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Title:

Flexible Sensing Electronics for Smart Prosthetic Hand

Abstract:

Smart prosthetic hand is of great significance in the field of rehabilitation, while flexible sensing electronics are the core devices for smart prosthetic hands to acquire front-end sensory signals for subsequent signal encoding, transmission, and neural interfacing to reconstruct the sense of touch. Presently, the application of smart prosthetic hand is still not popular, and one key reason is that the absence of exquisite sensing information significantly limits the accuracy and scope of in-hand manipulation. Therefore, it is essential to develop bionic flexible sensing electronics that can accurately perceive versatile information.

This talk is aimed at overviewing our recent progress of flexible sensing electronics for prosthetic hand. The design strategy of bionic flexible sensing electronics is firstly discussed. Then, the design and fabrication of several multifunctional biomimetic sensors for detecting friction force, viscoelasticity, texture, and thermal conductivity of materials are introduced. The integration of multifunctional tactile systems based on these biomimetic sensors, the read-out circuits and machine learning modules, as well as their applications in prosthetic hands for slippage perception, material classification, objects recognition, etc. are also introduced.

Biography:

Ting Zhang received his B.S. and M.S. degrees in chemical engineering in 1999 and 2002, respectively, from Nankai University, China, and his Ph.D from the University of California, Riverside, America, in 2007. In 2009, he joined Suzhou Institute of Nano-tech and Nano-bionics, Chinese Academy of Sciences, Suzhou, China, as a full Professor. He has been the director of i-Lab department and the Nano-X Vacuum Interconnected Nanotech Workstation, and deputy director of Academic Committee at Suzhou Institute of Nano-Tech and Nano-Bionics, Chinese Academy of Sciences since 2020.

He got the Distinguished Young Scholars of National Natural Science Foundation of China (2021), the Excellent Supervisor Award of Chinese Academy of Sciences (2020), the Young Science and Technology Talent Award of China Instrument and Control Society (2016), etc.

He served doctoral tutor of the University of Science and Technology of China, associate editor of "Microsystems & Nanoengineering", member of the MEMS device working group of the National Microelectromechanical Technology Standardization Technical Committee, and member of the Smart Medical Professional Committee of the Chinese Society for Artificial Intelligence, etc.

His research interests include smart nanomaterials, flexible electronics, bionic smart sensing and perception technology, wearable intelligent system, and exploring the innovative applications in smart healthcare, artificial intelligence, human-machine integration, energy and environment and other related fields.