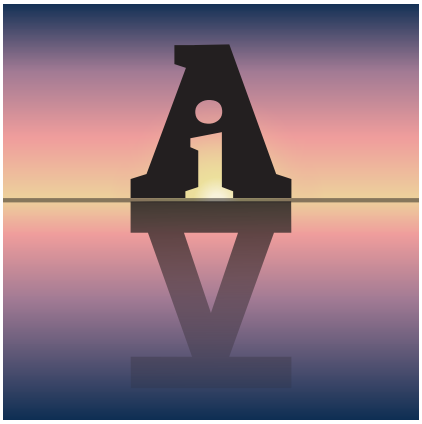

RECENT ADVANCES IN AI FOR NATIONAL SECURITY

Flight Safety for Tactical Autonomy – **Zack Serlin**

Poster Abstract

Pilots have long been learning to push their aircraft to the limit in tactical settings. As autonomous aircraft begin to join the fight in critical missions, they too must understand the limits of their capabilities. To accomplish this, we must design guardrails to limit these autonomous systems from behaving in unpredictable or dangerous ways. This program strives to enforce such limits on AI pilots using techniques from the field of safe control and learning. Using concepts from the neural control barrier function and infinite horizon optimal control communities, we construct a universal safety filter capable of preventing autonomous aircraft from entering unsafe regions (i.e., collision with the ground or other agents) and exceeding structural limits (i.e., excessive G forces). Given a requested control input from the AI pilot to the aircraft, this safety filter passes along the nearest safe control input to the platform, which prevents the system from leaving the safety envelope. We show the utility of this work on an F-16A aircraft model in a constrained canyon run scenario.

About the Author(s)

Zachary Serlin is a technical staff member of the Integrated Missile Defense Technology Group. Since joining Lincoln Laboratory in 2020, he has focused on formal guarantees for AI-based multi-agent autonomous systems. He has applied novel optimization techniques to Missile Defense Agency battle management problems, and led multiple DARPA and internal research and development programs in autonomous systems, one of which was a finalist in the 2022 R&D 100 awards. He holds a BS and MS in mechanical engineering from Tufts University and a PhD in mechanical engineering from Boston University.

For more information, please contact raains@ll.mit.edu

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