



As IT and automated systems, not least AI-based systems, become an increasingly large part of our daily lives, the need for safety and security grows. We need to be able to trust that the systems both work as intended and are robust enough to withstand inappropriate or even malicious use.

Solutions towards a safe and secure society cut across a large number of domains, and the interdisciplinary nature of the research at the Department of Computer Science at Aalborg University (CS) is therefore well-positioned to contribute to these solutions.

CORE AREAS

- Data Engineering, Science and Systems
- Data, Knowledge and Web Engineering
- Distributed, Embedded and Intelligent Systems
- Human-Centered Computing
- AI and Machine Learning

SELECTED TOPICS WITHIN SAFE AND SECURE SOCIETY



SAFETY ABOVE ALL IN WATER MANAGEMENT

Water is one of the biggest challenges in the world. But in and of itself, water is neither good nor bad – the challenge lies in ensuring that water is at the right place at the right time and of a certain quality.

In the project CLAIRe, researchers from CS aim to control water in urban areas and, for instance, prevent the number and extent of floods.

They do so by combining machine learning and formal model checking techniques with water engineering in order to optimise water resources while also ensuring safe and sustainable management of these resources.

KEYWORDS: MACHINE LEARNING AND FORMAL MODEL CHECKING TECHNIQUES

Project: CLAIRe: ControlLing wAter In an uRban Environment



HELPING BUSINESSES ENHANCE CYBER SECURITY

More and more businesses are exposed to cyber-attacks and security breaches.

Researchers from CS are part of a project aiming at improving the security of software-based products and services in these companies.

This requires a combination of different tools – including model checking and static analysis of current systems for verification and validation, benchmarking companies and improving software development processes.

KEYWORDS: MODEL CHECKING, STATIC ANALYSIS, VERIFICATION, AND DEVELOPMENT PROCESSES

Project: Sb3D: Security by Design in Digital Denmark



A RELIABLE WEB OF DATA

The World Wide Web is one of the most influential inventions and has radically changed our lives.

A part of it, however, is designed for machines and provides access to vast amounts of data: the Web of Data – a building block of the Semantic Web. Although the information on the Web of Data is freely available (Linked Open Data) and covers a broad range of topics, it remains mostly unexploited.

Researchers from CS are developing technologies that overcome current challenges and establish a reliable Web of Data, including the ability to explain answers by tracking information to the original source.

KEYWORDS: KNOWLEDGE GRAPHS, PROVENANCE, QUERYING AND MANAGING SEMANTIC DATA

Project: RelWeb: A Reliable Web of Data



PROJECTS WITHIN SAFE AND SECURE SOCIETY

CLAIRE: ControLing wAter In an uRban Environment

Kim Guldstrand Larsen, Thomas Dyhre Nielsen, Jiri Srba and Martijn Goorden with the Department of the Built Environment, AAU

EDAO: Example-Driven Analytics of Open Knowledge Graphs

Matteo Lissandrini, Torben Bach Pedersen and Katja Hose

Policy analysis and A.I. research (Autonomous driving)

Niels van Berkel and Michael Kvist Svangren with the Department of Politics and Society, AAU

Poul Due Jensen Professorate in Big Data and Artificial Intelligence

Katja Hose, Matteo Lissandrini, Tomer Sagi, Theis Erik Jendal, Martin Pekar Christensen with Concordia University and Singapore Management University

QWeb: Querying the Web of Data Easily and Efficiently

Katja Hose, Gabriela Montoya and Tomer Sagi with INRIA Rennes, University of Haifa, Nantes University and Rutgers

RelWeb: A Reliable Web of Data

Katja Hose, Gabriela Montoya, Matteo Lissandrini, Christian Aebeloe, Ghadeer Abuoda, Olivier Pelgrin and Kashif Rabbani with INRIA Rennes, WU Vienna, University of Ghent and ArangoDB

Unleashing the Potential of Open Data

Katja Hose, Gabriela Montoya, Tomer Sagi with Nordjyske Medier and Open Data DK

S4OS: Scalable analysis and Synthesis of Safe, Secure and Optimal Strategies for Cyber-Physical Systems

Kim Guldstrand Larsen, Andreas Holck Høeg-Petersen, Anton Christensen, Asger Horn Brorholt, Martijn Goorden, Nikolaj Jensen Ulrik, Pieter Jan Laurens Cuijpers and Sean Kristian Remond Harbo

Sb3D: Security by Design in Digital Denmark

René Rydhof Hansen, Peter Axel Nielsen, David Kinnberg Hein and Rasmus Broholm with DTU Compute, The Alexandra Institute, The Danish Chamber of Commerce, Confederation of Danish Industry (DI), Business Hub Central Denmark and The Danish Industry Foundation

SIOT: Secure Internet of Things – risk analysis in design and operation

Kim Guldstrand Larsen and René Rydhof Hansen with AU, CBS, DTU Compute, The Alexandra Institute, Beumer Group, Develco Products, Grundfos, Logo Payment Solutions, Micro Technic, SecuriOT, Seluxit and Terma

Verifiable and Safe AI for autonomous systems

Kim Guldstrand Larsen, Thomas Dyhre Nielsen, Martijn Goorden, Esther Hehyeon Kim, Martin Zimmermann and Christian Schilling with Aarhus Vand, Seluxit, Grundfos, Hofo and ITU

Want to know more?
Contact research
leaders below

DATA ENGINEERING, SCIENCE AND SYSTEMS (DESS)

Christian S. Jensen
csj@cs.aau.dk
Torben B. Pedersen
tbp@cs.aau.dk
Bin Yang
byang@cs.aau.dk

DISTRIBUTED, EMBED- DED AND INTELLIGENT SYSTEMS (DEIS)

Kim Guldstrand Larsen
kgj@cs.aau.dk
Jiri Srba
srba@cs.aau.dk

DATA, KNOWLEDGE AND WEB ENGINEERING (DKW)

Katja Hose
khose@cs.aau.dk

HUMAN-CENTERED COMPUTING (HCC)

Mikael Skov
dubois@cs.aau.dk
Peter Axel Nielsen
pan@cs.aau.dk