

Autonomous Remote Sensing in GPS-denied and Cluttered Environments using UAVs

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Keywords: UAV navigation, POMDP, planning, ROS, GPS-denied, Target finding

Abstract:

Unmanned Aerial Vehicles (UAV) operating in cluttered and GPS denied environments have to rely on on-board sensors as its source of localisation in order to navigate. The possible presence of obstacles or constraints presents and even more challenging environment for the UAV to operate. This work focuses on the development, implementation and testing of a system that performs UAV navigation, and remotely senses, modelled as a Partially Observable Markov Decision Process (POMDP) using a state-of-the-art online solver using a low cost commercial multi rotor UAV and a modular system architecture running under the Robotic Operative System (ROS). We present a framework and a system that enables a UAV to navigate, remotely search for a known target and map gas concentration in GPS-denied spaces. Results show the system to be robust to motion and perception uncertainties and indicate that the system is flexible enough to allow different types of planning algorithms, perception systems and motion control systems to be incorporated into the framework.

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