

# Novelty Statement

We would like to clarify that the paper, titled "Requirements driven Online Adaptation to Mitigate Runtime Uncertainty for AUSs", satisfies the novelty criteria of journal-first submissions: This paper reports completely new research results. It has no previously published work.

Autonomous Unmanned Systems (AUSs) are emerging to transform traditional industries. The control software of AUSs must adapt to uncertainties in the operating environment to satisfy multiple goals at runtime. In this paper, we propose a novel three-stepped control-based adaptation mechanism (Captain) to identify and mitigate goal violations while guaranteeing optimality and flexibility in multiple goals: Goal Satisfaction Checking, Goal Violation Analysis and Goal Satisfaction Optimization. Comprehensive evaluations of Captain are conducted on both simulators and real systems, using various AUSs, environments and workloads. The major contributions of this paper are three-folds:

- (1) A real-time requirement monitoring approach to proactively detecting goal violations and evaluating their degrees of violation based on a goal satisfaction model.
- (2) An approach to runtime multiple goal management to minimizing goal violations.
- (3) A real-time and multi-objective planner for sensor reconfiguration and motion planning of AUSs simultaneously.