Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XL-1/W4, 337-343, 2015
https://doi.org/10.5194/isprsarchives-XL-1-W4-337-2015

Volume XL-1/W4

26 Aug 2015

PERFORMANCE CHARACTERISTIC MEMS-BASED IMUs FOR UAVs NAVIGATION

H. A. Mohamed[1], J. M. Hansen[2], M. M. Elhabiby[3], N. El-Sheimy[1], and A. B. Sesay[1]
[1]Department of Geomatics Engineering, University of Calgary, Calgary, Alberta, Canada
[2]Department of Engineering Cybernetics, Norwegian University of Science and Technology, 741 Trondheim, Norway
[3]Public Works Department, Ain Shams University, Cairo, Egypt

Keywords: UAV, Navigation, Sensor fusion, INS/GPS, IMU, GPS, Magnetometer, Extended Kalman Filter, RTK

Abstract. Accurate 3D reconstruction has become essential for non-traditional mapping applications such as urban planning, mining industry, environmental monitoring, navigation, surveillance, pipeline inspection, infrastructure monitoring, landslide hazard analysis, indoor localization, and military simulation. The needs of these applications cannot be satisfied by traditional mapping, which is based on dedicated data acquisition systems designed for mapping purposes. Recent advances in hardware and software development have made it possible to conduct accurate 3D mapping without using costly and high-end data acquisition systems. Low-cost digital cameras, laser scanners, and navigation systems can provide accurate mapping if they are properly integrated at the hardware and software levels. Unmanned Aerial Vehicles (UAVs) are emerging as a mobile mapping platform that can provide additional economical and practical advantages. However, such economical and practical requirements need navigation systems that can provide uninterrupted navigation solution. Hence, testing the performance characteristics of Micro-Electro-Mechanical Systems (MEMS) or low cost navigation sensors for various UAV applications is important research. This work focuses on studying the performance characteristics under different manoeuvres using inertial measurements integrated with single point positioning, Real-Time-Kinematic (RTK), and additional navigational aiding sensors. Furthermore, the performance of the inertial sensors is tested during Global Positioning System (GPS) signal outage.

Conference paper (PDF, 1324 KB)

Citation: Mohamed, H. A., Hansen, J. M., Elhabiby, M. M., El-Sheimy, N., and Sesay, A. B.: PERFORMANCE CHARACTERISTIC MEMS-BASED IMUs FOR UAVs NAVIGATION, Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XL-1/W4, 337-343, https://doi.org/10.5194/isprsarchives-XL-1-W4-337-2015, 2015.

BibTeX EndNote Reference Manager XML