DEPARTMENT OF ARCHITECTURE, DESIGN AND MEDIA TECHNOLOGY
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Department of Architecture, Design, and Media Technology

Introduction

The department of Architecture, Design, and Media Technology is a multi-campus department with branches in Aalborg, Copenhagen and Esbjerg. In Aalborg the department has all of its four main subjects Architecture, Urban Design, Industrial Design, and Media Technology represented whereas in Copenhagen and Esbjerg its concentrates on Media Technology with cross-over to Architecture and Learning. The department holds 140 researchers and PhD students and participate in a long range of national and international projects. It provides teaching to over 1500 students at the three branches. The department is headed by Professor Hans Jørgen Andersen.

The department is unique in the Danish context as it collects disciplines within architecture, design, media and technology under one roof providing the foundation for a powerful new field of knowledge and development of competence within the field of design with a human focus.

Vision

The department’s vision is to utilize and investigate the interplay between creativity and technology for development of new growth areas in research and education directed towards the user or participants. The developed new architecture, urban design, products, and media solutions with the user or participants in focus addresses future societal challenges regarding development of sustainable and attractive ways of living. The impact on the physical environment and user interaction will be subjects for investigation, paving the way for new technologies and solutions that take the user experience fully into account. The ambition is to deliver excellent human centered technology research.

Department for Architecture, Design and Media Technology

Sections

- Architecture and Urban Design
- Industrial Design
- Media Technology
  - Aalborg
  - Copenhagen
  - Esbjerg

Committees

- Department committee
- Liaison Committee
- Research Committee
The section of Architecture and Urban Design has built the environment in all its facets as the field of attention. The section conducts research and teaching in the broad span from the large-scale development plans to the detail of the building with a diversity in the disciplinary backgrounds, coming from architecture, urban design, engineering, social science etc.

The research and teaching conducted in the section focuses on creating a strong combination of design-based, technological, and social science competencies with new innovative approaches to research and teaching characterized by an innovative approach linking research and practice within the built environment. Further, a holistic and integrated design approach is reflected in many research projects with the aim to produce new research-based knowledge to provide architectural quality for the users.

The Staff is composed of internationally experienced scholars and practitioners, and research and teaching is done in a network-based environment along with researchers and practitioners in Danish and international research environments, companies, and public authorities. The Architecture and Urban Design section staff mainly teaches at The School of Architecture, Design and Planning, Aalborg University.

The main focus of the research in the section is within: sustainable architecture, zero energy buildings, architectural quality, housing, health and well-being, tectonics architecture, urban design, mobilities research, mobilities design, urban transformation, urban- and landscape design, performative urban environments, urban space design, parametric design etc. In the section four overall research fields are present, being those of: Mobilities research, Sustainable Architecture, Urban Transformation and Tectonic Performance & Making in Architecture, as well as a number of more individual research fields.
Mobilities Research (C-MUS)

The research into mobilities explores what the increasing mobility of people, information, and goods means to societies. The research work from within the ‘Mobilities Turn’ and the underlying hypothesis that mobilities is ‘more than A to B’ movement. The research explores how commuting, everyday life transport, digital media, new production and consumption patterns have effects beyond mere displacement of people, information and goods.

The general research challenge is to explore and understand what mobilities mean to societies. In particular the research focuses on the relationship between infrastructure, technologies, cities, built environments and social and cultural processes. In more specific terms we research into everyday life mobilities within subway systems, car infrastructures, aeromobility, cycles, lights rails etc. The research is multimodal and (often) situational, and reaches from non-motorized mobilities over complex infrastructure to the new digital media and ‘smart city’ developments. The research is undertaken with a plethora of methods such as surveys, interviews, ethnographic observation, mobile mapping, GPS tracking, Rejsekortdata (big data) and thermic camera tracking, eyetracking etc.

Sustainable Architecture (SARC)

The research group for Sustainable Architecture regards integrated design as a cornerstone in research, education and practice and aims to fully integrate engineering aspects in architectural approaches. SARC applies a human-centered approach to architecture with the aim of enhancing health and quality of life in built environments as well as regards climate and urban context as main drivers of building design. The research spans from climate mitigation and adaption of build environment research to research concerning energy efficiency and indoor environment. Further, research is conducted concerning the integration of active energy systems in the design of architecture, life cycle-oriented tactics of applying materi-
Urban Transformation

The research group of Urban Transformation conducts research in relation to the rapid change of our cities in the post millennium period, focusing on the investigation of different methods and approaches to handle contemporary urban challenges in order to create tools that can support a more sustainable and long-term proof urban development. We are triggered by a desire to explore and create new ways of planning and designing our future cities, both in the rapidly expanding urban agglomerations as well as within the smaller cities outside the urban growth centers. Further, the research field consider the urban and rural landscapes as having a prevailing role in the development of the future build environment. This research field addresses issues related to how the development of urban areas can be achieved with an emphasis on quality; among others focused on in research on urban landscapes and public spaces, catalyst architecture, hybrid programming, art and temporary use as well as issues related to hydrology and climate adaptation, demographic growth and decline, and site-specific development.
ACT, Tectonic Performance & Making in Architecture, aims to contribute to tectonic research at the highest international level. We do this by developing design methods that link the current boom in the advancement of technologies applicable to the building industry, herein specifically digital technologies, with a continuous development of the vital spatial potential of architecture to move its inhabitants beyond mere practicality. We imagine, develop, and realize tectonic performance & making in architecture through direct interaction with the building industry and practice of architecture.

Selection of ongoing research projects:

- Airport City Futures
- Catalyst Architecture
- Northern Jutland as international flight destination
- Creating a common centre
- Smart travel card
- Strategies for the temporary city
- Developing coastal tourism in the Limfjord area
- Rural development
- Art in and outside of the art galleries
- Zero Energy Building Design
- Environmental Tectonics: Matter Based Architectural Computation
- Sustainable dwellings of the future
- The physiological impact of the Perception of Architecture
- DGNB certified Healthcare Centres
- Daylight and Window Preferences in Dwellings
- The potential of Art in healthcare
- ACT, Tectonic Performance & Making in Architecture
Section of Industrial design

The main research focus in the Industrial Design Section is the framing and facilitation of the early phases of the innovation using a systematic, methodological and integrating design process. This includes research in design theories, models and methods for creating a shared point of departure and development process for work of cross-disciplinary teams. The emphasis in the process is from the search phase until synthesis of a conceptual proposal, with an outset in wicked, ill-defined problems, challenges and opportunities within product and service development. Challenges that can be addressed using the Design Thinking approach on several levels; ranging from concrete idea and product development, process and project management to strategic and business levels.

Service Design

The aim of this research on Service Design is, at the same time, methodological and strategic. From the methodological perspective the research is providing new insights on how to design innovative services both in the private and public sector. Service Design is a relatively new discipline, in which methodologies and tools are still being developed. The research of our group aims at reinforcing and consolidating a methodological framework that support the activity of service designers. The methodological approach is based on users’ involvement, co-design and participation. Methods developed and used in those projects are refined and elaborated in and for teaching activities. From the strategic perspective this research area proposes promising scenarios for social innovation that have attracted the interest of public institutions, such as Aalborg Hospital or Aalborg Kommune, who became part of the above mentioned EU-funded projects in this area.
Almost all the research projects in this area have been focusing on healthcare strategies, although the potential for innovation also in other areas (such as urban development, IT services, citizens services) is also very evident.

Examples of Industrial Design projects:

• Sundinnovation
• Ludinno (Learning Labs for User-Driven Innovation
• Life 2.0. Geographical Positioning Services to Support Independent Living and Social Interaction of Elderly People
• My Neighbourhood
Section of Media Technology

The Media Technology section is situated in Aalborg, Copenhagen and Esbjerg. At Media Technology we focus on research within technology, creativity and the combination of the two. Concretely, we study and combine advanced technologies in areas such as computer vision and graphics, computer games, sensing and audio technology, interactive sound, animations, art and entertainment. At the same time we try to understand how these technologies influence human perception and interaction by applying them in solving real world problems. The research activities are grouped into the four main areas: Audio Processing & Music Informatics, Computer Graphics, Computer Vision, and Human Computer Interaction.

Audio Analysis and Sonic Interaction Design

The research in audio analysis and sonic interaction design is concerned with machine learning and signal processing for audio applications, computational models of music perception and cognition and sound synthesis and rendering for interactive applications. The research focuses on such problems as the design of algorithms that can carry out expert musical tasks in composition, analysis and musicology, for example for segmentation and classification of symbolic music data, and noise reduction, beam-forming, localization, compression, and classification methods for hearing aids, music equipment, communication, and audio archives, as well as physics based sound modelling of musical instruments and everyday sounds, new interfaces for musical expression, full body motion capturing and rendering to musical sound. As such, our research within the area encompasses everything from extraction of signals buried in background noise to inference about the contents and its meaning. The research in this area is conducted by the Audio Analysis Lab, the Multisensory Experience lab, the Augmented Performance lab and the Music Informatics and Cognition Research Group (MusIC).

Computer Graphics

Computer graphics is a wide research field which includes not only the generation of all kinds of graphics with all kinds of computers but also user interfaces to interact with computer-generated graphics, image processing, display technologies, and even camera technologies. The computer graphics research group focuses on photorealistic and interactive augmented reality as well as input and output interfaces for virtual reality. We also explore other directions of computer graphics research, for example, architectural visualization, physics-based animation, computer graphics for video games, etc.
**Computer Vision**

Computer vision is the digital version of human vision, where the eyes are replaced by a camera and the brain is replaced by algorithms implemented in software. The research field of computer vision is about developing and implementing such algorithms. The ambition is not only to replicate the abilities of human visual perception, but also going beyond human capabilities for example by seeing in the dark or measuring the actual distance to an object. We are working on many different computer vision topics, but most of them are focused on automatic camera-based analysis of people and their whereabouts. These activities are collected in the Visual Analysis of People.

**Human Computer Interaction**

What are the factors that make an interactive system successful? And what does successful actually mean? The Interaction Lab aims at investigating these fundamental questions. Factors include for instance cognitive abilities, physical abilities, social rules, or environmental parameters. In accordance with AAU’s strategy, the team specializes in applied research with relevant regional and national stakeholders in the areas health, smart learning and spatial interaction. Project examples include Apps for self-rehabilitation for patients with traumatic brain injury, storytelling devices for capturing and disseminating indigenous cultural heritage, social robots in health care or smart tools for changing the traditional role of institutional learning. The Interaction Lab is embedded in a strong international network of research collaborations and engages in research-based teaching on both bachelor and master level in a number of educations like Medialogy, Robotics, or Vision, Graphics, and Interactive Systems.
Lighting Design research and application

Lighting technology has undergone a revolution in recent years, as intelligent and interactive control of light, energy-saving measures and new LED technology can be applied to human qualitative and physiological perception of light. Research in Lighting Design combines science and technology to an architectural approach that seeks to improve our built environment with the applied knowledge of lighting design. Researchers, private business partners, municipalities and graduate students in Lighting Design team up to solve relevant problems. In this multi-disciplinary approach, the learning process of making, implementing and testing is created in real-life scenarios. Through scale models, photorealistic simulations and 1:1 dynamic lighting design mock-ups in situ, projects are developed. The experiments address needs and contextual analysis, concept design and development, prototyping, information technology and programming, autonomous controlled lighting and technical hardware solutions, including sensors, mobile lighting laboratory, thermal camera tracking, EEG and smartphone applications.

Examples of projects:

• The cocktail party problem
• Koldinghus Augmented: The Castle Chapel
• Apps for self-rehabilitation of brain lesion patients.
• Culturally Enhanced Augmented Realities, EU FP7 project
Selected research projects
Automatic Analysis of Sports Arenas

Knowledge about the utilisation of sports arenas is very important to the administrators and owners of the facilities in questions on efficiency and future designs. This project aims to automate this process with new computer vision methods. The three main goals are; firstly, to estimate the number of users and their position in the arena at a given time. Secondly, we want to automatically classify the activities performed in the arena and recognise a number of well-known sports types. Lastly, methods for estimating the activity level of individuals will be investigated. Using solely thermal video, any privacy issues are eliminated.

The images above illustrate the position of people summed over 10 minutes of observed activity. White areas are highly occupied while black areas have not been occupied.

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The Cocktail Party Problem

The human auditory system has a remarkable ability to separate sounds, even under very difficult conditions, for example when multiple speakers are speaking at the same time. This is called the cocktail party effect in reference to the particularly difficult circumstances (from an auditory perspective) of cocktail parties. Many hearing impaired people lose this ability, resulting in what is known as the cocktail party problem of restoring it, and try to avoid such situations, something that has a severe impact on their lives. The COCKTAIL project aims at improving the quality of life of hearing aid users by detecting and solving the cocktail party problem with new methods based on a combination of models of the human auditory system and advanced signal processing, something that is made possible by a new generation of hearing aids that can communicate with other devices, like other hearing aids, smart phones and tablets, using wireless technology. The project is a collaboration between the Audio Analysis Lab and hearing aid manufacturer GN Resound and is supported by the Innovation Fund Denmark.

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The ELDORADO project provides research-based knowledge to optimise the current meal catering and meal practices for elderly. A large proportion of the elderly does not eat the meals provided in sufficient quantities, increasing the risk that they become malnourished, and experience lower well-being. There is a need to redesign the food supply and the meal practices in order to better fit with the elderly’s individual preferences and practices. The number of elderly will increase significantly in the coming years and become highly demanding for personnel, goods and economic resources from the municipalities in Denmark.

Catered foods are often not consumed adequately and elderly feel dissatisfied and may become at risk for malnutrition. There are several reasons for this inadequate food intake but sensory and socio-psychological factors as drivers for intake need more attention. Especially social factors seem to be one of the main factors. Work Package 3 placed at the department is with ethnographic and User Centred Design approaches focusing on how new IT-solutions can support social facilitation within meal practices. The IT-solutions includes both traditional communication platform, but also investigating new possibilities for using Virtual Environments.

The ELDORADO project is in close collaboration with Copenhagen University (IFRO), Herlev Hospital, 7 municipalities, and meal service catering of Copenhagen.
Re-locating the Water of Limfjorden

The project investigates relations across water between regional and local scales focusing on a Danish inlet called Limfjorden. This region is changing and its harbours are transformed: from being the foundation and starting point for urban development the role of harbours are changing. As the water is losing its importance as route for goods, it takes on new roles and meanings. The water simultaneously unites and separates; as a dividing element to be overcome, but at the same time as a collective identity with common history. The project is developed in collaboration with a number of municipalities in the Limfjord area and is hosted by Centre for Mobilities and Urban Studies as part of a research project on mobilities and places.

On the basis of spatial analyses of harbours and interviews with local stakeholders and users, the project aims at using “design thinking” to develop concepts and design ideas unfolding relations across water. The project also engages in research experiments which involve a former ferry from Limfjorden. The ferry, which used to connect communities in the Limfjord area, is transformed into a floating lab facilitating connections between waterfront users and the water of Limfjorden.

The project investigates water on a local scale, through site explorations of interaction between user and water, which informs a regional scale enhancing connections between harbours and developing regional strategies on the basis of relations between local projects. The project takes point of departure in situations in physical space as driver for regional development, complementing traditional ways of developing regional strategies through overarching visions and marketing schemes. Between the fields of urban design and tourism this project thereby contributes to discourses concerning the future development of Danish coastlines and small town harbours, and introduces international research and cases to inform this.

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LIVING IN A NEARLY ZERO ENERGY BUILDING
– understanding the relation between energy use, user practices and user perception

Although it is still not common practice, several projects constructed during the last years demonstrate that it is possible to design buildings which can be defined as “zero energy buildings”. Research shows, however, that it can be difficult to meet the expected low energy consumption after commissioning. Several studies suggest that one of the reasons for this is that occupants’ behaviour and lifestyle strongly influence the final energy use.

This research project investigates the relation between energy consumption, user practices and user perception. Two newly erected youth housing complexes at Aarhus Harbour, Denmark, are the subjects of analysis. The project is planned to include several smaller (interrelated) studies, and the data used comprises daily measurements of the energy consumption of each of the 99 apartments as well as data received through two questionnaire surveys distributed to the inhabitants – youth in the age from 19 to 25.

The project is a collaboration between the housing association Ringgården and Aalborg University.

Researchers: Assistant Professor Anne Kirkegaard Bejder and Professor emeritus Mary-Ann Knudstrup

Nearly Zero Energy Youth Housing Complex at Aarhus Harbour, DK [Photo: A. Bejder]

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Northern Jutland as International Air Destination

Aalborg Airport is primarily a regional airport from where the people living in Northern Jutland depart from on their journeys out into the rest of the world. But in the past few years the airport has experienced growth in the number of international arrivals, with more and more foreigners flying into Aalborg Airport in order to spend business or leisure time in Northern Jutland.

This research has explored who these international travelers are, and why they come to Northern Jutland through Aalborg Airport. Both Aalborg Airport and Northern Jutland has an interest in increasing the number of international arrivals, and in the effort to attract more visitors, further knowledge of this group of travelers is necessary. This enables strategic route development in Aalborg Airport, and contributes to the destination development in Northern Jutland.

Aalborg Airport is Denmark’s third largest, with 1,4 mio. travelers in 2014, which constitutes a doubling of passengers since 2000. Denmark’s largest domestic route is from Aalborg Airport to Copenhagen, and there are daily departures to and arrivals from the large hub-airport in Amsterdam.

This research has used survey and interviews in the exploration of the international travelers in Aalborg Airport, and conducted the analysis based theoretically on the ‘aeromobilities in situ’-model. The top-international nationalities arriving in Aalborg Airport are Norway, UK, USA, Sweden, Faroe Islands and Germany, with just around 30% citing holiday or visiting friends and relatives as their reason to go, while just under 30% travel by air to Northern Jutland on business. Once they arrive in Aalborg Airport the study also shows that their final destination is mainly Northern Jutland, but also that the rest of Jutland is attracting the international travelers. The research has received funding from Aalborg Airport, Aalborg Municipality, Vækstforum, AalborgSamarbejdet and VisitNrdjylland.
Creative Robotics

Robotics in creative driven fields, such as architecture, are increasingly studied in research, and in some architectural industrial contexts, related to advanced material systems, adaptable fabrication strategies, and experimental physical prototypes. Industrial robots offer accuracy, flexibility, and reliability, and they can easily be customized to fit different working environments. These advantages present an opportunity to rethink the entire design-to-production process and facilitates an entirely new basis for creating intuitive, yet analytical based creative design processes.

The objectives of the research in this field is to create methods or techniques, which establish a direct relation between the intuitive design processes of the designer and the analytical robotic based evaluation and actuation properties. And, to understand how instrumental/informative predictions of design variations can be proposed and/or implemented in parallel to human design decisions. This requires studies into the control of robotic making, learning algorithms that project design alternatives for the designer, automated modification procedures of design solutions to increase problem identification, and computer vision analysis of human and material behaviour.
Open4Citizens – Empowering citizens to make meaningful use of open data

The Service Systems Design team at the Department of Architecture, Design and Media Technology is coordinating Open4Citizens: A European Horizon 2020 project aimed at widening the use of open data in the creation and improvement of existing services. At its core, it is a project about citizen involvement and data driven design of urban services.

The lives of citizens are deeply affected by the urban services that surround them, because most services shape and constrain their experience and interaction with the cities they live in. Currently a large variety of data is increasingly made openly available. Our vision is that this becomes a resource open to the largest possible number of people. To a great extent however, when it relates to open data the learning curve can be steep, and not all the data published is in a format and condition ready to actually work as a resource for innovation. Beyond gaining access to data, it is crucial to have an idea of how to use it, what kind of perspectives it opens, and what potential it represents.

In the O4C project we develop inclusive methodologies, concrete tools, use cases and a digital platform (www.opendatalab.eu) – all of which will allow citizens to make more meaningful use of open data as an actual resource. The project was kicked off in January 2016 and will run until June 2018. During the project time span of 2,5 years the local partners and project teams will be organising two cycles of participatory hackathons and related events across five places in Europe: Karlstad/Sweden, Rotterdam/Netherlands, Barcelona/Spain, Milan/Italy and Copenhagen/Denmark.

At one level a valuable outcome of the project is the concrete proposals, idea pitches and prototypes that grows out of the key activity; the hackathons in the project. These are intense co-creative events spanning 2-3 days bringing together a diverse range of stakeholders to address particular challenges in interdisciplinary teams.

At another level, the project aims to pave the way for a wide network of citizen centred OpenDataLabs across Europe; that support citizens and bottom-up initiatives to seize the opportunities offered by the availability of open data.
Open4Citizens is European Project under the Horizon 2020 Programme topic ICT-10-2015.
In Denmark, we’re working closely with the anthropological consultancy Antropologerne as well as technical expertise from the company Dataprocess. Consortium partners across Europe include: Politecnico di Milano in Italy, TU Delft in the Netherlands, i2Cat in Spain as well as Experio Lab in Sweden.

Website: www.open4citizens.eu
Bachelor and Master of Science

The Department of Design, Architecture and Media Technology offers education within Architecture and Design and Media technology.

Medialogy, bachelor and master program
To be successful in today’s media society, you should be able to bridge the gap between technology and creativity. At Medialogy, your creativity is what starts the process – and we give you the opportunity to study the interaction between technological science and the ways it is applied. At Medialogy, you will gain knowledge about film, animation and music technology and learn how design and computer science go hand in hand in today’s and tomorrow’s media productions. You will gain insight into the creative processes and thinking that precedes any media production.

Medialogy

You will also learn how to use technological advances in engineering science in design and production of e.g. digital creation and manipulation of sound
Architecture and Design

The study unites creativity and technical knowledge. The study gives you an interdisciplinary understanding of working with architecture, design and engineering. You’ll get a strong technical profile and knowledge about how you create and design anything from buildings and quarters to digital systems and utility items.

The study of Architecture and Design consists of two parts. Three year Bachelor’s programme (in Danish) and 2 year Master’s programme (in English) in Architecture, Industrial Design or Urban Design, Mobility

Problem Based Learning

As a student at AAU you will work closely together with your fellow students by way of problem based project work. The Aalborg Model for Problem Based Learning (PBL) enjoys great interest both nationally and internationally, and UNESCO has placed its only Professorial Chair in PBL at AAU.

Once you have formed a project group, you need to define a problem together that you want to examine. The problem forms the basis of your project and you are to a great extent responsible for defining this yourselves within a set though often very broad theme frame. The project work is completed with an exam. While working on your project, you will also need to do individual exams in your subjects. The project work together with lectures, literature and cooperation with the corporate sector will help you gain a deeper insight into the subject you are examining than if you had been working on your own.
Student Testimonials

Bianca Clavio Christensen,
10th semester, tells about Medialogy:

“To create is my passion, and technology is a great interest of mine. That is why I chose to study Medialogy, and it is what motivates me to continue studying.

The Medialogy programme offers a wide range of skills and knowledge, especially, within software development and the relationship between user and computer. In my opinion, Medialogy is where the programmer and designer meet, and together they create a fusion between technology and creativity.

The Aalborg Model is very appealing to me, with its focus on project work, and it has helped me understand, what learning-by-doing truly means. Here I have experienced that working in a group is a great way to learn together and learn from each other.”

Mathis Lauridsen Gerlich,
10th semester, tells about Architecture:

Since mid-elementary school, I have known I wanted to work in the field of architecture. After three years of studying Architecture & Design I am in no doubt that this education is a perfect match for me. Through problem based learning and group work, we are enabled to learn a more realistic approach when working on an assignment. Furthermore, this education is a great blend of traditional lectures as well as smaller assignments and longer projects where you can put your knowledge to the test. Another great aspect of this education is the way it combines the traditional artistic elements of architecture with more technical aspects.
Selected student projects

Architecture

Neuro-rehabilitation Center Brønderslev

This project takes a stand in the current debate of the future for the Neuro-rehabilitation Center in Brønderslev. ‘Region Nordjylland’ has decided that all neuro-rehabilitation in the region should be gathered at one location. At the time being, it is still uncertain if that location could be Brønderslev, but it has been a key point of this ongoing debate. This project places the neuro-rehabilitation center in Brønderslev.

The vision for the project is to create a building that can give equal accessibility for anyone. This is done to give the patients an experience of independence. The building is divided into two overall elements; the place for perspective and the place for contemplation. The patients have the opportunity to be perspective of the current situation in the living area as well as contemplated in the daily training.

The project is based on the theories and potential of ‘Healing Architecture’ as well as a discussion of sustainability and accessibility.

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Urban Design

The aim of the project is to introduce new ways of living by adapting the social aspects of a shared community into the present and combine this aspect with nature and water elements in the human and urban scale. By integrating water elements in the Shared Living Area, it is providing a water solution for flooding problems in the city by implementing a network of detention ponds. The character of the different areas of the project is defined by the interaction with water, while each of them has special features that make them unique in the city context. By making dense and low dense units of shared housing, we are creating more open spaces that will benefit both the area and city. Allowing people to occupy those semi-public spaces between units we are diversifying the experiences in the area, which combined with the water, will transform the Shared Living Area into an attractive neighborhood of Aalborg.
Industrial Design

Reachi

In 2014 Ida Stougaard Andersen and Pernille Skjødt graduated with their master thesis in Industrial Design. They developed Reachi – the missing link – a communication device.

Every year the Philippines is struck by over 30 natural disasters, which affects millions of Filipinos. When a natural disaster strikes and the regular communication and power lines are damaged, the affected people have no means of communicating their needs to the Philippine Red Cross. They must fight to survive without knowing when or if help will reach them. The Philippine Red Cross has trained 1.8 Million volunteers in disaster preparedness. But in the aftermath of a disaster the volunteers have no means to respond, and the Philippine Red Cross is left with little or no overview of the crisis and the needs brought by it, as well as no means of mobilizing their volunteers!

Reachi is a dedicated response device designed to let the 1.8 million volunteers send information directly from their affected communities to the Red Cross organisation. The system utilizes a matured mesh technology, guaranteeing signal without need of vulnerable, physical structures. Due to the density and defined location of the volunteers, the network will be strong and predictive.

The device is further designed to be disaster proof as it can withstand blows and drops, is waterproof and runs on solar power. With Reachi, he volunteer can send damage and assessment reports based on predefined options, with an interface designed to follow simple interaction principles. The design allows easy use and automatic information translation into digital visual maps, providing an instant overview for the Philippine Red Cross they are missing today. Reachi will enable faster response, relieving the affected people and saving lives.
Tangible Widgets for a Multiplayer
- Tablet Game in Comparison to Finger Touch

This master’s thesis investigated the use of tangible widgets in tablet games. Tangible widgets are defined as small physical objects that can be recognised by a capacitive touch screen. The focus of this project was to create a competitive 2-player game for tablets (Figure 1), which affords the use of tangibles widgets, when playing the game, compared to the use of regular finger touch. In order to accomplish this, five things had to be achieved:

Create an algorithm, which could detect and differentiate multiple widgets being present on the tablet screen at the same time. This algorithm also had to make sure the widgets would be detected with close to no frame drops, since this would break the immersion for the user when using the widgets.

Design the widgets, this meant the widgets had to be designed from scratch. The reason for this was to make sure all aspects of the widgets were optimal when the user had to play with them. Some of the design consideration were about: size, shape, wiring, interactive button, and spring system for touch points.

Design a game, that had some mechanics, which affords the use of widgets. This meant that the game design was focused around widgets. Besides this, the game also had to be appealing when playing it with regular finger touch.
Create a touch control scheme. Through multiple user tests an optimal control scheme for finger touch was designed for the game.

Scientific experiment, done through a user test on 32 people, in order to get some statistical results on whether people preferred to play the tablet game with tangible widgets or regular finger touch.

The results from this master’s thesis showed that users tend to prefer the use of tangible widgets over finger touch, when playing a tablet game, which is designed towards the use of tangible widgets. Furthermore it was proven that users interact more with the game, when using tangible widgets. This leads to more immersion and a more fun experience for the users.
This Master Thesis is about creating a Virtual Analog (VA) simulation of a plate reverb. Plate reverbs were popularly used in the 50’s and 60’s as a way to add reverberation to sound. In fact, it was the only reverb used on Pink Floyd’s Dark Side of the Moon! It utilises a small speaker attached to a big steel plate to make it vibrate, and several pickups to pick up the sound after it has propagated through the plate.

A big issue of using an actual plate reverb is the sheer size and weight of it. The plate is about 2x1m big and weighs (together with the rest of the installation) roughly 600 pounds. This, together with the current trends of digitalising audio effects, makes a digital implementation of it desirable. Several digital audio plugins of plate reverbs are already available. Even though, generally, these digital sound effects ‘do the job’, they do not have the ‘feel’ that the old analog effects had. Contrary to digital effect simulations, VA simulations rely on a model of the analog effect they are simulating; a model that takes into account parameters like room size, material properties, etc., to be changed.

For my project I created a VA simulation of a plate reverb in collaboration with Arturia, a French music soft- and hardware developer. Not only did the VA approach result in a very natural sounding reverb, it also posed many interesting opportunities that go beyond what is physically possible. In the end, the user could dynamically change parameters like the positions of the in- and outputs on the plate and the dimensions of the plate while sound goes through. This resulted in a flanging or pitch bend effect respectively which are very nice and unique sounding additions to the reverberation effect.
Visitors to The Music Museum (Musikmuseet) can look at the instruments on display, but can only touch few of them. This preserves the museum’s collection, but does not allow visitors to physically engage with and explore the instruments. In order to cope with this problem, students selected and replicated one of the most intriguing instruments on display, a medieval monochord bowed string instrument with an unusual vibrating bridge, called the tromba marina.

The tromba marina is a curious single stringed instrument with a rattling bridge, from which a trumpet like timbre is produced. The reconstruction was created using modern fabrication techniques and real-time signal processing algorithms, and presented at the 2016 edition of the New Interfaces for Musical Expression (NIME) conference.

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This work describes the design process of developing a service concept under the theme of smart cities and open data. It explores how to improve data literacy among youth in Copenhagen through academic research and co-creation methods. Youth are not naturally aware of the data they generate and how it is used, and are often overlooked and not included in decision-making in the development of cities. With the youth being future decision makers, this calls for a solution. To this, we designed Datacat. Datacat begins with a course on data literacy introduced in social science classes at high schools. Youth can link their online activities to the service, and share specific data in response to municipal challenges. Through Datacat, youth will become aware of the digital data they generate, and how it can be used to support and inform urban development projects in the municipality. This way the youth will improve their data literacy and become active citizens taking part in developing Copenhagen as a smart city.
The Master’s program, “Vision, Graphics, & Interactive Systems”, develops a large variation of engineering disciplines. These are used directly in solving the challenges associated with the semester projects. One example would be counting the number of people attending the Aalborg Carnival. Morten Bornø Jensen and Mark Philipsen tell about their Master’s project in the following:

During our final year, we had the choice of writing a long Master’s thesis, which included 7-months at University of California, San Diego in USA for conducting research for our thesis. The lab we were associated with is known for their research in Advanced Driver Assistance Systems (ADAS) for vehicles. We find it very interesting and important to address this area of research, as it is challenging and potentially saves lives by avoiding or limiting accidents. Some research from the field has already spawned products included in commercial vehicles driving around today. Examples
are adaptive cruise control, collision avoidance with active braking, and blind spot detection.

With our joint Master’s thesis we address issues associated with intersections, as they are especially prone to crashes. Navigating intersections requires awareness of surrounding objects, lane keeping, awareness of signs and signals. All of this sometimes becomes overwhelming to drivers and crashes happen. With assistance systems it would be possible to notify the driver of oversights or intervene when dangerous situations develop. With our background in computer vision we dove into existing research and with guidance from our supervisors found areas that we would try and improve. Our stay began with the collection of large amounts of video material collected from a camera mounted on the roof of our car. Subsequently, we began implementation of promising techniques from related work and test the working systems on our collected data. The scope of our thesis ended up becoming twofold, with one part revolving around research and development of systems that detects traffic signals, and another focused on detection and tracking of vehicles in intersections with the purpose of determining their path.
PhD

General information

The Department of Architecture, Design and Media Technology is responsible for the doctoral program of Media, Architecture, and Design. Beside this program the PhD. students affiliated the department are enrolled at program for Computer Science and Engineering and Electrical and Electronic Engineering.

The research environment is strongly international which is signified by the high international level of many of the researcher’s publications.

Doctoral Program in Media, Architecture and Design

The Doctoral Program in Media, Architecture and Design is a broad interdisciplinary program that focuses on design where the end-user and stakeholders have a central role in the research perspectives. Emphasis is placed on architecture, design & media focusing on the technical, social, and aesthetic dimensions. Construction and form of buildings, urban landscapes and spaces as well as design of artefacts, interactive media and art installations are of central concern. Special emphasis is on design and technology in the field of environmental and social sustainability; aesthetics and experiences; relational art; interaction design; and design, media and architecture as tools for local and international development – and for 'a better world'.

Research within the program is wide ranging and inter-disciplinary and concerns:
• Architecture, sustainable architecture, performative architecture, healing architecture
• Urban Design, urban architecture, urban transformation, urban space, urban culture/life
• Mobility, designing mobilities and infrastructures
• Interaction design, responsive environment, experience design, service design
• Media Art, relational art/performative art and technology
• Industrial Design, design of artefacts, design processes
• Research through Design

As the focus is on design as a constructing praxis, there is an interest in developing new research approaches such as practice-based research, research by design and participatory design processes. Several research projects under the program are working with experiments in a scale of 1:1 – or they have the goal to develop new designs, architecture or prototypes that can facilitate trials and experiments with participation of the goal end-users and stakeholders. Often, research, development and experimentation is carried out together with external private or public partners. Our goal is to
strengthen and develop theories and methods for research by or through design. In addition, we aim to strengthen the relationship and invoke collaboration between research and praxis and develop research tools to enable these developments.

The Research Environment is

Interdisciplinary and Problem-Oriented

The research draws on perspectives from engineering research, as well as from relevant design, architecture, media technology, human centered computing and social research disciplines. As an interdisciplinary and problem-oriented approach, we seek alternatives for solving particular problems within productions, social and public services, buildings, local neighborhoods, cultural enterprises and the urban fabric as such.

The research environment consists of academics with different professional backgrounds, representing a wide range of academic disciplines. PhD. research is carried out in partnership with a wide range of external public and private sector bodies.
Key figures 2016

Publications:

2015

171 Publications

Student intake (first study year)

Medalogy:

Copenhagen 106
Aalborg 102

Architecture and Design

115

Total

303

Students intake (postgraduate)

Medalogy

Aalborg 23
Esbjerg 3
Copenhagen 46

Architecture and Design

142

Total number of students

1400
Graduated students

**Medialogy**

Aalborg 22  
Copenhagen 64  
Esbjerg 16

**Architecture and Design**

126

**Phd Students**

Total Phd students 28

**Staff**

Technical and administrative staff: 25  
Scientific staff: 114  
Total number of employees at the Department 139

**Turnover**

Turnover: 110 million DKR  
Hereof external turnover: 17 million DKR

**Projects**

Number of national and international projects: 90 in total.  
Here of 13 international projects.
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