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ABSTRACT-ONLY

Development of an unmanned aerial system for low cost high resolution near infrared photography

C. Roessler, S. Speck, J. Schoemann, D. Paulus

Lehrstuhl für Luftfahrtsysteme, TU München, Boltzmannstraße 15, D-85747 Garching, Germany

Tel. 089 289 15985, Fax. 089 289 15982, email: christian.roessler@tum.de

Aerial near infrared photography allows monitoring of vegetation, soil and forests more efficiently than in the visible spectrum. For instance in archeology and botanical applications, the reflection of infrared light is an indication for the health of the plant and the kind of soil it is growing on.

The general problem of aerial photography is the high cost of the operation of an aerial vehicle. These tasks are mostly conducted with manned general aviation aircraft. The integrated sensors are expensive and heavy. In some areas, such as nature protection areas, it is even prohibited to fly using combustion engines.

Hence, in this paper an unmanned aerial system capable of high resolution near infrared photography is introduced. Our results show that with this small size aircraft high quality images can be produced at very low cost. Furthermore due to the zero emissions concept of the electric propulsion system used, environmentally restricted areas can be monitored.

The near infrared sensor is a modified digital single-lens reflex camera with an altered filter system, in order to record the infrared light spectrum. The weight of the camera is 1300g while the resolution is 6 megapixel. The carrier aircraft is an off-the-shelf foam remote controlled model aircraft which is cost-efficient and highly crash resistant. Its structure has been modified to accommodate the camera. Also the landing gear has been adapted to enable take off and landing from rough terrain on short distances without having to rely on declared airstrips. A Paparazzi autopilot is used for flight control. The aircraft is operable by one person with a flight time of about 15 minutes.

With the system presented, the advantages of aerial infrared photography are made accessible and affordable for a variety of applications.

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