2020 IEEE/RSJ

International Conference on
Intelligent Robots and Systems(IROS)

October 25-29, 2020 Las Vegas, NV, USA

Sponsors

Theme: Consumer Robotics and Our Future

IEEE IROS 2020

Workshop
"Robots Building Robots"
Digital Manufacturing and Human-centered Automation for Building Consumer Robots

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Title of your presentation:

Large-Area Sensorized Skins for Collaborative Robotics

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Abstract (about 1 page, Font: Verdana; Size 12; characters: about 4.000)

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The talk will discuss selected case studies of technologies for endowing robots with artificial tactile sensors that are distributed over large areas.

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 better 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 scenarios, however the used piezoresistive MEMS sensors cannot be integrated in a straightforward manner in order to cover large areas of robot bodies. Hence, additional technologies were explored, including sensors based on cultured biological cells such as MDCK, piezoelectric ZnO nanowires grown with seedless hydrothermal method, and Fiber Bragg Grating (FBG) sensors.

FBG technology, particularly, is considered very promising, and selected achievements are shown in the talk, including the application for the sensorization of a gripper able to manipulate fragile and deformable objects, or for covering the full area of an anthropomorphic robotic arm. 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 factories of the future.