MORE THAN JUST FIELD WORK

JAKUB KARAS DISCUSSES HOW A TEAM IN THE CZECH REPUBLIC IS USING UAVS TO MAP CROPS, LOCATE LOST DRAINAGE SYSTEMS AND EVEN SAVE ANIMALS' LIVES

One of the greatest potential uses of UAVs worldwide is in agriculture. Their main advantage is the ability to deploy drones almost instantly to survey agricultural land as soon as is needed in certain weather conditions, during and after calamities such as floods and landslides, or to monitor phenophases.

UAVs also brings opportunities not only to map in the different spectral bands but at very high resolution, which was not previously not possible. These detailed maps can be used for various purposes, including landscaping projects.

Other benefits include the ability to plan flights in the field according to the situation and to explore data and imagery several minutes after landing. Surveyors can then react immediately to any discoveries from the air, and plan further mapping and monitoring from both the UAV and the ground.

In the Czech Republic, my company Upvision is collaborating with several research institutes to test new possibilities for using UAVs in agriculture. We are working with a variety of UAV types with different sensors for different applications, using unmanned planes for mapping large areas and multicopters to map and monitor smaller areas and for special applications.

In particular, there are several potential applications of UAVs in the Czech Republic for mapping and monitoring for unusual purposes in agriculture, which in the future will continually increase.

One such use is mapping the extent of damage to crops on agricultural land from wild animals or after disasters such as heavy rains and storms. This applies particularly to large agricultural lands, where lately there has been frequent devaluation of crops by frequent storms and persistent rain. The easiest way to identify the extent of such damage is to map the exact area from a UAV and determine its status and area from a current high-resolution orthophoto.

A similar application is identifying the damage to maize crops from wild pigs, where it is possible to map the area from a UAV and measure the damaged area for insurance purposes and so on.

Identify and protect animals before harvest

An interesting application is the use of UAVs to protect animals before intensive harvest, mainly of grasslands. Nowadays, modern harvesting equipment is huge and its speed is high. As a result, increasingly frequently, hidden animals are killed, mainly deer roes, which are not self-sufficient.

For more than two years now, early in the morning before the full sunrise and the harvesting of larger areas begins, we have been successfully testing the use of a UAV with a thermal camera to identify animals and record their exact GPS positions. After we've identified the animals, the farmer or gamekeeper startles them from their locations or transfers them to a safe zone.

It turns out that this method is one of the best solutions for larger areas – much better than the land monitoring from a thermal imager on the ground, which isn't possible for larger areas; even preventive scaring didn't bring about the expected results.
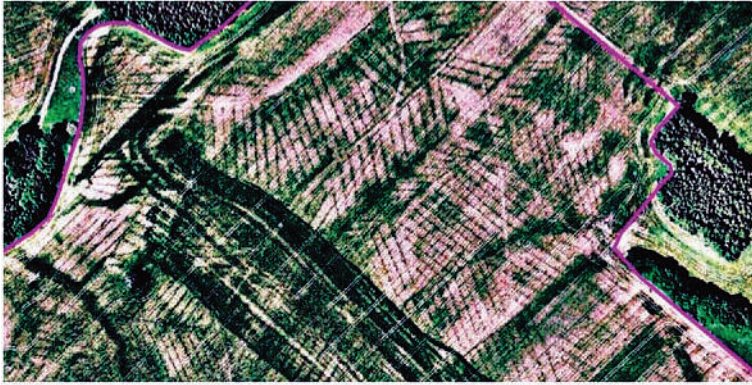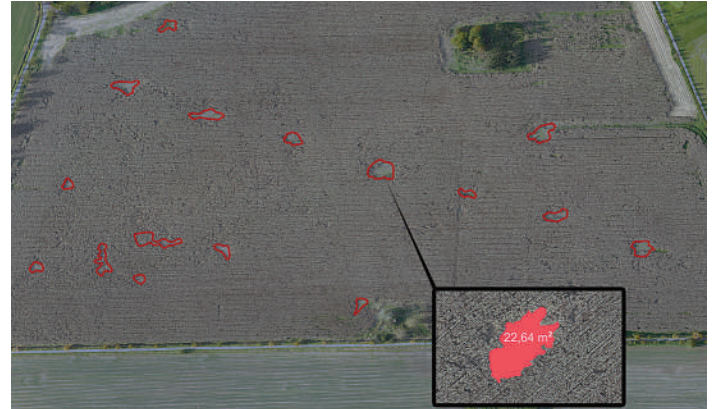
Identification of underground drainage systems from a UAV (© Upvision)

A UAV for mapping larger areas launched from the hand (© Upvision)
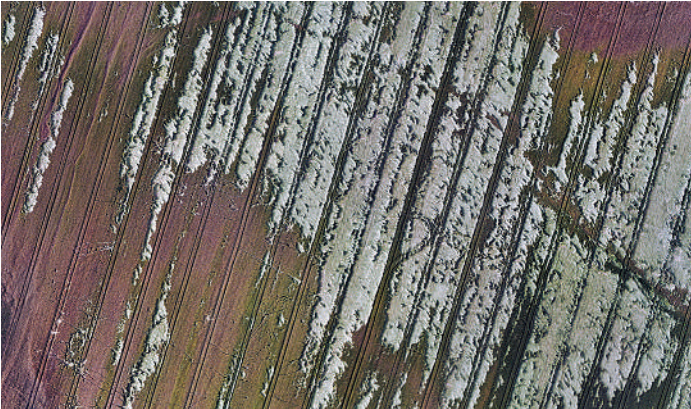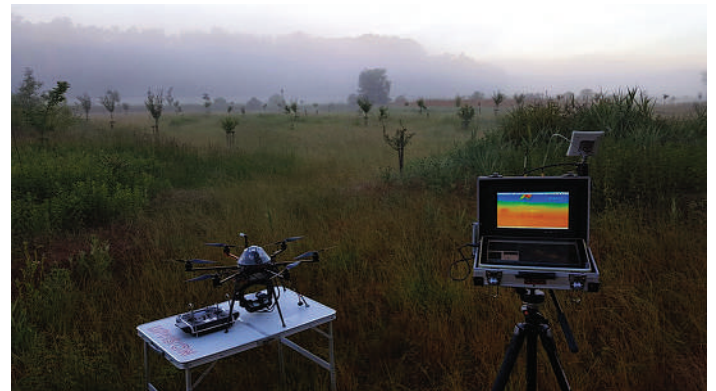

Agriculture land damaged by heavy rain (© Upvision)

Measuring damage to an area by wild pigs from an orthophoto taken from a UAV (© Upvision)

Thermal identification of animals from a UAV before harvest (© Upvision)

Using a UAV early in the morning to identify animals before harvest (© Upvision)

In the future, the use of UAVs to monitor fields before harvesting could save many animals' lives.

Identification of underground drainage systems

A large part of the agricultural area in the Czech Republic is on top of an underground drainage system. This system was introduced in the last century and the pipes are already at the ends of their lives, which is leading to disorders that manifest themselves directly on farmland.

Unfortunately, there is no precise documentation or maps showing how and where the system is under the fields. This means no one can maintain the system, and many owners are unaware that they even

have a drainage system under the land, even though by law they are its owners.

For the past five years, Upvision and the Czech Research institute for Soil and Water Conservation have been establishing a methodology to identify these underground drainage systems using remote sensing. We have determined that the best way to identify the system is to use UAVs to map agricultural land in certain climatic conditions. By creating an orthophoto at a specific resolution and coordinates, it is possible to create a high-resolution digital surface model on which are visible lines indicating the positions of the underground drainage pipes. By vectorising these lines in a GIS, you can obtain exact map locations of the drainage pipes several feet underground.

Conclusion

It is possible to collect geospatial data from a UAV at a lower price than from a piloted aircraft. This has resulted in the expansion of the use of remote sensing in agriculture, into areas previously no one could have imagined. In future, we can also expect a greater use of UAVs by small farmers.

THE USE OF UAVS TO MONITOR FIELDS BEFORE HARVESTING COULD SAVE MANY ANIMALS' LIVES

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