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Seminar:

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Toward Fluid Coordination of Multiple Robots and Humans

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Abstract
Multi-robot systems are advantageous to complete distributed tasks collectively through coordinated performance. To maintain optimality of the coordination in dynamically changing environments, the robots need to communicate to share new information arising from dynamic circumstances and recompute the optimal solution accordingly at run-time. These run-time efforts incur additional expenses and overhead which degrade the team performance, especially in the environments where the communication cost is prohibitively large (e.g., urban areas with severe radio interference or underwater). In systems where humans are included in the loop for supervisory control, unnecessary interventions applied by humans owing to low trust in the robots may also incur additional inter-robot communication and computation to comply with the supervisory commands.

In this talk, I will present my work on reducing run-time efforts attribute to dealing with dynamically arising events, such as changes in the environment or supervisory commands from a human in the loop. First, I will introduce a set of algorithms that utilize upfront computation to analyze available domain-specific information, thereby avoiding global communication and centralized computation at run-time. Second, I will present a recent work on modeling and estimating human trust in multiple robots performing emergent swarm behaviors. The estimates can be used to reduce unnecessary interventions from human operators, which may require additional expense to follow the commands. Finally, I will conclude with an overview of current work in developing an adaptive system where robots and humans are integrated seamlessly to increase joint performance.

Biography
Changjoo Nam is a Postdoctoral Fellow in the Robotics Institute at Carnegie Mellon University, where he investigates human-robot interaction and multi-robot planning. He received his Ph.D. degree in Computer Science from Texas A&M University in 2016 and an M.S. and B.S. degree in Electrical and Computer Engineering from Korea University in 2011 and 2009, respectively. His graduate studies include optimizing collective performance of multiple robots and simultaneous localization and mapping (SLAM). Before joining Texas A&M, he was a research scientist at Korea Institute of Science and Technology where he worked on outdoor localization of multiple robots. His research interests include multi-robot coordination and planning, human-robot interaction, and mobile robot navigation.