World Academy of Science, Engineering and Technology
International Journal of Electronics and Communication Engineering
Vol:8, No:11, 2014

LIDAR Obstacle Warning and Avoidance System for Unmanned Aircraft

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Abstract : The availability of powerful eye-safe laser sources and the recent advancements in electro-optical and mechanical beam-steering components have allowed laser-based Light Detection and Ranging (LIDAR) to become a promising technology for obstacle warning and avoidance in a variety of manned and unmanned aircraft applications. LIDAR outstanding angular resolution and accuracy characteristics are coupled to its good detection performance in a wide range of incidence angles and weather conditions, providing an ideal obstacle avoidance solution, which is especially attractive in military low-level flying platforms such as helicopters and small-size Unmanned Aircraft (UA). In this paper we discuss the integration of the Laser Obstacle Avoidance “Marconi” (LOAM) system on candidate UA platforms. The original LOAM system design and the performed helicopter test activities are summarised, including a brief description of the system architecture and sensor characteristics, together with the system performance models and data processing algorithms for obstacle detection and classification. The paper presents the dynamic modelling and the avoidance trajectory generation algorithm for UA applications. A description of the future planned flight test activities is also included.

Keywords : LIDAR, Obstacle Detection, Obstacle Avoidance, Obstacle Warning System, UA, Low-Level Flight, Sense and Avoid, Nap-of-the-Earth Flight.
Conference Title : ICEP 2014 : International Conference on Electronic Publications
Conference Location : journal city, WASET
Conference Dates : November 23-23, 2014