

Ambient Gaming and Play: Opportunities and Challenges

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Abstract. During the workshop on Ambient Gaming (AmGam'11) at the International Conference on Ambient Intelligence in Amsterdam, 16-18 November 2011, 17 participants from 8 different countries discussed emerging research topics around Ambient Gaming. With ambient games and play we denote playful activities that are seamlessly integrated within our daily lives in such a way that the boundaries between other activities and play disappear or blur. Ambient games blend the virtual and real world and are interacted with through multiple ubiquitous devices. Ambient games and play have a strong motivational character and may offer more natural and improved interaction. However, we are also faced with many challenges, not only technological, but societal and ethical as well.

Keywords. Ambient gaming, playful interactions, ambient intelligence, open-ended play, persuasive technology

1 INTRODUCTION

In many historical works about play, the definition of play is restricted to a specific 'time and place', separated from ordinary life (i.e. play takes place in a 'magic circle') [1,2]. Digital play, however, can be more integrated in a spatial, temporal and social sense [3] owing to new media, social networks, modern technology and (social) interaction. This enables us to design for playful activities that are seamlessly integrated within our daily lives in such a way that the boundaries between other activities and play disappear or blur; we call this ambient games and play.

Ambient games blend the virtual and real world and are interacted with through multiple ubiquitous devices. They incorporate ambient intelligence characteristics [4], which means being surrounded by 'smartness'. Ambient intelligence environments may sense who is present, where they are, what they are doing, and when and why they are doing it. In line with this, ambient games offer context-aware and personalized features. They also allow players to move around freely, without being bound by a computer screen or another device, by using information coming from sensors embedded in the environment. By their nature, they allow players to play throughout the day, as play and games may be incorporated in everyday objects and routines [5].

In this sense, ambient gaming and play changes the traditional notion of ‘game’, as governed by a well-defined set of rules, impenetrable to our everyday interactions, and bounded in terms of time, space, and participation, by expanding it in spatial temporal and social sense. Spatially, the traditional physical context is transformed into an omnipresent, dynamic, responsive and reconfigurable space for play [6]. See for instance the work on urban gaming and designing playful mechanics for interacting though and with the augmented city [7, this volume] in which the city serves as an environmental game interface that is augmented by transparent technologies. Vatavu et al. [8, this volume] describe how smart sensors and recognition algorithms enable people to use every day objects as active elements in their games, so that they are no longer confined to a single location to play, but can walk about freely and use a toy gun or a wooden stick as a weapon in the game. In this way, ambient gaming technologies lead to unrestricted and natural interaction. Extension in a temporal sense means that ambient games can be played throughout the day in an active or passive way. For instance, the ambient game that is described by [9], plays on even if the players are not actively playing. Finally, in the social sense, rules in ambient games are more likely to be socially constructed, and emergent patterns of play arise, much more like the free, unstructured play in traditional playgrounds, yet triggered and enabled by the artifacts of the ambient play space [6]. For instance, Rosales [10, this volume] describes how free play experiences can be improved and encouraged by adding technology to everyday objects such as clothes, accessories and toys that children wear all the time. The same holds true for the Intelligent Playground [11, this volume] which provides opportunities for open-ended play, based on intelligent sensors, adaptivity and embodiment. Free or open-ended play with interactive objects promotes children’s social and personal skills. Also, ambient gaming redefines the role of the players themselves, as everyone present in the ambient play may become part of the activity. Space. Players, onlookers, and passers-by may move in and out of the ambient play space and influence what happens even unaware [3]. Playful interactions in ambient play spaces are thus likely to lead to more social involvement, as compared with traditional, bounded play environments.

2 OPPORTUNITIES

Ambient gaming and play can be an effective means to persuade people to take part in certain activities, such as educational activities or physical exercise. For instance game-based learning tools could help to improve the learning process by creating a motivating, dynamic and entertaining forum to both teach and learn [, this volume]. In the PlayFit project [13, this volume] opportunities for play are created throughout the day, aimed at reducing the amount of time teenagers spend sedentary. As another example, the Ubitheragames [14, this volume] intend to offer handicapped people in a smart environment playful tools to do their exercises. By integrating smart sensors and actuators in daily objects such as wheelchairs and walkers, and by providing opportunities to play in a smart environment handicapped people are stimulated in a playful and ambient way to do their daily exercises. The motivation for people to take part in these ambient health games is high, because of their playful character. Moreover, the threshold to take part is very low, because the activities are intertwined

with peoples' daily activities and routines (e.g. taking the bus to school, having lunch, or having a daily walk).

Using ambient intelligence in games and play offer opportunities for more natural and improved interaction, because they are no longer confined to a television or computer screen, but can extend to the real world, using everyday objects as interaction devices [8,11]. In addition, ambient technology enables advanced awareness and personalization. This leads to more engaging experiences and increased flow, because the magic and suspension of disbelief are not broken by real world hurdles. In this way, in ambient gaming and play interaction moves from a more functional, goal-oriented role, to a playful experience that goes beyond usability, deriving meaning from its context.

Designing ambient games and designing for ambient play requires a different role of the designer. Design processes move to co-creation, participatory design and other design methods where the user and the environment play an important and active role, reflecting the change to interaction as the creator, facilitator or mediator of experiences [10].

3 CHALLENGES

From a technological perspective, ambient gaming and open-ended, free play require smart sensors that can be embedded in every day objects, such as clothes, walls, furniture, street lamps, the human body, etc. Intelligent algorithms are required that are able to detect, recognize and interpret data coming from different sensors in the environment. On the basis of the analyzed sensor data, adaptation and personalization should take place and relevant and adequate feedback should be provided to the user [14].

Ambient gaming is closely linked with gamification, a recent phenomenon that entails adding playful elements to non-game applications, in order to make them more fun and engaging. Gamification is already applied many different contexts, for instance in education, health and commercial organizations. Obviously, not every activity is more effective when cast in the form of a game, but gaming has several assets (e.g. intrinsic motivation, challenge, flow) that do work. However, although the strong motivational power of games has been proved in many different cases, it is unknown what the effects are in the long run. For instance, it is well-know from psychological studies that punishments and rewards can stop being effective when used for a longer period of time. Therefore, gaming mechanisms like competition and punishments and rewards should be used with caution, they should not be an end in itself. For instance in open-ended or free-play environments there are no predefined and fixed rules and goals, it is the experience of playing in itself and the social interaction that takes place around play that is rewarding.

Finally, in terms of control and privacy, it is important to allow players to make informed choices about their engagement. Especially when the boundaries between play and non-play are blurred, as they may be in ambient games, the user may become part of a game unaware and unwillingly. Also, when play is no longer restricted to a defined place in front of the television, or computer screen, data about players and players' actions may become publicly visible. This calls for a fine balance between control and engagement.

4 CONCLUSION

In the workshop on Ambient Gaming (AmGam'11) at the International Conference on Ambient Intelligence in Amsterdam, 16-18 November 2011, 17 participants from 8 different countries discussed emerging research topics around Ambient Gaming. Originally, ambient intelligence was designed to be 'calm' and non-intrusive technology [15]. Some of the criticism on ambient intelligent systems is focused on privacy and human control. Digital play and gaming as a process for user awareness and participation and creation [6] could balance this criticism, the disruptive nature of play. Other challenges are to facilitate open-ended and free play in smart environments, a big challenge for human behavior analysis. Finally, until now, the quality of interaction has mainly focused on usability and functionality of 'cause and effect'; this needs to be changed into dimensions of social interaction and experience, sometimes inefficient, emotional or counter-productive. The workshop contributed to a fruitful discussion and the organization of a network for ambient play research institutes.

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