



## Use of orthophotoimages in order to achieve the Zonal Urban Plan in Vulcan area, Deva Municipality, Hunedoara County

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### ABSTRACT

The studies presented in this paper were carried out in the western part of Romania, on the administrative territory of Deva Municipality, in the Vulcan area, in order to achieve a zonal urban plan. The purpose of the study is the acquisition of GIS data related to the realization of the plans for the technical approval for the Vulcan zonal urban plan. To achieve this plan, by default a GIS database, we used the LEICA TS02 total station with the measurement accuracy of 1 mm / km for distances and 2 seconds for angles, GNSS GPS rover RTK South S82T equipment to determine the points marked on the route that is to be traversed by the eBee senseFly drone, which helped with time management.

### INTRODUCTION

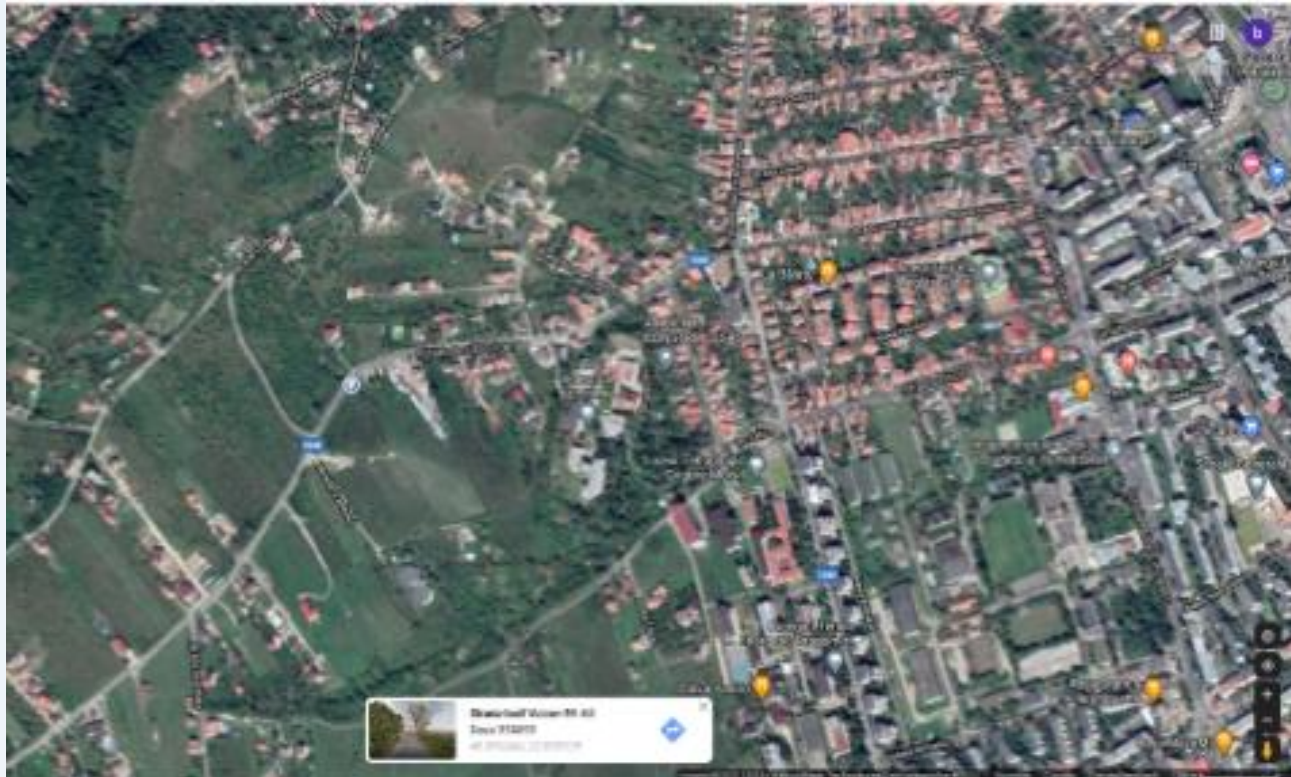
If at the beginning the implementation of a geographical information system meant the acquisition of hardware and software, now there is an increasing emphasis on data collection and implementation of customized geographic information systems (HERBEI et al., 2018; HERBEI, 2015).

Customized Geographic Information Systems have been developed for various uses: inventory of technical and municipal cadastre, environmental applications, pollution and impact studies, financial analysis and strategies, applications for monitoring technical and municipal networks, disaster prevention applications, tourism applications, monument protection, routing applications, public and private inventory applications, urban applications, precision agriculture (HERBEI and SALA, 2014; HERBEI et al., 2016) etc.

With the implementation of new technologies in almost all important areas of daily life, it was only a matter of time before the influences of modernization would appear in the cadastre system.

### MATERIAL AND METHOD

All the data obtained with the help of these equipments are complementary and the final result will be an Orthophotoplan of the Vulcan area. The research presented in this paper was conducted in Deva, Vulcan area, Romania. The municipality is located on the banks of the Mureş River. The case study presented below was performed in the Vulcan area. The study area is located along Iosif Vulcan Street in Deva. The street structure is uniform, a main street that branches into related streets. The buildings and houses are on either side of the main street with various positions. Most are lined up on the street, but there are many homes set aside.



The working methodology that was the basis of this study was divided into several stages and is summarized in the following list:

- Realization of the flight plan in the eMotion program and establishing the area to be measured
- Taking data from the field
- Processing of data taken with topographic and aerial photography equipment from the field
- Data entry in the AutoCad and Postflight Terra3d program powered by Pix4D
- The orthophoto image obtained after processing is aligned according to the data taken with GNSS equipment. Preparation of documentation for obtaining the technical approval from the Office of Cadastre and Real Estate Advertising.
- Elaboration of the zonal urban plan.

#### Equipment used

Rompos South S82-V RKN GNSS with real-time work possibilities, with internal radio on the frequency of 433 MHz and 4GB memory, has an integrated post-processing software and offers high measurement accuracy. The selectable antenna and the customized frequencies are optimized for applications specific to the job in question.

To determine the points along Iosif Vulcan Street, in the first phase we used the total station LEICA TS02, with routes from known points.

Designed to capture the surrounding realities quickly and easily, the eBee SenseFly drone makes the actual measurement a simple procedure. The equipment is a platform for sensors to capture reality



#### Hardware components

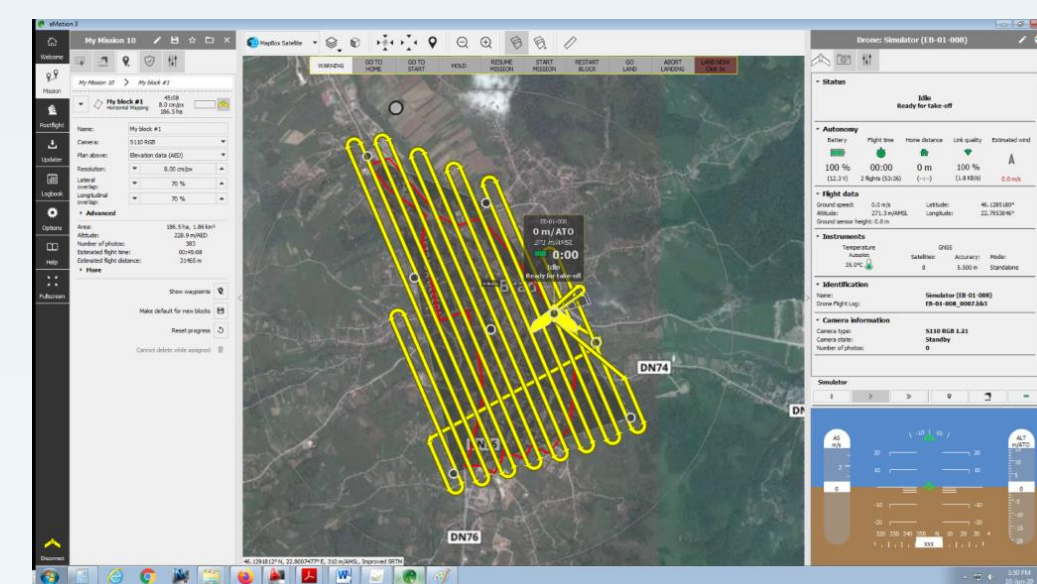
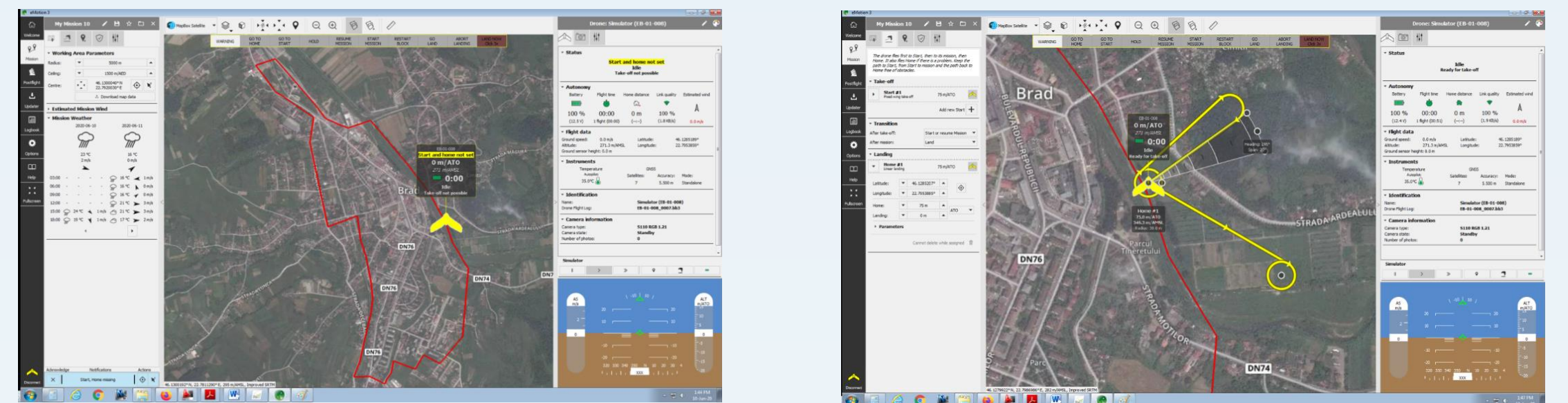
An Asus Rog laptop with a very powerful processor was used to process the data, which allowed the processing of the large amount of information contained in the digital images. The main features of the laptop are: Intel® Core™ i7-4700HQ 2.40GHz processor, Kaby Lake™, 16GB, 1TB, nVIDIA GTX 860 4GB.

### RESULTS AND DISCUSSIONS

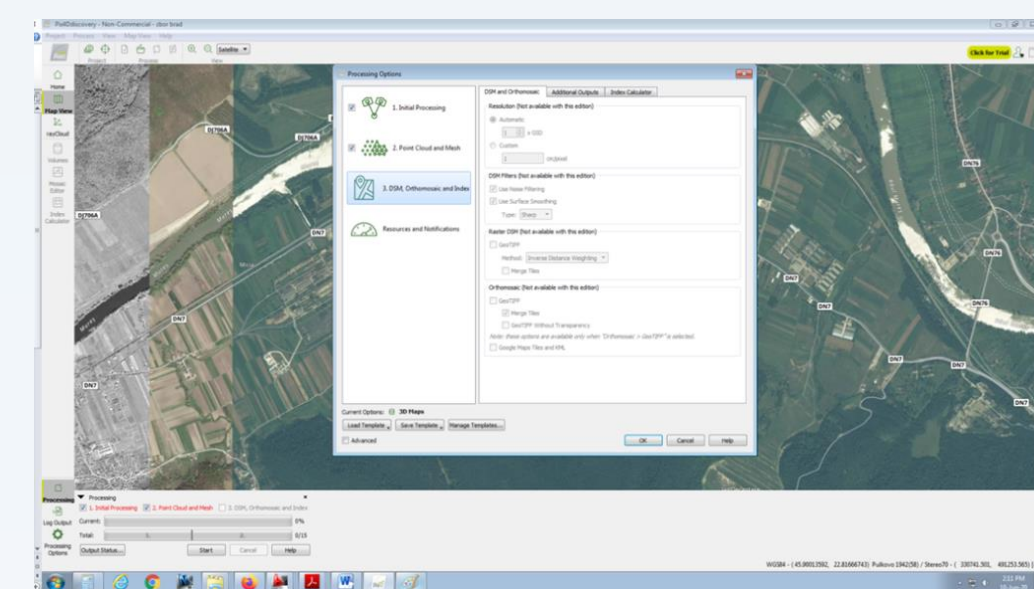
GNSS determinations on the points marked on the route were performed by the RTK method using GNSS equipment. After completing this procedure, we have the data for the alignment of the orthophotoplan to be generated from the data taken with the help of the drone.

To perform the measurement using the aircraft, we will perform three steps:

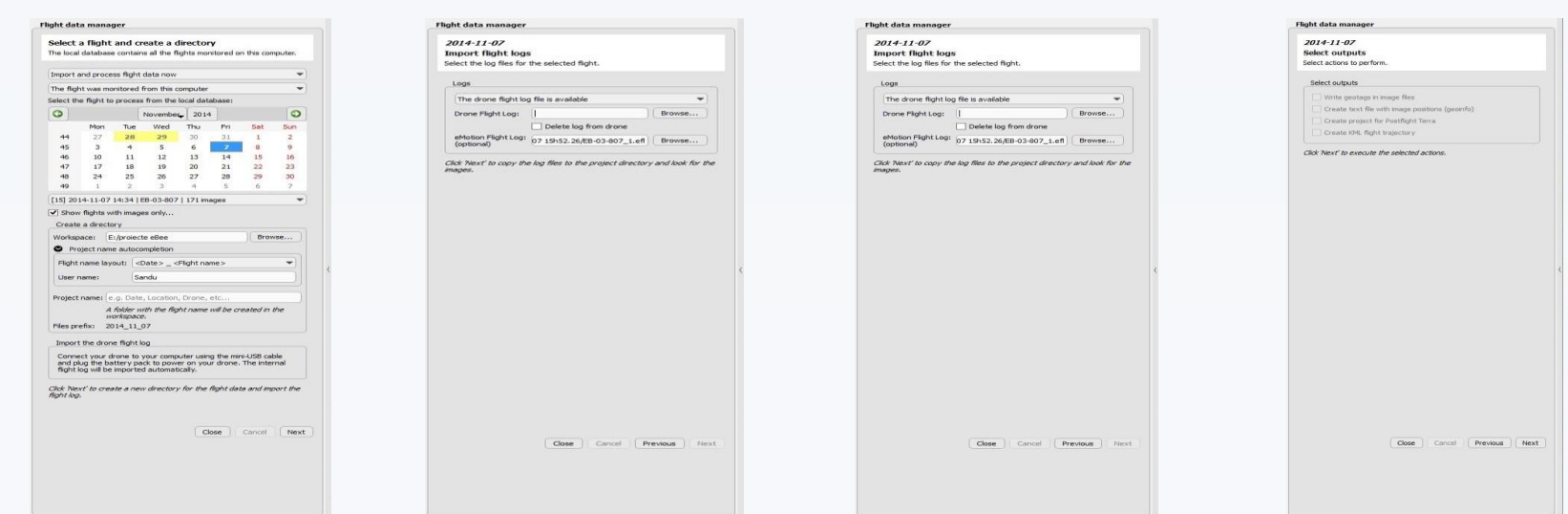
- In the first stage, the flight mission from the office will be baked;
- The second stage will go out on the ground with the aircraft, it will be placed on the launch point preset by the surveyor
- After completing the flight mission, the equipment is unloaded and the measurement and images taken by the camera integrated in the eBee SenseFly drone are processed.



The data obtained through the scan was processed in the Pix4D program, which is a data processing software taken with the eBee senseFly aircraft. The data taken with the drone are both images and point clouds.



From this menu, select the flight to be downloaded, the flight log to be used, download and coordinate the pictures taken and create the project.



The project can be imported either directly from the eMotion interface or by creating a new project and manually importing pictures taken with the drone



### CONCLUSIONS

The advantages of using geographic information systems and their applicability in many fields have led to the spread of this concept. Most institutions, companies working with spatial data have initiated a GIS project. Using aerial photography offers advantages such as speed of measurement, precision and accuracy of the data and the high degree of detail.