

Platform To Test and Evaluate Human-Automation Interaction (HAI) For Autonomous Unmanned Aerial Systems

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Abstract

The human-agent-robot teamwork (HART) framework enables humans to co-work with machines to create profitable applications by utilising their complementary strengths. Human-automation interaction (HAI) in autonomous Unmanned Aerial Systems (UASs) is modelled in this research via an intelligent platform using aerial digital twins (DTs) interconnecting physical twins in the real-world environment with virtual twins (VTs) in the digital environment, enabling advanced immersive interactions. The developed platform aims to establish a tight interface between two intelligent agents: humans and Automation-in-the-Loop (AITL) aerial agents by fusing their task-oriented manipulation/modification/calibration inputs in the human plane and the automation plane. The tight cognitive coupling of these planes within HART, regarding the human and machine factors, is expected to yield substantial improvements in overall task performance that cannot be achieved individually in unanticipated situations considering the embodied agents and unique intelligence and skills at both sites.

Index Terms— Human-automation interaction (HAI), cognitive coupling, embodied agents, telemanipulation, teleoperation, automation-in-the-loop (AITL), human-in-the-loop (HITL), human-vehicle co-activity, autonomous unmanned aerial systems (UASs), digital twins (DTs); human-vehicle teamwork

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