

Interactive Tools for Open Data Platforms

Public institutions increasingly publish data on open data platforms as an effort to stimulate the digital economy and promote transparency. Denmark is at the forefront with multiple open data platforms and initiatives. These platforms are repositories or databases with a simple API interface and often under-designed user interface. This opens up for multiple opportunities to develop interactive tools exploring and navigating open data platforms using concepts from visual analytics, data visualization, human-computer interaction, social and collaborative computing etc.

How can we design search interfaces that balance overview and detail?

-How can we design interfaces that allow the user to compare central data properties?

How would multiple users share and collaborate with/on data from these platforms? What techniques can we apply to improve search, comparison, sharing, idealization etc. in interface design?

In the project, students will be asked to choose a specific platform based on an initial introduction and together with the supervisor, identify relevant approaches and questions, implement interactive tools based on relevant literature and/or on behalf of a particular user group, and evaluate the designs using methods from within Information Visualization and Human-Computer Interaction. Through this project the students will hence show that they master methodologies, theories and concepts in Information Visualization and Human Computer Interaction. The students will plan and carry out the project and apply the results in the relevant contexts. The students will apply and reflect on the methodologies used to analyse and solve academic questions and issues. In the project the students will relay and communicate academic questions and issues, collaborating constructively on a scientific basis to solve subject related issues.

Supervisor: Henrik Korsgaard

Participatory Data Science

Within a very short time span billions of people have been getting accustomed to reading, sharing, and discussing data, visualizations, complex models, and projections because of the COVID-19 pandemic. These developments show the importance and prevalence of data representation and analytics – from simple visualizations to complex machine learning systems - to society. Therefore, the users involved in using data have expanded from highly skilled specialists to potentially everyone. This opens an exciting new area for exploring the opportunities and potentials in involving non-data scientists, citizens, and communities in developing novel data-driven applications, services, visualizations, products etc.

In this project, students will be asked to develop, conduct, and evaluate participatory design and co-design activities focusing on developing data-driven products and services. The data can be live data sensing devices or public APIs, or data collected within organizations or elsewhere. Students can work on developing formats for engaging people in co-design activities based on methods within participatory design, explore formats for representing data (by example, models, physicalization, visualization etc.) and analytics in co-design activities or look at a full design process from collecting data, to co-design, and the outcome. Ambitious students can examine how to work with analytics (statistics, machine learning, inspection etc.) in co-design activities.

Through this project the students will show that they master methodologies, theories and concepts in Human Computer Interaction and Information Visualization. The students will plan and carry out the project and apply the results in the relevant contexts. The students will apply and reflect on the

methodologies used to analyze and solve academic questions and issues. In the project the students will relay and communicate academic questions and issues, collaborating constructively on a scientific basis to solve subject related issues.

Supervisor: Henrik Korsgaard.

Ambient/Situated eInk Displays

eInk technology offers multiple advantages over other display technologies – they require minimal power to operate, improved readability and are often less intrusive than more common displays. However, the use-cases for eInk technology and examples seem limited to small tags in supermarkets and eReaders. As part of several projects, we are interested in developing use-cases for and explore eInk displays as ambient displays – at home, at work, outside, in the laboratory etc. Similarly, they seem ideal as situated and ad hoc output displays.

In this project students are invited to play around with eInk technology and produce design exemplars for ambient displays. This could involve exploring a specific design theme, conduct co-design activities within a domain, develop and test a specific application, explore interaction techniques, data visualization etc. Through this project the students will hence show that they master methodologies, theories, and concepts Human Computer Interaction. The students will plan and carry out the project and apply the results in the relevant contexts. The students will apply and reflect on the methodologies used to analyze and solve academic questions and issues. In the project the students will relay and communicate academic questions and issues, collaborating constructively on a scientific basis to solve subject related issues.

Supervisor: Henrik Korsgaard

Online/physical community applying participatory design.

This project aims to use and explore participatory design methods for working with bottom-up communities that are physically situated and supported online by shared tools (databases, google docs, Facebook, etc.). Through the design process, the aim is to explore their needs for further technology and prototype viable solutions. The project is based on exploration of relevant (Communities and Technologies) literature, and the process and prototypes are discussed in relation to this. Through this project the students will show that they master methodologies, theories and concepts in Participatory design and Human Computer Interaction. The students will plan and carry out the project, build digital and/or physical prototypes, and apply the results in the relevant contexts. The students will apply and reflect on the methodologies used to analyze and solve academic questions and issues. In the project the students will relay and communicate academic questions and issues, collaborating constructively on a scientific basis to solve subject related issues.

Supervisor: Susanne Bødker

Newcomers versus experts in an online community.

This project aims to explore how users learn and become members of an online community. The work will be based on Bryant et al.'s work where they study what interface mechanisms in Wikipedia it takes to 'become Wikipedians.' and include empirical interviews with community members and newcomers. The process includes developing design suggestions and prototypes to better support learning in the particular community. One possibility is to redo the Wikipedia study, another is to

choose another similar online platform. Through this project the students will show that they master methodologies, theories and concepts in Human Computer Interaction. The students will plan and carry out the project, and apply the results in the relevant contexts. The students will apply and reflect on the methodologies used to analyze and solve academic questions and issues. In the project the students will relay and communicate academic questions and issues, collaborating constructively on a scientific basis to solve subject-related issues.

Supervisor: Susanne Bødker

Shared traces in collaborative virtually activities.

Choosing a specific collaborative activity that happens virtually (either on-line or through a specific shared technology) this project works with traces of activity, analytically and constructively. Based on principles from the CIO project the aim is to identify a collaborative activity and explore the possibilities of augmenting this through traces. The process includes developing design suggestions and prototypes to better support traces, using the CIO principles. Through this project the students will show that they master methodologies, theories and concepts in Human Computer Interaction. The students will plan and carry out the project and apply the results in the relevant contexts. The students will apply and reflect on the methodologies used to analyze and solve academic questions and issues. In the project the students will relay and communicate academic questions and issues, collaborating constructively on a scientific basis to solve subject-related issues.

Supervisor: Susanne Bødker

Online Activism.

Online activism has become more and more common. Many initiatives see the light but fail to sustain themselves (sometimes because they do not gain traction, but sometimes because of difficulties sustaining the activism). Coordinating and sustaining online activism often relies on multiple platforms and actors that are made the best of and activated at different points of time. The project is about understanding what the artifact ecologies of online activism look like, and what challenges and opportunities activism has online. A project within this theme would typically begin by identifying one or more communities doing online activism (e.g. Everyday Sexism Projector For alle os som vil redde Den Gamle By) and then survey the literature on related work. The project will involve qualitative research (e.g. interviews and observations) and analysis thereof, focusing on how artifact ecologies and/or infrastructures play into supporting online activism. The outcome will be a report or thesis outlining the community, methodology, related work, key insights and recommendations within the field of Human-Computer Interaction. Through this project the students will show that they master methodologies, theories and concepts from Human-Computer Interaction. The students will plan and carry out the project. The students will apply and reflect on the methodologies used to analyse and solve academic questions and issues. In the project the students will relay and communicate academic questions and issues, collaborating constructively on a scientific basis to solve subject related issues.

Supervisor: Susanne Bødker

Declarative programming of interaction in computational notebooks

Computational notebooks such as Jupyter Notebook or Observable have become popular tools in data science and for programming that involves data processing or visualisation. Many notebook systems support embedding interactive widgets of various kinds, e.g., to embed an interactive map inside a notebook. Developing widgets typically require external tools such as an integrated development environment (IDE) where the programmer programs up against the API of the notebook system. Programming small interactive components inside the notebook itself is often relatively limited, not possible at all, or requires extensive knowledge of event handling and software architecture. We have developed a declarative programming model for specifying interactive behaviour in Web applications called Varv. Varv works like CSS just for specifying interactive behavior.

In the project, the students will experiment with how Varv can be used in the context of computational notebooks, build a prototype, and design a small user study to evaluate its feasibility. The students will work with and are expected to have experience with Web technology (JavaScript, HTML, CSS). The prototypes will be built on top of Webstrates (webstrates.net) using the Codelstrates v2 framework (<https://codelstrates.projects.cavi.au.dk>). Both of which are technologies developed in the CoCHI group.

Supervisor: Clemens Nylandsted Klokmoose

Interactive and collaborative JavaScript exercises in CoTinker

CoTinker is an experimental platform for creating learning activities around computational thinking developed at Aarhus University. CoTinker provides a web-based interface where students collaboratively can solve exercises and document their results. Our first prototype of a learning activity in CoTinker revolves around agent-based modelling (ABM). Students are presented with an interactive simulation of a biological phenomenon and are gradually asked to explain the phenomena that are modelled and solve various programming related tasks. CoTinker supports collaborative control of the progression of assignments, distribution of control across laptops and mobile phones, collaborative editing of code, and control of what code to expose to students for editing based on the given exercise.

The project will explore how CoTinker can be used to design learning activities around JavaScript programming. The students will develop one or more learning activities in CoTinker and design and conduct an empirical study to compare the use of CoTinker with a conventional assignment design. The students are expected to have experience with Web technology (HTML, CSS, and JavaScript).

Supervisor: Clemens Nylandsted Klokmoose

Violations of personal digital sovereignty

Human-computer interaction (HCI) research should be concerned that the current design of software and modern digital infrastructures challenge personal digital sovereignty. Personal digital sovereignty consists of an individual's independence, autonomy, and control in their relationship with data, software, and hardware:

- Independence means not needing to rely on others and is challenged when, for example, users are unable to make changes to their software without the (global) market demanding similar changes.
- Autonomy means the freedom to self-direct and is challenged when, for example, users are forced to update their software at the schedule of the developer.

- Control means the proactive power to determine how to achieve one's goals and is challenged when, for example, users are unable to combine multiple applications in new ways to interoperate on the same data.

In this project, the students will pick a profession (electronic musicians, patent clerks, communication consultants, architects, teachers ...) and try to document when the participants' personal digital sovereignty is violated and what aspect of the software they use are a cause of this. Methods can include qualitative interviews, cultural probes, future workshops, and more.

Supervisor: Clemens Nylandsted Klokmoose

Walkthrough based interface assessment methods with context in mind

Walkthrough based methods are used in many fields of computing e.g. in code reviews. In human-computer interaction several walkthrough-based methods have been developed often in conjunction with a variation of task analysis, e.g. the cognitive walkthrough. While walkthrough-based methods for interface assessment are cost effective and often easily communicated, they often depend implicitly on extended knowledge about the field of application and future users. In other cases, such methods may suffer from limited because context of use is not properly reflected. Through this project the students will show that they master methodologies, theories and concepts in Human Computer Interaction. The students will plan and carry out the project. The students will apply and reflect on the methodologies used to analyse and solve academic questions and issues. In the project the students will relay and communicate academic questions and issues, collaborating constructively on a scientific basis to solve subject related issues and develop a walkthrough-based method that enables the evaluator to better take context and knowledge about users into account. The method could be based on the cognitive walkthrough or other established walkthrough methods. The suggested method will be evaluated in the context of a development project.

Supervisor: Olav W. Bertelsen

A Case study of an IT development project in a company/organization

In this project the students conduct a case study of a development project in an IT-development organization. How is work done? What tools are used? Relation between development methods and actual practice? And similar questions. Methodically, the project will be a single case study (Yin), based on qualitative research interviews (Kvale). The case will be analyzed and discussed through selected perspectives on work and IT-development.

Supervisor: Olav W. Bertelsen