PFIN: An Efficient Particle Filter-Based Indoor Navigation Framework for UAVs

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***Abstract*—The utilization of Unmanned Aerial Vehicles (UAVs) like drones for indoor data gathering or sensing applications have gained popularity over the last decade. Indoor UAV navigation is a complex process, which involves several tasks such as mapping, localization, and path planning with obstacle avoidance. In this paper, a Particle Filter-based Indoor Navigation (PFIN) framework is proposed for the drone navigation process. In PFIN, Quadcopter Mapping Algorithm (QMA) is proposed using particle filter analysis to aid in mapping for indoor navigation. In addition, particle filter-based Optimized Localization Algorithm (OLA) and Adaptive Velocity Procedure (AVP) are proposed for the purpose of enhancing the precision in localization and to improve the velocity estimation for collision avoidance, respectively. Thus,**