# EPSTEIN INSTITUTE SEMINAR ▪ ISE 651

## Multi-Agent Path Finding and Its Applications

ABSTRACT - The coordination of robots and other agents becomes more and more important for industry. For example, on the order of one thousand robots already navigate autonomously in Amazon fulfillment centers to move inventory pods all the way from their storage locations to the picking stations that need the products they store (and vice versa). Optimal and, in some cases, even approximately optimal path planning for these robots is NP-hard, yet one must find high-quality collision-free paths for them in realtime. Algorithms for such multi-agent path-finding problems have been studied in robotics and theoretical computer science for a longer time but are insufficient since they are either fast but of insufficient solution quality or of good solution quality but too slow. In this talk, I will discuss different variants of multi-agent path-finding problems, cool ideas for both solving them and executing the resulting plans robustly, and several of their applications, including warehousing, manufacturing, and autonomous driving. I will also discuss how three Ph.D. students from my research group and one Ph.D. student from a collaborating research group at Monash University used multi-agent path-finding technology to win the NeurIPS-20 Flatland train scheduling competition. Our research on this topic has been funded by both NSF and Amazon Robotics.

**Dr. Sven Koenig**
Dean's Professor of Computer Science Department of Computer Science
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SPEAKER BIO – Sven Koenig is Dean's Professor of Computer Science at the University of Southern California. Most of his research centers around techniques for decision making (planning and learning) that enable single situated agents (such as robots or decision-support systems) and teams of agents to act intelligently in their environments and exhibit goal-directed behavior in real-time, even if they have only incomplete knowledge of their environment, imperfect abilities to manipulate it, limited or noisy perception or insufficient reasoning speed. Additional information about him can be found on his webpages: idm-lab.org.

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**TUESDAY, AUGUST 30, 2022**
3:30 PM – 4:50 PM
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