforms. The name implies that it is a golf game and that it is played in urban areas. The name tells the user that it is not a regular game of golf and it use the golf metaphor to to convey what can be expected from the game.

1.2 Project description

This chapter will present the original ideas of the project. This is an early stage of the development process and there is always the possibility that the initial idea will change as the project strides along. The game concept has been inspired by Nintendo Wii¹ and their wireless motion detection controllers[13].

¹<http://en.wikipedia.org/wiki/Wii>

1.3 Goal

This project has two goals, one for the project and one for the application.

1.3.1 Project

The goal for the project is to be involved in a development process from the start until evaluation of the first prototype. It is important to learn the process and methods used in developing an application for the mobile platform.

1.3.2 Application

The goal for this project is to create an application that will utilize and take benefit from the technology offered in modern mobile phones. Urban golf will give people a chance to play a game based on the golf metaphor in unusual surroundings. The goal is for people to have fun together and play a computerized game in the outdoors.

1.4 Gameplay

The game can be played wherever you are. All you need is a mobile phone which meets the requirements for the game. The game can be played either as singleplayer or multiplayer. Every game is registered on a game-server and based on the GPS-coordinates it is possible to see if there are other players playing a game in your area. Based on this information it is possible to join an existing game or create a new one. Before the game starts the players will have to decide how many courses they are going to play, whether they are going to have a break during the game and measure the wind speed if they want to play with actual wind conditions.

When this information has been gathered the game is ready to begin. The application will calculate the course and display it on the phone. The first tee is where the players are at the point when they start the game. Map data is collected for the actual place from for instance GoogleMaps or Open Streetmap. The course will be drawn as a layer over the map. Buildings can be shown on the course as forest, rough, bunker or water, while the open areas are defined as the fairway. This information will be gathered by a map-service that based on coordinates know where the buildings and roads are. On the map the player will receive information on which course one are playing, what the par is, current stroke, wind speed and which golf club the player has selected. While the

players are playing the application will update their status on facebook² and foursquare³.

To strike the virtual ball the players use their mobile phones. The motion-detector in the mobile phone will detect the movement of the phone and gathered on this information the outcome of the swing will be calculated. It is possible to slice the ball if you have a nervous swing. Dependent of the wind and how well you swing the phone the ball will fly through the air. The players can see the ball flying over the course on the phones screen. As one hit the ball one will hear the classic golf ball sound and the phone will vibrate.

When all the players have teed off they will have to walk to their respective balls and hit again. This routine repeats itself until everybody has finished the course.

If the players selected to have a break during the game, before the game started, the course route will be calculated in such a manner that the selected "break-put" will end outside for instance a cafeteria. One can either choose where to have a break, or let the application decide based on information from the yellowpages. The winner of the game will, as in regular golf, be the player with the least amount of strikes.

1.5 Scenarios

There are several possible scenarios in which one could use this game. An interesting add-on could be to create a tourist/guide version. In Halden this version could for example be a predefined course which is played on Fredriksten Festning where all the courses will end on a historical interesting place. When the player has managed the put, he/she will receive information on the phones display about the place they are standing.

To interweave the game with existing social on-line channels like facebook, twitter and foursquare one can help to create an awareness of the game and display for instance high scores outside the application itself.

Another extension is the possibility to download predefined maps generated by other users from the web. This makes it possible to play the same game as someone else and thus the possibility to have a highscore for that special game. This will be a more competitive game mode and one can reach fame in the urban mobile golf community.

²<http://www.facebook.com>

³<http://www.foursquare.com>

1.6 What makes this an interesting project?

There are several aspects that make this an interesting project. As the mobile phones become more and more powerful, the possibilities increases accordingly. It will be exciting to play around with, and explore what can be done with the mobile phone. This project will also be a great opportunity to be acquainted with the process involved in creating a mobile application. Golf is also an interesting, social and fun game which one can play in one owns pace. This game will bring golf to the masses and it is possible to play it anywhere with anyone. The game is interactive and will make the players use their mobile phones in an unusual context. The game can be either competitive or one can use the game as an arena to be with good friends and stroll around the golf course of their likings, either way, it will be fun. The game will combine principles of an old traditional game with new technology.

1.7 What makes this a mobile application?

This game is situated outside which means it must be played with a mobile device. The game will benefit from many of the brilliant new technologies that have been implemented in new mobile phones. When playing the game the users will have to move around as the game is played. The game will be very dynamic with its randomly created courses.

1.8 What makes this a social application?

There are three aspects to be considered when calling this a social application. First you have the communication through the device. By being able to see through the application whether there are other players in your area and the possibility to join their game, there is a social connection. Through the application there is also a collaboration aspect when the users upload their high scores and information about played courses that other people can play.

Second you have the communication through existing social media where you can upload what you are doing and where you are doing it. This makes it possible for people that do not play the game themselves to physically meet their friends and later join if they like to. This makes the awareness of the game independent from the application itself.

Third you have the human relations when actually playing the game. By deciding to play a game people will actually have to meet face to face. This makes this a social event that friends can

do together. During the game it is also possible to stop in a café where one have a break and a coffee before one continues to play the game.

1.9 What capabilities of a mobile phone will be used in your project?

Urban golf will use many technical aspects of the mobile phone. The following sections will discuss the technologies to be implemented and how they will be used in Urban golf.

1.9.1 GPS

GPS will be used to determine where the players are and create a course based on that information. The GPS will track the players around the course. The GPS will also be used to gather information of nearby facilities based on information from either the game server or third party services. The GPS will also be used to submit geographical position to social media and update your profile.

1.9.2 Motion detection

The gyro and compass in the mobile unit will be used to determine the wind direction and wind strength. It will also be the key ingredient in calculating the swing and how the ball is hit.

1.9.3 Internet access

It is very important that the players are connected to the Internet to download mapdata and other non-static data that are needed to play the game. Access to the Internet makes it possible to upload a good golf-course and compare high scores. This can be achieved by either GPRS/UMTS or Wi-Fi.

1.9.4 Microphone and speaker

The microphone will be used to gather information about the wind speed in the sense of noise on the microphone. The speaker in the device will convey sounds to the players.

1.9.5 Mobile phone vibration

When a player hits the ball the mobile phone will vibrate to simulate that you actually hit something.

1.10 What similar projects/applications are already in existence?

Urban golf⁴ is not a new idea. It is believed that urban golf began in 1741 in Scotland. What is new with this game is that the players don't need clubs to play, but they use their mobile phones. I have found one similar golf-game that is played with the iPhone called Gigaputt⁵. An illustration of Gigaputt can be seen in figure 1.1

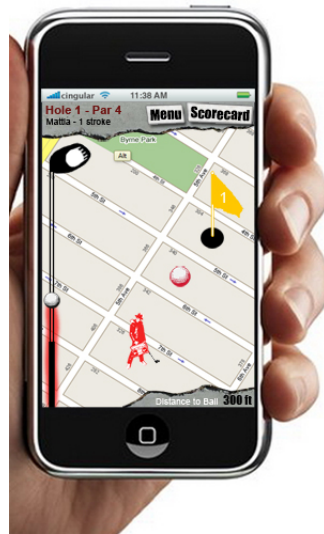


Figure 1.1: Screenshot from Gigaputt

⁴http://en.wikipedia.org/wiki/Urban_golf

⁵http://www.giganticmechanic.com/games_gigaputt.html

Chapter 2

Project plan

The goal for this application is to create a prototype that uses the "Wizard of Os" principles. The prototype will be tested on other students at Oestfold University College. The results from the testing will be evaluated.

2.1 Prototypes

2.1.1 Working prototype

The working prototype 2.1 will be a partially implementation of the whole project. To begin with I will create an application that downloads a map covering the area at your current GPS-position, which will serve as a playing field. On this map there will be coordinates that represents tee-off, players position, golf ball and the hole. The player will move around in this field by pressing a button to simulate a golf-strike. The ball will then move closer to the hole. Elements that will be implemented in the prototype are as follows: GPS-coordinates, map from Open streetmap, hitting the ball and moving. The menu structure of the game will also be implemented, but all the items will not be functional.

2.1.2 Paper prototype

The goal of the paper-prototype is to illustrate all the functions that are not implemented in the working prototype. A paper prototype is a low fidelity prototype which is an affordable method to use when testing a new product[7]. The paper prototype I will implement consists of a N82 mobile phone that has been cut from paper and a paper strip consisting of the different screen shots2.2. The



Figure 2.1: Example prototype

paper strip will be placed in the screen of the paper phone. As the user navigates in the application, the paper strip is moved left or right, thus changing the output on the paper phone screen.



Figure 2.2: Example paper prototype

2.1.3 Wizard of Oz prototype

2.2 Testing

The test objects will be recruited amongst the students at the college. I will select five random persons that will test both prototypes. During the testing it is important to observe the testers and note what they are saying and how they are acting when testing. After they have tested the prototypes they will answer a questionnaire. The evaluation of the testing will be evaluated based on the test objects reactions and their answers to the questionnaire.

2.3 Evaluation

Based on input from the testers and their experience with the prototypes, I will evaluate my project. The results from the evaluation will then be added to the final report. There are no iterations in this project, so the changes suggested in the user testing will not be implemented.

2.4 Schedule

Table 2.1: Preliminary schedule for my project

Date	Action
Week 5	Detailed project description and HCI assignment
Week 6	Begin implementation
Week 7	Project proposal
Week 8	Implement maps from Open Streetmap
Week 9	Implement GPS-coordinates
Week 10	Implement golf ball, movement and striking
Week 11	Paper mockup
Week 12	Prototype
Week 13	Test the prototype
Week 14	Evaluate prototype
Week 15	Finish the project
Week 16	Report
Week 17	Report
Week 18	Report
Week 19	Final submission

Chapter 3

Urban golf

This chapter will describe HCI aspects of Urban golf and give some thoughts to how users will be recruited to the application. It is important to think about the HCI aspects to give the users the best experience. In a pervasive game like Urban golf it is important to think about the fact that the target group will use this game in another context than a desktop game and thus bear this in mind when creating the game[8]. A user study from Finland gives some clear guidelines in what users expect from a mobile game and discuss solutions as of how to create a good pervasive mobile game. At the end of the chapter there will be a short plan on the prototype to be used and the evaluation of the prototype.

3.1 Human Computer Interaction

Traditionally one have thought of two paradigms on context of HCI, but as users get more involved with creating content and shaping an application, a third paradigm has been coined[5]. As technology evolves and new devices are presented to the market, one will also have new possibilities. Today people interact with their mobile phones in a new fashion. In Urban golf the users will have to use their mobile phones actively, for instance when striking the ball. Results from the game and the courses played can also be uploaded to a central game server, helping to generate content that will benefit other users. Based on how the user performs an action, feedback will be given to user in form of sounds, vibration and visual on the phone. This will be a haptic application that will involve the user to a greater extend than traditional mobile games[10]. Creating a usable interface to any application is difficult and also critical for the success of the application. If the users don't get the experience they expect to get, they will probably use another application[12]. It is therefore

important to create a design that will keep the users attention on your application.

The following sections will describe elements that will be used in Urban golf and how communication happens between the users and their mobile device.

3.1.1 Sounds

To strengthen the feeling that you are playing golf there will be some familiar golf sounds. When a user takes a swing at the ball he will hear both the swoosh sound to imitate the swing, a click when the ball is hit and a third sound when the ball is putted in the hole. These three sounds will help emphasize that the users are playing golf and give the players a better experience[9].

Other players in the same game can also show other players acknowledgement for a good strike. If a competitor takes a good swing, the other players can press an applause button that will play an applause on the phone to the person who had a good swing.

3.1.2 Visual

The visual part of the application is very important. What the application conveys through the display of the phone is important for the user experience[3]. It is important that the application does not give too much information on the display, but it is also important that all the necessary information is displayed. Too much or too little information will confuse the user.

In Urban golf the display will be used to display the menus from which the user can select an action. Based on a choice from the menu the display will change. There will also be required information from the user in some of the sub-menus. If you create a game you will have to select how many players, how many holes and the name of the game¹.

When the game has started the user will be shown a map and some point of interests(poi). The poi's are the tee, golf balls and the hole. The golf balls will have their players name beside them so it is easy to see whom is whom. Other information that will be on the map is meters to the hole, what club you are playing with, wind speed and direction, the par of the hole and how many strikes you have used.

When the game is finished the players will be shown a score for the hole and return to the main menu.

¹So other players can find the game and possible join the game

3.1.3 Vibration

Vibration is another important tool that can be used to convey something up on the user. When the user strikes the ball the mobile phone will vibrate which will simulate that the player hits the ball. The phone will also vibrate when the user has put the ball. The vibration will enhance the user experience and emphasize that something is happening. This is a tactile method to give the user feedback. It has been argued that a tactile feedback on mobile devices increases the user experience[1].

3.1.4 Social media

The application will be closely connected to existing social channels on the Internet. This will give the users the chance to communicate with their friends through a familiar portal. By changing their status on Facebook or Twitter they can tell others what they are doing. By connecting the application to Foursquare it will be possible for players to check in and earn badges while playing a game of golf as well.

3.1.5 Other aspects

Since the mobile phone is a multi-tool it is important that the players also can use the other functions of the phone when playing a game. If a player receives a phone call, the game will pause until the player is finished talking. This can be annoying for other players in the game, so it is important that a phone call is not too long. Other users might drop out of the game if it pauses too long. This is something that will have to be user tested and commented.

The design must be as easy as possible, but still maintain functionality. It is important that the design is user centred and that the application easily can be used by anyone.

3.2 Recruiting and involving users for your application

This chapter will give my thoughts on the target group of Urban golf, how the game can be distributed to recruit new users and what this will do for game when it comes to user feedback.

3.2.1 Target group

Urban golf is a game that can be played by everyone. It does not require any prerequisites from the users, although it would be an advantage if the users are familiar with how golf is played. The game

play is performed in such a way that it does not limit the game to any particular group of people. Whether you are young, old or physically disabled, you can play this game. The main factors deciding if people will play this game or not might be time, interest in golf, technical abilities and an available device to play the game on. The game has therefore a quite large target group.

3.2.2 Distribution

There are several factors that need to be considered in regards to distribute a new application. An application will rarely be distributed by itself, so it is important to have thoughts on how the game will recruit users. The game must be distributed through existing channels. By using big online communities like Facebook where you can reach a large amount of people will be an absolute asset when it comes to distributing and making the application known to the masses. Depending on the game will be free to download or cost money will have an effect on which distribution channels that will be used. If the game will cost money it will have to be sold at existing online game stores, telecom services and through the games own homepage. If the game comes free of cost it is more easily distributed in the sense that it can be made available at more places. It will also be easier for users to share the games with their friends and in this way increase the user mass. It is also possible to distribute the game without charging the users and instead implement services inside the game which will charge the different participants, for instance if a café or art gallery wants to be represented in the game they will have to pay for this service. This would in turn increase their revenue by more visitors from the Urban golf community.

The game would also most certainly benefit from good expert and user reviews. If the game scores well on these reviews this will help boost the distribution and the hype for the game.

It would also be a good market strategy to present the game in the proper arenas such as the "Come out and play"² events. This is a place where there will be many people who are likely to adapt a new game and who can help you make an awareness of your game.

Social networks

Foursquare, twitter, facebook

²<http://comeoutandplay.org>

3.2.3 Feedback and evaluation

As the game will recruit more users it will most likely produce more user feedback. With this feedback it will be possible with further development of the game and to implement new ideas. The users can leave feedback on the homepage of Urban golf. It is also possible to gather statistics from the game server whether for instance users finish the games they start to play. If the users tend to not finish the game that they have started it is important to find possible solutions to why people do not finish their games. With a larger mass of users it would also be possible to conduct user surveys amongst the users.

Based on the information gathered Urban golf can be evaluated and make decisions regarding the future of the game.

3.3 Collaboration

When it comes to collaboration it is an interesting aspect how much the users should be involved and how this involvement shall be implemented. If the user is required to contribute, this will to many users be felt intrusive. The collaboration should be voluntarily and it should not take the focus away from the application which is to play Urban golf, but it is important to emphasize that it is the user generated content that will help develop and shape the game. This chapter will describe how Urban golf will deal with the collaboration aspect. Figure 3.1 shows a raw sketch with the different users and their connection to the central game server.

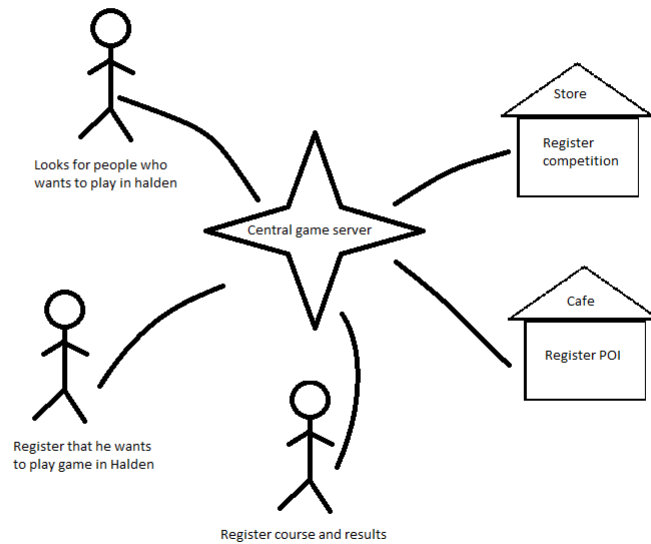
3.3.1 In-game collaboration

The collaborative and social aspects of Urban golf are linked together. Before the game starts the users have the possibility to either create a new game or to join an existing game. It is also possible to search for other people who have registered that they need someone to play with in the actual area that you are in. By contributing that they are available for a game of golf they will keep the community alive.

When a game has started, information that a game is playing in a specific area will be broadcast³ to the game server, making it possible for other users to see the game and possibly join the the game. By sending the coordinates to a actual game to the game server it is possible for the application when a new game is started, to make several games cross paths so that players can have a chat with fellow

³As long as the players are not playing a private game

Figure 3.1: Collaboration raw sketch



golfers while playing. When the players are playing a game they will also have the opportunity to report whether at course that was created is not playable. This could be due to traffic, water or other obstacles that make this a bad course. Then when a new game is created in this area the course will avoid the geographical spot that was reported as a bad area to play. When playing the game it is possible for the players to give other players performing well a "cheer". When a player gives a cheer to another player an applause sound will be played at that players mobile phone

When the game has finished the players have the opportunity to upload the game profile to a server and make it available for others to play. Along with the course data, the local record for that course will be saved in a high score. Players can then select if they will play that course again to improve their score and it is available for other players to play the same game to beat the existing score.

3.3.2 External collaboration

Local businesses can advertise in Urban golf. By going to the games' web page they can register their store with GPS coordinates and what they are offering. If you for instance have registered a

café, it will be tagged on the map and a course in that area will frequent that place more often. It is also possible for stores to create Urban golf competitions. By announcing that they will have a prized competition, they will attract players and hopefully more customers. The businesses can in this way collaborate with the users of the game to create a dynamic and living community.

3.3.3 Challenges

One major challenge in creating a functional collaborative application for the mobile platform is the fact that they are mobile[11]. The mobile device used to play the golf needs to be connected to the Internet while playing and to upload results and other data to the server. If the user loses connectivity the information might not be registered. It is also a challenge to decide how the collaboration shall be implemented and how much the application shall rely on it. In a collaboration aspect you are fully dependant upon people using your system. If there are few users or businesses participating in the game, the application will become static.

3.4 Context

“Context is any information that can be used to characterize the situation of an entity.” and “A system is context-aware if it uses context to provide relevant information and/or services to the user, where relevancy depends on the user’s task.” A.K.Dey [4]

These two definitions by Dey defines in short what is meant by context and context-awareness. This chapter will describe the context and context awareness of Urban golf. By being a mobile application the awareness of the application will be a central topic in describing its functionality.

3.4.1 Context

Urban golf is played outside, alone or with someone. The game will preferably be played when the weather is fine since the mobile devices usually are not to found of water. The game is played with the aid of a map on your mobile phone which implies that the users will have to have knowledge about navigating a map. The golf metaphor is also a context in the sense that the users will have to use their mobile phone to imitate striking a golf ball. The game can be played everywhere as long as there is a gps signal and a connection to the Internet present. The game will most likely be played in an area surrounded by buildings, but it can also be played in a more rural area and there is no reason that the game for instance can be played in a boat on water. So there are no limits to the geographical context in which the game can be played.

The users of Urban golf will most likely be in a relaxed setting since they are playing a game. This means that the game will be played in a social context and for fun. There will of course in many cases be a competitive state when playing the game, but again this will be a social event. Since the application is intended to be used for recreation the users will likely be less prone to faults within the application compared to an application that is more sensitive for errors such as a medical application.

3.4.2 Context awareness

The application will have context awareness mainly concerning the gps location. Urban golf is a location based game, that based on the users gps coordinates will create the appropriate map data and the opportunity to enclose this information to on-line social media. By using the gps coordinates the application will at any time know where the user is and display relevant information from for instance FourSquare, registered stores and other points of interest.

The golf swing is another ability in the application that is context aware. By registering the movement of the mobile phone with the inbuilt motion sensor, the application will decide how the user performs a swing. The microphone in the mobile phone can also be used as a measurement tool, which means that the application will also be aware of the wind conditions at a specific location.

By analysing the map the application will be able to know in what kind of area the phone is located. If there are many buildings and streets where the game is played, the application will know if the game is played in a possible crowded and central area, versus an area with little traffic and more rural. This will not be implemented in Urban golf, but it proves that by analysing the data fetched by the application, the application will have a high degree of context awareness based on its location.

3.5 Location and maps

The Urban golf application will fetch relevant map information from the Internet based on the GPS coordinates supplied by the GPS unit in the mobile phone. On this map there will be displayed relevant information to the players. Urban golf is fully dependant upon the location to display the correct map and information for a specific geographical location. This section will describe how the application will utilize information from the GPS sensor to display relevant map data to the users.

3.5.1 Location

Based on the location of the user, the application will load the current map section and other relevant information from this area. This could be information from FourSquare, stores that are hosting an Urban golf competition or a place where one can take coffee break. The location of the game is also reported to the central game server. This makes it possible for other users to see that there is a game of urban golf being played. The location is also important considering that the users might want to share their game with others. The location will therefore be used to guide the users playing a game, but it will also be an important factor in communication with other users when it comes to information sharing and user generated content. Without knowing the location of the mobile phone Urban golf would never have a chance of being realized. It is important to be aware that the game is very vulnerable if the GPS signals disappear. If this is the case the game will lose its geographical context and thus be rendered useless.

3.5.2 Maps

There are several on-line services that provide map data that can be used in an application such as Urban golf. Urban golf will use data from the open source project Open Streetmap⁴. The users will be presented to an excerpt of a map containing the data from the area in which the user is currently present. On top of this map the user will get additional information based on the users location⁵. Urban golf only needs static map data. This means that it will only download the map data for the current strike. As a user walks around, the map will not continue to update as in a navigation system, only the map data needed to take the next strike will be presented. This will give less traffic to/from the Internet and a possible more smooth experience since the application will not continuously download data. The zoom level of the map is also important to take into consideration. Mobile phones have relatively small screens and resolution. With this in mind it is important to find a zoom and detail level of the imported map that looks pleasant and is able to show all the information needed.

⁴<http://openstreetmap.org>

⁵Longitude and latitude from the GPS sensor

3.6 Play and game

To discover how play and game relate to Urban Golf it is important to first define what play and game are. Johan Huizinga⁶ did through his cultural studies write “Homo Ludens”[6]. In this book he discusses the possibility that play is the primary formative element in human culture. Animals play just as well as humans, play is inherited in us all and acts thus as instincts. When playing one creates an own sphere to contain the game often called the “magic circle”. Huizinga argues that within this circle there exists other rules than in everyday life, humans can behave different when within this circle.

In Urban Golf the magic circle which contains the play area is the course created by the application. Within this course there is a different set of rules that applies to the players. They must perform certain acts that does not conform with everyday rules. These acts are defined by play. When swinging the mobile phone (golf club), they will perform an action that is defined by the game and not by social and cultural norms. When performing these acts the players can be free and for a short period of time devote themselves to playing a game. Playing can be performed everywhere and is not pin downed to any location. This is also true with Urban Golf which can be played anywhere. This means that the magic circle can be created independent of time and space. The main goal of Urban Golf is to have fun with friends and enjoy a good game. There is initially no money prizes and the game can solely be played for recreational purposes. This will also fit into the notion of play as there is no material profit that can be derived from playing this game. Play in Urban golf is an activity that spontaneously creates a reaction based on an event in the game. Play is the true emotions and fun that is shown by the players.

Roger Caillois⁷ defined game as an activity with the following characteristics: fun, separate, uncertain, non-productive, governed by rules and fictitious. If we look at these keywords and try to relate them to Urban Golf we will see that Urban Golf has a good chance to comply with this definition. Whether Urban Golf is fun or not is a subjective opinion, but this is most certainly the goal. When playing this game the players are supposed to have *fun* and enjoy themselves. When playing this game, people will enjoy themselves and have their mind set on playing golf. Urban Golf is not bound to any location nor time and is therefore *seperate*. Where, when and who is not predefined by the application which means the game can be played whenever the participants want to. The outcome of the game is not clear until the game is finished. This means that there is an *uncertainty* of who will win. The results can not be predicted on forehand. All that happens in the

⁶http://en.wikipedia.org/wiki/Johan_Huizinga

⁷http://en.wikipedia.org/wiki/Roger_Caillois

game, stays in the game. The users will benefit from playing Urban Golf in having fun and being social with other people. Whether this is *non-productive* or not is a subjective opinion. For some it might be useful to get out and have fun with other people, meaning that this will be socially useful for them. Urban golf might therefore fall into two categories, both useful and not. Initially the game is not intended to have a large impact on peoples life, but again this is subjective and for some it might actually be productive. They will not make any major changes to everyday life and is thus *non-productive*. Their skills within the game might increase and the players are likely to meet other interesting people, but this is all on a game level and social area. On a general basis though, the game will most likely follow Callois definition of a game. Urban golf is *governed by rules* and *fictional*. The game is played imaginary in the real world. The game follows a set of rules that the players must obey if they are to finish the game correctly. This shows that Urban Golf complies with Caillois definition of a game.

Although there are several definitions of both play and game, this paper has chosen to use widely accepted definitions by Huizinga and Caillois.

Chapter 4

Prototype

For demonstration of Urban Golf there will be created a paper prototype, also known as a low fidelity prototype¹. A paper prototype is a cheap and yet powerful method to use for testing. The idea is to catch whatever essential flaws there might be with the application before a functional prototype is implemented. The next logical step after the low fidelity prototype is to create a prototype with greater functionality. Based on user feedback a functional prototype can be implemented, which again will be tested and evolve to the finished application. Within the scope of this project, there will only be created a paper prototype which will be evaluated.

The paper prototype will consist of small sheets of paper cut to fit the screen of a mobile phone. The resolution of the prototype will be 320x480 pixels. The prototype will show screen dumps of the functions in the game. The game that will be played is predefined since it is not possible to take every possible outcome from the users into consideration. The game will be tested down town Halden. The tee, where the player starts, and the green is predefined. What happens between tee and the green can vary to some extend. Every strike will have three possible outcomes. The wizard will based on the actions from the user select where the ball lands. Since this is a low fidelity prototype it is limited how many functions of the game you can test. This first prototype will therefore first test the game play in single player mode.

After the testers have tested the game they will have to answer some questions to sum up their experience with the prototype. This questionnaire will be described later in this chapter.

¹http://en.wikipedia.org/wiki/Paper_prototypes

4.1 Objectives

There are several objectives with this prototype. First of all the concept of the game needs to be tested. Does the application stand to peoples expectations when they play the game? It is also important to do testing on the selected design of the prototype. Is it easy to navigate within the application? Is there something with the navigation that can be improved or seems ambiguous? Is the information that is displayed confusing? Is there too little or too much information displayed? The testers will also have to comment or suggest improvements that can be implemented in the game. There has also been framed one hypothesis that hopefully will be answered after the testing during the evaluation phase.

4.1.1 Hypothesis

Urban golf will be played with the mobile phone as a golf club. Since most new phones have an integrated gyrocompass and motion sensors the application will take benefit of these technologies and create the mobile phone into a virtual club. The game could easily have been played without these sensors and the ball could have been struck using a button on the phone. The thesis is then: **Playing golf on a mobile phone using the accelerometer and gyrocompass enhances the playability and the degree of realism as experienced by the player.** To test this thesis the players will play a hole with both the motion sensor enabled and just by pressing a button.

4.2 Paper slides

The following section will describe the paper slides that will be used in the prototype. Every slide that is shown here will be printed on photo paper and possible laminated if it rains during the test day. To minimize the number of pictures show, there will only be illustrated one picture for every scenario, that means that all the possibilities for each strike will not be shown.

Figure 4.1 shows the splash screen. This is the first screen the user will see and this image tries to convey a combination of both a city and a golf course, i.e. Urban Golf.

After the splash screen the user is presented with menu as seen in figure 4.2. From this menu the user will have several choices. In the prototype it is only the create game function that is implemented. This is since there is only this function that will be tested in the game and it is difficult to test the other functions in a paper prototype.

When the user has selected to create a game, he will be presented with several choices, figure

Figure 4.1: Splash screen

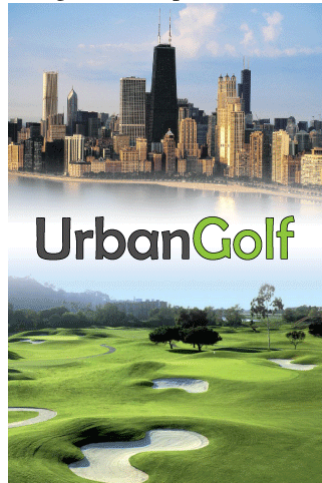


Figure 4.2: Menu

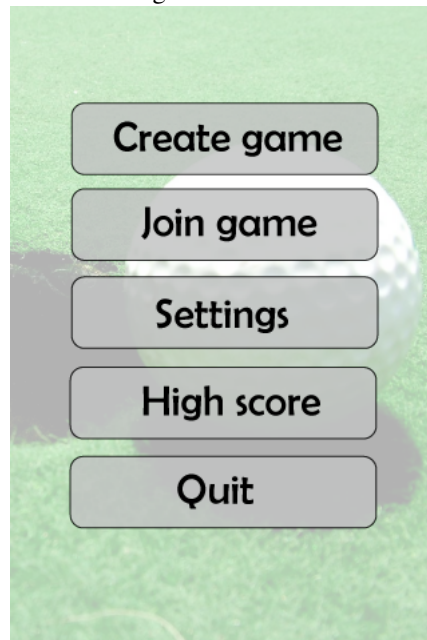
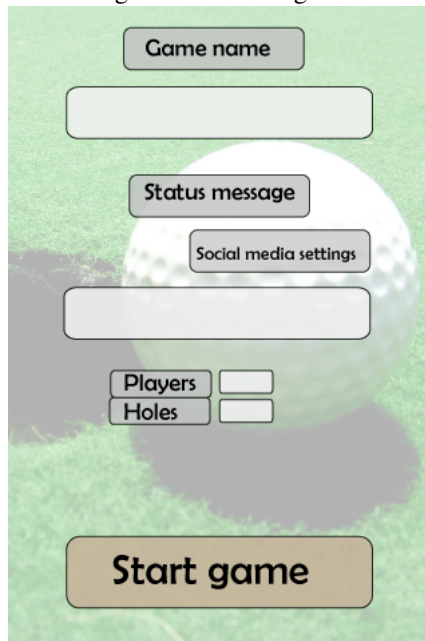


Figure 4.3: Create game

The image shows a mobile application screen for creating a game. The background is a green golf course with a white golf ball in the center. The screen contains several input fields and buttons. At the top, there is a button labeled 'Game name' above a text input field. Below that is another button labeled 'Status message' above a text input field. Underneath is a button labeled 'Social media settings' above a text input field. At the bottom left, there are two rows of controls: 'Players' with a numeric input field, and 'Holes' with a numeric input field. At the bottom center, there is a large, prominent button labeled 'Start game'.

4.3. These choices will set up a game server where other people can join in and play, but for now it is only implemented with single player. This screen will give the player a chance to customize his game.

Figure 4.4 shows a info screen where the user will get information about the hole he is going to play. The information screen will present information which is relevant to the user about the hole that is going to be played. After the information screen the user will see the first in game screen, as seen in figure 4.5. This screen will show information about where the user is and where he is going (indicated with the green on left hand side). On top of the screen the user will get information about the par of the hole, which strike he is on, the wind speed and which club he is using. By pressing the club icon the user will get up information about different clubs to choose from. Every clubs has different capabilities and the game will default choose the seemingly best club to use.

After the player is finished with the first strike. There will be displayed information about the current shot. This is seen in figure 4.6. As well as seeing information about the shot, the player is able to send a pre defined tweet that will be displayed on the users Twitter profile. This tweet can have information about the players strike and geographical location along with a message. This sequence will repeat itself until the hole is finished. When the hole is finished the player will get the

Figure 4.4: Information about hole



Figure 4.5: In game tee off

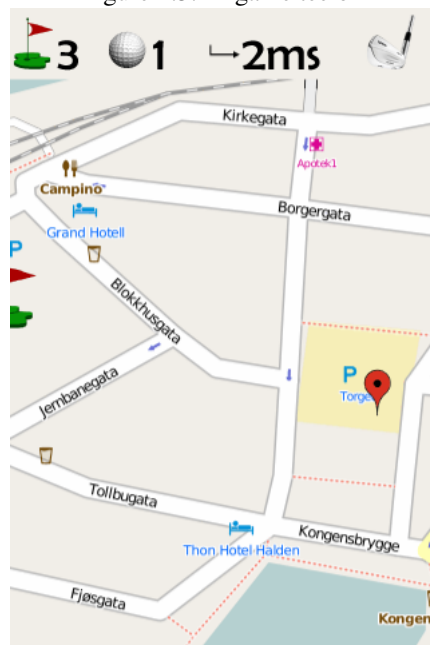


Figure 4.6: Results strike one



overall results for the hole. This is shown in figure 4.7. The player will have the opportunity to tweet the overall score. Since this prototype only plays one hole, the player will have the opportunity to go back to the menu. If there were more holes to play, the player would move on to the next hole.

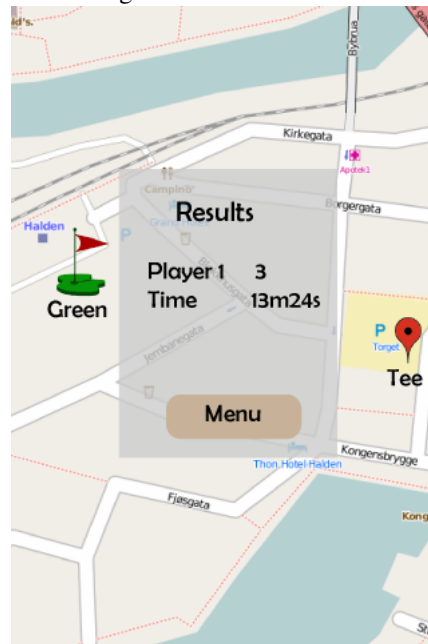
This is basically the layout of the prototype and a short description of the different elements that are included. The following sections in this chapter will describe the roles that are needed to test this prototype and how it will be executed.

4.3 Roles

As with any experiment there are several roles that needs to be engaged. With this experiment there are four roles to be filled. These roles will be filled by two people.

Administrator and data logger Briefs the players about the game Urban Golf. The administrator is also responsible to gather data from the experiment. **Moderator/Wizard** The wizard is in charge of the paper slides. He decides which slides to present for the player and how to organize the cards for quick access. The wizard will be a fellow student at the college.

Figure 4.7: Results hole



4.4 Equipment

To perform the test there will be used a deck of predefined cards, the paper prototype. To tape the communication between the player and to document the testing phase, the whole test will be filmed. This film will be used to evaluate the test.

4.5 Execution

The prototype will be executed as a “Wizard of Oz” experiment^{2,3}. This means that the testing will be performed with a person that acts like a computer. Based on an action performed by the tester, the “computer” will display information on the testers paper mobile phone. This is a good way to test a low fidelity prototype and will give the testers an experience that will be relevant to the real game.

First the player will be briefed shortly about the application and how the test is to be performed by the administrator. This introduction will take 5 minutes at most. After the introduction the test

²http://en.wikipedia.org/wiki/Wizard_of_Oz_experiment

³http://www.usabilityfirst.com/glossary/term_105.txt

group will go down town and test the game play of the application. The moderator is responsible to act as the computer and will display the equivalent card to the action the user selects. The administrator will tape the whole test. The idea is that the player will interact with the prototype independent of the administrator and moderator. If there are any issues that appears during the testing, this will be recorded and taken into consideration during the evaluation.

After the test the test group will return to the college where the participants will answer a short questionnaire about the experience from the game. There will only be one person testing the application at once. The time estimated for the whole test will be 45 minutes. The actual game will take about 15 minutes to perform, but in addition to this it is also a travel time to and from the test site which will take approximately 15-20 minutes. Add this to the briefing and questionnaire the total amount of time per person will be in the vicinity of 45 minutes. There will be four persons testing the application. According to Nielsen's DUE model these four persons will contribute with finding 75 percent of the errors with the application.

4.6 Test subjects

The persons who will test the application will be recruited from the college. There will be two experienced persons that will test the application, and two inexperienced persons. By experienced is meant a user with a technological background and an ability to adapt to new scenarios in a presumable easy manner. By inexperienced user is meant a person that is not that acquainted with the technology offered in mobile devices and presumable has more difficulty in understanding the technology. By using persons from these two groups one will receive input from two different points of view. What is important for the experienced user might not be important to the inexperienced user and vice versa. This will ensure that feedback will be gathered from a more diverse segment. There is no pre-requisite that the person testing the game has any knowledge of how golf is played. The players will be depersonalised in this report.

4.7 Questionnaire

The questions that are proposed on the questionnaire will reflect the objectives and thesis concerning the prototype. Although the demography of the person testing the game might not be that relevant, all the users will supply this information. It is important that the questions are not biased and ambiguous. The questions need to be direct and concise. The questionnaire will in its entirety be

referenced in the appendix.

4.7.1 Evaluation

When it is time to evaluate the test of the prototype the experience from the user will be emphasized. The administrator and moderator will also go through the footage to see whether there are any interesting comments about the application during the game play. Comments that are interesting are comments from the player about the game, but also comments from the administrator about events that might be interesting for the evaluation phase. Based on the questions that are answered by the players there will be created a short summary of their experience and also created a short recommendation for the further development of Urban Golf.

Chapter 5

Concluding remarks

To be written when the report is finished...

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Listings

Appendix A

Appendix