KEYNOTE SPEAKERS

WUQIANG YANG

UNIVERSITY OF MANCHESTER

WERNER MUELLER-VEITH

CEO PHOTONEO BU

ORGANIZING COMMITTEE

ANTONIJA ČELAN

ASSOCIATION OF CHEMICAL ENGINEERS AND TECHNOLOGISTS SPLIT (UKITS)

NIKOLA GJELDUM

ASSOCIATION OF MECHANICAL ENGINEERS SPLIT (DISS)

VENUE

08 APRIL 2024 // UNIST - FACULTY OF CHEMISTRY AND TECHNOLOGY

09 APRIL 2024 // UNIST - FACULTY OF ELECTRICAL ENGINEERING, MECHANICAL ENGINEERING AND NAVAL ARCHITECTURE

ADVANCED SENSORS IN CHEMICAL AND MECHANICAL ENGINEERING

08 - 09 APRIL 2024, SPLIT

08 April 2024 // 13.15 // F402 - Faculty of Chemistry and Technology
Electrical capacitance tomography and its industrial applications (Wuqiang Yang)

09 April 2024 // 10.15 // B402 - Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Capacitive touch sensors for robots (Wuqiang Yang)

Use Cases for 3D-image sensing and innovative AI-based automatization to enable a better future for the world (Werner Mueller-Veith)

Chemical, mechanical and electrical engineers - research activities and collaboration perspectives (A. Čelan, N. Gjeldum)

WUQIANG YANG

UNIVERSITY OF MANCHESTER

Professor Wuqiang Yang (Fellow, IEEE, FIET, FInstMC) has been working with The University of Manchester, U.K since 1991. His main research interests are electrical capacitance tomography (ECT), and touch sensors for robots. He has published more than 400 papers and two books with an h-index of 52. He received several national and international awards, including the 2021 IEEE IMS Best Application Award. He is an Associate Editor of IET Sci. Meas. and Technol. Currently, he is the Director of the Joint Research Laboratory of Touch Sensors for Domestic Robots at The University of Manchester.

Electrical capacitance tomography and its industrial applications

Among various industrial tomography modalities, electrical capacitance tomography (ECT) is the most mature and has been used for many challenging applications. ECT is based on measuring very small capacitance from a multi-electrode sensor and reconstructing the permittivity distribution in a cross section of an industrial process. Compared with other tomography modalities, ECT has several advantages: no radioactive, fast response, both non-intrusive and non-invasive, withstanding high temperature and high pressure and of low-cost. Because of very small capacitance to be measured (much smaller than 1 pF) and the “soft-field” nature, ECT does present challenges in capacitance measurement and solving the inverse problem. The latest AC-based ECT system can generate online images typically at 100 frames per second with a signal-to-noise ratio (SNR) of 73 dB. During this seminar, ECT principle will be discussed, and the AC-ECT system will be introduced. Examples of industrial applications, in particular imaging fluidised beds for pharmaceutical manufacturing, clean coal combustion and methanol-to-olefin conversion, will be discussed. Future developments will also be highlighted.

Capacitive touch sensors for robots

Touch sensing or tactile sensing is important for a robot to interact with the external environment. Currently, most robots can handle a known object at specific location and they are vulnerable to an unknown object or unknown environment. Touch sensors play an important role in interaction between a robot hand and an unknown object because touch sensors can provide necessary information on touch detection and for feedback control. Among various touch sensing techniques, capacitive touch sensors have gained popularity, due to their simple structure, high sensitivity, low power consumption, quick response, wide dynamic range and low cost. During my talk, I will start from the need of touch sensors for robot applications. Then, I will review existing touch sensing technologies, and introduce the principle and implementation of capacitive touch sensors and the design of the dedicated digital-analogue hybrid chip. Finally, I will talk about applications of capacitive touch sensors and the developed chip on robots with video demonstration, and discuss other possible applications of capacitive touch sensors, including implementation of brain computation, artificial skin, AI functions, and very low cost electrical capacitance tomography (ECT) system.

WERNER MUELLER-VEITH

CEO PHOTONEO BU

Werner Müller-Veith, serves since October 2021 as the CEO of Photoneo Sensors & Automation. A Telecommunications engineer by education, he graduated from Danube University in Krems, Austria as certified board member. His 25 years international management experience includes successful assignments in the USA, Switzerland, Germany and Austria. Prior roles included leadership of Business Units and global sales organizations at AMETEK and Danaher, both US Fortune 500 corporations. He served on the advisory board of the Austrian Leadership association, WdF. He repeatedly acts as a mentor and is a passionate advocate of value-based leadership. Sustainability, mindfulness, diversity and respect are the basis of his management culture.

Use Cases for 3D-image sensing and innovative AI-based automatization to enable a better future for the world

Photoneo is a leader in 3D-imaging and vision guided robotics. Based on the proprietary CMOS image sensor, new dynamic use cases are enabled. An array of 10 applications will be presented, where robot-deployment helps to increase efficiency and output in industrial manufacturing. Each use-case is enabled by 3D-sensing, mostly combined with AI. Also logistic automatization is discussed and additionally the positive effects of high quality 3D-imaging on human health, agricultural yield, and drug safety will be presented with specific application examples.

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