

The logo for SPS Automation features the letters 'SPS' in a large, bold, black sans-serif font. The 'S' on the left is a single character. The 'P' in the middle is a single character. The 'S' on the right is a single character. There are three red dots between the first 'S' and the 'P', and three red dots between the 'P' and the second 'S'. To the right of the second 'S' is a small icon consisting of a central black circle with four white lines extending outwards to four smaller white circles. Below the 'SPS' is the word 'AUTOMATION' in a smaller, black, all-caps sans-serif font.

SPS
AUTOMATION

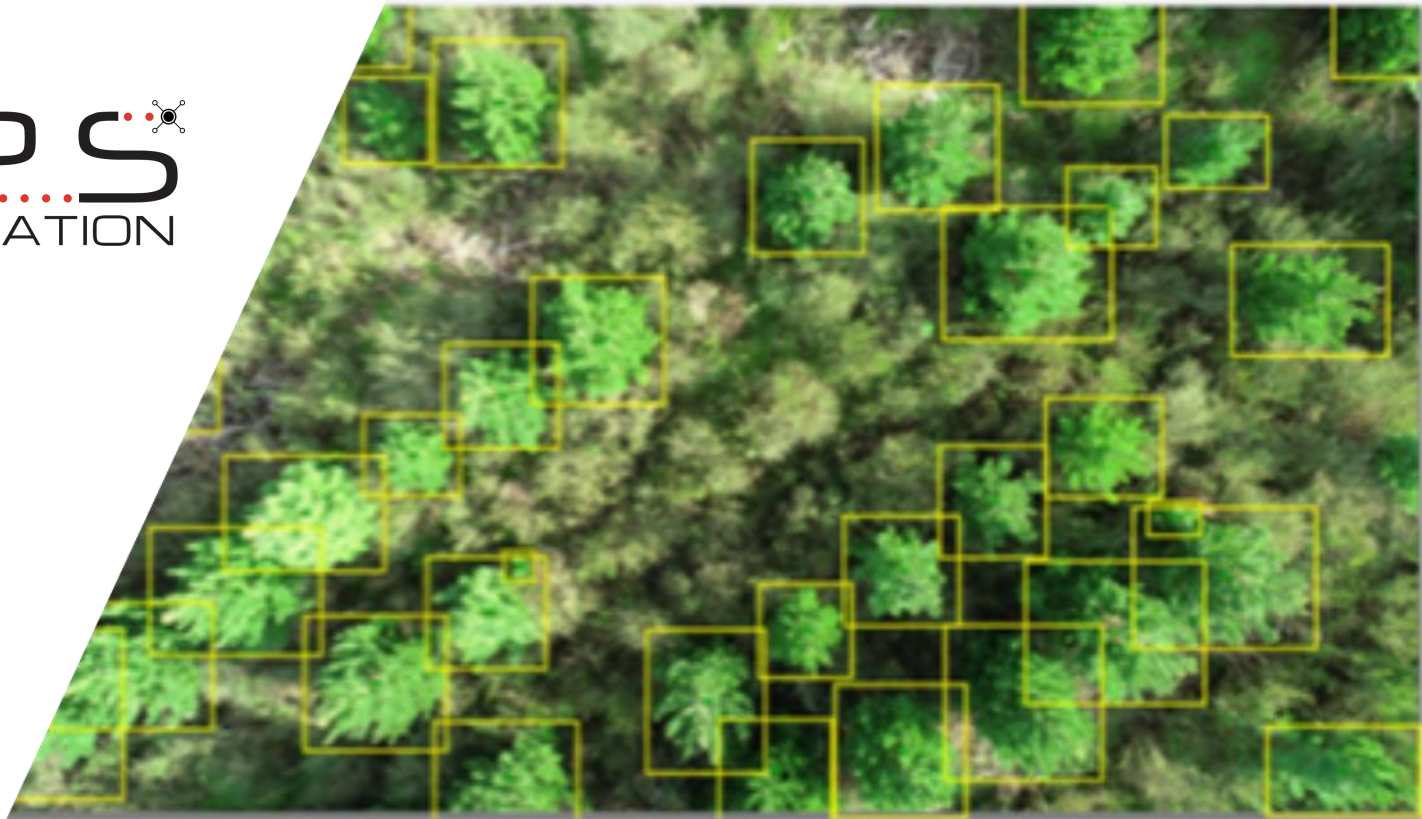
Southern AgriTech and Innovation Day 2024



Who are we?



- 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 Hoults – 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



Project Collaborators

CallaghanInnovation

New Zealand's Innovation Agency

AERONAVICS
New Zealand - Industrial Aerial Robotics

SPS
AUTOMATION

SCION
FORESTS | PRODUCTS | INNOVATION

**Precision
Silviculture
Programme**

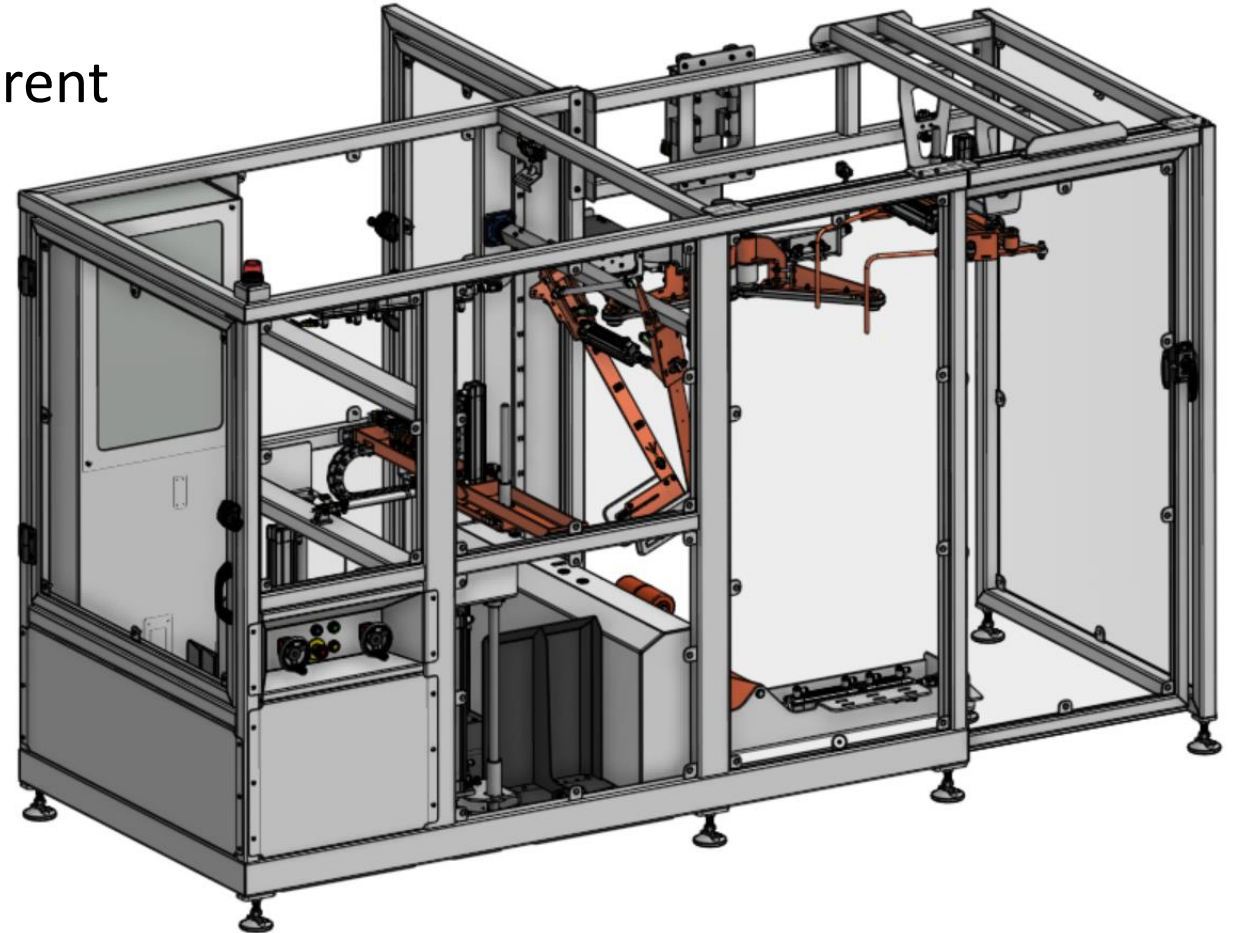
Powered by
**FOREST
GROWERS
RESEARCH**

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

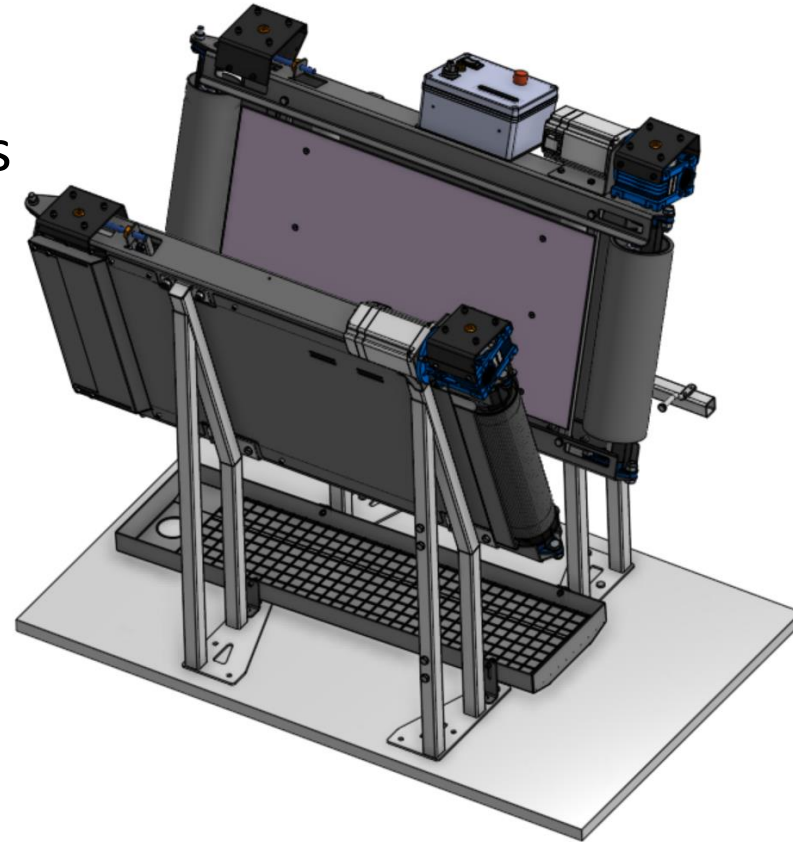


Automated Loading, Packaging, & Handling Assistant



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



Automated UAV Spot Spraying System

Wilding Conifers



A New Tool in the fight against Wildings

Wilding conifers are invasive trees attacking the high country and farmland of New Zealand.

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



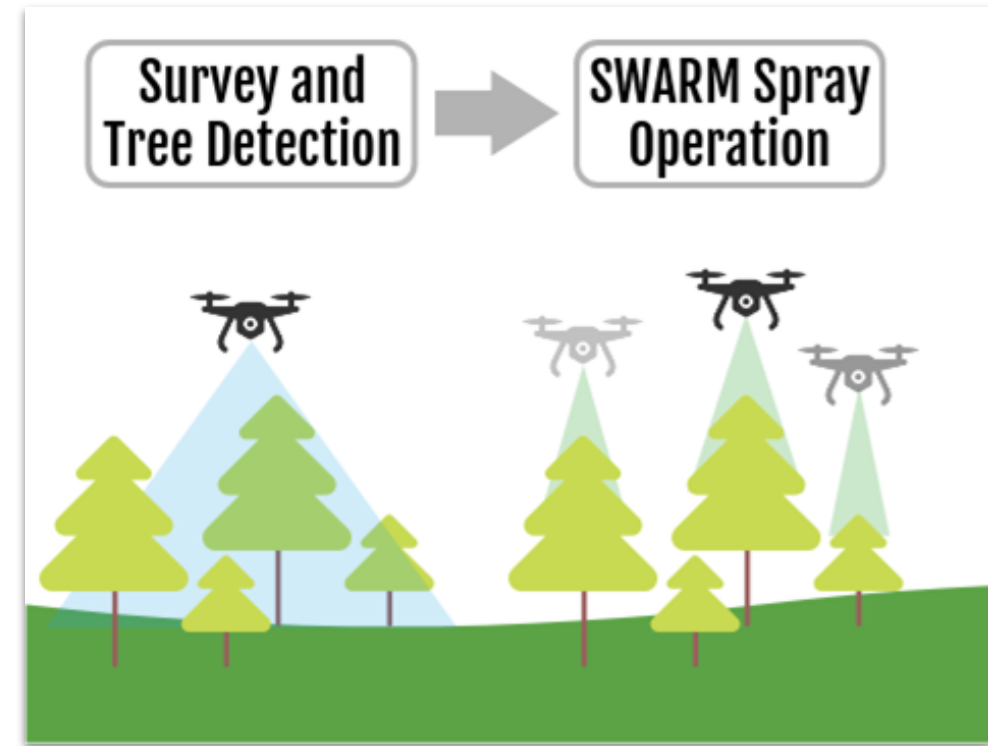
The SPS Automation UAV Spray System

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*



SPS
AUTOMATION

scion
FORESTS | PRODUCTS | INNOVATION

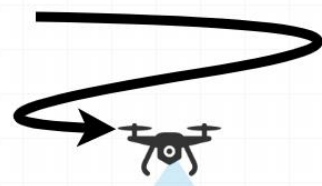


Target Areas Surveyed

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



Area mapped by survey ground teams using specialised aircraft



Flights are carried out using the premade flight paths.
Pilots load the flight plans and hit "RUN"

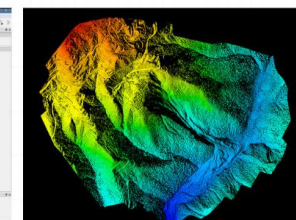
All complex flight parameters are set by ADCAMCentre



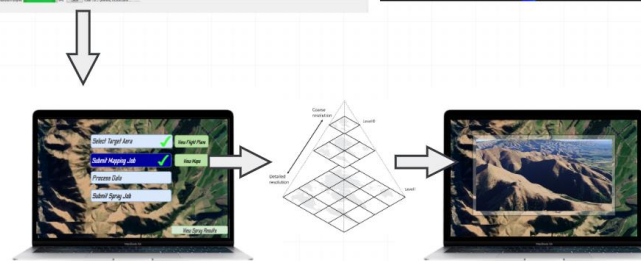
Aircraft Remote Command Centre processes aircraft flight logs and captured images



ADCAM Centre



The ADCAM Centre processes 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

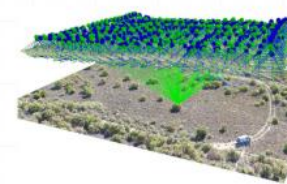
- Each tree identified using a Deep Learning detection algorithm
- Output includes indexed GPS tree locations
- Optimised flight plans for multiple spray aircraft are generated
- Fully automatic



Automatic pine tree detection and geo-localisation



Deep-learning
detection algorithm
with Cloud
processing



Orthophoto - Input



SPS Pine Tree
Detection
System



Indexed GPS Tree
Locations - Output



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



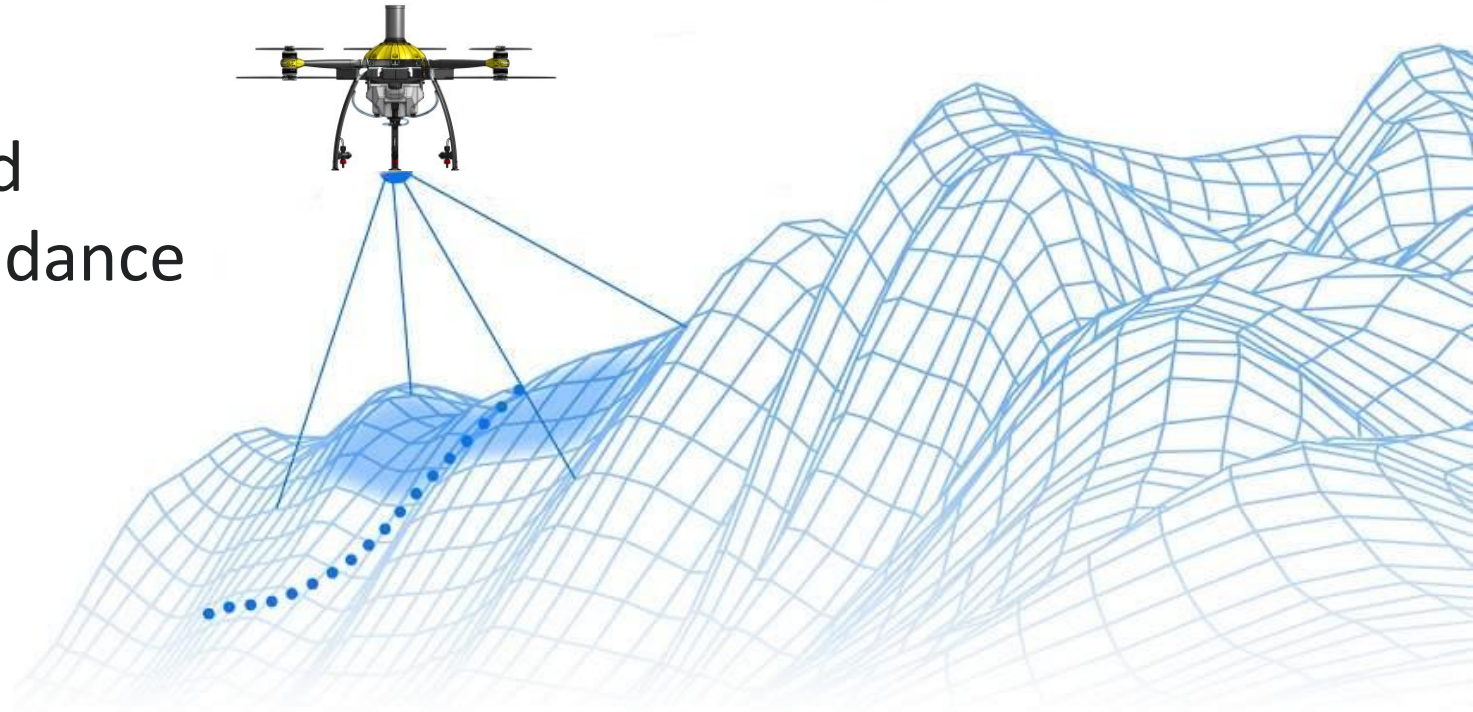
SPS
AUTOMATION

SCION
FORESTS | PRODUCTS | INNOVATION



Navigation – A step beyond collision detection

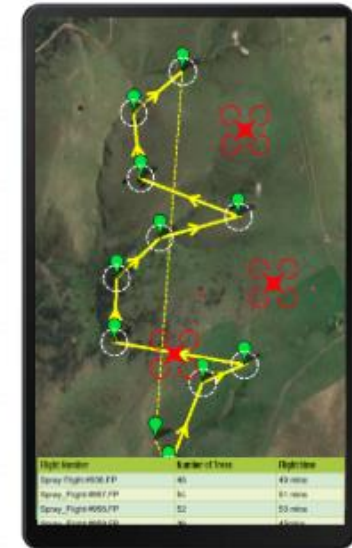
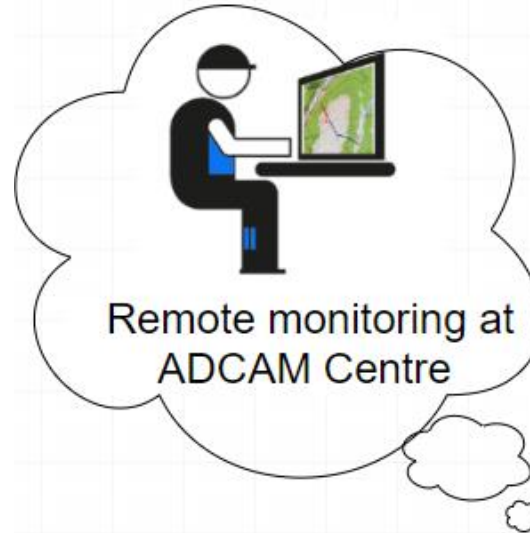
- Precise navigation through complex terrain
- Onboard SLAM processing and guidance
- Backup localisation
- Alternate path planning
- Surrounding terrain point cloud
- Ultra low altitude collision avoidance



Swarm Spray Operation

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

Spray Operation



Onsite
Swarm
Spray App

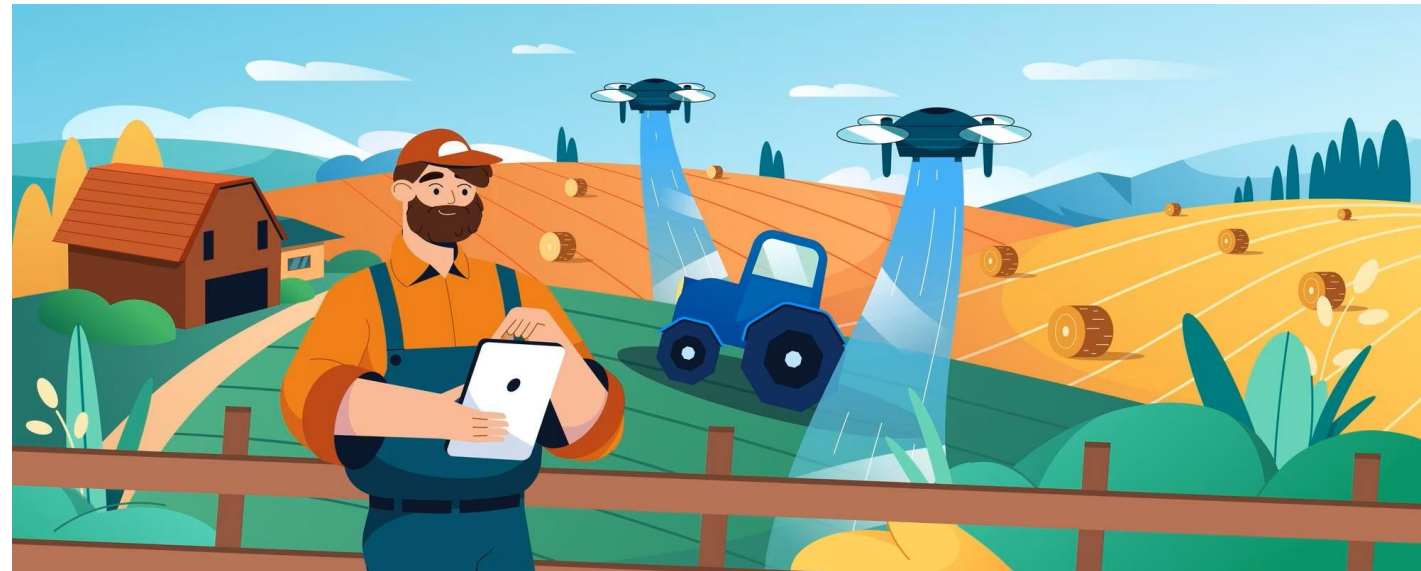
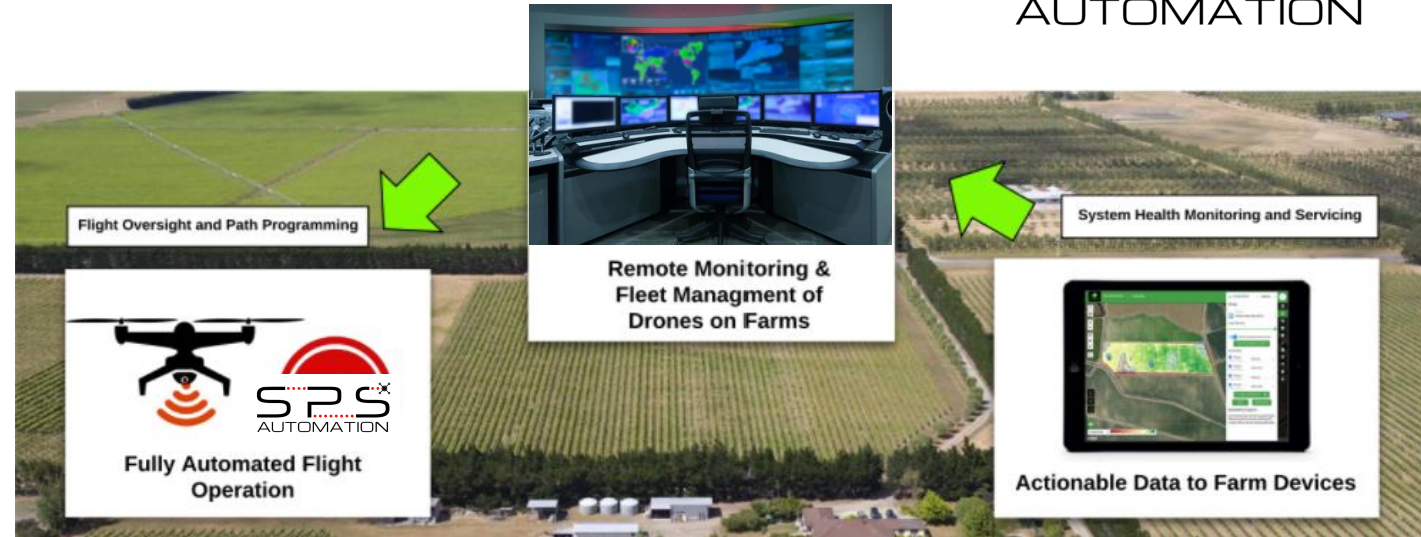
Teams carry out Swarm
Spray Operations



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.

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*

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



SPS
AUTOMATION

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

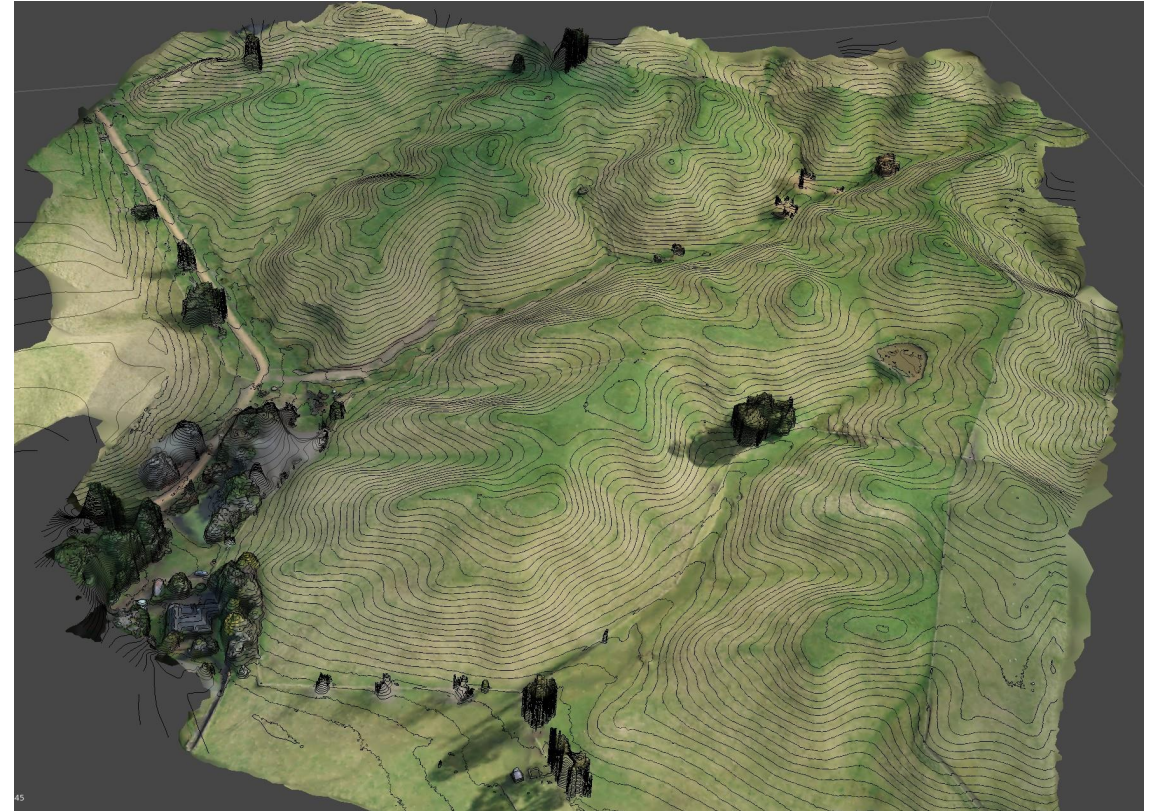
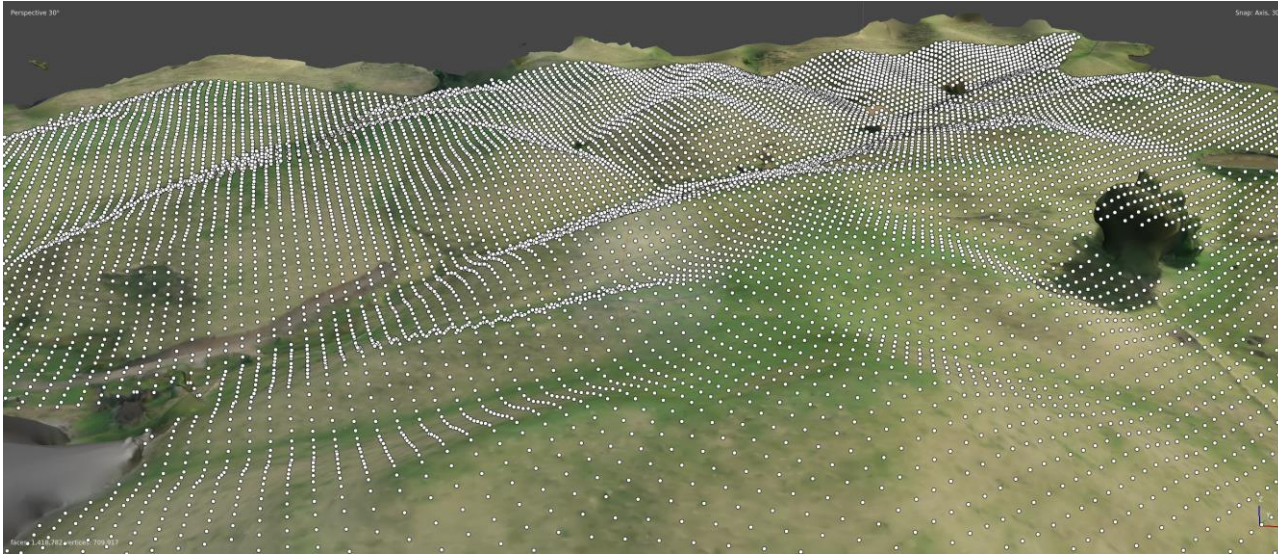
Using the SPS Automation UAV Spot Spraying System

- 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)

Forestry UAV Spray Trials



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

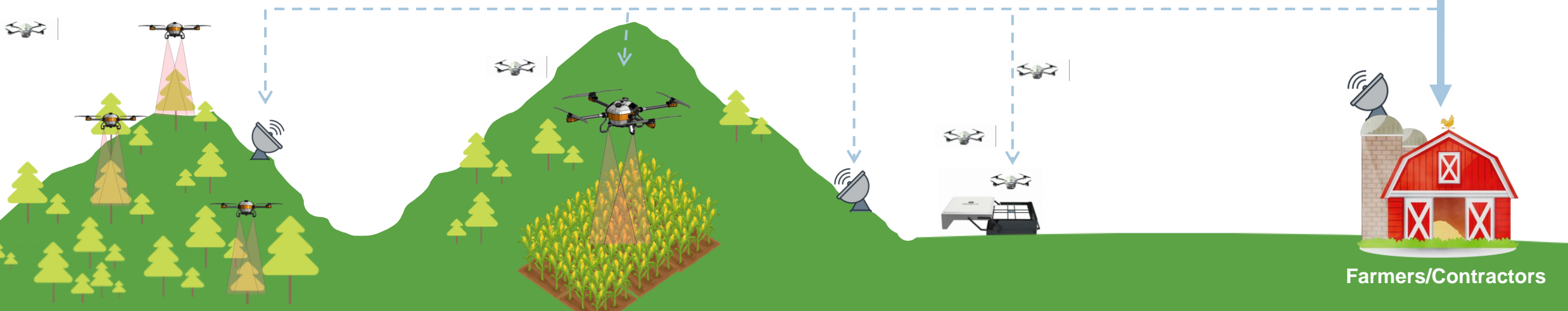


Vision – Tomorrow

An Ecosystem of Autonomous Robotic Technology



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



S P S



AUTOMATION

0276961269 | info@spsautomation.com

Questions....