Challenge for WASP Autonomous Systems Course 2016

Your goal is to make the ground robots and the drones deliver medical supplies to people in need after for example an earthquake. Since the robots lack the capability to actually pick up and manipulate objects you are free to come up with creative solutions to showing what your system can do. You may make reasonable assumptions as long as you make these explicit.

Requirements

- The system should support multiple ground robots and multiple drones. The demonstration should involve at least one ground robot and at least one drone “delivering” at least two boxes of supplies.
- The ground robots should be used for long distance transportation of the boxes. The drones should be used for short distance transportation, taking a (virtual) box from the ground robot to its destination (or the other way around). You are encouraged to make the drone mark that it is picking up/delivering a box for example by flying over it and changing the altitude in a controlled manner. It would be nice if you attached a string under the drone and it actually touch the ground to mark a pickup or delivery. The LEDs can also be used.
- You are encouraged to autonomously explore the environment to create a map with the locations of the victims and obstacles. The location of the supplies can be assumed to be known.
- You may mark supplies and victims with tags or similar, but we encourage you to do without. There is for example some support for people tracking in OpenCV.
- We encourage you to track objects rather than re-detect them every frame.
- The ground robots should avoid obstacles.
- There should be some form of ground station for an operator to interact with the system.
- The operator should be in the decision loop for example approving plans, marking objects in the video feed or adding/removing no-go-zones.
- The solution should integrate planning, control, and decision making. For example, plan how to achieve the overall mission, plan a path from A to B avoiding obstacles and control the robots to follow the trajectory, and decide where the robots should rendezvous.
- You are strongly encouraged to support run-time adaptation of the plan if actions fail or things change unexpectedly. This can be demonstrated by for example adding/moving physical obstacles or adding/removing virtual no-go-zones from the operator station.
- The robots should collaboratively solve the task. The coordination should be based on run-time information and not completely pre-defined.

Examination

- At Session 2 each group should give a 5-10 minute presentation of their plans for the challenge.
- At Session 3 each group should demonstrate their system locally, prepare a short video of their system and give a 10 minute presentation of their current solution.
- On Nov 15, each group should hand in a short (2-3 pages) written status report to the GSM including a plan about what will be included in the final demonstration
- At Session 5 each group should show their final video and be prepared to answer questions related to their system. Each person in the group should be able to explain how the system works, answer questions related to the system and analyze and motivate design decisions. The video should be a self-contained 5 minute video. The videos will be published on the WASP web page afterwards. A Best Video Award to be handed out during the dinner.
- On Dec 12, each group should submit a document with one section for each person where he/she describes what he/she did and how this contributed to the project. All group members should sign the document.
- To get the credits for the challenge each group should publish their source code on GitHub together with a description of the project. Will be linked from the WASP web page.