UAV ROUTE PLANING FOR AVOIDING ENEMY RADARS

Senem Aktas, Nergiz Kilinc, Hazan Daglayan, Ibrahim Cereci, Murat Karakaya

Atilim University, Ankara, Turkey

***Abstract*— Unmanned Aerial Vehicles (UAV) are one of the most expensive tools for reconnaissance and tactical attack missions in military operations. As a countermeasure to increasing usage of UAVs, the conventional method is to employ stationary radars to detect the presence of any UAV. Therefore, while planning route for an UAV, not only the target locations, but the radar locations and their coverage radius should be taken into consideration. Moreover, to minimize the risk of flying over enemy terrain, total length of UAV route should be minimized. In this study, a route planning solution for multiple UAVs are developed and tested under the aforementioned constraints. Thus, the developed solution generates a route, which is not covered by the radars and its length is shorter. To simulate the locations of radars and targets, we use the Travelling Salesman Problem (TSP) benchmark files. Radar coverage area is modeled as two dimensional circular areas with a fixed radius. We develop a Genetic Algorithm (GA) to create the desired route. The GA initially builds a population of routes from one target to another. Next, each solution is checked to see if any radar coverage intersects with. If so, we apply an avoidance procedure to modify that part of the route such that the UAV can fly out of the radar coverage. The avoidance procedure is repeated until all the parts of the route are out of all radars' coverage. In order to find the shortest route, we build up necessary crossover and mutation operations. Moreover, we also apply a non-heuristic method to solve this problem and the results of both methods are compared. The experiment results prove the success and the validity of the proposed GA.**

Keywords*— *GENETIC ALGORİTHM, OPTIMIZATION, UAV ROUTE PLANING, RADAR AVOIDANCE