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Design of a Drone Light Show Production System

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Abstract: A Drone Light Show (DLS) is visual entertainment in which multiple autonomous drones form complicated flight patterns. As drones become smaller and more efficient due to technology advances, a DLS can replace fireworks for cheaper and reduced risks. This paper describes the design of a control system to create drone trajectories using a "Lead-Follow" Control System in a Cartesian coordinate. The simulation was created through a Matlab subprogram called Simulink and studies the trajectory behavior of the two drones with optimal Proportional, Integral and Derivative (PID) control gains to determine the separation between the drones. Based on the optimal separation, risks of fatality, injury and property damage are assessed. With a proportional gain of 6, derivative gain of 0.3, and a 0.1 integral gain, separation distances of 10 ft., in the X and Y axes and a 0 ft. separation in the z axis, a 5% error margin was achieved.

Keywords: Design, Drone, Light,Show, Production, System, Simulation, Simulink, Matlab