PHONE: +4551741932

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SKILLS

Robotics, Programming, Matlab, Simulations, Control Systems Design, Electronics, Instrumentation, Signal Processing, Digital Signal Processors, Microcontrollers, Digital Electronics, Electrical Engineering, Power Electronics, Sensors, Mathematical Modeling, Circuit Design, Debugging, Algorithms, Physics, ISO 13849, Object-Oriented Programming (OOP), Embedded Systems, C#, Simulink, Embedded Software, Embedded Linux, MathCAD, LaTeX, C, .NET, Embedded C, Linux, C++, Teamwork, Mechatronics, Hardware-in-loop systems, Digital Signal Processing, Embedded Operating Systems, Microprocessors, Analog, Offshore Oil & Gas, Robot Operating System (ROS), Eclipse CDT, Sensor Fusion, Kalman filtering, HIL

HONORS

Esbjerg University Prize

Esbjerg University Prize is awarded to outstanding students at Aalborg University, Esbjerg and Southern University, Esbjerg to promote business research in innovation, competence and internationalization.
See more at: https://www.et.aau.dk/news/show/prize-to-team-from-aalborg-university-esbjerg-.cid196218

LANGUAGES

Danish (Native or bilingual proficiency),
English (Full professional proficiency),
German (Elementary proficiency)

Christian Mai
R&D Specialist | Robotics ~ Control systems ~ Electronics

I'm a natural inventor and problem solver with educations in electronics and control systems engineering (focus on mechatronics and robotics) and experience within both academic research and industry R&D.
I possess a high degree of creativity which I utilize in problem-solving, often swaying from "this is what we've always done", and looking for opportunities to improve both product and process, using knowledge and ideas from across fields.
I prefer to work in research and development or specialist roles where creativity, analysis, and inventiveness are valued. Additionally, I prefer to work in team/project and problem-based settings because I believe a problem-analysis-oriented approach combined with different perspectives leads to better outcomes.
In my spare time, I enjoy sailing (mostly in the coastal waters of Denmark) and home improvement projects.

EXPERIENCE

Mai|Develop
Mar 2016 to Present

Freelance Information Technology Consultant

Freelance work within R&D and product development.
Area of works include control systems, robotic systems, mechatronics, PCB development, sensor integration, IoT electronics, microcontroller programming, C# desktop development, Access databases.

Vektor Dynamics
Jan 2020 to Dec 2020

Research And Development Engineer

Research and development within large scale autonomous mobile robotics, specifically industrial robotic lawnmowers.
This includes all task from theoretical research to practical work; path-planning, navigation, experimentation, control tuning, electrical systems design and review, test rigs, simulation, C++ programming, ROS based implementations.

Vektor Dynamics
Dec 2016 to Dec 2019

PhD (Researcher)

(As part of PhD, see educational description)
Formerly known as Sidis Engineering / Sidis Robotics

Aalborg University
Sep 2014 to Dec 2016

Research Assistant

Design and specification and hands-on work within process systems for oil&gas simulation/pilot plant in a small team. Primary work on Simulink-based SCADA/HIL systems, selection and implementation of process equipment such as pumps and flow/level sensing, P&ID diagrams etc. Also worked on membrane (ultra/nano) filtration pilot plant.
In summary; assisting with experimental work and documentation of experiment projects.

Mai|Develop
Feb 2013 to Mar 2016

Computer Repair Technician

(Then known as Christians IT service)
Works were within computer repair and network installation, consumer electronics systems, website design and management.

Centex ApS
Jun 2011 to Aug 2011

Student developer .NET

C# development. The primary project .NET conversion and rework of a VB6 full-stack windows application meant to support sales engineers' calculations within HVAC

systems. Additional internal development tasks also.

EDUCATION

Syddansk Universitet - University of Southern Denmark
2016 to 2020

Doctor of Philosophy - PhD

PhD in Engineering based on work with mobile autonomous/cooperative robotics. Academic research was conducted in cooperation with a local company developing autonomous lawn-moving robots.
Research thesis on mobile robotics for agriculture/groundskeeping. Areas of research were path-planning, navigation, control design and tuning, sensing/sensors (and sensor-fusion).
Included practical work/experimentation on test rigs, simulation, C++ programming and ROS based implementations.

Aalborg University
2012 to 2014

Master of Science (MSc)

Subjects include system Identification and estimation, fault diagnosis, reliability analysis, design of intelligent reliable systems. Applied projects includes self-balancing robots, oil-and-gas control systems, diesel generator control systems.

Aalborg University
2008 to 2012

Bachelor of Science (BSc)

Study subjects include microprocessor based systems, combined analog and digital systems, real-time regulation systems, control and filtering. Applied projects in mechatronics, robotics and PC based systems.

HTX - Esbjerg
2006 to 2008

Student

High school, studied Physics, Chemistry, Mathematics, Danish, English Graduated with 10.8, equivalent 4.0 GPA

PUBLICATIONS

Online Slug Detection in Multi-phase Transportation Pipelines Using Electrical Tomography

International Federation of Automatic Control

Slugging flow in offshore oil & gas multi-phase transportation pipelines cause big challenges as the flow regime induces flow and pressure oscillations in the multi-phase pipelines. The negative impacts of the most severe slugs are significant and thus the elimination of slugging flow in the pipelines is a highly investigated topic. To eliminate the slug in an online manner real-time slug detection methods are often required. Traditionally topside pressure transmitters upstream a 3-phase separator have been used as the controlled variable. In this paper Electrical Resistivity Tomography (ERT) has been examined as an alternative to the traditional pressure transmitters. A lab-scaled testing facility has been constructed in order to obtain test data from a ERT transmitter with 12 probes. Different flow regimes have been generated by a pump and a compressor where 2-phase flow can be tested. Based on the results the study concludes that the ERT is able to detect the slug very well when the oil and water is well mixed. Furthermore the traditional pressure transmitters have the limitation that pressure variations can be caused by other operating conditions than slug, such as change in the back pressure from control valves. The biggest limitation using ERT is the lack of ability to distinguish between gas and oil, and thus the ERT can only be used as an effective slug detect measurement when the oil-to-water ratio is low.

Intelligent Control of Diesel Generators Using Gain-Scheduling Based on Online External-Load Estimation

Proc. of the IEEE International Power Electronics and Application Conference and Exposition (IEEE PEAC'14)

Emulation and control of slugging flows in a gas-lifted offshore oil production well through a lab-sized facility

Control Applications (CCA), 2013 IEEE International Conference on

In the oil and gas industry, the gas-lift assist approach is often used in the production wells when the reservoir pressure is insufficient to ensure cost-effective production. However the side-effect of this approach is the often occurrence of regular/irregular large oscillations of the production flow and pressures in the production well system, which is referred to as the slugging flow problem. This instability is mainly due to the casing-heading mechanism. This work investigates the possibility to use a feedback control for stabilizing the production operation without sacrificing the production capability. A lab-sized production well system is constructed in an economic manner. Afterwards, a simple nonlinear model is derived according to physical principles and then verified with the experimental facility. A observer-based state feedback control is designed to handle the potential slugging problem. The developed controller manipulates the openness degree of the production choke based on feedback a number of pressure measurements. The current simulation results showed satisfactory control performances by stabilizing the system operation at some relatively large production rate which is originally open-loop unstable.

Cost-Effective ERT Technique for Oil-in-Water Measurement for Offshore Hydrocyclone Installations

International Federation of Automatic Control

The goal of this paper is to introduce and design a cost-effective Oil-in-Water (OiW) measuring instrument, which will be investigated for its value in increasing the efficiency of a deoiling hydrocyclone. The technique investigated is based on Electrical Resistivity Tomography (ERT), which basic principle is to measure the resistivity of substances from multiple electrodes and from these measurements create a 2-D image of the oil and gas component in the water. This technique requires the measured components to have different electrical resistances, such as seawater which has a lower electrical resistance than hydrocarbon oil and gas. This work involves construction of a pilot plant, for testing the feasibility of ERT for OiW measurements, and further exploring if this measured signal can be applied as a reliable feedback signal in optimization of the hydrocyclone's efficiency. Different algorithms for creating 2-D images and the feasibility of estimating OiW concentrations are studied and evaluated. From both steady state and continuous laminate flow perspectives, with respect to the objective which is to use this measurement for feedback control purposes.

PROJECTS

Subsea robottics (for offshore O&G inspection and monitoring)

Jun 2015 to Dec 2016

Research and development of ROVs and AUVs for subsea pipeline inspection and monitoring etc.
Our current ROV platform: VideoRay Pro 4 (http://www.videoray.com/homepage/professional-rovs/videoray-pro-4.html)
Training platform: two sets of OpenROV v2.8 (http://www.openrov.com/)

CERTIFICATIONS

IELTS Academic - 8.5

Nov 2020 to Nov 2022

IELTS Official

C++ Programmering Videregående

Mar 2020

SuperUsers a/s