

TNO shatters limits in high resolution images

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In the development of Earth observation systems for small helicopters flying at low altitude, the Netherlands leads the field worldwide. By the end of this year, TNO will have mastered the production of very high resolution recordings, something that is still beyond the capabilities of satellites and aircraft. This is vital to the inspection of air and water quality, infrastructure and building activities.

The mini-helicopter's equipment includes a camera for taking pinpoint-sharp colour photos and video of the Earth's surface, an infrared camera and a spectrometer. What makes TNO's *Low Altitude Remote Sensing (LARS)* so interesting is its combination of different types of data at high resolutions.

'On full autopilot, the mini-helicopter flies a pre-programmed route at an altitude between 10 and 150 metres. We have already flown test flights to map changes in a polder landscape and in the Westerschelde estuary. And that's just two applications in a wide range that will soon be possible,' say Dr Arthur Reymer and Jaap van 't Hof of TNO. Monitoring Systems, their business unit, specialises in the processing and manipulation of large quantities of visual material.

2 X 2 CENTIMETRES

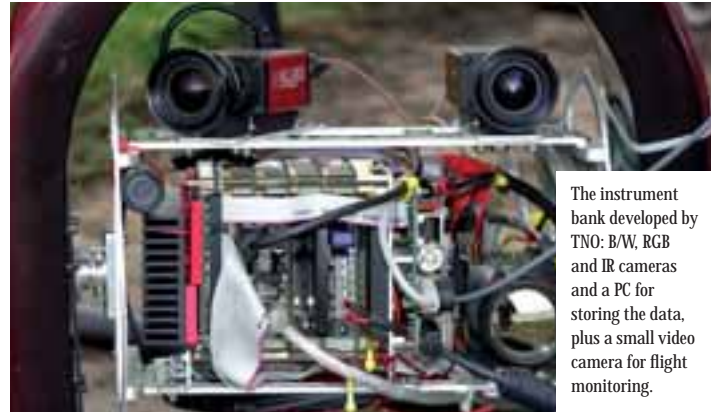
Various TNO specialists are involved in this development: optical specialists who realise the very high resolution images, geologists, software developers and experts in the field of data processing, sensors and wireless communication systems. 'It is this pool of expertise that makes TNO pre-eminently suited to getting this development off the ground.'

In recent years mini-helicopters have become increasingly lightweight and ever more sophisticated, prompting TNO to devise new applications for them and their instruments. Taking aerial measurements used to be the exclusive preserve of satellites and aircraft. But this approach has the attendant disadvantages of high altitude, dependence on the weather, lower resolution images and high costs. By way of comparison, the satellite launched last year, whose remit includes taking photos for Google Earth, takes colour photos whose resolution is limited to about 1.5 x 1.5 metres.

'By the end of this year, we'll be using the mini-helicopter to produce images accurate to a resolution of 2 x 2 centimetres,' reports TNO. 'Worldwide, that's a breakthrough and also why both the public sector and trade and industry are expressing such enormous interest. Just to be clear, we are talking about civilian not military applications.'

MORE DETAILED, CHEAPER

One such civilian application is the inspection of the algae concentrations in the Westerschelde estuary, for which a test has been carried out in cooperation with the Netherlands Institute of Ecology (NIOO-KNAW). Estuarial changes reveal much about the quality of the water and environment. To date, the study has involved using a spectrometer to take manual measurements at a large number of points. This takes considerable time and human resources. As well as taking over the point measurement, the mini-heli has increased the number of sites at which measurements are taken. Simultaneously, two cameras take a photo every two seconds of the flight path, thus scanning a large part of the water surface.



The instrument bank developed by TNO: B/W, RGB and IR cameras and a PC for storing the data, plus a small video camera for flight monitoring.



Jan Verhagen of HighEye BV, builder of the mini-heli, and former TNO employee Alan Peyaud.



'Thanks to the accurate GPS on board we know exactly where each recording has been made. All the data are fed straight into the computer and are used to produce 3D projections. The result is a much more detailed scan of the flight path in a much shorter time and at considerably less cost.' Working with the Rijnland District Water Control Board, TNO has similarly mapped a polder landscape where saline groundwater was causing damage.

One of the sectors expressing great interest in this solution is the building sector. It sees scope for inspecting roads, railways and bridges as well as the 3D mapping of day-to-day project progress. Early this month, the national media reported that the National Police Services Agency (KLPD) will be using a LARS-type heli-sensor combination in the war on drugs. This is, according to Reymer, 'a nice example of what LARS-type technology integration can mean for a specific application.'

Info: arthur.reymer@tno.nl, jaap.vanthof@tno.nl