An Autonomous Collision Avoidance Strategy for Unmanned Air Vehicle Guidance

Yazdi Ibrahim Jenie⋆ and Erik-Jan van Kampen⋆
⋆Control and Operation Division, Faculty of Aerospace Engineering, Delft University of Technology
Kluyverweg 1, 2629 HS Delft, The Netherlands

Abstract

At the current time, autonomous collision avoidance systems (ACAS) are expected to play a main role for integrating the use of Unmanned Air Vehicles (UAVs) into the National Airspace System (NAS). This paper discusses an autonomous collision avoidance strategy for UAVs, in context of the integration. The strategy consist of two distinctive part, i.e., cooperative and non-cooperative avoidance. In the first part, avoidance are conducted according to some common rules, while expecting the other UAV involves also follows them. The non-cooperative avoidance act as the last minute avoidance from rogue obstacles (including UAVs) that violates a certain distance. A method named Velocity Obstacle Method is used as the base of avoidance algorithm, extended to suit UAV and its autonomous system applications. The avoidance maneuver in this paper decomposed into three basic maneuver, i.e., Avoid, Maintain, and Restore. Avoiding UAVs then decide to go from one mode to another using the avoidance algorithm represent as a hybrid system model. At the end of this paper, several implementation of the strategy for both cooperative and non-cooperative avoidance is presented, follows by several conclusion and suggestion.