

Morning Innovation Station - Site 3

Drones, Drones, Drones!

Airborne Solutions, FernTech, Overview, & Cottesbrook Dairy





Ferntech

New Zealand's Drone Experts

Ferntech NZ LTD

- Proudly NZ owned and operated company
- Over 10 years industry experience
- Auckland Branch
- Christchurch Branch

Travis Watkins

- Team lead for DJI Agriculture
- 102 Qualified

Teams

- Commercial
- Consumer
- Repairs and service





What we offer

- Local warranty support and repairs for DJI products
- Trained and experienced technicians
- Part 102 compliant inspections and service
- Preventative care
- Reliable advice, trusted support, and proven solutions
- Industry-leading Drone Pilot Training
- Regular Drone Service Plan

Expert advice

Since our humble beginnings we have worked with a range of clients across various sectors, ensuring drone pilots use the right solution for their project.

From surveyors mapping sites to engineers creating 3D models to track project progress, we have what it takes to deliver the aerial solutions, training, support, and service you need to achieve your goals.



Industries we work with

- Surveying
- Construction
- Engineering
- Asset inspection
- Utilities
- Agriculture
- Public safety
- Film and television

Combining the latest technology with our expert guidance, you can rest assured that you have the most cost-effective, efficient, and accurate solution for any project.





PIX4D software solutions

Drone surveying & mapping course

Learn all the essential drone surveying skills and knowledge in this comprehensive 2-day course.

Specialist training

Application drone training

Fast track employee drone knowledge and productivity in this hands-on drone operation and features course.

Time the second se

Part 101 & 102 courses

Learn everything you need to know to fly as a drone pilot under the Part 101 & 102 certificates.

Why DJI?

- Renowned quality and excellent performance
- Advanced safety features
- Intelligent Systems (Batteries, interface, and software)
- Value
- Ease of use
- NZ Service and backup

Benefits

- Time and cost saving
- Safety
- Precision Agriculture
- Survey and Mapping
- User friendly
- Portability





Enterprise Drone Models 2024

- M350RTK
- M30S and M30T
- Mavic 3 Enterprise
- Mavic 3 Thermal
- Mavic 3 Multispectral
- Agras T50 and T25

DJI M350RTK

- Flagship drone
- Multi Payload Drone
- Dual battery
- Hot Swap
- Designed for continuous operations
- IP55
- RC plus
- RTK precision
- High detailed mapping
- Thermal
- Lidar
- Third Party payload





DJI M30S and M30T

- Dual battery
- Hot Swap
- Designed for continuous operations
- IP55
- RC plus
- RTK precision
- Thermal
- Zoom
- Laser range finder
- Compact Portability



DJI Mavic 3E

- Precision Mapping
- Compact
- RTK (optional accessory)
- Advanced safety features
- Live terrain follow
- Speaker (optional accessory)

DJI Mavic 3T

- Thermal
- Compact
- RTK (optional accessory)
- Advanced safety features
- Live terrain follow
- Speaker (optional accessory)





DJI Mavic 3 Multispectral

- Precision Mapping
- Prescription maps
- Compact
- RTK (optional accessory)
- Advanced safety features
- Live terrain follow
- Speaker (optional accessory)
- Green (G): Red (R); Red Edge (RE):; Near infrared (NIR)

DJI Agras T50

- Heavy Payload
- High Flow Rate 16L/min
- Four Sprinkler Kit (Optional) 24L/min
- Multidirectional Obstacle Sensing
- Quick change optional Spreader
- Field Operations
 21 hectares per hour
- Orchard Operations 4 hectares per hour
- Spreading Operations 1,500 kg of granules per hour
- Improved radars for improved obstacle detection and avoidance
- Live terrain follow





DJI Agras T25

- Light and Nimble
- High Flow Rate 16L/min
- Four Sprinkler Kit (Optional) 24L/min
- Multidirectional Obstacle Sensing
- Quick change optional Spreader
- Live terrain follow

Area mapping

Create and fly mission to cover the target area.



Agras Workflow

Image processing

Process images through DJI Terra software



Mission Planning

Plan missions with 3D results



Upload

Spray





Joshua Dunn





Satisfied clients

As locals who use these products daily, our team is on-hand to deliver expert knowledge and provide practical experience to your projects.

With an eye on the future, our goal is to increase New Zealand's adoption of drone technology, making it a safer, more productive, and more sustainable country.



Our key clients include:

- PGG Wrightson
- Interpine
- Fire Emergency NZ
- Downer
- Department of Conservation
- Orion
- Beca
- All Blacks
- Fulton Hogan
- Marlborough Lines
- NIWA
- University of Auckland
- New Zealand Warriors
- Scion Research
- Landsar
- University of Canterbury



Morning Innovation Station - Site 3

Drones, Drones, Drones!

Coming up: Video from Bayden (Airborne Solutions)



Lunch

Proudly sponsored by ASB Rural







Afternoon Innovation Station - Site 3

Tailored Agricultural Robotics

SPS Automation





Southern AgriTech and Innovation Day 2024



Who are we? Specific Automation

• SPS Automation is a Christchurch-based R&D company specialising in tailored airborne and ground-based automated robotic systems.

• Our core technology is bespoke sensor-based AI and the design/integration of the robots that use it.



The SPS Automation Team





John and William Rolleston – Directors



The SPS Automation Team

Scott Spooner – CEO/CTO Mark Bentley – Chief Engineer - Embedded Systems Chantelle Walker – Executive Business Administrator Sara Lexa – Office Manager Sheldon Coup – Advanced Mathematics Peter Gillett – Mechanical Engineer Ollie Lines-Smith – Mechanical Engineer Lachlan Brewster – Software Engineer Corrie Hoult – Pilot/Aerospace Engineer Ross Oliver – Electrical Engineer Robert Rolleston – Mechatronics Engineer Thomas Ratlidge – Industrial Designer Kristina Brunsgaard – Embedded Engineer Emily Carter – Mechatronics Engineer Nathan Van Slooten – Engineering Intern

New Zealand Made – For New Zealand Agriculture

All systems are NZ designed, manufactured, and serviced at our

South Island based engineering facilities



Westham Industries - ALPHA

Automated Loading, Packaging, & Handling Assistant

Modular seed bagging system

- Easily configurable for integration with different existing hopper systems
- Bag cycle time of 5 seconds
- Handles various bag types
- Attaches MPI labels to filled bags
- Standalone System







Westham Industries - ALPHA



Automated Loading, Packaging, & Handling Assistant









Other Projects

- Low-cost Animal Conveyor
- Airbourne Wash System
- Drone Swarm Technology
- Omnidirectional Platforms
- Many, many more...









Autonomous Drones In Agriculture

How can drones help NZ agriculture?

What farmers want:

- Stock & asset monitoring
- Crop monitoring
- Spraying/Planting
- Weed/Invasive plant control

What are their concerns?

- Piloting skill
- Technology fear
- Regulation
- Cost











A New Tool in the fight against Wildings



Working alongside helicopter and ground crew operations, our system is purpose built to control the following complex target areas:

- Sparsely infested areas
- Remote locations
- Buffer zone control
- Safe graveyard reinfestation







The SPS Automation UAV Spray System

A turn-key solution to **control sparsely infested conifers**

- Survey an infested area
- Identify wilding tree locations
- Spray the trees using swarm spray operation

Ease of use:

- Easy to deploy and simple to operate
- Automatic/remote operation
- Comprehensive training course





Target Areas Surveyed



- Identify infested land for wilding control
- Survey using autogenerated flight plans
- Generate photogrammetry data





Aircraft Remote Command Centre processes aircraft flight logs and captured images



ADCAM Centre







captured data into a Geo-tagged Orthophoto and Digital Elevation Model (DEM). Results are uploaded onto the Job Server and clients can view through detailed map tiles through user interface.



Identification of wilding trees using ML

- Each tree identified using a Deep Learning detection algorithm
- Output includes indexed GPS tree locations
- Optimised flight plans for multiple spray aircraft are generated
- Fully automatic



Automatic pine tree detection and geo-localisation



Deep-learning detection algorithm with Cloud processing





Optimised Flight Plans for Swarm



- Terrain shape driven
- Multiple aircraft operation without overlap



Automatic flight path planning with optimised route



Multiple computer optimised flight plans generated based on real-world flight characteristics of SPS Spray Drones.

Flight plan generation can be for single or swarm operations

Mapping Flight Plan Files Generated

Flight Number	Number of Trees	Flight time
Spray Flight #956.FP	48	49 mins
Spray_Flight #957.FP	54	51 mins
Spray_Flight #958.FP	52	53 mins
Spray Flight #959 FP	36	45mins

The SPS Automation Spray Machine

- Simple to use
- Purpose built system
- Designed for continuous operation (Hybrid)
- Checklist based operation
- Fully automatic
- Powerful low altitude collision avoidance
- Adjustable spray swath
- Spray system designed and tested with SCION
- SPS comprehensive training course







Navigation – A step beyond collision detection

- Precise navigation through complex terrain
- Onboard SLAM processing and guidance
- Backup localisation
- Alternate path planning
- Surrounding terrain point cloud
- Ultra low altitude collision avoidance





Swarm Spray Operation



Onsite Swarm

- Multiple aircraft operation
- Mesh-based network
- Fully automatic
- One crew member operates entire fleet
- Remote monitoring
- Realtime operations app



Spray Operation Remote monitoring at ADCAM Centre Spray App Teams carry out Swarm **Spray Operations**

Teleoperation

Reducing Human Factors for Agricultural UAV Operations

- Fully automated flight systems
- Remotely monitored/piloted
- Checklist based Stop/Go operations
- App based end-user operation
- Reduced regulatory procedures
- Highly controlled flight and maintenance procedures.
- Subscription based "System as a Service"







To Spray, Or Not to Spray?



- On-board real time tree inference
- Secondary pine verification
- Auto herbicide calculation
- Varying levels of autonomy
- Ability to add additional trees "on the fly"
- Each tree sprayed has a picture taken and environmental data captured.

SPS Click and Approach Tree confirmation and aircraft guidance system



Aircraft hover over GPS located trees. SPS Spray App allows the user to select a tree and confirm spray. Once a tree is selected the aircraft uses computer vision to track and guide itself into spray position. If there are additional trees then users can sequentially select trees to spray



Each location photographed

Each GPS Location the Aircraft visits has a photo and environmental data recorded

Photos are uploaded to the Results database

Photos are also used to improve SPS Tree Detection Algorithm



Spray Results

Comprehensive logging and reporting of all data



- Area coverage
- Number of trees sprayed
- Total chemical and fuel used,
- Total operation time
- Operation cost







Automated UAV Spot Spraying System

Release Spraying using UAV's

Release spraying of new forest blocks

This is where we use a residual herbicide prior to planting to prevent competitive weeds from choking the new trees for the first six months ensuring they have a good start.

Current methods

- Require people to spray manually
- Expensive and time consuming
- Limited to human-accessible terrain
- Scorched Earth....
- Limited staff resources

Using the SPS Automation UAV Spot Spraying System

- Survey an intended area
- Optimise tree locations
- Spot spray using swarm UAV spray operation
- Re-spray when weeds regrow



Forestry Pre-plant



Pre-Plant spraying – UAV mapping and tree location optimisation



- Algorithm-driven optimised tree placement
- User-definable spacing
- GPS Indexed tree Placement

Forestry UAV Spray Trials







Spray Trials in collaboration with SCION, Pan Pac Forest Products Ltd and Forest Growers Research Ltd (FGR)

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Spray Trials in collaboration with SCION, Pan Pac Forest Products Ltd and Forest Growers Research Ltd (FGR)

Heavy Lift Agricultural Hybrid Aircraft

In partnership with the Precision Silviculture Program led by FGR, SPS Automation is developing a new generation of heavy lift Spot Spraying UAVs based on feedback from trials.

Expected Performance

- 140kg MTOW
- 120min Flight time
- 50kg-60kg payload
- Continuous precision spot spraying
- 20kw hybrid generator

Target Applications:

- Forestry Release Spraying
- Spot Spraying
- Invasive plant control
- Broadacre Spraying









Vision – Tomorrow

An Ecosystem of Autonomous Robotic Technology

- 2024 2026 2028 2029
- Autonomous release & weed spraying
- Swarm UAV operation
- Full teleoperated/monitored aircraft systems
- Drone in a Box asset management
- SaaS operation and maintenance program
- Real-time tracking/support for ground crews
- Alternative to herbicide weed control
- Airworthiness certified systems
- Ultra heavy-lift UAVs (300kg 500kg Payload)







Questions....

Afternoon Tea

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lestpac



