Draper Autonomy Research Interests

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Introduction

Draper has been active in the research and fielding of autonomous solutions for multiple decades. From multi-week duration underwater vehicle missions to spacecraft mission planning, real-time planning for autonomous parafoils, or multi-agent ground and air vehicle cooperation, we apply autonomy across many domains and at all technology readiness levels. We continue to seek cutting edge ideas and technologies to push the stat of the art forward.

About Draper Laboratory (www.draper.com)

Draper is an independent, not-for-profit corporation, chartered to work on problems in the national interest. Draper is ***seeking collaborative research partners from universities*** *to further the state of the art in key technologies of mutual interest. Research Whitepapers describing Draper's technology interests and Technical Points of Contact can be found on the Draper Scholars webpage (*Draper Scholar Program | Draper*). The Draper Scholars Program funds thesis-bearing MS and PhD students at partner universities as one of the effective ways to progress the technology. Other means of collaborative research (e.g. joint proposals, sabbaticals, etc.) are also encouraged. Please contact* ***education@draper.com*** *if you have further questions.*

Research Interests

1. Multi-agent Autonomy Frameworks and Enabling Techniques

As autonomous vehicles proliferate, mission designs naturally move towards multiple autonomous agents working in cooperation to solve problems. We seek frameworks applied to multiple agents that don't just enhance single vehicle capabilities but instead enable new mission designs and revolutionary advances in autonomous team achievements.

2. Optimal Teaming Formulations

In large and complex engagements, many open questions remain when incorporating autonomous agents with operators, decision makers, and planners. Some questions we are seeking insight into are:

- What level of centralization vs. decentralization in command and control is optimal in an engagement? How does this change as the environment, enemy, and resources evolve?
- What level of autonomy should be given to agents in a large operation? How does this change as the environment, enemy, and resources evolve?
- What is the optimal teaming formulation (crewed, uncrewed, crewed-uncrewed) to complete an objective? How does this change as the environment, enemy, and resources evolve? How is the trade-off between successfully completing this mission vs. reserving resources for future engagements made?

3. Spacecraft Autonomy Solutions

We seek advancements in spacecraft autonomy that can apply to Earth orbit and beyond

4. Robust Navigation in Challenging Environments

Robust navigation is an underpinning to higher level autonomy functions. We seek vehicle navigation and perception technologies that operate robustly both with and without GPS across domains from underwater to beyond Earth orbit.

5. Uncertainty-aware Planning and Decision Making

We seek planning and decision making frameworks that have an awareness of system uncertainty and can present operators with optimal plans including knowledge of uncertainty before and after planned actions.

We would be targeting PhD students for the development of novel approaches; and MS students for the application of existing approaches to specific problems of interest to Draper.