Transdisciplinary Convergence of Human-Centric Robotic Systems and Cybernetics

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Abstract

Today's discourse among technical professionals and technology enthusiasts alike is teeming with subject matter focused on innovations resulting from the research and practice of systems science and engineering, human-machine systems, and cybernetics. Whether it is complex systems enabled by cybernetics, intelligence for robotic and vehicular autonomy, new capabilities enabled by advances in machine learning, augmented humans, human-machine fusion, or other forms of human-machine symbiosis, the dialog is vibrant in technical and non-technical sectors of society. The convergence of these focal areas is prevalent at the current cutting edge of technology, but with a more pronounced emphasis on human factors and human relationships to technologies comprising complex systems and toward enabling appropriate human-centric solutions. With cybernetics as a science of, and transdisciplinary approach to studying, control and communications in machines and living things, its elements can be combined to enable complex and increasingly intelligent systems that interact with humans in a symbiotic or collaborative fashion. This talk focuses on such systems in the form of intelligent or otherwise cognitive robots. In that context, it highlights applications involving ideas from cybernetics and human-robot interaction research, considerations for next-level robotic intelligence needed to enable smart human-collaborative robots, and opportunities for leveraging transdisciplinary ideas that would enhance such robotic systems.

About the Keynote Speaker

Edward Tunstel (tunstel@ieee.org) is an IEEE Fellow and 2018–2019 president of the IEEE Systems, Man, and Cybernetics Society. He is an associate director of robotics at the United Technologies Research Center, which he joined in 2017 after working for ten years at the Johns Hopkins Applied Physics Laboratory, where he served as senior roboticist in its research department and Intelligent Systems Center and as space robotics and autonomous control lead in its space department. He was previously with NASA's Jet Propulsion Laboratory for 18 years, where he was a senior robotics engineer, group leader of its Advanced Robotic Controls Group, and flight systems engineer responsible for autonomous navigation, mobility and robotic arm subsystems for NASA Mars Exploration Rover missions. He maintains expertise in robotics and intelligent systems with current research interests in mobile robot navigation, autonomous control, cooperative robotics, robotic systems engineering, and soft computing applications to autonomous systems. He has authored more than 150 technical publications and co-edited four books in these areas. He received bachelor and master degrees in mechanical engineering from Howard University and the Ph.D. in electrical engineering from University of New Mexico.