

Master's Thesis Defense Announcement
Mechanical and Aerospace Engineering Department
University of Texas at Arlington

**Autonomous UAV Mission Planning Under Threat Using
Model Predictive Control with Proportional-Navigation
Pursuers**

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Abstract

This thesis presents a MATLAB-based simulation framework for autonomous UAV mission planning in constrained and threat-rich environments. The UAV must visit assigned checkpoints and reach a final goal while avoiding no-fly zones, radar threat regions, and a pursuing adversary. The study compares conventional route-following guidance with a model predictive control-based guidance strategy, while the pursuer is modeled using basic pursuit and proportional navigation.

The results evaluate mission success, capture avoidance, path length, completion time, and minimum separation. The simulations show that conventional route-following is vulnerable to interception, while the MPC-based approach improves threat and obstacle avoidance by accounting for future vehicle motion and environmental constraints. Overall, this work demonstrates the benefits and tradeoffs of MPC-based UAV guidance under adversarial mission conditions.