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Tuesday, 24th January 2023, 16:00 s.t.

TU Wien, Institut für Angewandte Physik, E134
1040 Wien, Wiedner Hauptstraße 8-10
Yellow Tower „B“, 5th floor, SEM.R. DB gelb 05 B

The seminar will be also held as a Zoom Meeting

<https://tuwien.zoom.us/j/7332600640>



Touch science and engineering: from biomedical applications and tactile restoration with neuromorphic information encoding to sensory enrichment for the metaverse

The talk will discuss selected case studies of technologies developed for endowing robots with artificial tactile sensors that are distributed over large areas and to deliver tactile feedback for the metaverse.

In the presented scientific approach, robotic systems are developed by capitalizing on a fertile interaction between robotics and neuroscience, so that the advancements of neuroscientific research can lead to the development of more effective technologies, which in turn contribute to the fundamental understanding of physiological processes.

A first case study proposed is with piezoresistive MEMS sensors, applied to bionic hand prostheses to restore rich tactile skills, such as texture discrimination, in upper limb amputees. The developed biorobotic technologies and artificial intelligence methods, based on information encoding with neuromorphic spikes emulating physiological tactile representation, can be applied to a variety of sensory augmentation scenarios. Additional technologies were explored to cover large areas of robot bodies, including sensors based on cultured biological cells such as MDCK, piezoelectric ZnO nanowires grown with seedless hydrothermal method, and Fiber Bragg Grating (FBG) sensors.

Selected achievements are shown in the talk, discussing the application of tactile sensing technologies in a gripper able to manipulate fragile and deformable objects in collaboration with NASA-JPL, or for covering the full area of an anthropomorphic robotic arm recently published in Nature Machine Intelligence journal. Particularly, covering a robotic arm with a large sensorized skin allows the implementation of smart collaborative policies, such as safe interaction and programming by demonstration, that can be deployed in the factories of the future.

All interested colleagues are welcome to this seminar lecture
(45 min. presentation followed by discussion).

Friedrich Aumayr
(LVA-Leiter)

Markus Valtiner
(Seminar Chair)