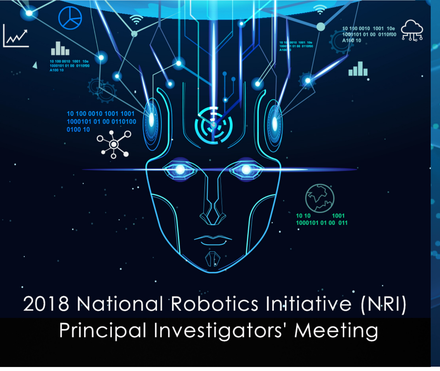

NRI: INT: Balancing Collaboration and Autonomy for Multi-Robot Multi-Human Search and Rescue

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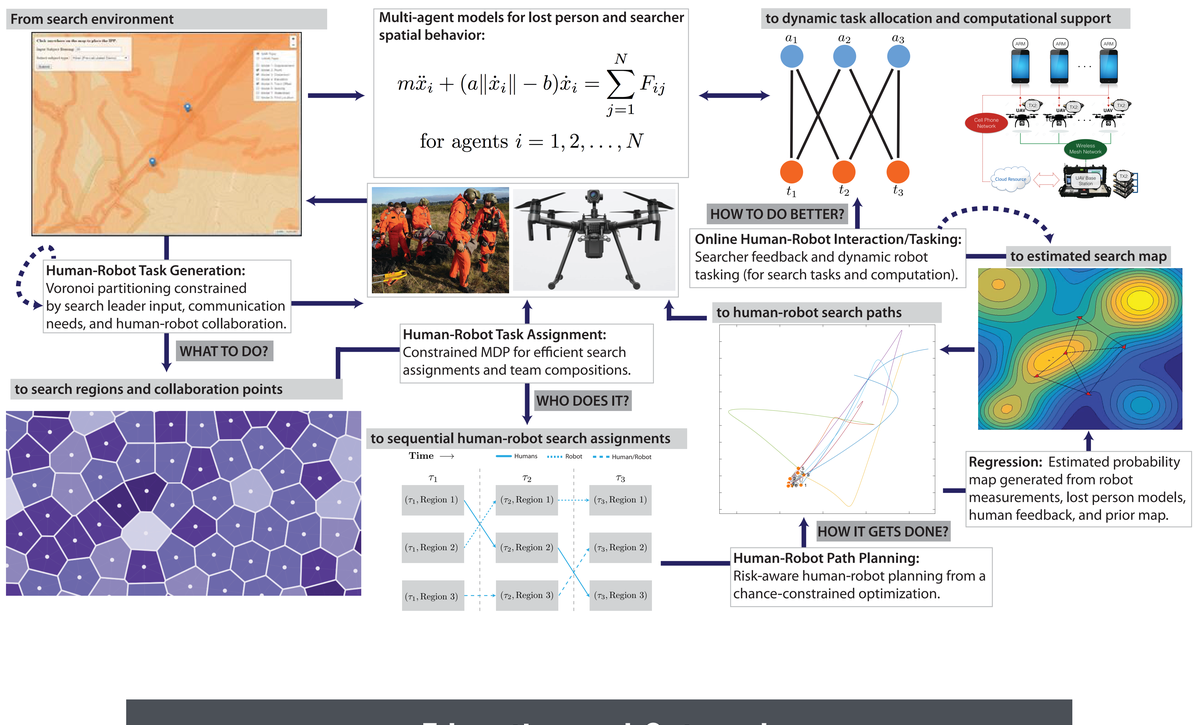
Challenge

- Enabling teams of human searchers and unmanned aerial vehicles to collaborate towards improving search outcomes and reducing human effort.
- Selecting and assigning search tasks that ensure long-term human-robot collaboration, while complementing human searchers in real-time.

Solution

- Multi-UAV control system leveraging risk-aware multi-robot planning for human-in-the-loop control.
- Distributed computing that balances human-robot interaction, communication, and decision-making.
- Interface between human searchers and UAVs that allows operation from complete autonomy to manual control.
- Large-scale prototyping in Virginia Tech's UAV facility and mock searches with support from active SAR veterans.

CAS•LAB
Coordination At Scale



Education and Outreach

- K-12 academic experiences for students in collaboration with Virginia Tech's Center for Enhancement of Engineering Diversity.
- Advisory board oversight from leaders in the Virginia search and rescue community.
- Interdisciplinary graduate curriculum on cooperative robotic systems.
- Cross-training undergraduate and graduate students in computational methods and engineering.

Award #: CNS 1830414, Awarded Oct. 2018, http://caslab.ece.vt.edu/research

Scientific Impact

- Planning and control systems that can autonomously gather information in a distributed way while adapting to uncertain human plans.
- Interfaces that allow humans to collaborate effectively with robots and appropriately guide exploration vs. exploitation.
- Scalable computation that supports the analysis, storage, and sharing of data subject to power and connectivity constraints.

Broader Impact

- Volunteerism is in dramatic decline nationally and across Virginia, and thus UAVs could eventually supplement the lack of trained volunteers.
- UAV teams will also create an ad-hoc network over which human searchers may communicate.
- Portable, low-cost, low-power computational infrastructure suitable for a wide range of applications.

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