"This technology could change the way we find and monitor threatened species, saving us both time and money."

Tania Pettitt
Partnership Manager 'Saving our Species' program
NSW Office of Environment and Heritage

The Fujitsu Digital Owl solution uses AI to process thousands of drone images, and helped the NSW Government's Saving our Species program to find and monitor hard-to-reach threatened species.

At a glance

Country: Australia
Industry: Public Sector
Founded: 2013
Website: environment.nsw.gov.au/sos

Challenge

Locating and monitoring threatened plants and animals can be difficult in the rugged and vast Australian landscape. It was for this reason that Fujitsu approached the Saving our Species program (SoS) as it identified an opportunity to apply its advanced technology and analytics to make threatened species monitoring more efficient.

Solution

Fujitsu and SoS worked with drone specialist, Carbonbix, to dispatch a drone fitted with a 5kg hyperspectral video camera capable of taking five photos a second. Pictures were analysed using Fujitsu Advanced Image Recognition software to detect threatened plants.

Benefit

■ Fujitsu Digital Owl is far more cost effective and produces fewer emissions than using a helicopter

■ AI image analysis gives an instant view of the specific plants, which can then be monitored

■ The AI image analysis shows the broader habitats where the plants are found, helping to inform the actions needed to save these species

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Customer

A flagship threatened species conservation program, Saving our Species is an element of the NSW Government's Environment portfolio. As part of this, $100 million, over five years (2016 – 2021), has been committed to help secure the future of NSW threatened plants and animals. Saving our Species combines best-practice science and research, with practical on-ground actions that directly benefit threatened species and the land they inhabit.

Products and Services

- FUJITSU Digital Owl
- FUJITSU Advanced Image Recognition (FAIR)

Tracking threatened species

Saving our Species (SoS) is tasked first and foremost with protecting the natural environment. In Australia's rugged countryside, that can be a challenge. Even something as simple as monitoring the survival of a threatened plant species can involve helicopter flights costing thousands of dollars, or a perilous hike up a mountainside.

More than 1,800 plant and animal species in Australia are threatened or endangered, and almost 1,000 of these are found in NSW. The Saving our Species program is therefore always on the lookout for smart ways to improve its ability to both detect and protect threatened species and eliminate invasive ones, such as the prickly pear.

"Mount Dangar, in the Goulburn River National Park, is the only place in the world where the small, rare tree Acacia dangarensis and the daisy Senecio linearifolius var. dangarensis grow," explains Tania Pettitt, Partnership Manager, Saving our Species. "Usually, monitoring these threatened species would entail a full day on foot with no guarantee of surveying the whole area, or paying up to $10K per helicopter trip."

Fujitsu and the NSW Government had a long-standing sustainability partnership. Fujitsu had been part of the SoS working group to develop the NABERS Energy for Data Centre ratings, a world-first validation of Data Centre Energy Efficiency claims. As well as being part of the working group, Fujitsu had been an early pioneer of the rating system, with the first data centre rated to the standard in Australia and the first complete portfolio rating.

Fujitsu came to the Saving our Species team with a radical suggestion: use drones to survey the territory, geo-tag thousands of images and then feed them into an AI platform that can teach itself to recognise the plants in question. With the funding provided by Fujitsu's internal incubator program, this idea was made possible through the management of the Digital Co-Creation team.

"Fujitsu is a Sustainability Advantage member, meaning it is committed to a green ethos. When it suggested using drones, we thought the Hunter Valley would be the ideal location for a pilot of the technology," says Pettitt. "It offers a cost-effective way to monitor both flora and fauna much more quickly and accurately."

Autonomous drones combined with AI

Fujitsu partnered with Australian drone company Carbonix to identify an appropriate drone: one with a three-metre wingspan that can take off and land vertically, and can glide at speeds up to 100km/hr. The attached 5kg hyperspectral video camera can take up to five photos per second and enables canopy penetration for the specific targeting of vegetation.

Five thousand images were captured over two days, with detailed maps pinpointing plant locations. Fujitsu's high-performance AI computing was then used to analyse site photography to detect threatened plants, while the introduction of pest plants were identified for eradication. GPS coordinates were then given to rangers to validate all findings.

"We all went up – Fujitsu engineers and Carbonix pilots – to the site and spent two days with the drone in the air, which supplied images directly to the Fujitsu hardware with its AI algorithm that could seamlessly detect the tree and the daisy, once we had tagged a few examples," continues Pettitt. "It was a massive win for us because we had no idea whether they would be there."

"Following a prolonged hot and dry summer, we feared the daisy population had perished," adds Lucas Grenadier, Senior Team Leader, Ecosystems and Threatened Species, NSW SoS. "So this exercise gives us a baseline of the existing population and a method to track it remotely over time."

Award-winning innovation

The Fujitsu Digital Owl solution provides an efficient, cost-effective and accurate way to carry out surveys of threatened plants and animals. "The project gives SoS the knowledge it needs to preserve these unique species and undertake key actions like collect seed and cuttings, weed control, and fence off plants that might otherwise be eaten by feral goats."

The solution was funded by Fujitsu's incubator program which enables staff ideas to develop into fully invested projects. The successful project was awarded the Smart Technology award at the ARN Innovation Awards 2018; and the partnership was recognised at the CitySwitch Awards which recognise sustainability excellence.

"This technology could change the way we find and monitor threatened species, saving us both time and money. The AI technology that Fujitsu has developed makes analysing thousands of images far more efficient," comments Pettitt. "This technology has the potential to have multiple applications beyond locating remote plant species, as Digital Owl is an effective way to conduct surveys. The Saving our Species team are now excited to survey using Digital Owl to locate other species."

"We are at the frontline of an existential battle where climate change is having a radical impact on native flora and fauna," concludes Grenadier. "Having new tools such as Fujitsu Digital Owl gives us more than a fighting chance of protecting key plants and animals for future generations."

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