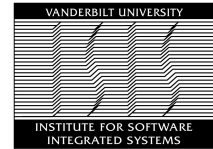


P&M: Perch and Move UAV Technology

Tools for Autonomous, Mobile, Multi-Sensor Acquisition and Processing¹

Summary of Features

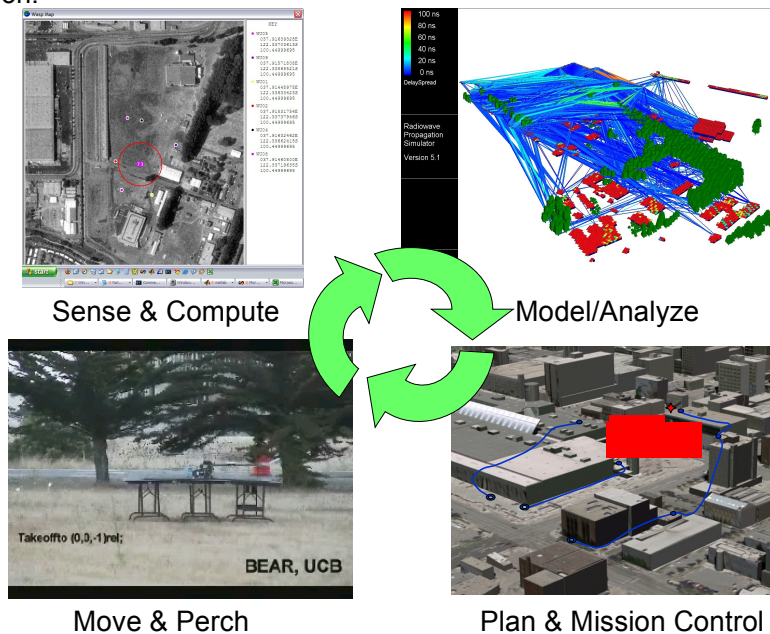


The P&M Technology consists of a set of tools for dynamic optimization of multi-sensor UAV applications, specifically where the sensor platforms can autonomously perch, sense, and move to optimize the accuracy of the target task. The process includes environmental modeling and analysis, system performance prediction, onboard sensor processing, platform relocation planning/path planning, and autonomous takeoff, movement, and landing. The combined effect is a system that can silently monitor for activity and, via successive sense/plan/move operations, drastically improve sensor accuracy in congested, urban environments.

The P&M components and techniques consist of:

- 1) Environmental modeling & preplanning with respect to sensor mode and physical UAV navigation;
- 2) Prediction of system performance based on environmental models, system state/sensor locations, and measured signals;
- 3) Sensor Location Planning, considering signal properties and reachability of sensor platforms;
- 4) On-board processing of high-compute-load sensors (e.g. Radio Geolocation via Time-difference-of-arrival);
- 5) UAV path planning, including deconfliction of multiple UAV paths in 3-space;
- 6) And Mission Planning, managing resources and coordinating the distributed system of UAV's to perform the mission.

The figure below illustrates the various pieces of the P&M system and tools on the Radio Geolocation/Electric Helicopter UAV application:



From a given perch location set, the sensors detect a signal and compute a target location. E&M Field models are used to calculate multipath effects suggest a set of new sensor locations for improved accuracy. The mission and path planner allocates UAV's to those locations and plans 3d paths for each vehicle. Finally, the vehicles execute the paths via autonomous takeoff, navigation, and landing. The cycle repeats until the urban effects are mitigated and the required accuracy is achieved.

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¹Original research and development was supported by DARPA/IXO P&M Seedling program through USAFRL.