

In partial fulfillment of the terms for obtaining the PhD degree, Stine Schmieg Johansen will give a lecture on the following subject:

Sound Zone Interaction in Homes - Studying and Designing for Modification of Personal Soundscapes

on Friday 15th of October 2021, 13:00, in room 0.2.13 at Selma Lagerlöfs Vej 300

Abstract:

In this dissertation, I investigate how to design interaction with sound zone systems in homes. Sound zone systems consist of loudspeaker arrays that, together with software filters, can direct sound towards part of a physical environment while minimising it in other parts of that same environment. This means that sound zone systems have spatial properties that contradict users' prior experiences with sound, calling for new interaction design approaches. Technologies for sound zone systems are still emerging. This impacts the research in two ways. First, I rely on methods that enable users to articulate experiences that are entirely new or that they cannot yet have. Second, I build on extant research on the broad topics of personal sound, soundscape, and interaction with physical environments, because research on sound zone systems is conducted within audio engineering. The research is guided by the following research question: How can interaction with sound zone systems in the home be designed for modifications of soundscapes?

I divide the main research question into two sub-questions that focus on (1) characterising the relation between sound zone systems and soundscapes, and (2) supporting users' understanding and control of sound zone systems with interaction designs. These questions are addressed from a postphenomenological philosophical worldview, with a particular focus on embodied interaction.

The contribution of the dissertation is towards a theory of sound zone configurations from a user experience perspective. On the basis of findings from seven studies, I propose that sound zone systems can be designed in configurations that result in different soundscapes and accommodate different situations. This is unfolded in six full papers. The findings show that sound zone systems can be conceptualised from the way a user relates to their acoustic environment. When physical environments are shared between people, different needs related to sound emerge depending on situations in which users are engaged. Analysing the social characteristics of these situations together with the properties of sound zone systems, the dissertation contributes with a set of interaction design challenges for sound zone systems in homes. Based on the understanding achieved through the initial three of the seven studies, I investigate two different approaches to supporting users' control of sound zone systems: Light and shape-change. Findings show that visual overlays to sound zone systems affect users' experience of how the sound in one sound zone distributes in a physical environment as well as how two sound zones overlap with each other.

Future work includes (1) investigating the relations that emerge in sound zone configurations, (2) further elaborating on using light and shape-change for sound zone systems, and (3) expanding the research into other domains such as hospitals and public spaces.

Members of the assessment committee are Associate Professor Ivan Aaen (Chairman), Aalborg University, Professor Chris Greenhalgh, University of Nottingham, UK., and Associate Professor Eve Hoggan, Aarhus University, Denmark. Professor Peter Axel Nielsen is Stine's supervisor. The moderator is Associate Professor Dimitrios Raptis.

All interested parties are welcome. After the defense the department will be hosting a small reception in cluster 5.