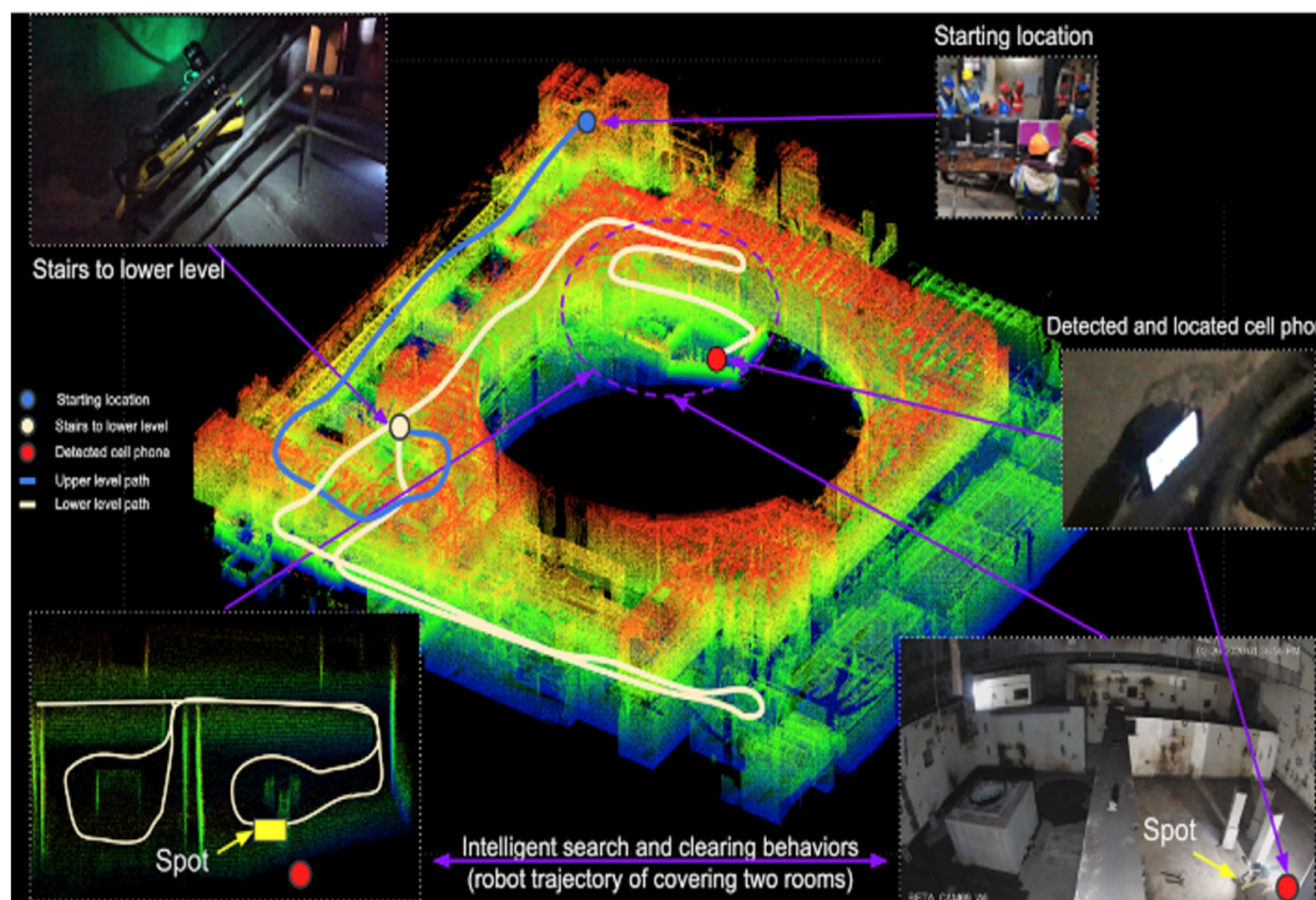


AUTONOMOUS MISSION PLANNING AND HUMAN-LEVEL REASONING USING SEMANTIC REPRESENTATION OF ENVIRONMENTS

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OBJECTIVES AND APPROACHES



Overall Objectives

Autonomous exploration and signal source localization in challenging environments for improved situational awareness

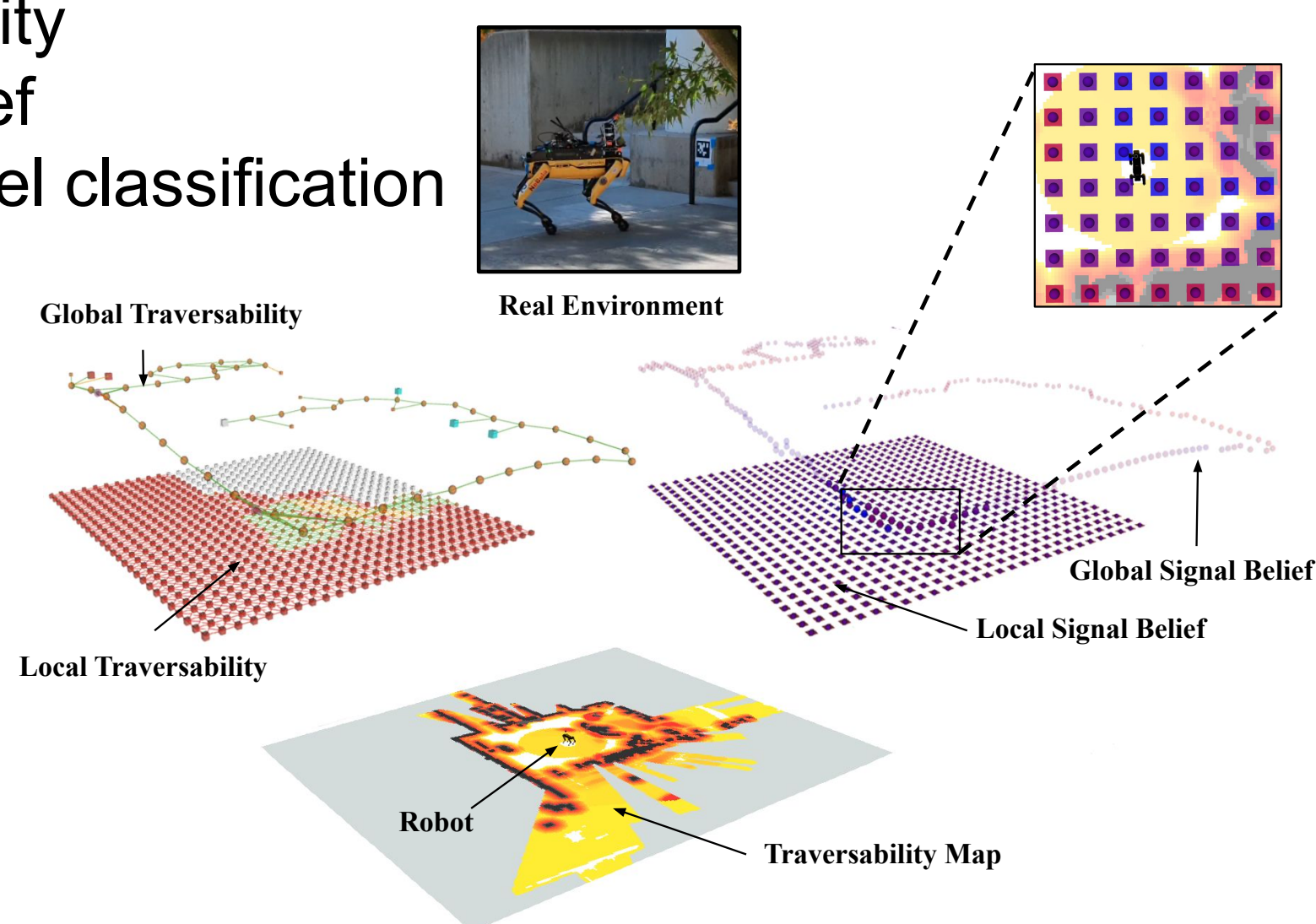
- **Map** complex 3D environments without GPS
- **Navigate** safely in obstacle-laden environments
- **Detect & Localize** objects of interest using visual/RF signatures

Approaches

- **Multi-modal semantic-based** situation understanding
- **Semantics-aware mission planning** for coverage and source seeking

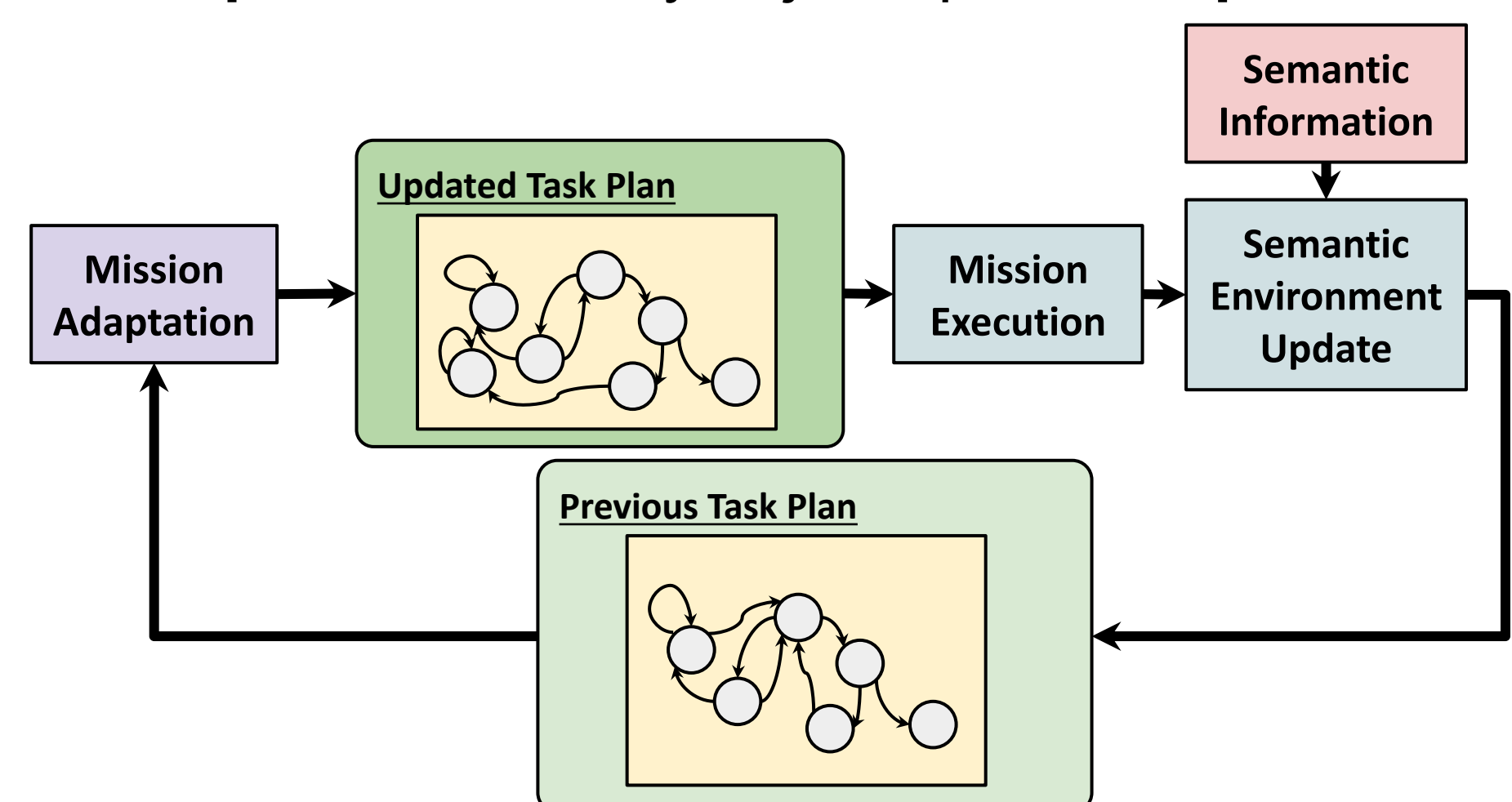
SEMANTIC REPRESENTATION

- Traversability
- Signal belief
- Human-level classification



SEMANTICS-AWARE MISSION ADAPTATION

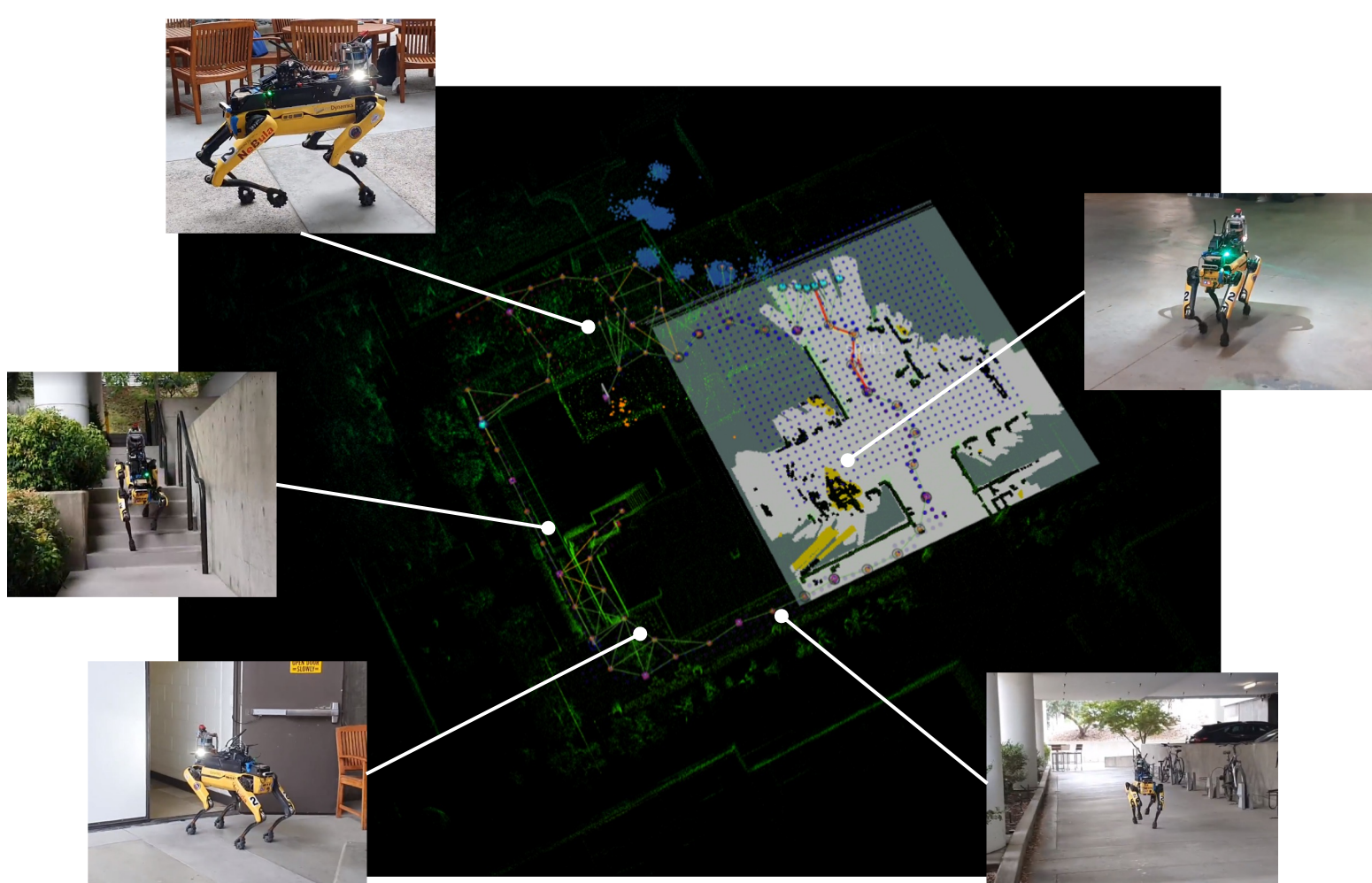
- **Pre-defined policy** using semantic information
- **Mission planner** actively adjusts plan with **pre-defined policy**



EXPERIMENTAL RESULTS AND ANALYSIS

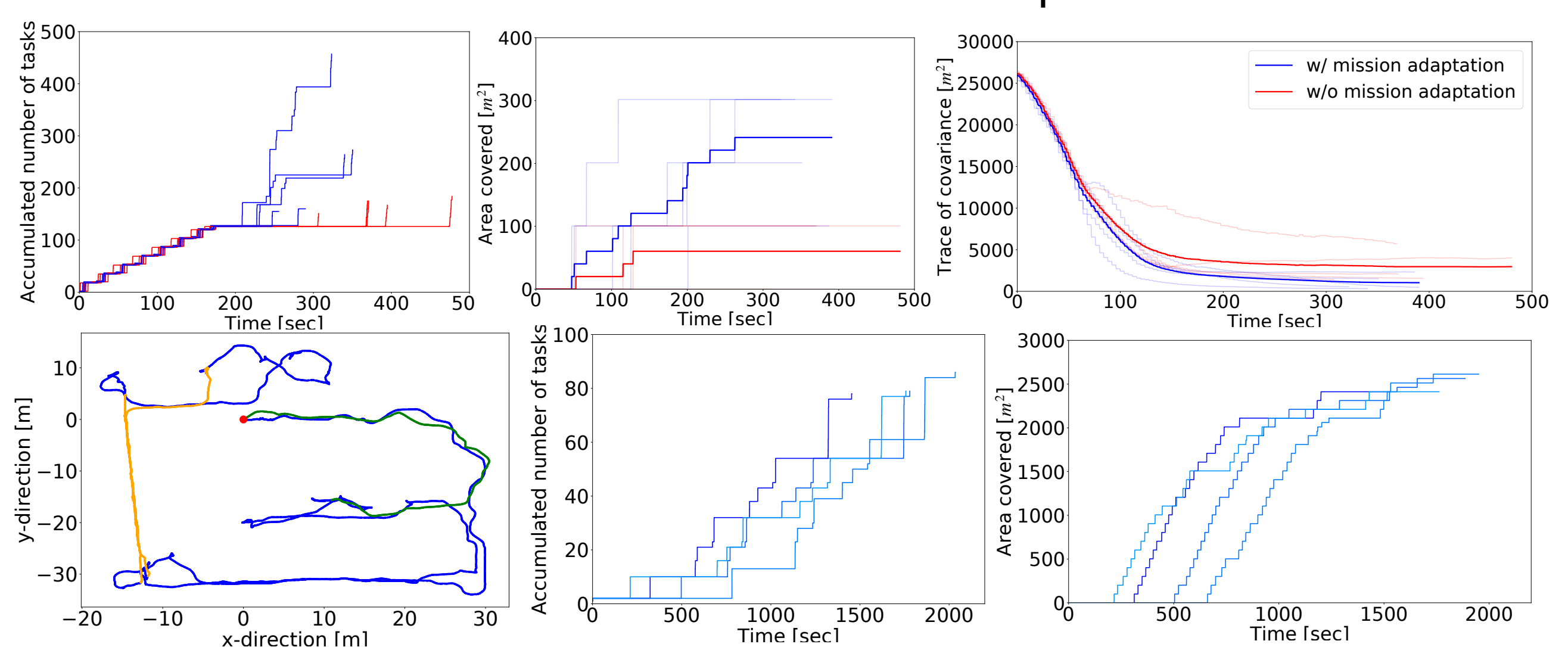
Experiment Scenario

- Autonomous **exploration** and **source seeking**
- **Multi-level** building area: JPL301 parking lot



Results and Analysis

- Assessed in **mission operation** and **achievement** of quality
 - Effects on semantic representation
 - Effects on semantic-aware mission adaptation



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Publications:

1. Sangwoo Moon*, Oriana Peltzer*, Joshua Ott, Sung-Kyun Kim and Ali-akbar Agha-mohammadi, "Semantics-Aware Mission Adaptation in Robotic Operations (submitted)," 2023 IEEE International Conference on Robotics and Automation (ICRA), London, UK, May 2023.
2. Christopher E Denniston, Oriana Peltzer, Joshua Ott, Sangwoo Moon, Sung-Kyun Kim, Gaurav S Sukhatme, Mykel J Kochenderfer, Mac Schwager and Ali-akbar Agha-mohammadi, "Fast and Scalable Signal Inference for Active Robotic Source Seeking (submitted)," 2023 IEEE International Conference on Robotics and Automation (ICRA), London, UK, May 2023.

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