The role of the unmanned aerial vehicle (UAV) has significantly expanded in the military sector during the last decade mainly due to their cost effectiveness and their ability to eliminate the human life risk. Current UAV technology ranges widely to support a variety of missions; however, one particular field of interest is the area of the low cost expendable UAV since its small price tag makes it an attractive solution for target suppression. A swarm of these low cost UAVs can be utilized as guided munitions or kamikaze UAVs to attack multiple targets simultaneously. The focus of this thesis is the development of a cooperative online path planning algorithm that coordinates the trajectories of these UAVs to achieve a simultaneous arrival time to their dynamic targets. A nonlinear autopilot design based on the dynamic inversion technique is also presented which stabilizes the dynamics of the UAV in its entire operating envelope. A nonlinear high fidelity six degrees of freedom model of a fixed wing aircraft was developed as well to act as a test bed to verify the performance of the presented algorithms.

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The public is welcome to attend.