

Title

Explainable AI-Enabled Haptic Feedback Prediction for Human-to-Machine Applications

Speaker

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Abstract

The immersive experience of humans through remote machines has high potential for economic and societal impact – from enabling tactile robots for industrial applications through to assistive technologies for the elderly and those with additional needs. Nonetheless, the emergence of human-to-machine (H2M) applications poses significant challenges to communication networks that carry multi-modal information between the humans and machines/robots. H2M communications require ultra-low latency, high reliability to ensure seamless responsive interactions between humans and machines. As such, advanced network architectures, hardware, and bandwidth allocation algorithms have been investigated to provide quality of service guarantees for these latency-sensitive applications. Foremost, AI-enhanced servers located at the optical line terminals of optical access networks have been proposed to predict haptic feedback signals, thus reducing the round-trip time in control-feedback loops. In this plenary talk, we will review our newly proposed explainable AI (XAI) framework for haptic feedback prediction. The framework harnesses a feature selection process based on Shapley additive explanations to reduce the number of features in the machine learning model such that training and inference times can be reduced. This reduction is important for supporting latency-sensitive H2M applications and improving the overall user experience. For future H2M communication networks, deploying XAI-enhanced servers is a promising solution to further reduce latency.

Biography



Elaine Wong received her Ph.D. (2002) degree in Electrical Engineering from the University of Melbourne, Australia. She is a Redmond Barry Distinguished Professor and is currently Pro Vice Chancellor (People & Equity) of the University. Her current research interests include low-latency communication networks and prescriptive analytics to facilitate human-to-machine applications over the Tactile Internet. Elaine currently serves on the ARC College of Experts, the IEEE Photonics Society Board of Governors, the IEEE

Technical Activity Board, Committee of Diversity Equity and Inclusion, and is Chair of the IEEE Communication Society Optical Network Technical Community. She is Technical Editor of IEEE Network, General Chair of Opto Electronic Communication Conference (OECC) 2024, and General Chair of Optical Fiber Communication Conference (OFC) 2025. She has previously served on many editorial boards including IEEE/Optica Journal of Optical Communications and Networking, and IEEE/Optica Journal of Lightwave Technology.