



University of Colorado  
Boulder

**Robotics Summer Student Seminar**  
**June 24, 2021**



**Ofer Dagan**

*Heterogeneous Decentralized Data Fusion for Multi-Agent Robotic Systems*

In the context of multi-agent systems, there is a growing interest to allow for the coordinated and cooperative operation of heterogeneous systems in uncertain environments. For example, a team of air and ground vehicles can vary in their sensing, computing, and communication capabilities, and might have different sets of models and objectives. The question is how to share information in a scalable and modular way, despite this heterogeneity?

In this talk I will show how we exploit the conditional independence structure inherent in different robotics problems to develop a family of methods that allow exact and approximate decentralized Bayesian fusion. These can be used to significantly reduce communication and computation costs, allowing scalability in multi-agent heterogeneous systems as will be demonstrated with a multi-target tracking simulation.

Ofer Dagan is a 3rd year PhD student in the Cooperative Human-Robot Intelligence Lab (COHRINT), advised by Dr. Nisar Ahmed. He received the B.S. degree in aerospace engineering, in 2010, and the M.S. degree in mechanical engineering, in 2015, from the Technion - Israel Institute of Technology, Haifa, Israel. From 2010 to 2018 he was a research engineer in the aerospace industry. His research interests include theory and algorithms for decentralized Bayesian inference in heterogeneous autonomous systems.



**Caleb Escobedo**

*Contact Anticipation and Avoidance for Robotic Manipulators using Onboard Sensors*

As humans and robots begin to coexist in work and household environments, pure collision avoidance is insufficient, as human-robot contact is inevitable and, in some situations, desired. Onboard sensors have the ability to enable manipulators to anticipate contact and enhance their approximation of the surrounding environment. This presentation will focus on the ability for robot arms to take slight deviations from their original trajectory through velocity reduction and motion restrictions with the use of onboard sensors. Additionally, this talk will explore future directions for modular sensor units and associated algorithms.

Caleb Escobedo is a 2nd year PhD student in the Human Interaction and Robotics (HIRO) Group advised by Alessandro Roncone. He has a B.S. in Computer Science from Trinity University located in San Antonio, TX. His research focuses on robotic skin for physical human robot interaction in close proximity environments. With sensors placed on robotic manipulators he has developed algorithms for obstacle avoidance and contact anticipation when contact is desired by human collaborators.

**Location:** AERO 120, located at 3775 Discovery Drive.

**Parking:** Lot 550 (<https://www.colorado.edu/map/?id=336#!m/445898>).

**Covid-19 guidelines:** Audience will wear masks as per University policy until otherwise updated (<https://www.colorado.edu/covid-19>).

**Questions:** Please contact [christoffer.heckman@colorado.edu](mailto:christoffer.heckman@colorado.edu)  
AND [xuefei.sun@colorado.edu](mailto:xuefei.sun@colorado.edu) (in advance) or (949) 874-7979 (day-of).