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A NEW APPROACH FOR AN INCREMENTAL ORIENTATION SEQUENCES

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Abstract. Civil applications for small size unmanned aerial vehicles (UAV) have become more and so have accurate orientation and navigation of these devices in unknown terrain. This paper presents a novel approach for compatible positioning in facade observation based on monocular low resolution stereo images captured by a camera mounted on a UAV. Also, a 3D point cloud of the facade is generated. This allows for navigation assistance, collision avoidance or the evaluation of the point cloud density. To be able to deal with the increasing amount of observations and unknown feature points, an incremental bundle adjustment based on automatically determined tie points and self-calibration is used. Self-calibration and orientation allows for an efficient double cross-check of the detected feature points and their corresponding camera parameters values for the nonlinear bundle adjustment. The initial values are estimated within a sound basis for the incremental adjustment. Our algorithm is evaluated by means of a facade of the Welfenschloss in Hannover, captured from a manually flown Microdrones md4. The results are compared with the orientation results of our approach with an approach in which initial values for the camera parameters are computed algebraically.

[Conference Paper](#) (PDF, 1240 KB)

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