

WEWAVE- a collocated cheering application

Annalisa Casati
Chalmers University of
Technology
Gothenburg, Sweden
casati@student.chalmers.se

Elise Karlsson
Chalmers University of
Technology
Gothenburg, Sweden
elisek@student.chalmers.se

Laure Charton
Chalmers University of
Technology
Gothenburg, Sweden
laurec@student.chalmers.se

ABSTRACT

As people become more isolated by the ubiquitous mobile screen, the need for social activities to take part in the same place at the same time decreases every day. With such a flexible gadget ubiquitously present in our society there are also opportunities to enhance face-to-face interaction. Inspired by Lundgren et al.'s collocated design framework [1], this paper explores how to subtly break down the social barriers through a mobile game application based on the simple gesture of lifting a finger. The team will discuss the methods and process used to design and develop this application, as well as the challenges faced and the reflections with regard to further development of the concept.

Author Keywords

Collocated interaction; game application; gestural interaction; design process

ACM Classification Keywords

H.5.3 [Information Interfaces and Presentation]: Group and Organization Interfaces

INTRODUCTION

Society has long been voicing the concern of mobile devices socially dividing people. For some time, the interaction design research community has been providing an alternative view on the problem by presenting frameworks and materials on the subject of collocated interaction [1] [2] [3], where face-to-face situations are supported by technology. Huizinga holds in [4] that a most effective strategy to breaking down the barriers between people is through the use of games. This paper thus introduces the game WeWave as an addition to this research space. This is a collocated game designed to burst the social bubble by inviting players to gather around the same device, and which takes the concept of the Mexican wave and juxtaposes it with the mobile touch event. The research that the team aimed to explore is that of whether collocated social interactions can be enhanced through the use of a gesture-based game on a single device?

Alongside the concept of WeWave itself, this paper also presents and discusses the process leading up to the design, development, and testing of an interactive prototype implemented for Android, with emphasis on the methodology, the results, future improvements and its place in the collocated interaction design sphere.

THEORY

There is a large body of work relating to the encouragement of collocated interaction through mobile devices. A platform for social and spatial interaction (SSI) was introduced by Lucero et al. [3]. In their study, probes are used to analyze mobile usage patterns, and the SSI platform is introduced as an exploration of new ways to encourage shared multi-user collocated interactions over personal-individual use of their mobile phones. Similarly, work undertaken by Lundgren et al in [1] introduces a framework for designing collocated mobile experiences.

This paper explores the potential of the ludic concept of the “magic circle” for bringing players together. Originally introduced by Huizinga in [4], the magic circle is a mental state players enter when playing a game in adherence to its rules. In the circle, the rules of the game apply and override real world ones, leading people to perform actions they would not have otherwise, such as killing, betraying, or as in this case, overcoming social boundaries. In fact, Huizinga discusses the feeling of “being ‘apart together’ in an exceptional situation” when speaking about games, as a motivator for the formation of social bonds [4].

Lundgren and Torgersson [2] also occupy this intersection between mobile collocated interaction and games, but in the space of “hybrid games”, i.e. boardgames enhanced by digital components. Their reasoning for the above is that games “open up the design space” for designing unusual solutions that can later become more mainstream [4]. Where this project differs from that of Lundgren and Torgersson is in contemplating a boardgame-like digital game, contained entirely within a mobile application.

METHODOLOGY

The team's design process followed the Jones [5] model, falling into three phases: Divergence, Transformation and Convergence. This was then succeeded by a cycle of Implementation and Playtesting. The process and results of playtesting are further discussed in the Results section, whereas this section concentrates on describing the design process.

Inspiration

Starting from the theme of collocated interaction, the team began by finding inspiration from existing applications. Two that were particularly influential were the mobile games Space Team and Bang. Space Team influenced early designs of WeWave, where players were each on separate

devices networked together. Bang, a game where two players have a “shoot-out” around a single device, inspired the choice to make all players in WeWave gather around one screen. Both games are simple, quick and intuitive, which certainly affected the simplicity ultimately inscribed in the WeWave concept.

Divergence

The team held a number of ideation sessions based on the theme. The first employed Lundgren and Torgersson’s framework for collocated interaction [1], skewing each of the properties to generate a set of possible ideas. The second started from the theme, and proceeded to consider it from various angles and based on various scenarios where collocated interaction might be possible, such as cafés, sports events, games, public transport and parties. Many varied and interesting ideas were generated during this phase, due to the diversity of the team both in background and in culture.

The team made a number of voting passes over the idea set, allowing each team member to both endorse ideas with votes, and to veto ideas that they did not feel were feasible. The last pass the team rationalized the ideas in terms of ease of implementation within the given time frame, eventually whittling the set down to three ideas.

Transformation

The three ideas resulting from ideation were:

- **Codenames:** Mobile Edition - an application based on the Codenames party game, where players are divided into two teams, within which they collaborate to match a clue given by their team leader to a set of words laid out on the table.
- **Car-Go** - a game where players connected to the same Bluetooth network co-operate to navigate a car around a track.
- **Wave** - a game where the players have to perform the Mexican wave using touch gestures, executing them in correct sequence to continue cheering for their team playing in the center of the screen.

The three ideas were developed into more full-fledged concepts using the key questions who, what, when, where and why, along with a possible use case scenario. These were then used to gather external feedback.

Convergence and Concept Development

The final choice was made based on the reception of the three concepts by potential users, along with the perceived difficulty of implementation in the given time frame and available resources. The Wave concept was chosen and refined in the form of an interactive paper prototype (Figure 1) and a pitch presentation, including ideas about graphic look and feel, functionality, and initial implementation plan. The presentation was given to other designers and programmers, providing the team with additional feedback and technical ideas that could then be used to implement the

product. Further details of the full concept are given in the Result section of this paper.



Figure 1. Paper prototype

Implementation

The aim of the prototype was not necessarily to implement the full concept, but to complete the core functionality in order to facilitate playtesting and feedback on the theme and concept. The team organised its implementation process according to the Agile software development methods. One team member was responsible for producing graphics and the other two for programming, with members of the team working closely together in a shared workspace throughout. The prototype was then subjected to user evaluation and play-testing, in order to inform future development of the concept. The feedback received is described in the Playtesting section below.

As the WeWave concept included ideas about animation and graphic profile from the very start, a main challenge to implementation was developing the envisaged old-school pixel art graphics. The application of three-dimensional perception theories such as lighting and perspective adds another level of difficulty in such a limited environment, bringing pixel art graphics closer to being a craft skill. The decision nevertheless goes together with a recent revival trend and interest in preserving pixel art, to the point of funding a Kickstarter project about a pixel academy platform that aims to conserve the skill [6][7].

RESULT

We-Wave, the concept

WeWave is a collocated game based on the Mexican Wave. Multiple players are gathered around the same device, and try to perform the wave in the correct sequence in order to prolong the wave for as long as possible. The players are scored on the number of times the wave goes around the stadium, and the score goes towards cheering for their chosen team, affecting their performance on the pitch.

In the application, the central device represents a sports stadium with a crowd watching a game, and each player gains control of a member of the crowd. A number of touch areas (or seats) are located around the perimeter of the stadium. Each seat is linked to an avatar that sits when the player’s finger is placed on the seat, and stands when they lift it. Players sit as the game counts down to the start of the game, the player to initiate the wave is randomly selected.

They can initiate the wave when all players are ready by making their avatar stand.

When the wave reaches each player's seat in turn, the players have to make their avatar stand and sit down while the wave passes over their seat. The wave's progress around the stadium increases in speed as the game progresses and if a player does not stand up or sit down at the right moment, they lose and are eliminated from the game.

An additional level of difficulty is added in "gesture mode", where instead of just sitting and standing, the players have to pay attention to what gesture should be performed during each circuit of the stadium. For example, a circle, which would make the avatar turn around.

Mobile Application

The prototype represents the minimum viable product for the game in the form of an Android application. This prototype encompasses a start screen, the main game, and a winning screen, and implements a subsection of the concept presented above. This includes support for up to five players, animation of the avatars, a circle moving in a stadium circuit to simulate a wave, gradual speeding up of the wave, and coronation of a winner. The application includes full pixel-art graphics and animation for all envisaged components.

Playtesting

As a final step of the design and development process, the team conducted a playtest of the mobile prototype (Figure 2) in which individuals external to the team tested the game and gave their impressions. Feedback was mostly optimistic, especially with regard to the graphics. A number of improvements were suggested to improve gameplay, such as:

- Executing the full animation of sitting and standing back up again when you lift your finger.
- Explaining more clearly to the player when and why they have lost.
- Varying the speed of the wave, or introducing several waves to add additional difficulty.
- Giving players lives so that they are not immediately eliminated and get time to learn.
- Ending the game when the second-to-last player is eliminated, rather than when the final player has lost.
- Giving the player more time to execute the wave gesture, but increasing the speed of the game faster.
- Adding more leeway to when a successful wave has been executed, with scores given based on accuracy.
- Explaining the game more clearly at the beginning for new players. The win and lose conditions right now are very unclear.

In addition, playtesting highlighted how short each game was, with players often eliminated in the first or second circuit. Unfortunately, due to this fact and the incompleteness of the prototype, little data was gathered on how the game might support social interaction between players. Much of the feedback received, however, can be used to prolong the length of the game and hopefully amend this lack of data.



Figure 2. Evaluation of WeWave

DISCUSSION

Designing with code

In a sense, this project followed an approach of designing with code. The team progressed straight from a paper prototype to the implementation, rather than go through the usual intermediate stages of digital screenshots, interactive walkthroughs, etc. As a way to obtain a more high-fidelity prototype in a short amount of time and with limited resources, this worked well, but obviously meant that the final prototype suffered from lack of user feedback. This was highly influenced by the limited timespan of the project, and means that the mobile application produced should be seen more as a proof of concept and source of inspiration for further development.

Theme and lack of playtesting

When conceived, the application had a very strong emphasis on the look and feel to enhance the game experience and the gameplay itself. The game was not play tested with external parties until the player avatars and animation on the final screen were fully implemented. One can contemplate whether it is problematic to let graphics have an influence on the design from such an early stage. However, Björk and Holopainen [8] suggest that the theme can help players "understand what will be encountered as gameplay elements and challenges", which is certainly the case here. A more abstract version of this game would fail to explain why the basic gesture is lifting your finger rather than pressing it on the screen.

Nevertheless, even though the application contains a real time aspect, it may have been possible to find compromises

to fake different elements in order to get feedback on the basic playability, such as how people communicate in such situations or how the scoring system worked. It might have been better to first further refine the game mechanics and implement the bare bones in the prototype, thereby receiving the feedback from the evaluations at an earlier stage.

Collocated interaction

Without more rigorous user testing and refinement of the prototype, it is difficult to establish how effective WeWave is in facilitating co-located interaction, or its potential as a rewarding game. Though playtesters expressed a liking for the concept and theme, it is clear that the gameplay itself needs to be made more rich and forgiving if it is to prolong social interaction between players, and produce a more competitive atmosphere.

Future Work

Beyond this, there are some drastic steps that need to be taken to improve the gameplay, coming out of comments from playtesters. Of particular interest is basing the scoring system on the accuracy of the wave gesture rather than on number of waves survived, and giving each player lives, as it is felt that this will extend the game length. This new approach would also eliminate the discomfort the last player currently feels with continuing to play, as the end-game condition would conceivably be down to something other than all other players being eliminated.

With a functional prototype available, the game can now be improved upon to enrich the experience based on future feedback and insights. Emphasis would be placed on prolonging the experience and giving further cause for players to interact with each other.

CONCLUSION

This paper has presented the concept and process behind designing and implementing WeWave, a collocated game that enables participants to take part in a common activity around the same device. This game represents a fruitful use of the collocated design framework [1] as a starting point, and an exploration of Huizinga's [4] ideas around using a game as a way to break down the barriers between people.

The collocated design framework [1] can be used to summarise the user experience components at play in WeWave. It employed timed co-ordination of action, symmetrical information, proximity to a single device and an increasing pace. The most intriguing aspect of the application from a collocated interaction perspective is that players play around a single device, reminiscent of the board game paradigm where all players play on the same

game board. WeWave can be seen as a digital forage into this format, as a game that would be impossible to implement with a physical game board due to the real-time restrictions, but enabled by the device as a digital game board. The collocated interaction mechanisms implemented and tested in WeWave are relatable to most of the main principles of Social and Spatial interaction [3]: it supports joined multiuser actions, the phone is used to interact by performing simple actions and gestures are the main input mode.

This work set out to answer whether collocated social interactions can be enhanced through the use of a gesture-based game on a single device. In its current state, more work has to be carried out to refine the application, while current results can be considered cursory research into the possibilities of such an application. Unfortunately the game did not undergo enough testing to appropriately assess its ability to answer the research question, and thereby the main conclusion to draw from this work is that future work is needed to further explore this idea.

REFERENCES

1. Sus Lundgren, Joel E. Fischer, Stuart Reeves and Olof Torgersson. 2015. Designing Mobile Experiences for Collocated Interaction.
2. Sus Lundgren and Olof Torgersson. 2005. Bursting the Mobile Bubble
3. Lucero, A., Keränen, J. & Jokela, T. 2010, "Social and spatial interactions: shared co-located mobile phone use", ACM, , pp. 3223.
4. Huizinga, Johan. Homo Ludens: A study of the Play Element in Culture. Boston, MA: The Beacon Press, 1955
5. Rhodes Hileman (c) 1998. An introductory lecture for digital designers. In *Design Methods: seeds of human futures*. John Chris Jones, John Wiley and Sons. 1970. New York and Chichester.
6. Dinofarm Games. 2015. A Pixel Artist Renounces Pixel Art. <http://www.dinofarmgames.com/a-pixel-artist-renounces-pixel-art/> (Accessed 2015-11-20)
7. Retronator Magazine. <https://medium.com/retronator-magazine> (Accessed 2016-01-10)
8. Thematic Consistency, wiki article, 19 October, (last modified 4 August 2015, accessed 2016-01-13), <http://129.16.157.67:1337/mediawiki-1.22.0/index.php/Thematic_Consistency>