Probabilistic Hypothesis Driven, Adapting, Human-Robot Teams

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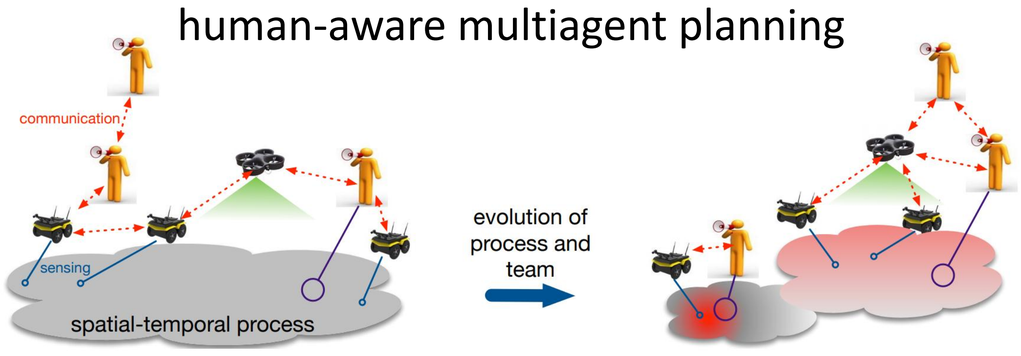
Project goal: develop foundational theory and validated algorithms for human-robot teams which operate in complex environments potentially evolving over time

Key problems: human-robot information exchange & human-aware multiagent planning



The project aims to advance the state-of-the-art in two main robotic subfields:

- Planning in multiagent search problems
  - The presence of heterogeneous teams (UGVs, UAVs, humans) makes our setting unique
- Human-robot interaction
  - Devise interaction modalities based on natural language for mixed teams of first responders

Mixed-Integer Linear Programming Models for Multiagent Non-Adversarial Search

Path planning under uncertainty → **probabilistic driven approach**

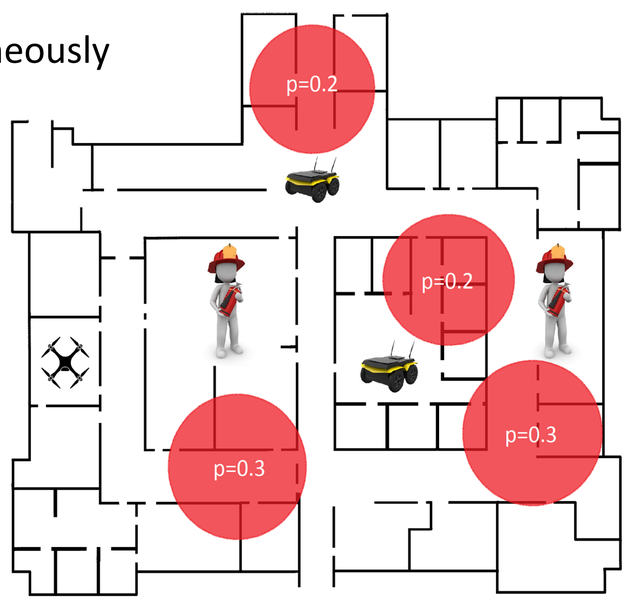
*Where to position the searchers **at each time-step** where they, as a **team**, are **most likely** to intercept the target?*

First MILP model to simultaneously encompass:

- multiple searchers,
- arbitrary capture ranges
- false negatives

Almost doubles the planning horizon w.r.t. the state-of-the-art (Hollinger et al., IJRR 2009)

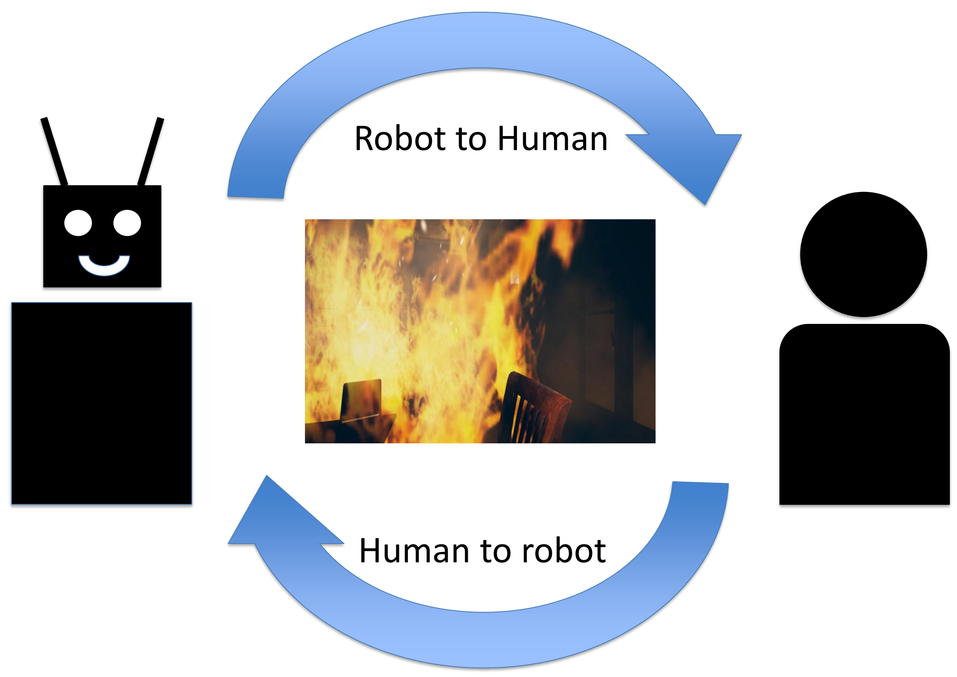
Centralized and distributed implementations



Investigating extensions for incorporating human-robot joint tasks

Human-Robot Interaction via Natural Language

The robot acts as a first responder and provides scene perception to the human



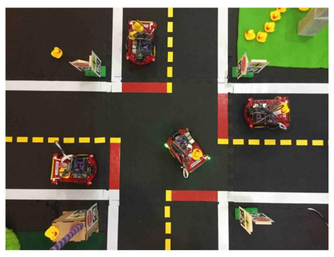
The human provides information to the robot to assess the danger level of the scene and improve plans

The project is focused on search and rescue, but the proposed methodology will be more broadly applicable:


Energy: leak detection

Disaster response

The project currently funds two PhD students that are involved in education and outreach activities:


Duckietown project
www.duckietown.org


NYS 4-H Career Explorations Program

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