

# Pete Trautman

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**11:10AM-12:00PM**

**Bourns Hall A265**

## ***Robotic Navigation in Human Crowds: Theory and Experiments for Harnessing Cooperation***

### ***Abstract***

We consider the problem of navigating a mobile robot through human crowds. In particular, we explore three questions. What constitutes "successful" navigation for a robot in human crowds? In the presence of reactive agents, how is a robotic navigation system properly defined? And, can we design a navigation algorithm that encourages humans to treat the robot as an agent with a task to accomplish, instead of as a toy? In this talk, we address these questions by developing a principled, probabilistic model that predicts how humans perform cooperative collision avoidance, while anticipating their goal-oriented behavior, called Interacting Gaussian Processes (IGP). We demonstrate our approach on a robotic navigation task in a crowded lunchtime cafeteria. In our experiments, we close the loop by using an automated tracking system (capable of collecting up to 30 tracks at around 15Hz, with low data association error), making predictions using our probabilistic model, and using the predictions to drive the navigation on a Pioneer robot.

Additionally, 80 hours of ground truth crowd data has been collected and stored over the course of the experiment thus far. The data consists of human-human interactions and human-robot interactions. This data is being collected to assist in the development of future crowd prediction and crowd navigation algorithms.

### ***Biography***

Pete Trautman is a PhD student in Control and Dynamical Systems at the California Institute of Technology. Prior to coming to Caltech, Pete was a Captain in the United States Air Force, assigned first to the National Air and Space Intelligence Center and later to the Air Force Research Laboratories, both at Wright-Patterson Air Force Base in Dayton, Ohio. He graduated Magna Cum Laude with a B.S. degree in Applied Math and Physics in 2000 from Baylor University. He grew up in Alamogordo, New Mexico, near Trinity Site, where the first atomic bomb was detonated.

Please see <http://www.cds.caltech.edu/~trautman> for more information.