



Go2-Sample & Return

— Multi-Robot Cooperation for Mapping and Intervention in Hazardous Environments

Robotics Institute
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Introduction

- This project addresses technical and scientific challenges of a “go to sample and return” strategy which has potential applications in surveillance of critical infrastructures, intervention in contamination zones and inspecting safety of public and industrial plants.
- This strategy will be applied on heterogeneous robotic platforms including unmanned ground vehicles (UGV), unmanned aerial vehicles (UAV) and robot arm-hand systems, equipped with advanced sensors for searching, mapping and path planning in the targeted zone.
- The project will utilize knowledge and expertise from aerospace, electronics, computer, nuclear and mechanical engineering fields to enhance the robotic technology.



Context and Background

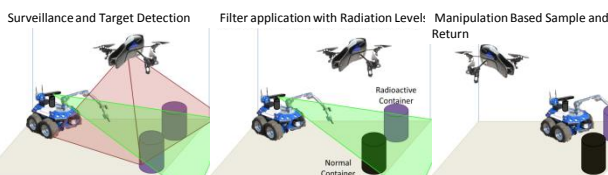
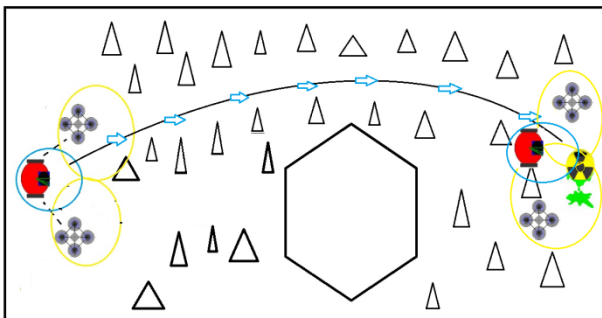
- Safety and security is one of the most important topics in Abu Dhabi 2030 vision to make Abu Dhabi a safe place for people to work and live in;
- Security is also one of the five strategic priority areas of Khalifa University;
- Khalifa University Robotics Institute (KURI) focuses on innovative progress in robotic technologies to support real operational scenarios on safety and security.

Research Objectives

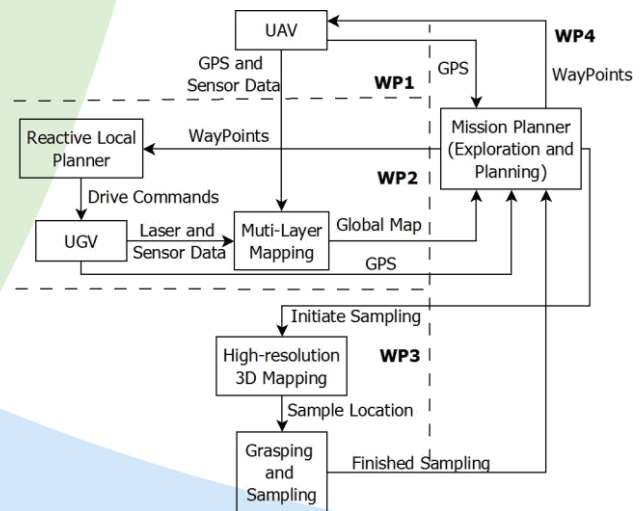


- Multi-robot Cooperative Navigation and Formation Control;
- Cooperative Multimodal and Multi-Scale for Data Fusion and Mapping;
- Intervention and Reactive Robot Grasping for Sampling.

Scenario of Surveillance and Reactive Grasping



System Architecture



Desirable Outcomes

- A hybrid path-planning algorithm for the UAV-UGV cooperative navigation;
- A linear or nonlinear distributed consensus protocol for the formation coordination of heterogeneous unmanned system;
- Multi-sensor data acquisition method and information integration model;
- Multi-layer and Multi-Scale map algorithm for robot intervention;
- Multi-sensor fusion and information integration model for grasping;
- A grasping planning and sampling algorithm by using combined on-board sensor data information and interactions with UGVs/UAVs;
- Architecture of the whole System;
- PhD and MSc Programs.