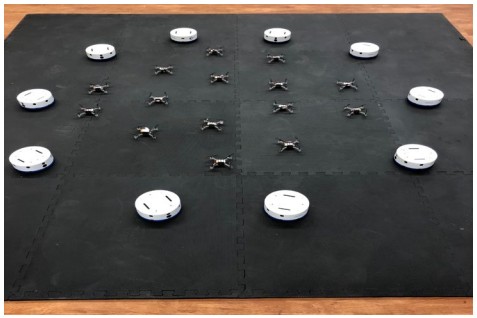
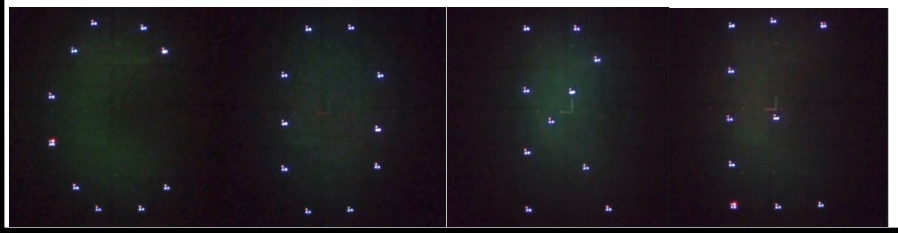
Matthew Hale





Research Objectives and Key Challenges:

- How to quantify information flow in multi-agent systems with impaired, intermittent, and unreliable communications
- How to use impaired information in agents' decision making and ensure safety, stability, and performance
- How to protect sensitive information in multi-agent collaboration

Significance of Work:

- Enabling collaborative autonomy that is resilient to disrupted network-level feedback
- Enabling multi-agent performance guarantees to persist despite uncertainty in networks and their environments

High-Level Technical Approach:

- Algebraic and spectral graph theory
- Operations research and convex optimization
- Differential privacy and stochastic control systems

Potential AFRL Collaboration Areas:

- Disaggregated Heterogeneous Autonomous Systems
- Reactive, Resilient Multi-Agent Autonomy
- Safeguarding Sensitive Information in Collaborative Settings

Center Research Areas:

- Network Control Systems
- Optimization and Distributed Coordination
- Differential Privacy

Recent Accomplishments:

- ✓ Developed the first differentially private linear-quadratic-Gaussian (LQG) controller
- ✓ Developed novel block-based asynchronous optimization techniques
- ✓ Developed methods for non-asymptotic random network analysis

Current Funding:

- AFOSR, AFRL, Lockheed Martin Advanced Technology Labs

Short-Term Research Vision:

- Expand optimization results to constrained problems
- Expand random graph analysis to directed networks

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