

Unmanned Aerial Vehicle (UAV) based mapping in engineering surveys: Technical considerations for optimum results

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Abstract

Unmanned Aerial Vehicles (UAVs) are a promising technology with great potential as a tool in engineering surveys. As every tool, it requires sensible use and more importantly, a good understanding of the surveying principles involved. This technology has already become the Holy Grail in mapping surveys, in many cases totally replacing terrestrial surveying equipment: its ability to cover large areas in very little time is a highly desirable characteristic in an era where quick and effective intervention has become the norm. We show that this comes at a cost; high resolution images require more expensive sensors or lower flight heights and computers with high processing capacity to allow for processing of large numbers of images. An engineering approach, such as a compromise between the flight height and the detail that can be derived from the orthomosaics, is required almost at all times, if, for example, cost and time are the driving parameters. Due to the wide availability of UAVs and their ease of use, the number of operators with limited surveying and photogrammetric knowledge is constantly increasing. In this study we discuss some of the main technical parameters, such as the effect of topography and UAV orientation on the overlap value, the camera calibration, number of control points and lighting conditions that need to be taken into account in order to utilize UAVs to their maximum potential.

Keywords: *UAV; Fixed wing; VTOL; Mapping; Image resolution; Engineering geological survey*

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