



College of Engineering
Department of
Mechanical & Industrial Engineering

The Robert W. Courter Seminar Series

3:00-4:00pm, Friday, February 2nd, 2024

PFT 1206

**Plans that deal with observation
intermittency**

**by Prof. Dylan Shell Computer
Science & Engineering
Texas A&M University**



Robots' sensors provide information that is seldom, alas, a perfect characterization of state. This challenge has been tackled through classic techniques such as probabilistic estimation and filtering, as well as uncertainty-aware planning. Such approaches are effective when uncertainty arises from noise (e.g., corruption via some stochastic source). Instead, this talk examines a rather different species of non-ideal observability: I'll scrutinize circumstances in which sensing information is sporadic, with high-quality data arriving only intermittently. The challenge then becomes one of temporal sparsity, with the robot having to act with estimates that are out-of-date. I'll present our approach to the problem of planning for such settings, showing some counter-intuitive examples (e.g., more frequent information isn't always better) and how knowledge about knowledge (i.e., when information will arrive) plays a specific role. Oftentimes, as roboticists, we can affect the observation process (such as by design or control of the environment), and so I will also touch upon a joint optimization formulation to model such cases.

***Dylan Shell** is a computer scientist at Texas A&M University who works in the areas of robotics and AI. Broadly, his research aims to analyze and synthesize complex, intelligent behavior in systems that interact with the physical world. He has an interest in algorithmic and formal foundations of planning problems, and extremely simple (or minimal) robots. He has published papers on topics from multi-robot task allocation, biologically inspired multiple robot systems, estimation of group-level swarm properties, rigid-body simulation and contact models, and robotic theatre. His work has been funded by DARPA, DoD (ONR, ARL), NSF as well as Ford and 3M; he has been the recipient of teaching, service and reviewing, and research awards. Dylan serves as the President of the Robotics Science and Systems Foundation.