

Analyzing the Aesthetics of Participation of Media Architecture

Jonas Fritsch
IxD Lab/PACT
IT University Copenhagen
Rued Langgaards Vej 7
2300 København S
frit@itu.dk

Erik Grönvall
IxD Lab/PACT
IT University Copenhagen
Rued Langgaards Vej 7
2300 København S
erig@itu.dk

Morten Breinbjerg
CAVI/PIT
Aarhus University
Helsingforsgade 14
8200 Aarhus N
mbrein@cc.au.dk

ABSTRACT

This paper presents a theoretical framework for analyzing the aesthetics of participation of media architecture. The framework is based on a close reading of French philosopher Jacques Rancière and provides four points of emphasis: modes of sense perception, forms of engagement, community and emancipation. The framework is put to use in the analysis of three experimental media architectural projects; *Ekkomaten/Echoes from Møllevangen*, the *coMotion Bench* and *FeltRadio*. We discuss the findings from this analysis and outline future perspectives on how to develop and use the framework prospectively in the design of media architectural projects and other interactive environments.

CCS Concepts

• **Human-Centered computing** → **Interaction design.**

Keywords

Media architecture; aesthetics of participation; experience philosophy; politics of sensation.

1. INTRODUCTION

A recurrent theme when theorizing media architecture is the relation between the introduction of interactive and digital technologies into urban space and its effects on human experience. Adam Greenfield and Mark Shephard have argued that interactive technologies are actively shaping the affective experience of being in the city and the choices we make there [11]. In his book *Against the Smart City*, Greenfield also draws attention to the experiential changes caused by the “connected sensors, actuators and display systems we increasingly find interwoven into the fabrics of our cities” [10]. Previously at the MAB conference, Allen has argued that media architecture must be understood in relation to the transformations in the experience of the urban catalyzed by digital and interactive media [1]. Sade has investigated the aesthetics of media facades in relation to our experience of urban environments and a “new urban aesthetics” [23]. In addition, Urbanowicz and Nyka call for a heightened attention towards exploring the role of media and interactive technologies in generating multi-sensorial experiences, framed as a form of ‘participation through the senses’ [24].

In this paper, we wish to extend the above conceptual exploration. We propose a theoretical framework for the investigation of the experiential effects of media architectural projects and the design of urban interactive environments by articulating their *aesthetics of participation*. The proposed framework build on the work of French philosopher Jacques Rancière and provides four analytic points of emphasis to articulate the experiential qualities of media architecture; modes of sense perception, forms of engagement, community and emancipation. Together, these points of emphasis form an analytic starting point for understanding the relation between the perceptual dynamics and modes of participation staged by interactive technologies in urban environments. This paper uses three projects that fall within the definition of media architecture as presented by Brynskov et al. as ‘the design of physical spaces at architectural scale incorporating materials that allow for dynamic, reactive or interactive behavior.’ [5, p. 1-2]. Within the overarching frame of media architecture, these three projects explore the use of digital sound (*Ekkomaten/Echoes from Møllevangen*), interactive and sensor-based furniture (*coMotion Bench*) and a technology for making radio waves perceivable and exploring wirelessness through sensorial augmentation (*FeltRadio*). The three projects all embody the qualities mentioned in the media architectural definition above and we will go into more detail when we present them later on in this paper.

The notion of ‘aesthetics’, as it is used in the context of this paper, is defined by Susan Buck-Morss in her article on Walter Benjamin’s *Artwork Essay* [6]. Here, she defines aesthetics by drawing on its original Greek etymological meaning, and states that: “*Aisthitikos* is the ancient Greek word for that which is “perceptive by feeling.” *Aisthisis* is the sensory experience of perception. The original field of aesthetics is not art but reality - corporeal, material nature.” [6, p. 6]. In Rancière’s work, the notion of aesthetics falls within Buck-Morss’ definition, and concerns directly a ‘distribution of the sensible’ determining particular modes of sense perception and modes of participation through different forms of engagement. This distribution of the sensible is connected to power and emancipation based on the exclusion and inclusion in different communities governed by a politics of aesthetics, working on an experiential level, and to some extent staged by the technologies deployed. Here, politics is not to be understood ideologically but rather as ‘how something works’ in a particular distribution of the sensible.

We start out by presenting the theoretical foundations going into the actual framework for aesthetics of participation. We then present the outline of the framework, and discuss how it can be used to articulate the experiential qualities of media architecture by unfolding; modes of sense perception, forms of engagement, community and emancipation. We use the framework to analyze the three different media architectural projects, all presenting quite different aesthetics of participation. Finally, we discuss the

findings and open up to future perspectives considering the use of the framework to analyze, understand, and also to facilitate, media architectural design and, more generally, interaction design processes.

2. THEORETICALLY FRAMING AESTHETICS OF PARTICIPATION

This framework has matured over a period of 3 years in the AU research center on Participatory IT (PIT) where ‘Aesthetics of Participation’ has been a main theme of investigation, bringing together theory from participatory art [2, 17] and Participatory Design. There is a growing recognition of the work of Rancière within HCI and Interaction Design, as seen in John McCarthy and Peter Wright’s book *Taking [a]Part – the Politics and Aesthetics of Participation in Experience-Centered Design* [18]. Here, the authors mobilize a conceptual genealogy around Rancière’s work merged with a dialogical perspective from Bakhtin. In the framework that we present in this article, we also draw on this conceptual mobilization, in particular when it comes to the understanding of participation and community engagement. However, we will dive deeper into the notion of aesthetics to supplement Rancière’s vocabulary with concepts aimed at more closely unfolding the perceptual and sensory dimensions of media architectural projects from an aesthetic point of view. We primarily draw on Rancière’s books *The Politics of Aesthetics* [19], *Dissensus: On Politics and Aesthetics* [21] and *The Emancipated Spectator* [20]. Throughout, however, we supplement with literature that helps unfold the basic points of emphasis laid out by Rancière.

2.1 Mobilizing Rancière: The Distribution of the Sensible and Politics of Aesthetics

In Rancière’s philosophical work, a key concept is the ‘distribution of the sensible’. This is described as the “system of self-evident facts of sense perception that simultaneously discloses the existence of something in common and the delimitations that define the respective parts and positions within it.” [19, p. 12]. The distribution of the sensible is directly tied to modes of sense perception that determine particular modes of participation and forms of engagement with a given context. Focusing on the sensible is very concretely understood as that which is visible/invisible, heard/unheard, sayable/unsayable – and, as a consequence, thinkable/unthinkable [18].

The sensible here is directly related to the notion of aesthetics, where aesthetics refers to a study of the system which determines what presents itself to our sensory experiences [19]. To understand the aesthetics of participation enabled by a media architectural project, it is necessary to understand what *modes of sense perception* are being activated. This means looking into the possible activation of different senses; sight, hearing, taste, smell, touch. In addition, we also want to emphasize the kinesthetic and proprioceptive senses. Kinesthesia is part of the sensory capacities dealing with bodily perception. The physiological definition of the term is the awareness of the position and movement of the body in space [22]. If a person closes her eyes and successfully places the index finger on the nose, the kinesthetic sense is utilized. To perform this task, you do not have to look at the finger; rather you feel the finger moving towards the nose, based on your bodily perception. Kinesthesia is part of the somatosensory system that is conscious bodily perception distributed throughout the whole body [3]. When defining kinesthesia, proprioception is often

included, since both deal with the perception of bodily movement. The difference between the two is that kinesthesia is kinetic motion, while the proprioception is the sensory faculty of being aware of the position of the limbs, as in the example with the nose and the finger, and the state of internal organs. Brian Massumi argues that proprioception is always a primary phase in every sensation [15]. Proprioception is an enactive awareness of the body’s own movement, affecting the body’s actual unfolding through a non-conscious backgrounding which is a condition of possibility of any and all orientations [16]. Accordingly, visual focus and manual grasping can be backgrounded by the same primary proprioceptive experience. This relates the concept of proprioception to another central concept, namely that of synesthesia. Synesthesia or our synesthetic sensibility is the experiential level where input from our senses (sight, hearing, smell, touch, taste) are fused, for instance hearing a picture or seeing a sound. Massumi uses an example from cinema, where you see and hear a person shooting a gun but only hear the ensuing smashing of a human head. This nonetheless triggers a visual event of seeing a person getting hit by the bullet; you *feel* like you saw it. Here perception is an active construction of something which has not in fact been visually perceived. Synesthesia may occur between other senses than hearing and sight and even without the actual operation of one of the participating sense modalities; you can hear-see without having either heard or seen.

As stated above, the sensorial distribution constitutes particular modes of participation, offering different *forms of engagement* with – or within – a given context. The forms of engagement established by this distribution of the sensible concern what is shared and common and what is not (inclusion/exclusion), the relation between the individual and the collective, the relation between power and knowledge, and between active/passive participation [19]. From a media architectural point of view, these forms of engagement will always be affected by the technological and interactive setup. To contextualize, Dalsgaard and Hansen develop the notion of ‘performing perception,’ a term describing how a user’s experiences of operating an interactive system in front of others can itself heavily influence her own perception of the system. Within the framework of performing perception, users interchangeably take on different roles through the course of interaction; operator, performer and spectator [7, p. 13:2]. How the media architectural project accommodates these different roles, also relates to the staging of forms of engagement.

The distribution of the sensible also has an effect on the possibility for the formation of a *community* where the “(...) distribution of the sensible reveals who can have a share in what is common to the community based on what they do and on the time and space in which the activity is performed.” [19, p. 12]. This communitarian constitution can be altered or problematized through ‘dissensus’ which makes it possible to change “...existing modes of sensory presentations and forms of enunciation; of varying frames, scales and rhythms; and of building new relationships between reality and appearance, the individual and the collective” [21, p. 141]. Rancière emphasizes how art can be instrumental in bringing dissensus to these conditions. The notion of ‘politics of aesthetics’, another central term in Rancière’s philosophy, denotes exactly the “(...) practices and modes of visibility of art that re-configure the fabrics of sensory experience” [21, p. 140].

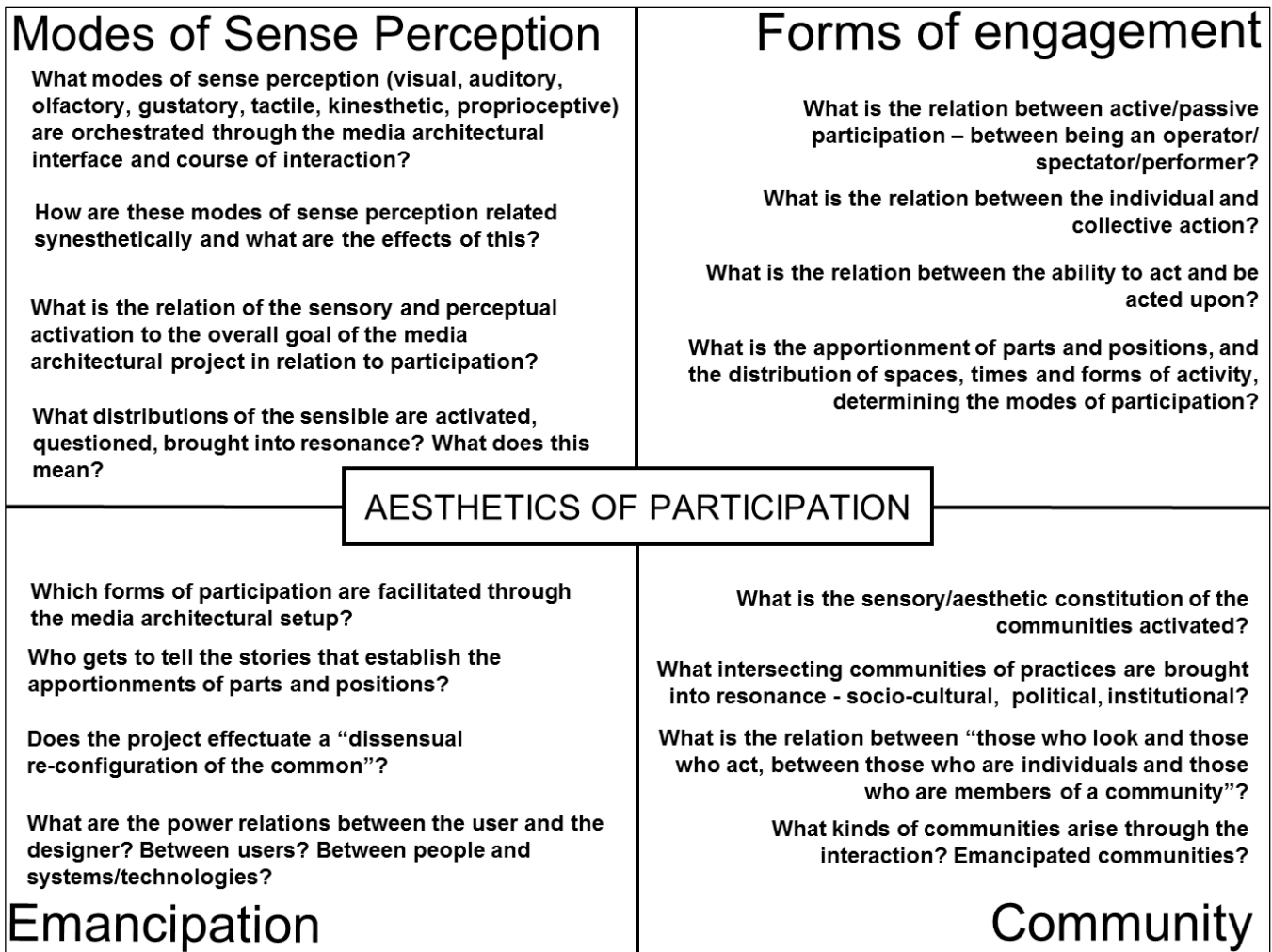


Figure 1. The Aesthetics of Participation framework.

These artistic practices of re-configuration can establish a “...dissensual re-configuration of the distribution of the common through political processes of subjectivation.” [21, p. 140]. This can lead to a process of *emancipation*, establishing new apportionments of parts and positions in what is shared and exclusive, offering new modes of participation through alternate sensorial distributions. Rancière states that an emancipated community is a community of “storytellers and translators” where “words, stories and performances can help us change the world we live in” [20]. In their book, McCarthy and Wright argue that Rancière calls for a “dissensual politics of emancipation”, where “...emancipation is not brought about by trying to make everybody the same but by starting from the assumption that all participants, though different from each other, are equal.” [18, p. 42]. In the framework, we also take this as a conceptual starting point for reflecting on the relation between users and designers.

3. THE AESTHETICS OF PARTICIPATION FRAMEWORK

The aesthetics of participation framework is based upon the four identified analytic points of emphasis above, with the aim of articulating the experiential qualities of media architecture by unfolding; modes of sense perception, forms of engagement, community and emancipation (see Figure 1). As part of the framework, we have identified a set of questions for each of these

points based on the theoretical foundation presented above. The purpose of the points of emphasis and in particular the questions is to identify and guide important considerations in works of media architecture and the design of urban interactive environments. The framework should not be understood as a checklist to ensure or validate the level of aesthetics of participation. Rather, the framework is a tool for reflection and analysis, to be used both 1) in the design process and 2) when studying a design in use. The different points offer distinct questions with respect to different concerns that can assist a designer or researcher in the overall assessment of a project from the perspective of aesthetics of participation. Through the configuration of the framework, we are trying both to become more specific when it comes to articulating for example experiential qualities on a sensorial level (modes of sense perception), while also addressing the relation between the micro-sensorial activations and macro-political considerations (emancipation). The different forms of engagement are staged by the distribution of the sensible offered by the media architectural setup locally, but also govern the possibility to constitute a community on a more global scale. While the framework is made up by four parts, there is no rank or order between these four components. In one project, one or two of these may be dominant while in another project some of the other qualities may be more evident.

In the following section, we will analyze three media architectural projects – *Ekkomaten/Echoes from Møllevangen*, *the coMotion Bench* and *FeltRadio* – using the framework to unfold the aesthetics of participation offered by each project. We have chosen these projects, since we have been involved in the design processes behind them, and consequently have an in-depth understanding of the different design choices and considerations going into the crafting of them. Further, we have big amounts of data from observations, video analysis, interviews and so forth to ground the analysis. Finally, we believe these projects present different aesthetics of participation from a media architectural point of view, highlighting different aspects of the framework, and jointly presenting three cases that put the framework to use in interesting ways. The projects differ in terms of the modes of sense perception activated, and the resulting forms of engagement and modes of participation facilitated. Based on the analysis, we will reflect on the quality of the framework, how it can be used and discuss possible refinements and how the framework might function prospectively when designing and understanding media architecture and other interactive environments.

4. EKKOMATEN/ECHOES FROM MØLLEVANGEN

Ekkomaten (see Figure 2) is an interactive listening machine. It was designed to give people an opportunity to hear an 18th century soundscape consisting of six echoes from the past in the city of Aarhus, Denmark, as part of a historical festival. The installation uses interactive sound to make it possible for people to

experience different stories, feelings and atmospheres through their interaction with the machine. As part of the historical festival, *Ekkomaten* was placed on a downtown square, Store Torv, in Aarhus. People controlled *Ekkomaten* by physically turning the machine around its axis and by that pointing it in different directions. When people pointed the machine to a specific place in the square and its surroundings, they could hear the 18th century echo of that place played through headphones attached to the machine. The design of the *Ekkomaten* machine is inspired by pre-radar listening devices and it also embodies a range of steampunk qualities. The machine is heavy to navigate, and people need to engage physically to turn the machine and interact with the soundscape. It is possible for up to 4 people to listen and navigate *Ekkomaten* simultaneously. Through its physical and site-specific design, *Ekkomaten* provides an affectively engaging listening situation using interactive means to offer a poetic and auditory interface to the history of the city. It can be seen as a media architectural installation that attempts to bring the cultural heritage of the city into the daily life of the citizens through the staging of an interactive sound event [4]. More information about *Ekkomaten* may be found in [9] and specifically about *Ekkomaten* as media architecture in [4].

In *Echoes from Møllevangen*, the *Ekkomaten* machine was used to orchestrate a collective listening process. The main idea was to activate the auditory sensibility of the inhabitants of the Møllevangen neighborhood in Aarhus, to foster community storytelling by displaying people's own stories about the environment. The purpose of the project was to use the *Ekkomaten* infrastructure to create a participatory sound archive that reflected the participant's auditory perceptions and imaginations of their neighborhood. Møllevangen has traditionally been framed as a rather tough neighborhood, but the local social worker told us that most people loved living there, and could not imagine living anywhere else. Hence, we wanted to create a story about the place told by its inhabitants as an alternative to our own and other people's prejudices. By arranging a collective listening process, we tried to facilitate a focused mode of listening that would allow for the background noise of Møllevangen to come into the foreground of attention through the auditory sensibility of its inhabitants. *Echoes from Møllevangen* differs from the original cultural heritage focus of *Ekkomaten* in that it expands the listening situation to encompass the production and collection of sounds fed into the soundscape. People are not only invited to interact with a soundscape; they become active participants in building up the archive from which the soundscape was made, making it a participatory soundscape. In addition, we also made it possible to comment directly on the soundscape through the machine, adding new material in real-time. We exhibited the participatory soundscape made up of inhabitants' recordings and interviews with inhabitants from Møllevangen, in a central location of the actual neighborhood (see Figure 2).

4.1 Reflections on modes of sense perception

From the outset, of course, *Ekkomaten* is a media architectural project that primarily targets the auditory sense. Sound hits us immediately; we are not able to protect ourselves from it, before we get time to reflect on what we're hearing. However, and in particular from our observations of *Ekkomaten* in use, we would like to emphasize how also the visual, tactile and kinesthetic senses are engaged through the course of interaction. There is resistance built into the interaction; people have to bodily engage with the installation to turn it around, activating their kinesthetic and tactile senses. The appearance and physical design of the machine has a strong effect on people's experience of the



Figure 2. Ekkomaten at 'Store Torv' (top) and at Møllevangen (bottom).

interaction. A lot of people would only look at the machine, but still get a sense of the narrative space offered by the machine without listening to the actual echoes. Since the machine is physically located in the city, on the site where the different echoes take place, you might argue that the experience of the installation is in fact multi-sensuous; you see the space, you hear the sounds, you have the smell of city, all factors influencing the perception of the soundscape – and back again, influencing the perception of the cityscape reflected through the sound. *Ekkomaten* also works synesthetically; the sonic experience blends into the tactile-kinesthetic interaction with the machine, and a range of people also reported on how they could actually see the places activated sonically in front of their eyes, e.g. in the echo about the old city well, which no longer exists.

In *Echoes from Møllevangen*, the use of sound and listening was applied as an aesthetic strategy to create a new form of attention to people's lives in their everyday neighborhood. Here, sound is both related to allowing people to engage differently with their environment – but it also relates to the ideas about storytelling, as described by Ranci re (see previous section). In addition to listening to the participatory soundscape, interacting with the physical *Ekkomaten* machine, *Echoes from Møllevangen* provides a new layer of sensorial engagement; people from the neighborhood themselves both produce, listen to, reflect and comment on the soundscape of their everyday lives.

4.2 Reflections on forms of engagement

This leads directly to talking about the different forms of engagement facilitated by the first *Ekkomaten* project. By engaging with the auditory content of the 6 echoes, you are also engaging with the history of the city. The sonic engagement becomes a vehicle for activating the cultural heritage of the city, bringing it into people's everyday lives. This kind of participation is not ensured by the interaction with the machine; a lot of people would simply turn the machine around performatively to test out the interaction, without listening. However, there were also examples of people listening to all 6 echoes (30 minutes in total) and afterwards talking to us (the researchers) who were also present, about the different stories, the validity of the information provided etc. This was clearly an engagement going beyond the immediate interaction, but activated through the interactive setup. Others were simply engaged in the exploration of *Ekkomaten* itself as a machine, an electronic object; how it was made, how it worked – and not least how it might function in a re-design. We have explored this in more detail in [9].

In the outset, *Echoes from Møllevangen* tried to provide the setup for a richer engagement with the soundscape, by asking the inhabitants themselves to provide the sounds – and by making it possible to directly comment on the soundscape via the machine (a function that, interestingly, was not used by any listeners). However, we must be careful not to conclude that people were more richly engaged this way; in fact, from our findings we can see how people would record the sounds, hand over the recorders, and then disappear from the project. In fact, in this project, even though there was participation in the collection of sounds, the engagement with the soundscape was less rich than in the original *Ekkomaten* project, where people would be inspired to tell stories and share opinions based on listening to the soundscape.

4.3 Reflections on community

Echoes from Møllevangen was in the outset a project for a particular community, namely the citizens in the Møllevangen neighborhood, to facilitate a new collective storytelling about this community. First and foremost the project was for the people in

the community, but also for outsiders, who would get a new sense of the place through the sound recordings. To some extent, we succeeded in mobilizing a community of listeners, making them aware of their environment through a new sensorial exploration through sound. However, rather than forming a collective, the participants remained individually engaged in the collection of sound; the community of listeners was only present to us, not the people involved. This, we believe, is an important shortcoming of the project. Also, in the end, only a few outsiders actually engaged with the *Ekkomaten* installation when it was set up in Møllevangen. This was largely due to a lack of advertising, but nonetheless something in which we did not succeed.

In *Ekkomaten*, being part of the historical festival, such a diversity of people were interacting with the machine that it is difficult to identify any particular communities engaged. However, we might say that a temporary community of listeners was in fact created through people's interaction with the machine; strangers started talking about, what they were hearing, discussing the sounds, the installation, the interaction, the historical framing. In addition, the *Ekkomaten* project facilitated a sort of meeting between a research community and everyday citizens of Aarhus; we engaged in conversations with these people about the installation, our research and so forth – and this is actually one of the most important sources of new knowledge coming out of this kind of 'in the wild' experiments.

4.4 Reflections on emancipation

In particular *Echoes from Møllevangen* actively tries to create an emancipated community of storytellers, by allowing the inhabitants to create a venue for the display of their own ideas and knowledge about the environment in which they live. However, we must say that the project did not meet our expectations in that respect. Some people were eager to collect sounds, others less so – but the biggest challenge came from us, the designers, having to take the sounds and create a soundscape out of them. In the end, we became 'judges'; we had the power to choose what to include/exclude, even though this should have been the task of the community itself. Technically, however, it would have been challenging to create a totally open storytelling platform that would have also been interesting to listen to over a longer period of time. This way, we do not think there was a lasting dissensual reconfiguration effectuated by the project; some people might have felt emancipated/empowered by being asked to actually tell their stories (in particular one person did in fact take the role of reporting back very seriously), but overall we should have been better at facilitating the collective listening process through the duration of the project period and, possibly, beyond.

In the original *Ekkomaten* project, the distribution of power was much clearer as we, the researchers, were in power; we had curated the soundscape, determined the interactive setup and so forth. However, in this process, we did engage in a range of interesting points of negotiation concerning e.g. fact vs. fiction in the formation of the stories/echoes, as we have reported on in [9]. With the interactive setup we were trying to make the point that the city holds an affective and poetic potential worth engaging with. The installation can be seen as a way for people to engage with cultural heritage issues, possibly changing their everyday perceptions of the city they live in – or the technologies they are surrounded by – which can also be seen as a form of emancipation.

5. THE COMOTION BENCH

The *coMotion bench* (see Figure 3) is a shape-changing bench. It has a classic rectangular form and is 2,5 meters long and 40 cm

wide. The size of the *coMotion bench* allows up to six people to comfortably sit on it. The bench is not equipped with either back- or armrests. The actual shape-change is done by substituting the bench's legs with 8 linear actuators. The height of each actuator-leg can be controlled, altering the height of the whole bench or a section thereof in the range 55-85 cm. More detailed information about the *coMotion bench* can be found in [13].

The *coMotion bench* was intentionally designed to explore shape-changing interfaces and people's perception of them 'in the wild', while being unaware of the ongoing experiment. As a designed artefact, a bench is a mundane architectural element, typical in public spaces. A bench can be perceived as a public and temporal meeting-place, for friends or strangers, and as an object, with specific social codes connected to it. While seated on a bench, people may be physically located close to each other, maybe even so close that there is some form of body contact. Despite this closeness, it is (in our country) uncommon that people that do not previously know each other interact while being on the bench, for example by speaking with each other. On a bench, you may be alone together.

The shape-changing capabilities of the *coMotion bench* allowed us to alter the height of the bench and to tilt its seats in different ways. This gave us the opportunity to explore how the physical manipulation of people sitting on the bench might influence their social behavior and possibly trigger new social encounters in a public space. We have done 'in the wild' experiments with the bench, having over 100 people sitting on it over the course of many days, in three diverse locations. We have tested the bench in a large music hall foyer, in the departure hall of an international airport and inside a large shopping mall; all semi-public but also very diverse places. People were often not aware of the shape-changing capabilities of the bench beforehand, since it was not advertised, and since the bench was designed so the actuators and the other control-elements were not visible. Only when being seated on the bench, most people became aware of the shape-changing capabilities by experiencing them first hand. However, as each person walked away from the bench, a researcher addressed them to discuss their experience of the *coMotion bench*.

5.1 Reflections on modes of sense perception

The *coMotion bench* mainly activates the tactile and kinaesthetic sense organs, by physically manipulating the seated person's body through physically lowering/raising or tilting the bench or a section thereof. However, by doing so the bench also challenges our proprioception, our own sense of being a body in space. This in turn affected other senses, like the vision and the balance organs. As the bench was raised so people seated on it could no longer rest their feet on the ground, many started to wiggle their legs and feet back and forth, much like children usually do.

The bench implemented two modes of activation and interaction with its occupants; 1) mediated by an observer the bench could be remote controlled wirelessly from a distance and 2) directly through seat-sensors inserted in the bench that could detect how people were seated. Using the seat-sensors, the bench changed its shape according to the patterns of how people were sitting on the bench (e.g. one person on each edge of the bench, or 4 people close to each other). How people were sitting on the bench resulted in different physical expressions of the bench, physically moving the people on the bench up, down or tilting them in one direction or the other. As the bench changes shape, a visual element is introduced. People may realize themselves that they, and indeed the bench, are moving. They may also see other people on the bench being moved, while moving or not being moved

themselves. However, the main sensorial stimulus remains the physical, kinetic push and its result on for example the balance organ. Depending on the current state of mind of the seated person, previous experiences, level of stress etc, the physical manipulation of the body also affected the proprioceptive sense to different degrees, impacting the larger sensorial apparatus. Through a subtle change in the bench, people later recounted a fear of illness, or that they were under attack. Others took comfort in the bench being there to help them relax.

The main sensorial stimuli come through the physical manipulation of the persons seated on the bench. This sensorial stimulation was a key driver behind the design rationale for the *coMotion bench*. One of the main design ideas was to understand if an unexpected event, like the bench physically manipulating the seated persons' bodies, would encourage new social interactions by altering the distribution of the sensible in a public space.

5.2 Reflections on forms of engagement

The *coMotion bench* invites for different forms of engagement. People participate in a private, or possibly shared, experience by sitting on the bench. They participate in an interaction with the bench as a designed artifact, both when it is a 'normal' bench and when it changes shape. Also, people invite others to participate in a shared experience of the bench. They do this by asking their friends to come and sit down, often without telling them about the newly discovered shape-changing properties of the bench. The *coMotion bench* hides its shape-changing capabilities when no person is sitting on it. Little knowing about the particularities of the bench, people sit down to read a book, to have a chat with their friends or simply to rest. Most people do not actively choose to engage with a shape-changing bench, or to experience shape-change. Rather, they seek the well-known, non-surprising experience of sitting down. As such, one can talk about these people's participation as not only passive, but even involuntary;

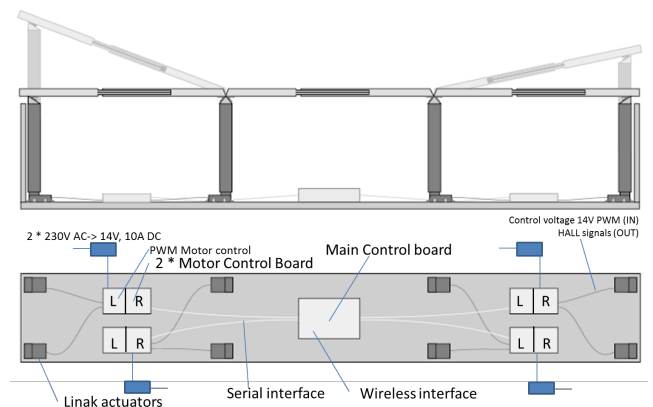


Figure 3. The *coMotion bench* in a shopping center and an overview of its technological design.

people are sort of “victims” of the shape-change and the experiences it creates, since they have not been given a choice to interact. Once activated, people have, however, the chance to become active participants by exploring, individually or in group, the bench and its range of movements, or, to disengage and leave the bench. In the latter case, the experience they got, disregarding their level of engagement cannot be made undone. Researching interactions in the wild that are not revealed to people beforehand do not only challenge the people that are directly affected by the technology, but also raise ethical and methodological concerns for us as researchers.

Another perspective on participation is the engagement in conversation, sense-making and sharing of experiences that occurs between people co-located on the bench as it starts to alter its shape. This is an active form of participation, which derives from the unfamiliarity of the event. People do not expect the bench to change shape, and hence they ask others on the bench if they also can ‘feel’ the movement, they talk about what it is, how ‘strange’ it is and sometimes try to figure out how and why the bench move. However, what we have observed is that this form of participation in conversation and sense-making is often limited to the duration of the shape-change. Once the bench returns to its ‘normal’ state (i.e. being a rigid, non-movable bench), the conversations stop and people return to whatever they were doing.

Some people tried to look under the upholstery, or feel with their hands through it, to feel ‘if something or someone’ was there. However, surprisingly few people went further and actually tried to decode, or map out, the bench’s programmed behavior. That said, the way the shape-change was actuated depended for example in the seat-sensor mode on how people were seated on the bench. But before a shape-change did occur, people had to be seated for 30 seconds. This was an intentionally programmed constraint to allow people to sit down and relax, not being afraid that they could not sit on the bench. However, it also meant that sometimes people were moving around on the bench, which prevented a shape-change. All these designed aspects made it harder for people to make sense of the shape-change and decode the bench’s behavior. In a way, it was easier for people to be acted upon by the bench, than to intentionally control the bench, preventing performance. To a large degree, this uneven relation was due to the 30 seconds delay in the shape-change activation.

We also observed that people got very different experiences from the *coMotion bench*, depending on their awareness of the shape-changing capabilities. People that got exposed to the shape-change unaware of the bench’s capabilities got surprised, some scared while others aroused. Some of the people who got a somewhat negative experience of the shape-change could later come back and get a changed, more positive experience once they understood what happened. They engaged differently with the bench depending on their knowledge of what the bench represented, its purpose, behavior and functionality. Other people brought their friends along, to expose them to the bench, These people went from being acted upon, to directing others to an unexpected experience.

5.3 Reflections on community

As described above, the *coMotion bench* does not reveal its shape-changing capabilities before it physically starts to alter its shape. The bench has been tested in three very diverse semi-public places, a music hall foyer, an international airport departure hall and in a shopping mall. These are all semi-public places, which people visit for very different reasons and in different states of mind. At the music hall, a place many visit with their friends or a

loved one for a joyful experience, the *coMotion bench* became an extension of such a joyful experience. People thought the bench was fun and it enhanced their visit, becoming part of the overall experience of the place. However, at the airport, people perceived the bench and their interactions with it differently. They for example talked about the bench as being a preparation for flying, something related to their upcoming voyage. In this setting, as with the shopping mall, more people were stressed and some of these people perceived the bench in more negative terms, something we did not observe at all at the music hall. We observed that the type of setting and the mood people were in to a high degree shaped their experiences of the bench and their willingness to engage in conversations with us.

5.4 Reflections on emancipation

As previously stated, the ‘users’ of the *coMotion bench* are mainly unaware of the augmented, purposefully designed capabilities of the bench. From that perspective, the relationship between the designers of the bench and the people using the bench can be considered uneven. The designers, through their visions and ideas manifested in the bench, will act on, and affect, people sitting on the bench. This is effectuated without people’s consent to experience a shape-changing bench, to engage in conversations about the experience etc. Some people did, however, get very deep, personal experiences from their interactions with the *coMotion bench*, very often related to lived experiences, the setting where the bench was placed and their momentary mental and physiological state. We had very stressed people that experienced an increased level of stress or people having fun with their friends that got an amplified feeling of joy and fun.

As the shape-changing capabilities of the bench did not have any apparent purpose, different people attributed very different meaning to the bench, being a massage-bed, a ‘joy-ride’, a preparation for take-off and flying a plane. Such a diverse attribution of purpose and meaning can also be seen as an estrangement, a dissensual reconfiguration of the common, and the common architectural surroundings, as the everyday bench started to change shape.

6. FELTRADIO

FeltRadio (see Figure 4) is a portable device that captures the momentary signal strength of WiFi and other 2.4GHz radio signals and then sends a representation of these values into the body using Electrical Muscle Stimulation (EMS). For further information about *FeltRadio*, please see [12].

FeltRadio is hosted in a 15*10*7 cm enclosure and contains a broadband radio receiver, a band-pass filter for 2.4GHz, a microcontroller and an EMS device to enable *FeltRadio* to send signals into the body. Two wires with adhesive pads are connected to the EMS part of the device and these pads are attached to the human body, making it possible to send the EMS stimuli into the body. There is also the possibility to visualize the

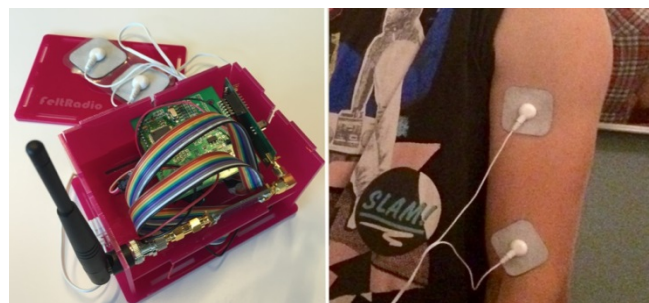


Figure 4. FeltRadio and how it is connected to the arm.

captured signal strength on a 10 segments LED display. *FeltRadio* works with sensorial augmentation, meaning that it augments an existing sense organ with the capability to detect something it normally cannot perceive. In this particular case, *FeltRadio* augments the tactile (and visual) sense organs with the capability to detect WiFi and other 2.4GHz radio traffic signal strength.

FeltRadio was designed to explore the hidden signals and their infrastructures that constantly surrounding us in modern, populated areas. By rendering something invisible as radio perceivable to the human senses through tactile stimuli, *FeltRadio* allows the carrier to not only perceive the world where he or she lives in new ways but also to reflect upon it. We have performed tests, where people while equipped with *FeltRadio* have walked around in either their neighborhood or at their workplace. These walks provoked reflection and sometimes gave the participants new insights, altering their previous image of WiFi, radio and the everyday environments they lived in.

6.1 Reflections on modes of sense perception

FeltRadio's main mode of communication is through EMS (although also a visual element may be activated if using the 10 segment LED bar display). Through EMS, *FeltRadio* hence provides a bodily, tactile and kinesthetic sense perception when in use. The use of sensorial augmentation, by rendering momentary radio signal strength in the 2.4GHz band perceivable through tactile stimuli, affects not only the tactile sense organ. Some participants told us that also their other sense organs got affected; they had a full-body experience where they became more aware of all their senses while using *FeltRadio*. The muscles themselves get electrical impulses sent through them and this omnipresent augmentation of the human senses catalyzes a deeper reflection on WiFi and its presence in our everyday spaces. This form of sensorial augmentation links to the notion of synesthesia and both the relation between, and the fusion of, sensorial input and how diverse sense impressions are combined to create new sensorial impressions. However, this was an outcome that was not purposefully designed for, but where the designed sensorial augmentation had a larger effect on the distribution of the sensible than anticipated. The sensorial stimuli created by the *FeltRadio* technology made people reflect on what WiFi is, how pervasive it is, and the match (or mismatch) between people's mental model of WiFi and what they experienced using *FeltRadio*.

6.2 Reflections on forms of engagement

In a way, *FeltRadio* stages a rather passive mode of engagement; when equipped with *FeltRadio*, the carrier receives EMS input without the need for any particular actions. This passive engagement can, however, lead to concrete, active actions; one may move to what is thought to be a more 'quiet' space in terms of radio waves, or one might engage in tracking down a strong signal. Another perspective on participation and engagement in relation to *FeltRadio* is how it uncovers our potential vulnerability toward other persons' interactions. Regardless if we choose to use or not to use technology, radio transmitters etc., we, and the shared spaces we live in, are all filled with the results of other people's (wireless) interactions. WiFi data with emails, Youtube movies and the latest Twitter streams fill the airwaves and hence constantly surround us. What is perceived as a 'good' place in a modern office is often where there is a good WiFi and cellular coverage; *FeltRadio* allow this perception of 'good' and 'bad' to become more nuanced as for example a place with bad radio coverage offers more sensorial relief. Hence, our engagement with the architectural space changes as we can tap into the otherwise hidden radio infrastructures and data. Further, *FeltRadio* makes it

possible to actually engage with the wireless infrastructures through our senses. We are still trying to investigate what it actually means to participate in wirelessness through the senses.

FeltRadio is personal and shared at the same time. The experience it creates for the carrier is highly personal, and perceivable only for that person. However, that private experience is initiated by all interactions between people surrounding the carrier, most of which are not directly involving the carrier in any way. Another outcome of our early investigations of *FeltRadio* is the sense-making mode activated in the test persons when equipped with *FeltRadio*. They attempt to find reasons for the signals and explain why and how it can be that there is much (wireless) activity an early afternoon in a small suburb where one may assume that most people are at work.

6.3 Reflections on community

At one level, *FeltRadio* has brought the research community close to people representing a variety of social and educational background to discuss and talk about WiFi, technology, and the perception of these. These have, however, been on a one-to-one basis. At another level, and as discussed above, *FeltRadio* may allow people to experience the digital presence of others, of the communities around them. This can lead to an increased awareness of inclusion/exclusion in different communities, a social reflection prompted by the sensorial stimuli. *FeltRadio* also highlights that we all participate, also bodily, in technology use – either through our own use of technology or through others' use. Indeed, even if we as individuals purposefully decide not to, for example, use wireless technology, we all are part of a society, a community where wireless and other interactions with technology take place. Likewise, our actions, and interactions, cannot be seen in isolation. Rather, we must perceive the design of interactions to be situated in a larger community of practices, where other interactions, activities and agendas exist even though they may be invisible to us and our sensory faculty.

6.4 Reflections on emancipation

In *FeltRadio*, the mode of interaction has been selected by the designers. As of now, we, the researchers, have set up experiments where people do walks in their neighborhood, or at their workplace, of about 2*20 minutes while wearing *FeltRadio*. Even though the tests were performed 'in the wild' and people walked in diverse locations, the tests were also rather scripted as we did the same activities with all users, changing only the location. The test-setup together with the technological design of *FeltRadio* somewhat hindered emancipation as the study participants could not change or in other ways control the interaction modality or how they used *FeltRadio* during the test. But it should be pointed out that even if the activities were scripted and similar for all participants, the individual experience for our participants remained unique, since we cannot – and have not intended to – fully determine people's experience in advance [17]. To work with the above identified concerns, we see a need to have people living with, and exploring, *FeltRadio* over a longer period of time and without us as researchers being constantly present. It would also be interesting to explore how different senses could be activated and how that would change the perception of both WiFi and *FeltRadio* as technologies.

Furthermore, *FeltRadio* allows people to see parts of their lived world differently, by providing sensorial stimuli of something mundane, but otherwise imperceptible. In our tests we have observed that through this augmentation of the senses, people start to relate differently towards WiFi, but also towards other people, buildings and technologies. However, this form of empowerment

comes with a potential cost as people may start to realize that the experience of *FeltRadio* comes from something that is out of their control – other people’s communication and technology use.

7. DISCUSSION

From the analysis in the previous sections, it is clear that the three projects differ greatly in their aesthetics of participation. Concerning the modes of sense perception, the primary sensorial activation concerns the auditory sense (*Ekkomaten/Echoes from Møllevangen*), the kinesthetic-proprioceptive sense (*coMotion bench*) and sensorial augmentation and tactility (*FeltRadio*). However, it also seems clear that all three projects are actively exploring particular experiential qualities as participatory strategies for engaging with cultural heritage/collective storytelling, shape-changing interfaces and critical reflections on WiFi traffic through media architectural designs. Further, a common theme arising from the analysis was the multi-sensuous and synesthetic activations; the distribution of the sensible concerns all senses, and when you are dealing with the aesthetics of participation of media architecture, you have to consider the impact on all senses in analysis and design. *FeltRadio* is interesting as a project that not only alters the distribution of the sensible but actually augments peoples’ sensory abilities, so they can suddenly ‘feel’ WiFi. Media architectural projects can also experiment with whole new forms of sensation or abilities to sense. And in the case of the *coMotion bench*, it becomes clear how sensation is not only restricted to human experience; physical and architectural objects also sense, and act accordingly. The distribution of the sensible has to account for nonhuman agency as well if the complexity of urban interactive environments is to be understood in its full experiential complexity.

The relation between modes of sense perception and forms of engagement also varies. In *Ekkomaten*, the auditory sense is the backbone for an auditory engagement through listening, made possible through the interaction with the machine. Interestingly, listening becomes a performance in public space, attracting attention and people to interact with the machine. It also becomes a way of engaging with matters of cultural concern, and living heritage. *Echoes from Møllevangen* tries to add an even more performative mode of listening, where the inhabitants themselves collect the sounds – even though the participatory soundscape still remained somewhat curated, and did not seem to provide the sufficient means to sustain the engagement of the citizens in the participatory storytelling project. Opposite from this idea of a very direct mode of participation, we see the *coMotion bench*, actually hiding away its interactional qualities, creating a very different form of engagement. *FeltRadio* uses the technology to actually let people engage with that which they cannot normally sense, a participation that prompts a range of critical reflections.

It might be argued that the community part of these projects is somewhat limited if compared to other media architectural projects who have as an explicit goal to activate communities for a cause, also discussed in design literature as publics [8], e.g. reducing the emission of CO₂ or providing a venue for public debate, to name a few examples. The closest we get is *Echoes from Møllevangen*, even though, as we have stated, the project did not succeed in mobilizing a community storytelling in the end. There are clear examples of inclusion/exclusion in the projects, often framed as those who interact and those who do not. Mostly this concerns the actual situation of interaction, though; as in the *coMotion bench*, where it would mainly be the people on the bench who would be involved in the interaction, as opposed to *Ekkomaten*, where the machine itself attracted a lot of attention in

addition to the experience offered through interaction with the machine. Still, people rarely chose to interact with the shape-changing features of the bench, as it did not reveal these capabilities to people beforehand. In the case of *FeltRadio*, it is complicated to fully determine the communities activated, since the sensorial experience of WiFi signals can be an outcome of a range of intersecting communitarian activities. We will argue, however, that it is important to consider the communitarian aspects of the media architectural configurations as an integral part of the distribution of the sensible. An example of a media architectural work that emphasizes the community and communitarian aspects of both the society and the media architecture design is Rafael Lozano-Hemmer’s work *Voz Alta* (Loud Voice) [14]. *Voz Alta* is a memorial, participatory installation in remembrance of a student massacre in Mexico. The installation is built up around local sound (i.e. a megaphone), projected light and radio transmissions. Anyone is allowed to walk up to the megaphone and speak out their memory from the massacre, creating a community of storytellers that counters the official records of the event. The spoken word is heard by everybody close by, but it also activates beams of light that translate the voice into pulsing light that is sent out over the city, including a specific light beam that is directed to the former building of the Ministry of Foreign Affairs. Additionally, the spoken stories are also broadcast over radio for anyone to pick up and listen to. In *Voz Alta*, one can more easily see the community-aspects of our framework come into play, compared with our own three projects. It is clear when looking at projects like *Voz Alta* that the community aspects of media architecture projects can be influenced by offering particular forms of engagement through different modes of sense perception. As a consequence, we wish to pursue further investigations of communitarian aspects both with respect to existing projects and future designs.

Concerning emancipation, again, it might be argued that *Echoes from Møllevangen* tried to create an ‘emancipated community of storytellers’, but failed in achieving this goal since there was no sustained engagement throughout the project. One of the reasons was that we never established a participatory knowledge base, and that designers and users remained separated throughout the project. In the *coMotion bench* project, some people had an emancipatory feeling when discovering the sudden shape-changing capability of the bench, possibly also as a way to reflect on how the future of media- and interactive architecture might change our everyday environments and architectural objects. It is definitely possible to argue that a dissensual reconfiguration has been catalyzed; but it is difficult, from our current studies, to assess the impact it has had. The same might be said concerning *FeltRadio*, where we would need more longitudinal studies to determine whether being able to suddenly sense radio would manifest itself as a dissensual reconfiguration with an emancipatory potential. Here, we would also like to emphasize that there is no a priori ‘higher’ value associated with emancipation in the framework; hence, this is not a call for media architectural projects to always pursue an emancipatory agenda, different project genres exist, which is a good thing. It is important, however, to examine the questions associated with this point of emphasis in the framework, and to articulate the aspects concerning power, knowledge, participation and users/designers.

In the analysis, we have primarily chosen to work with projects that we have been involved in and which we are familiar with, to be able to back the analysis with solid empirical data. It is clear, though, that it would be interesting to test out the framework in an analysis of other forms of media architecture, not least more

traditional screen-based experiments, to unfold the aesthetics of participation facilitated by distribution of the sensible of media facades, architectural lighting and urban screens. This would also make it possible to better refine the framework based on a larger pool of exemplars, something we wish to pursue in the future.

8. CONCLUSION

In this paper, we have presented a theoretical framework for analyzing the aesthetics of participation of media architecture, based on a close reading of Rancière. We see the framework as a tool to analyze and understand existing media architecture and also to facilitate new media architectural design processes. The framework has been refined through theoretical developments, analysis and design work, but is still in-the-making.

We have highlighted four points of emphasis and a range of questions that can be used to unfold the complex interweaving of modes of sense perception, forms of engagement, community and emancipation that form the aesthetics of participation in urban interactive environments. Through our analysis of three media architectural projects, we have shown how it is possible to use the framework to bring forth constitutive elements of how these projects engage their users on a sensorial level that relates directly to modes of participation in a wide range of matters of concern. It is clear that the aesthetics of participation offered by the different projects, varies greatly. It might be argued that the flat structure of the framework in its current form does not fully recognize the dynamic nature of participation, and the interrelations between the four points of emphasis. This also extends to the analysis, which becomes somewhat linearly applied and constrained. Whereas we do believe that there is a point in being ‘forced’ to consider both the presence and absence of particular aspects and experiential qualities presented in the framework, future work should explore ways to better bring this dynamics to the fore.

We are currently embarking on a project, where we will use the framework prospectively to identify particular design concerns and help us articulate experiential qualities we wish to pursue in the design process. Hopefully this will add to the maturation of the framework, showing how a continued focus on how aesthetics of participation, and the relation between the distribution of the sensible and modes of participation, can be an important theoretical and analytical contribution to the evolving field of media architecture, and HCI in general.

9. ACKNOWLEDGMENTS

Thanks to all our colleagues for their collaboration and support in the design projects and theoretical explorations. This research has been funded by Aarhus University’s interdisciplinary research centre, Participatory IT, www.PIT.au.dk (project code 10509).

10. REFERENCES

- Allen, P., Framing the media architectural body, *Proceedings of the 4th Media Architecture Biennale Conference: Participation*, 2012, Aarhus, Denmark, 9-12
- Bishop, C., *Artificial hells: Participatory art and the politics of spectatorship*, Verso Books, 2012
- Bloom, F. E., Lazerson, A. and Hofstadter, L., *Brain, mind, and behavior*, Educational Broadcasting Corporation, USA, 2001
- Breinbjerg, M., Urban sound interfaces: poetic approaches to media architecture, *Proceedings of the 4th Media Architecture Biennale Conference: Participation*, 2012, Aarhus, Denmark, 43-46
- Brynskov, M., Dalsgaard, P. and Halskov, K., Understanding media architecture (better): One space, three cases, *In Proceedings of the Workshop on Interactive City Lighting, CHI 2013*, 2013, Paris, France,
- Buck-Morss, S. Aesthetics and Anaesthetics: Walter Benjamin's Artwork Essay Reconsidered. *October*, 1992, 62:3-41
- Dalsgaard, P. and Hansen, L. K. Performing perception-staging aesthetics of interaction. *ACM Trans. Comput.-Hum. Interact.*, 2008, 15(3):1-33
- Dantec, C. A. L. and DiSalvo, C. Infrastructuring and the formation of publics in participatory design. *Social Studies of Science*, 2013, 43(2):241-264
- Fritsch, J., Breinbjerg, M. and Basballe, D. A. Ekkomaten—exploring the echo as a design fiction concept. *Digital Creativity*, 2013, 24(1):60-74
- Greenfield, A. Against the smart city (The city is here for you to use Book 1), Do Projects, New York, 2013. *Kindle edition*, 2013,
- Greenfield, A. and Shepard, M. Situated technologies pamphlets 1: Urban computing and its discontents. *The Architectural League of New York, New York*, 2007,
- Grönvall, E., Fritsch, J. and Vallgård, A., FeltRadio – sensing and making sense of wireless traffic., *Paper accepted for proceedings of Designing Interactive Systems (DIS) 2016*, In press, Brisbane, Australia.,
- Grönvall, E., Kinch, S., Petersen, M. G., et al., Causing commotion with a shape-changing bench: experiencing shape-changing interfaces in use, *Proceedings of the 32nd annual ACM conference on Human factors in computing systems*, 2014, Toronto, Ontario, Canada, 2559-2568
- Lozano-Hemmer, R., Project "Voz Alta", from: http://www.lozano-hemmer.com/voz_alta.php, 2015
- Massumi, B., *Parables for the virtual: Movement, affect, sensation*, Duke University Press, 2002
- Massumi, B., *Ontopower: war, powers, and the state of perception*, Duke University Press, 2015
- McCarthy, J. and Wright, P., *Technology as Experience*, MIT Press, Boston, 2004
- McCarthy, J. and Wright, P., *Taking [A] part: The Politics and Aesthetics of Participation in Experience-Centered Design*, MIT Press, 2015
- Rancière, J., *The politics of aesthetics*, Bloomsbury Academic, London and New York, 2013
- Rancière, J., *The emancipated spectator*, Verso Books, 2014
- Rancière, J., *Dissensus: On Politics and Aesthetics*, Bloomsbury Academic, London and New York, 2015
- Rasch, P. J., Grabiner, M. D., Gregor, R. J., et al., *Kinesiology and applied anatomy*, Lea & Febiger, 1989
- Sade, G., Aesthetics of urban media facades, *Proceedings of the 2nd Media Architecture Biennale Conference: World Cities*, 2014, Aarhus, Denmark, 59-68
- Urbanowicz, K. and Nyka, L., Media architecture: participation through the senses, *Proceedings of the 4th Media Architecture Biennale Conference: Participation*, 2012, Aarhus, Denmark, 51-54