

Designing Spatial Multi-User Interaction

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ABSTRACT

In this paper, the Spatial multi-user interaction design program is presented as a part of a PhD research program [1]. The overall focus is to explore the possibilities of spatial multi-user interaction and how this can be designed. The program consists of the theoretical foundation based on HCI and action oriented interaction design. The experimental design model consists of four design spaces which can be used for information gathering and prototyping and is basically a design, inspiration and discussion tool for interdisciplinary designers.

Author Keywords

Interaction design, spatial multi-user interaction, design.

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

Hallnäs et al claim the need for new design programs that can guide and develop practice by opening up new design spaces, and define a design program as a general description of the design intention, where some position regarding basic approach is stated [2]. The design space that is identified and explored in this program is spatial multi-user interaction. In the following sections the general program theme and basic motivations for spatial multi-user interaction will be described, followed by a design model used in design experiments.

The design program has implicitly been the base for design experiments, and the design experiments have explicitly been the foundation for further development of the design program. In future work, the design program will be the foundation for further experiments.

Spatial multi-user interaction refers to the design of computational things with a strong focus on several simultaneous users and spatial aspects, and where a focus on spatial aspects is a central design variable. The central theme is interaction design with a clear focus on the appearance of physicality and several simultaneous users rather than design for efficient use with its focus on digital aspects and single users. It is a program that extends the

traditional work practice based HCI into playful and leisure based interaction design.

Spatial multi-user interaction supports human communication through computational technology based on democratic values, where several simultaneous users do not have to take turn in being in control and where interaction is based on movements of the human body. As opposed to work practice based technology designed for efficiency, this is technology where the human body in physical space is in focus for playful and leisure based interaction.

Spatial multi-user interaction takes a start in people's way of expressing themselves physically, both individually and together with others. Here, the human body with its multiple intelligences is a given, and the computational things attempt to be designed within the limits of the human body's expression. To support the user in several of her intelligences by exploring both the physical, digital, social and interaction space, is taking advantage of the materials potential to a great extent.

A designer can discover new design potentials in the existing environment when being in a design situation. A user can re-discover a familiar thing as it suddenly has the potential to perform new things. The interaction comes from human behaviour, and the tools are familiar with built-in technology, which are conscious design intentions, namely that the object has been designed to support the user by explorations in this technology's – this material's – properties, and not changing the user's behaviour.

Basic motivations

As a program for experimental design, Spatial multi-user interaction is concerned with the dual design introduced by computational technology. The basic characteristics of computational things are in their appearance in use, their expressiveness, dependency on the execution of programs and its manifestation in a physical material. Design of computational things thus necessarily involves components of spatiality; questions about working models for a design practice where the digital and physical aspects and computational technology as a design material are central issues. This motivates experimental work where special attention is paid to spatiality as a basic design parameter.

DESIGN MODEL: SPATIAL MULTI-USER INTERACTION

A challenge within pervasive and ubiquitous computing is to design spaces where people can live, communicate and interact without the technology interfering. To have the environment support human behaviour to such extent that we act without paying that much attention to what we do. This PhD-project approach this challenge by examines spatial multi-user interaction, spaces where several persons spatially can interact and communicate simultaneously. Four factors have been identified to be able to focus on and define spatial multi-user interaction, and they are named *space* in the sense of potential design spaces:

- *The interaction space*: The sensor reading space where movement, fix points and inputs can be sensed
- *The social space*: Where humans act and live their everyday lives, communicate, co-operate, attention, activity, intention, understanding, place
- *The physical space*: Everything visible, meaning things, environment, personal gadgets, appearance, location, physical interaction, physical time/space
- *The digital space*: Projections, communication protocols, computer model, infrastructure, relative time/space, augmented space, machine communication

These four spaces have been chosen as they complement each other in covering the context of a computational thing. The four spaces have successfully been used in different projects, and have proven helpful for designers.

DISCUSSION ON THE DESIGN MODEL

The model presented above is a try to divide the findings and the prototypes into different design spaces. The model can be used as a tool in the data collection phase, in the design phase, for definitions and in discussions. The model is a try to mark out that all the four design spaces are equally important when designing computational things, and especially for spatial multi-user systems. Working with information technology as a material for design means working with software, hardware, traditional physical materials and social aspects. The model aims at making this fact more visible during the entire design process.

To develop inter-spaces where people live, communicate and interact simultaneously, without technology interfering with human behaviour, the four design spaces could be a help to investigate how to design the system, not the user. An analysis of the four spaces can be the foundation for developing spatial multi-user systems, and thereby support human behaviour in both the physical and digital world.

It is important to manifest that there is no exact way of drawing a clear distinction to what is one or the other. They

are all important aspects, and they all both demarcate, intervene, mix with and relate to each other. By actively taking a decision upon where to place an aspect can give rise to very fruitful discussions. Depending on the background of the designers and their individual interpretation of findings will have a huge impact on design. This fact can create very interesting discussions, and could be an eye-opener to the design team. As interaction design is an interdisciplinary field, with several different competences, people come to have very different opinions about what finding is relevant in which category, and the impact of it in other categories. Competences involved in this project are interaction designers, architects, engineers and computer scientist, and there is a constant very fruitful discussion about what is physical or digital, what approach to have in design, and so on.

To further explore the possibilities of combining the four design spaces in designing spatial multi-user interaction, spatial architectural perspectives can be included to enrich the interaction design. By focusing on and understanding information technology in combination with spatial properties and boundaries as design materials is to take advantage of what is already in the context, however the nature of a design material is its ability to take up new forms or relate to other materials in new ways shifting its initial function. The focus on these aspects provides designers the basis to rethink the existing elements of the context – the physical as well as virtual elements.

CONCLUSION

Interaction design is an unfolding activity demanding deep involvement from the designer. Sometimes the designers are not aware of what materials there are in a design situation, or different materials mean different things to the different designers. The design model and the design methods presented in this experimental design program can be one way of engaging the designer in unfolding the context and materials at hand. Hopefully, spatial multi-user interaction is a growing area of interest in interaction design, to meet with the user in the physical world and take a start in people's way of expressing themselves physically. This design program claim for weighting the aspects from the physical design space equal to aspects from the digital, the interaction and the social design space.

REFERENCES

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