WASP Project Course 2023

Human AI Teaming in autonomous Search and Rescue missions

Background

WARA-PS acts in the domain of public safety to support research aimed towards creating a safer society through autonomous agents such as drones, boats, underwater and ground vehicles. Scenarios include rescue mission, surveillance, and transportation.
This project course aims to explore and improve search missions by locating and identifying missing people in a virtual map, using UxV's to search the virtual world. The goal is to streamline search and rescue missions by improving agents and teams regarding resilience, collaboration, flexibility, need for human interaction and situation awareness, to better handle unforeseen events. Parameters that may effect the mission include battery time for drones, change in priority based on injured people in need of assistance, transportation of necesseties or vehicles or hardware malfunctions. Human agents may act in the scenario to provide additional information to support the autonomous agents.
The course will be based on a repeatable scenario with missing people in a large area and a set of agents and resources (e.g. rescue equipment, battery changing stations) at the rescue leader's disposal. New challenges, information or disturbances will be posed as the scenario plays out, re-defining the scope. The group need to assess these disturbances and examine how the mission can be carried out to complete the tasks at hand.
In the planning phase of the scenario, a tabletop board game will be used to test the scenario and establish a contingency plan. This will be a reoccurring part of the course to identify desired levels of automation and appropriate human intervention.
At the end of the course a similar scenario with new challenges will be introduced to test the improvements made by the project group.

Constraints: Programming knowledge desireble

Participants

Industrial partner: Combitech

Industrial supervisor: Emma Jonsson, emma.jonsson@combitech.com

Academic supervisor: Jonas Lundberg, jonas.lundberg@liu.se, Linköpings Universitet

Coordinating WARA representative: Jesper Tordenlid, WARA-PS

Suggested WASP PhD students:

Challenges to investigate

- Object detection
- Dynamic resource allocation
- Human AI Teaming
- Resilience
- Unforseen events in mission
- Multi-domain collaboration

Resources

WARA-PS platforms including Arena Map and scenario builder, UTM City simulator, strategic board game for planning execution of missions

Deliverables

- Scenario description
- Contingency plan based on established game rules
- Recorded scenario run
- Processed event logs
- Live demonstration of new scenario play through
- Report

References

Lundberg, J. and B. J. E. Johansson (2015). "Systemic resilience model." Reliability Engineering & System Safety **141**: 22-32.

Lundberg, J. (2015). "Situation Awareness Systems, States and Processes: A holistic framework." Theoretical Issues in Ergonomics Science **16**(5): 447-473.

Lundberg, J., M. Arvola and K. L. Palmerius (2021). "Human Autonomy in Future Drone Traffic: Joint Human–AI Control in Temporal Cognitive Work." Frontiers in Artificial Intelligence **4**(104).

Keywords

simulation, object detection, HMI, human AI teaming, dynamic resource allocation, joint multi-domain mission