APPLICATION OF A NEW MODEL HELICOPTER SYSTEM IN ARCHITECTURAL PHOTOGRAMMETRY

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ABSTRACT

In architectural photogrammetry the production of facade plans or 3D models is usually one of the most important points of interest. The disregard of roofs is partly caused by the lack of appropriate image acquisition methods. In order to overcome these drawback a new image acquisition system has been developed. This aerial vehicle consists of a radio controlled model helicopter including a special designed camera mount which is an integrated part of the landing skid. The camera mount is designed for amateur cameras as well as for professional cameras and for digital video cameras and can be tilted radio controlled. In addition, a separate small CCD-Camera looking through the view finder and a video link including video transmitter, video receiver and ground-monitor are used to provide an in-flight control of image contents and to control the shutter release. In order to check the applicability of the helicopter for photogrammetric purposes, a historical mill was chosen as a test object. The mill itself is a rather complex building with an inner courtyard. For this pilot project 82 terrestrial photographs, taken with a digital camera, were combined with 38 photographs taken from the model helicopter. The photogrammetric measurements were made using the new photogrammetric plotting software ORPHEUS. This paper describes the application of the new helicopter system for architectural photogrammetry and the production of a high-quality 3D photo model. Special emphasis is laid on the description of the new helicopter platform and the software used for photogrammetric plotting.

1 INTRODUCTION

In architectural photogrammetry the production of facade plans is usually one of the most important points of interest. The disregard of roofs is partly caused by the lack of appropriate image acquisition methods. Using a crane or a hydraulic jack is often to cost expensive and the resolution of aerial photographs often does not fit the requirements because of safety restrictions of flying height. Similar problems appear in the field of archaeological excavations. The use of radio controlled model helicopters and zeppelins seems to provide a solution for these problems. However, there are also problems connected with these platforms. The shutter release is also radio controlled and usually the contents of the taken photograph is only approximately known. In addition, professional helicopter systems are often too expensive. That is why these systems have only been used scarcely, too.

In order to overcome these drawbacks a new image acquisition system has been developed. This aerial vehicle consists of a radio controlled model helicopter including a special designed camera mount which is an integrated part of the landing skid. In addition, a separate small CCD-Camera and a video link including video transmitter, video receiver and ground-monitor are used. The model helicopter needs only a small space for starting and landing and is able to hover over one spot. It can be applied for all types of close range projects including industrial applications.

In order to check the applicability of the helicopter for photogrammetric purposes, a historical mill was chosen as a test object. About 80 terrestrial photographs were taken of the mill which is a rather complex building with an inner courtyard. For that purpose a digital camera (Kodak DCS460c) with two different focal lengths was used (15 mm and 28 mm). In addition, 38 photographs using a small format amateur camera were taken from the model helicopter recording the roof scenery. Control information was provided by geodetic measurement of about 120 distinct points. After scanning the helicopter images