Sherief Hashima, RIKEN Center for Advanced Intelligence Project

Title

AI-Driven Multimodal Sensing: From Earth Vibrations to Intelligent Wireless Environments

Abstract

Recent advances in deep learning and intelligent wireless systems are redefining how we sense, interpret, and interact with the physical world. This keynote explores the convergence of artificial intelligence, sensing, and communication through three complementary research fronts. First, a deep learning–aided vehicle classification framework using seismic data demonstrates how ground vibrations captured by geophones can be transformed into high-accuracy classifiers, enabling cost-efficient and privacy-preserving traffic monitoring for smart cities. Second, a neural network–based partial discharge identification system for power cables reveals how AI can enhance the reliability of electrical infrastructure by automatically recognizing complex discharge patterns, facilitating predictive maintenance in high-voltage systems. Finally, the talk envisions beyond-5G sensing paradigms where Reconfigurable Intelligent Surfaces (RIS) turn wireless environments into active sensors, empowering new forms of human activity recognition and environment-aware communications. By bridging the physical and electromagnetic sensing domains through AI, these works collectively illustrate a shift toward cognitive, data-driven, and reconfigurable sensing ecosystems paving the way for sustainable, safe, and intelligent societies in the 6G era.

Photo

Biography

Sherief Hashima received his B.Sc. and M.Sc. degrees in Electronics and Communication Engineering (ECE), with class of honors, in 2004, 2010 from Tanta and Menoufiya University, Egypt, respectively. He obtained his Ph.D. degree from Egypt-Japan University of Science & Technology (EJUST), Alexandria, EGYPT in 2014. He is a Scientific Researcher, computational learning theory team, RIKEN AIP, Japan since July 2023. He has been working as an Associate professor at the Engineering and Scientific Equipment Department, Nuclear Research Center (NRC), Egyptian Atomic Energy Authority (EAEA), Egypt, since 2014. From January to June 2018, he was a visiting researcher at Center for Japan-Egypt Cooperation in Science and Technology, Kyushu University, Japan. He is a technical committee member in

many international conferences and a reviewer in many international conferences, journals, and transactions. His research interests include wireless communications, machine learning, online learning, 5G, B5G, and 6G systems, image processing, millimeter waves, nuclear instrumentation, and Internet of Things. He is a Senior Member of IEEE and a member of AAAI and ACM.