

Path Planning for Multiple Unmanned Aerial Vehicles Based on Adaptive Probabilistic Sampling Algorithm

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Abstract : Path planning is essential for UAVs (Unmanned Aerial Vehicle) with autonomous navigation in unknown environments. In this paper, an adaptive probabilistic sampling algorithm is proposed for the GPS-denied environment, which can be utilized for autonomous navigation system of multiple UAVs in a dynamically-changing structured environment. This method can be used for Unmanned Aircraft Systems Traffic Management (UTM) solutions and in autonomous urban aerial mobility, where a number of platforms are expected to share the airspace. A path network is initially built off line based on available environment map, and on-board sensors systems on the flying UAVs are used for continuous situational awareness and to inform the changes in the path network. Simulation results based on MATLAB and Gazebo in different scenarios and algorithms performance measurement show the high efficiency and accuracy of the proposed technique in unknown environments.

Keywords : path planning, adaptive probabilistic sampling, obstacle avoidance, multiple unmanned aerial vehicles, unknown environments

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