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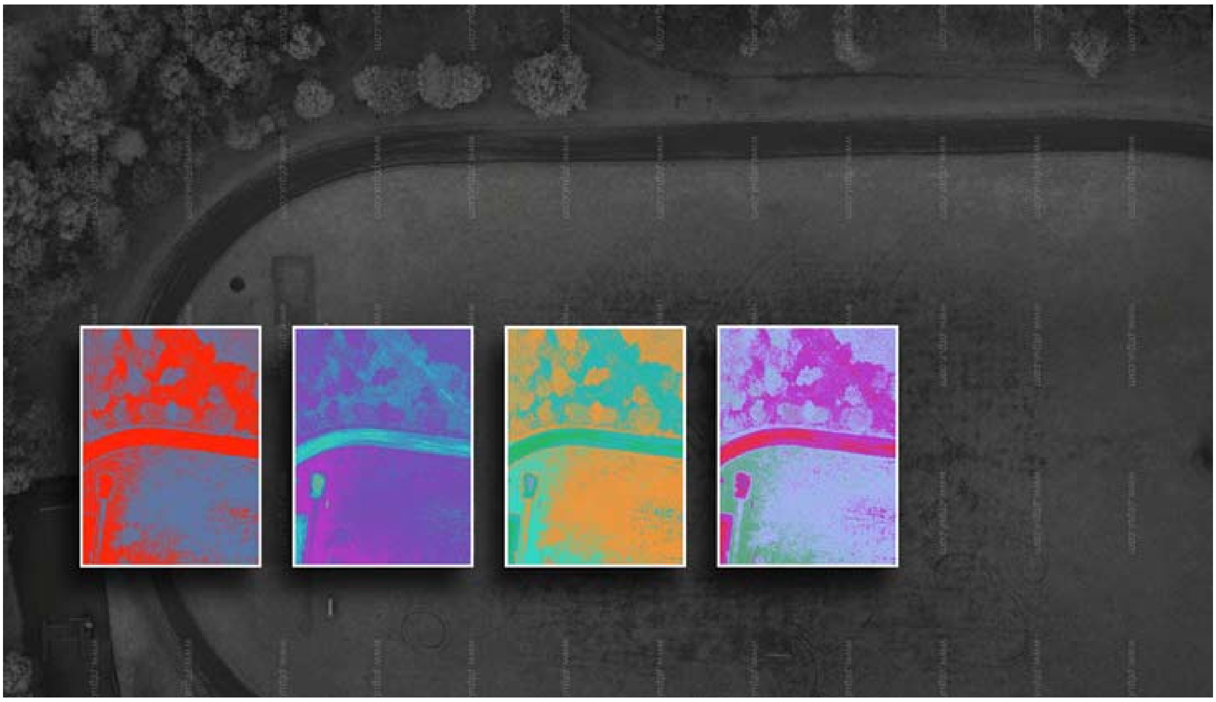
Press Release /// Pressemitteilung

UAV- / Drone-based Precision Agriculture & Smart Farming

6. May 2015



With our development of high-performance, precise and robust lightweight UAVs on the one hand and new multispectral and hyperspectral or smartly combined sensors on the other hand opportunities and markets are rapidly emerging. Including the use of drones / UAVs in remote sensing as multispectral sensing platforms, which has become quite popular for a wide range of agricultural applications in the last decade.

UAV / drone-based precision agriculture & smart farming

Precision farming and smart agriculture aim at more sophisticated, more detailed information about forest and agricultural land to optimize land management for lifestock, aquaculture and cultivation. That information must be site specific. In short: You need precise and comprehensive information reflecting the variety of any parcel of land.

Yield mapping and field management with UAVs / drones?

Therefore unmanned aerial vehicles – also called remotely pilot aircraft systems (RPAS) or unmanned aircraft systems (UAS) – serve as flying sensor platforms. From UAV- / drone-based surveying flights in the planning stage of an agricultural project, to UAV- / drone-based yield mapping, crop-cutting

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records and field management: For every need aerial images deliver information of higher value. Such as aerial high-resolution RGB imagery combined with geographical data in surveying or aerial high-resolution RGB imagery and spectral band information in combination with geographical data in soil and crop inspections. There is so much information available from aerial perspectives. Sometimes satellite images can give a clue of soil and crop conditions, but particularly for precision agriculture and smart farming much more sufficient information would enable that more substantial savings and output. That's what the Jülich Research Centre could confirm: The AscTec Falcon 8 is able to collect required data in required quality and very efficient in use. To this see: http://www.asctec.de/en/back-to-the-future-remote-sensing-for-uav-precision-farming/.

UAV- / drone-based identification of crop and soil

Achieving better nutrient distribution within a field and applying the optimum level for each single site is not only a vision. Farmers and decision makers can get all required information with minimum delay to enable management decisions based on current crop and soil status. Identifying crop and soil properties in near-real-time and at delivering results to spatial resolution enables the identification of every in-field variability. The Jülich Research Centre explored that UAV / drone application for years. Many successful tests show the validity of aerial imaging as well as the reliability of our unmanned flying platform, the AscTec Falcon 8.

So let's use UAVs / drones to count trees and ripe fruits. Let's use UAVs / drones to measure conditions, environment, degree of ripeness and irrigation. Let's use UAVs / drones to localize fawn and other animals, detect vermins or pests. And let us identify differences in vegetation, growth, nitrogen supply, soil properties and yield capacity between areas within a field and respond accordingly with requirements – with the help of reliable UAVs / drones.

UAV- / drone-based irrigation and vegetation monitoring

Thus you receive information about water quality and irrigation as well. Nothing more but the precise amount of required fertilizers and pesticides can be used at the right parts of the field. No over watering and over fertilization any more. In addition protecting the environment by preventing nutrient accumulation. Irrigation and water conditioning can be analysed and optimised, too. Per UAV / drone you can gain additional valuable data for enlightening analysis. The AscTec Falcon 8 – due to its new autopilot AscTec Trinity – becomes up to 4 times faster than today's multi-rotor systems. Moreover its waypoint navigation functionality enables quick surveying with high area output and exact reproduction for frequent analysis. So you can acquire fine-scale vegetation data over large areas with minimal effort.

Tested UAV / drone sensors

The different UAV / drone sensors each have their strengths and limitations that have to be managed by matching sensor specifications and limitations to data acquisition requirements. Of course one would replace the tested sensors by today's latest cameras and more advanced sensors like our Inspection Payload TZ61, a FLIR Tau 2 640 or the coming soon MicaSense RedEdge multispectral

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camera. No longer available as well is the Sony Alpha NEX-5. Instead we currently offer the Sony Alpha 6000 and the Sony Alpha 7.

- UAV / drone RGB camera: Integrated RGB camera Sony Alpha NEX-5, field of view 73.7° x 53.1°, 3 spectral bands, range Red, Green & Blue, image size 4912 x 3264, image format JPEG, dynamic range 8 bit, payload / weight 500 g, handling wireless trigger, live view
  Results: Footprint shape rectangular, Footprint size (m) [UAV sensor height (m)] 149.9 x 99.9 [100], Ground resolution (m) 0.0305
- UAV / drone IR camera: Canon Powershot IR, VIS + infrared camera in the AscTec Falcon 8 UAV, field of view 57.2° x 40°, 3 spectral bands, range Green, Blue & IR, image size 4000 x 3000, image format JPEG, dynamic range 8 bit, payload / weight 100 g, handling interval mode
  Results: Footprint shape rectangular, Footprint size (m) [UAV sensor height (m)] 109.0 x 72.8 [100], Ground resolution (m) 0.0273
- UAV / drone IR camera: Tetracam MCA6, Multispectral Imager with 6 bands of 10 nm width, field of view 38.3° x 31°, 6 spectral bands, range 450–1000 nm, image size 1280 x 1024, image format RAW, dynamic range 10 bit, payload / weight 790 g, handling interval mode
  Results: Footprint shape rectangular, Footprint size (m) [UAV sensor height (m)] 17.3 x 13.9 [25], Ground resolution (m) 0.0135
- UAV / drone IR camera: Ocean Optics STS-VIS, Spectroradiometer with additional electronics for remote control, field of view 12°, 6 spectral bands, range 338–824 nm, image size n/a, image format n/a, dynamic range 14 bit, payload / weight 216 g, handling wireless trigger, live view
  Results: Footprint shape circular, Footprint size (m) [UAV sensor height (m)] Ø 2.1 [10], Ground resolution (m) n/a

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Find the complete summary here: Deploying four optical UAV-based sensors over grassland: challenges and limitations. – Unmanned aerial vehicles (UAVs) equipped with lightweight spectral sensors facilitate non-destructive, nearreal-time vegetation analysis: Download.

Turn key UAV / drone technologies for agro-industries

Standalone high-tech solutions like the AscTec Falcon 8 deliver information of high spatial and temporal resolution in a non-invasive manner. Remote sensing UAV systems are particularly promising for precision agriculture and diverse specific niche markets, where detailed spatial information and temporal resolution need to be available frequently. The UAV / drone AscTec Falcon 8 can be helpful in agricultural ecology, land management, rural development and agricultural constructions, aquaculture, irrigation and water management, livestock and dairy farming, plant propagation and seed control, plant protection, soil management and post harvest management, precision farming and smart agriculture, agricultural research and development (R&D).

Depending on each specific application useful data can be collected, analysed, processed and compared to receive sufficient information very efficient. More information will lead to more economical efficiency. Enabling agro-industries to increase productivity through optimized deployment of natural and artifical resources.

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