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NEW METHOD FOR THE CALIBRATION OF MULTI-CAMERA MOBILE MAPPING SYSTEMS

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Abstract. Mobile Mapping Systems (MMS) allow for fast and cost-effective collection of geo-spatial information. Such systems integrate a set of imaging sensors and a position and orientation system (POS), which entails GPS and INS units. System calibration is a crucial process to ensure the attainment of the expected accuracy of such systems. It involves the calibration of the individual sensors as well as the calibration of the mounting parameters relating the system components. The mounting parameters of multi-camera MMS include two sets of relative orientation parameters (ROP): the lever arm offsets and the boresight angles relating the cameras and the IMU body frame and the ROP among the cameras (in the absence of GPS/INS data). In this paper, a novel single-step calibration method, which has the ability of estimating these two sets of ROP, is devised. Besides the ability to estimate the ROP among the cameras, the proposed method can use such parameters as prior information in the ISO procedure. The implemented procedure consists of an integrated sensor orientation (ISO) where the GPS/INS-derived position and orientation and the system mounting parameters are directly incorporated in the collinearity equations. The concept of modified collinearity equations has been used by few authors for single-camera systems. In this paper, a new modification to the collinearity equations for GPS/INS-assisted multicamera systems is introduced. Experimental results using a real dataset demonstrate the feasibility of the proposed method.

[Conference Paper](#) (PDF, 602 KB)

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