CAREER: Robots that Plan Interactions, Come and Go, and Build Trust

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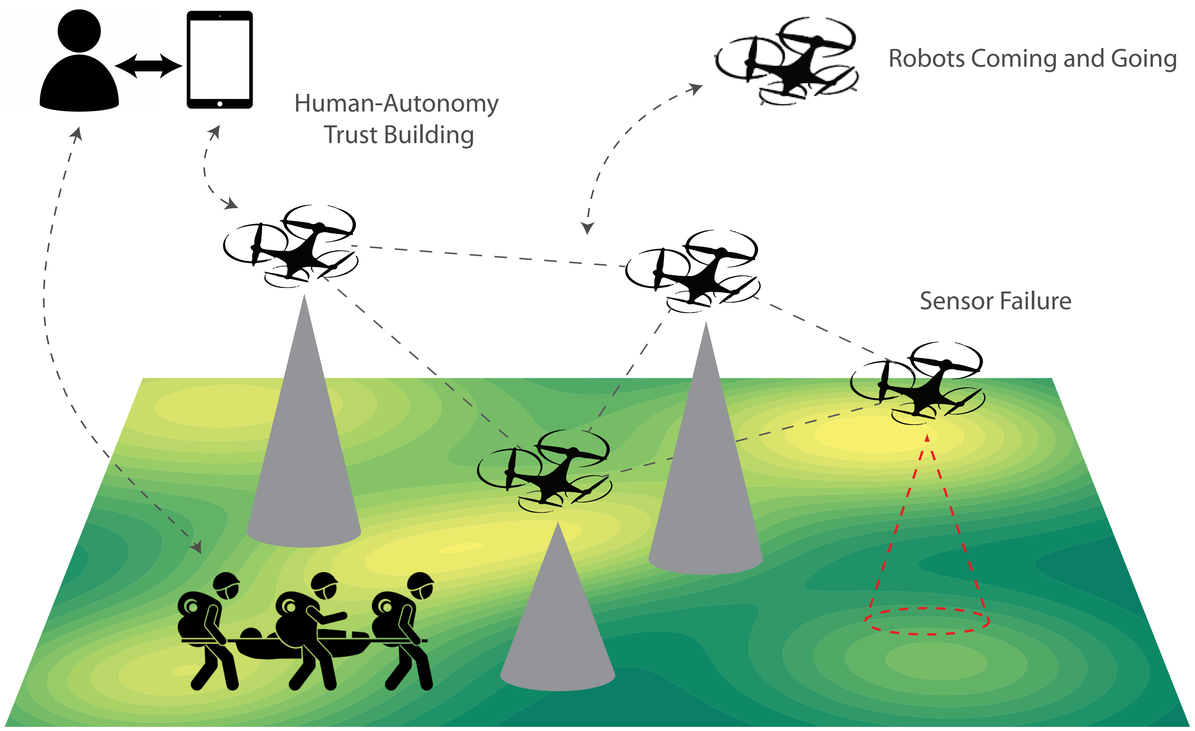
Challenge

- Allow robots to plan their interactions intelligently, gracefully enter and exit systems, and participate in trustful decision-making processes with humans.
- Demonstrate effective human-autonomy trust-building in search and rescue.

Key Results

- Independence systems for computing robot interaction structures over time.
- Combinatorial optimization for planning robots entering/exiting systems while respecting objectives.
- Trust-building in collaborative multi-robot multi-human (MRMH) decision-making based on multi-armed bandits.
- A set of search and rescue (SAR) case studies for evaluating research thrusts.
- A portable, indoor/outdoor, multi-scale testbed for experimental validation.



Project Overview:
Multi-human multi-robot teams
building trust in search and rescue.

Education and Outreach

- K-12 academic experiences for students with Virginia Tech's Center for Enhancement of Engineering Diversity.
- Hands-on experiences with trust-building UAVs targeted towards persons with a disability.

Scientific Impact

- Systems that plan their interactions in a manner that adapts to high-level mission objectives, while respecting low-level collaboration requirements.
- Systems whose composition changes over time while remaining resilient to such changes.
- Systems that select actions that actively build trust from other systems over time.
- Systems that are prototyped and tested under realistic conditions across varying scales of deployment.

Broader Impact

- Trustworthy interactions that adapt over time are critical for effective human-autonomy teams, across a wide range of applications.
- SAR volunteerism is in dramatic decline nationally and across Virginia, and thus UAVs could eventually supplement the lack of trained volunteers.

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