AUTOMATION & CONTROL

THE AUTOMATION & CONTROL SECTION AT AALBORG UNIVERSITY

DEPARTMENT OF ELECTRONIC SYSTEMS

TECHNICAL FACULTY OF IT AND DESIGN

The section works within the decision mechanism shaping the future in the desired way. Physical information is converted into digital data and processed by an algorithm. The result is information on how to influence the environment and control may hence be seen as a "machine brain".

RESEARCH

KEY RESEARCH AREAS

Our research concentrates on two application-driven topics: Autonomous Systems and Industrial Control, and a theoretical research field, Optimization.

Autonomous Systems encompasses research on industrial robotics, cooperative robotics, satellites, unmanned aircraft, and boats. The focus is on the motion of autonomous vehicles - or simply, robots - moving on the ground, flying or sailing. The key areas are localization, path planning, safety and interaction between robots and people.

Industrial Control comprises applied optimization, control, and safety analysis. The focus is on applying control techniques to industrial products. The typical application domains include water infrastructure, smart grids, and smart buildings.

Optimization includes polynomial optimization, stochastic optimization, optimal control, machine learning, secure optimization, and numerical methods for stability and safety analysis. We develop algorithms that optimize the behaviour of dynamical systems in terms of energy, wear and tear on components, or revenue.

WHAT WE DO

Robotics: the goal of this research is to go beyond robots that function in isolation and to make them interact with people. This aim is achieved by generating robot actions that account for interaction and coordination with users: assistive and interactive robots.

Control: The goal is to develop algorithms for control of complex and large-scale systems such as smart grids or water networks. The research ranges from stand-alone regulator design to whole-system control design.

COLLABORATION

EXTERNAL PARTNERS

The section has a long tradition of collaboration with industry partners, public sector authorities, international universities and other departments at the university. Specifically, two of our professors are also chief engineers at Grundfos on control and leakage detection in water networks; Danfoss and Lodam on refrigeration technology; Vestas and Ørsted on wind energy solutions; Blue Ocean Robotics and Nilfisk on autonomous robots; water and electric utilities on optimal resource dispatch, and on industrial automation with DEIF and Alfa Laval.

ACADEMIC PARTNERS

DTU COMPUTE, DTU ELEKTRO., DTU WIND, SDU Mærsk Mc-Kinney Møller Institute, Steno Diabetes Center, University of Cambridge, University of Oxford, University of Strathclyde University of Groningen, CNRS, University of Stavanger and Polytechnic University of Catalonia.

AALBORG UNIVERSITY

DENMARK

KEY PROJECTS

PLUG AND PLAY PROCESS CONTROL (P3C)

We have developed a novel concept for process control which allows the control system to self-reconfigure when connected with an intelligent sensor.

EFFICIENT DISTRIBUTION OF GREEN ENERGY (EDGE)

A project that works with improved integration of wind energy in the power grid through effective coordination of both electricity generation and consumption. Specifically, the project developed rigorous methods for managing the flow of energy among consumers and producers connected to the power grid.

WATER INFRASTRUCTURE LABORATORY

A laboratory facility at Aalborg University that enables research on water infrastructures. The water laboratory reproduces water distribution networks, wastewater networks, district heating and its connections to the electricity network and the internet.

VIDEO PRESENTATION

CONTACT

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