Destination Rail

Application of Unmanned Aerial System (UAS) for railway infrastructure assessment
Destination Rail

Main project components

FACT

1. Inventory of problems
2. Location of Hotspots
3. Monitoring of switches, crossings and tracks
4. Monitoring of earthworks
5. Monitoring of structures
Drones are a relatively new technology that has resulted from improved global positioning systems (GPS), better software, smaller computers, sensors and advance in materials.

Different types of drones which can be monitored remotely or fly autonomously using a pre-programmed flight plan.

- DJI Phantom 4 Pro
- DJI S1000+
- senseFly eBee RTK
UAS - Drones

- In recent times, for the purpose of photogrammetric recording and mapping, using of UAS (Unmanned Aerial System) is becoming more affordable, accurate and safer.
UAS - Drones

• each of these types are capable of performing missions, but still each one has advantages and disadvantages
• UAS can take different forms and can be divided in two major groups by constructions which are “fixed wing”, and “rotary wing”
UAS - Drones

Different types of sensors that can be used with drones:

- Thermographic camera
- LiDAR laser scanner
- Gas detector
- Multispectral camera
UAS - Drones

Helping railways: new assessment methodology

- 'standard' means of visual examination is walking along the railway and noticing irregularities
- in the case of high or steep slope embankments, important information can easily be overlooked

![Image of landside due to inadequate drainage, cross section for calculations, clogged drainage channel, and deformation of the existing support (driven rails and wooden sleepers)]

Typical problem of embankment instability - image recorded with UAV, as a part of the repair project on railway track in Croatia
UAS - Interactive procedure of visual assessment in real time

DESTination RAIL
Decision Support Tool for Rail Infrastructure
EU Project No. 636285
UAS - data collection – Croatian railways
UAS – Drones - Point cloud generation

Mapping Doljan landslide

• 56 pictures
• Ground Sampling Distance (GSD): 0.48 cm
UAS - Drones
Point cloud generation
3D polylines
UAS - Drones

Point cloud generation

Contours & cross sections
UAS - Drones

Point cloud generation

Volume calculation
UAS - Drones

Point cloud generation

High resolution orthophoto map
UAS - Drones
Resolution [cm/pixel] : 1.5
UAS - Drones

Point cloud generation

DSM digital surface model
UAS - Drones
3D animation
UAS - Drones

Mapping Pčelić railway
- 493 pictures
- Ground Sampling Distance (GSD): 0.48 cm
UAS - Drones

3D animation
UAS - Drones

Rockfall mapping:
• traditional methods for collecting volume and geometry data in some cases can be very time consuming, expensive and in most cases very dangerous with final result not matching required accuracy
UAS - Drones

Mapping Jurdani rockfall:
- 175 pictures
- Ground Sampling Distance (GSD): 0.48 cm
UAS - Drones

3D animation
UAS – additional possibilities

Google Earth overlap
UAS – additional possibilities

3D PDF

doljan_simplified_3d_mesh
UAS – additional possibilities

3D Textured Mash
UAS – additional possibilities

Upload to the cloud

https://cloud.pix4d.com/pro/project/278684/3d?shareToken=841565db15774d2ca2214f109c461045
UAS - overview

Advantages:
• ability to customize to user needs
• provides research and mapping inaccessible areas
• various types of exports
• accuracy and precision
• amount of data

Disadvantages:
• high costs in the case of crash or damage
• inability to measure in all weather conditions
• legislation
• amount of data
Thank you for attention!

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