

REMOTE SENSING RESEARCH AND DEVELOPMENT CENTRE

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DEVELOPING OF THE COLLECTING AND DIGITALISING METHODOLOGY OF THE DATA FROM THE LAND
BORDER VIOLATION PLACES USING UNMANNED AIRCRAFT SYSTEMS WHICH IS SUITABLE AS
EVIDENCE IN COURT



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RESEARCH

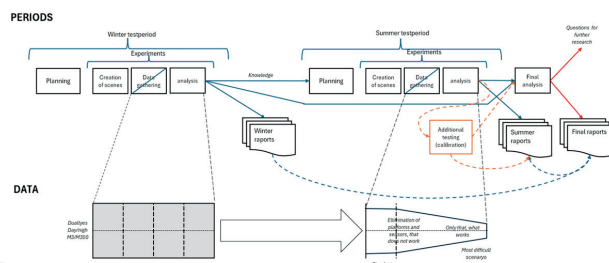
DESCRIPTION

In a situation where a neighboring country does not cooperate in resolving a border incident, determine whether, to what extent, and in what manner it would be possible to obtain evidence from its territory without physical intervention - using widely available unmanned aerial vehicle (UAV) based remote sensing tools and consumer software.

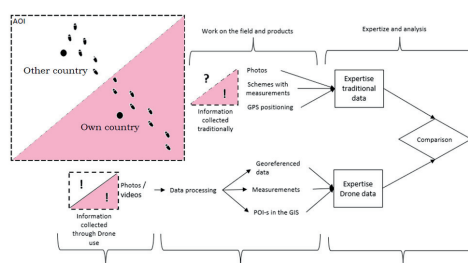
RESEARCH PURPOSE

1. To test the applicability of UAVs in collecting relevant data from staged scenes of land border violations (RGB, thermal and multispectral camera photos) in different scenarios and conditions (study border/forest/swamp/lake summer/winter day/night).
2. To examine and process data obtained using UAVs and sensor combinations so that they can be used as sufficiently reliable evidence in real case
3. Analysis and evaluation of new solutions in cooperation with end users (court and border guard experts)

Metodics



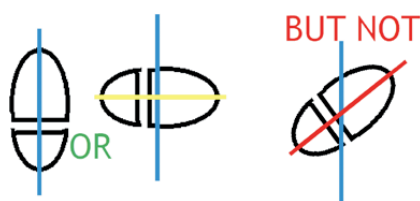
Experiment



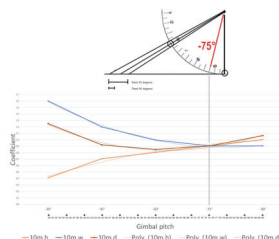
RESULTS

1. UAV-based work does not destroy evidence or create new traces at the scene - it is compatible with the use of dogs.
2. UAV is quickly deployed, as traces must be photographed as quickly as possible.
3. Georeferenced photographs taken with a UAV have a level of accuracy that allows geographical localization of traces for crime scene diagrams, but measurement of shoe prints, etc. only under ideal conditions.
4. Thermal infrared (TIR) can highlight footprints hidden in snow. In summer, it is suitable for searching for warm bodies (people and fireplaces), but the warming of other bodies causes false positives.
5. Multispectral cameras may or may not provide a visual result - future perspective machine learning
6. Due to the correspondence of the pixel to the ground (pixels in a more distant area cover more), it is preferable to photograph the dimensions of the object along or perpendicular to the long axis of the camera lens.
7. You need to know your camera when using it: for the Zenmuse H20N, the ideal photography angle is -75°.
8. fits successfully into the workflow.

Result 6



Result 7



Result 8 workflow



FUTURE RESEARCH

1. Determining the location of a data-collecting UAV in the event of GNSS interference.
2. Increasing cross-border measurement accuracy, namely:
 - Determining distortions
 - Refining the UAV location in three-dimensional space
 - Merging a photo with terrain model
3. Multispectral cameras and machine learning

