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DIRECT GEOREFERENCING WITH ON BOARD NAVIGATION COMPONENTS OF LIGHT WEIGHT UAV PLATFORMS

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Abstract. Unmanned aerial vehicles (UAV) are a promising platform for close range airborne photogrammetry. Next to the possibility of carrying certain sensor equipment, different on board navigation components may be integrated. These devices are getting, due to recent developments in the field of electronics, smaller and smaller and are easily affordable. Therefore, UAV platforms are nowadays often equipped with several navigation devices in order to support the remote control of a UAV. Furthermore, these devices allow an automated flight mode that allows to systematically sense a certain area or object of interest. However, next to their support for the UAV navigation they allow the direct georeferencing of synchronised sensor data.

This paper introduces the direct georeferencing of airborne UAV images with a low cost solution based on a quadcopter. The system is equipped with a Global Navigation Satellite System (GNSS), an Inertial Measurement Unit (IMU), an air pressure sensor, a magnetometer, and a small compact camera. A challenge using light weight consumer-grade sensors is the acquisition of high quality images with respect to brightness and sharpness. It is demonstrated that an appropriate solution for data synchronisation and data processing allows a direct georeferencing of the acquired images with a precision below 1m in each coordinate. The precision for roll and pitch is below 1° and for the yaw it is 2.5° . The evaluation is based on image positions estimated based on the on board sensors and compared to an independent bundle block adjustment of the images.

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