DRYAD

AI, IoT & LoRaWAN: Transforming Ultra-Early Fire Detection for Forestry, Infrastructure, and Climate Resilience

Sohan Domingo
VP Sales & Operations - Dryad Networks

ARCIA

Bushfires are expensive, catastrophic & getting worse

Every year, bushfires destroy ecosystems, cripple economies, and accelerate climate change.
The numbers speak for themselves:

$4.4Bn+
Estimated loss in tourism revenue due to bushfires (2019-2020)

$2.32Bn+
Insurance claims from the 2019 – 2020 fires

5,900+
Structures lost – Including 2,800 homes (2019-2020)

96Mn
Hectares burned – Forests and land destroyed (2023-2024)

173
Lives lost – Black Saturday bushfires (2009)

7Bn
Tonnes CO_2 , ~20% global carbon emissions from wildfires annually

The Black Summer bushfires left a scar on Australia—devastating communities, wildlife, and livelihoods.

These images are a stark reminder that early detection isn't just prevention; it's the difference between disaster and survival.

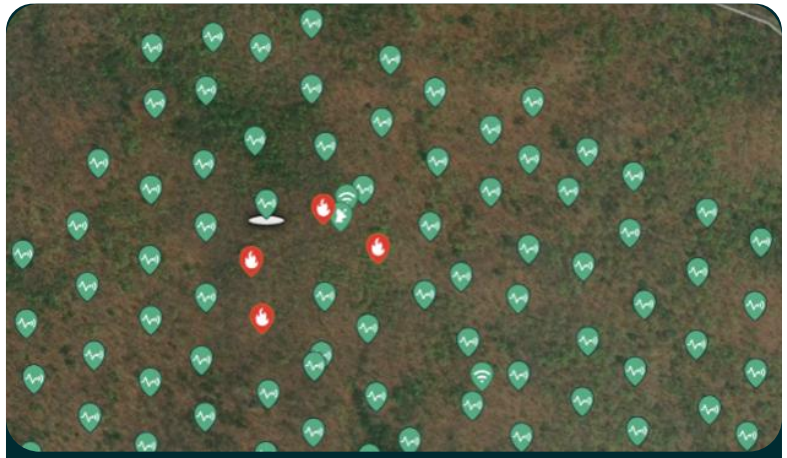
January 2025 Southern California Wildfires - USA

+24,000 Hectares Burn
+15,000 Buildings Lost
US$250 billion loses

2021 Manavgat Wildfire - Turkey

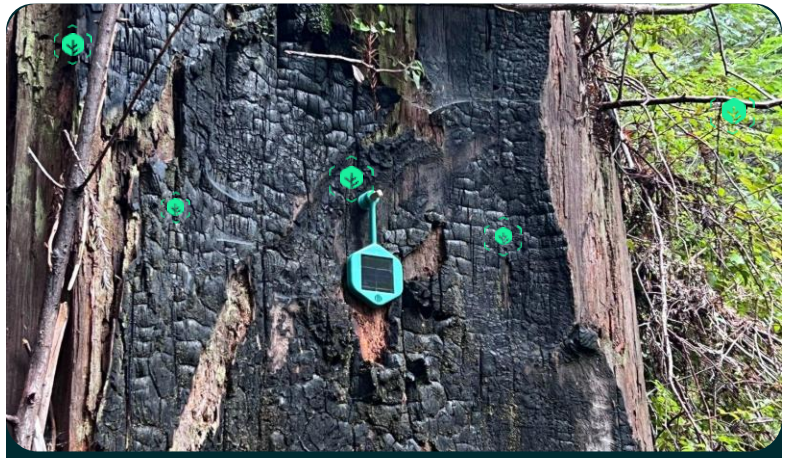
+200,000 Hectares Burn
+1,000 Buildings Lost
US$231 Million loses

Role of AI, IoT & Networks in early fire detection



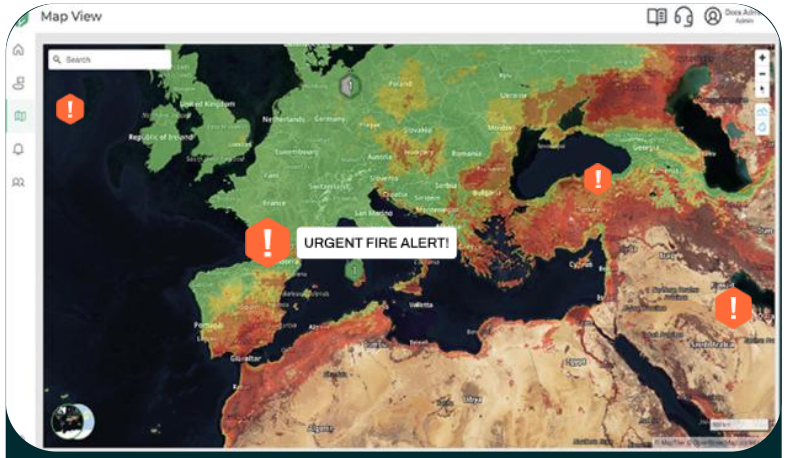
Networked Fire Detection Across Large Areas

- Deployed over vast, remote, or inaccessible regions
- Mesh network for real-time environmental monitoring
- Continuous surveillance, 24/7, even in extreme terrain



IoT Sensor Networks

- Data flows through resilient mesh networks
- Transmit data in real-time
- Detect micro-changes that precede fire ignition



AI-Powered Data Processing

- Detects early-stage fire risks & patterns
- Filters false positives (e.g. heat vs. real fire)
- Predicts fire spread to guide fast response

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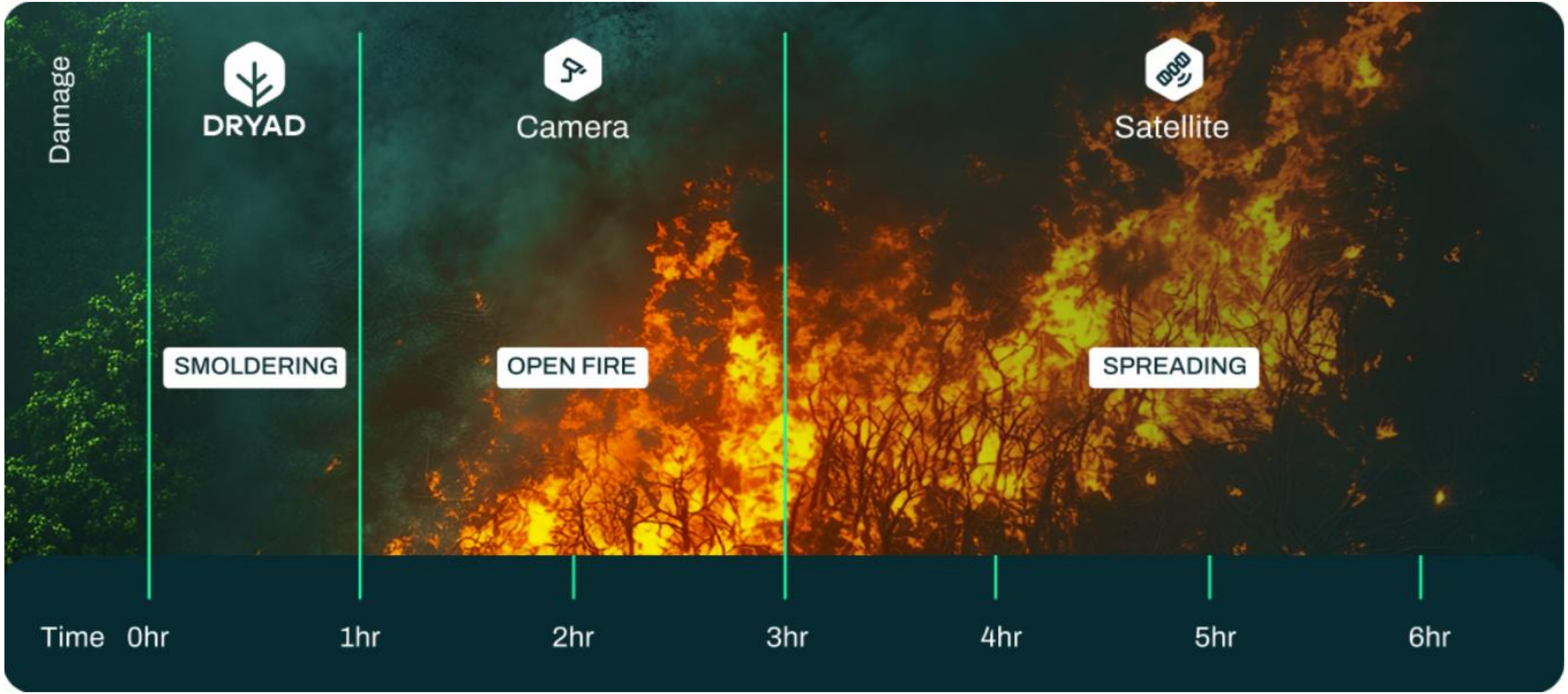
Time is of the Essence



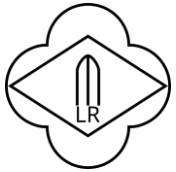
We protect the pulse of the forest.

Silvanet: A revolutionary sensor network

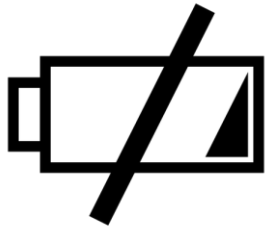
Detect Wildfires Before They Spread—In Minutes, Not Hours

- Our solar-powered gas sensor detects wildfires within minutes & triggers for timely action
- Detects fire at the smoldering phase, before flames spread
- Uses AI-powered edge computing to analyze air composition
- Operates maintenance-free for 10-15 years using supercapacitors

The Backbone for Large-Scale, Sustainable Monitoring - LoRAWAN

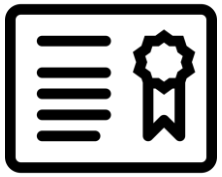


Long-Range Communication



Low Power Consumption

Scalable & Flexible



No Licensing Fees

Secure & Reliable

Remote Firmware Updates

AI/IoT - Gas Sensor

Solar-powered gas sensor ‘smells’ fires within minutes from ignition.

- Detects fires at smoldering phase
- Runs on solar power & supercapacitors
- Low cost, high volume deployments
- 10-15-year lifespan maintenance-free
- AI-powered EDGE computing
- IP67 waterproof

Large-Scale IoT Mesh Network for Forestry

Dryad's technology operating mechanism

1. FIRE STARTS
(smoldering stage)

2. SENSORS DETECT
GAS ANOMALIES

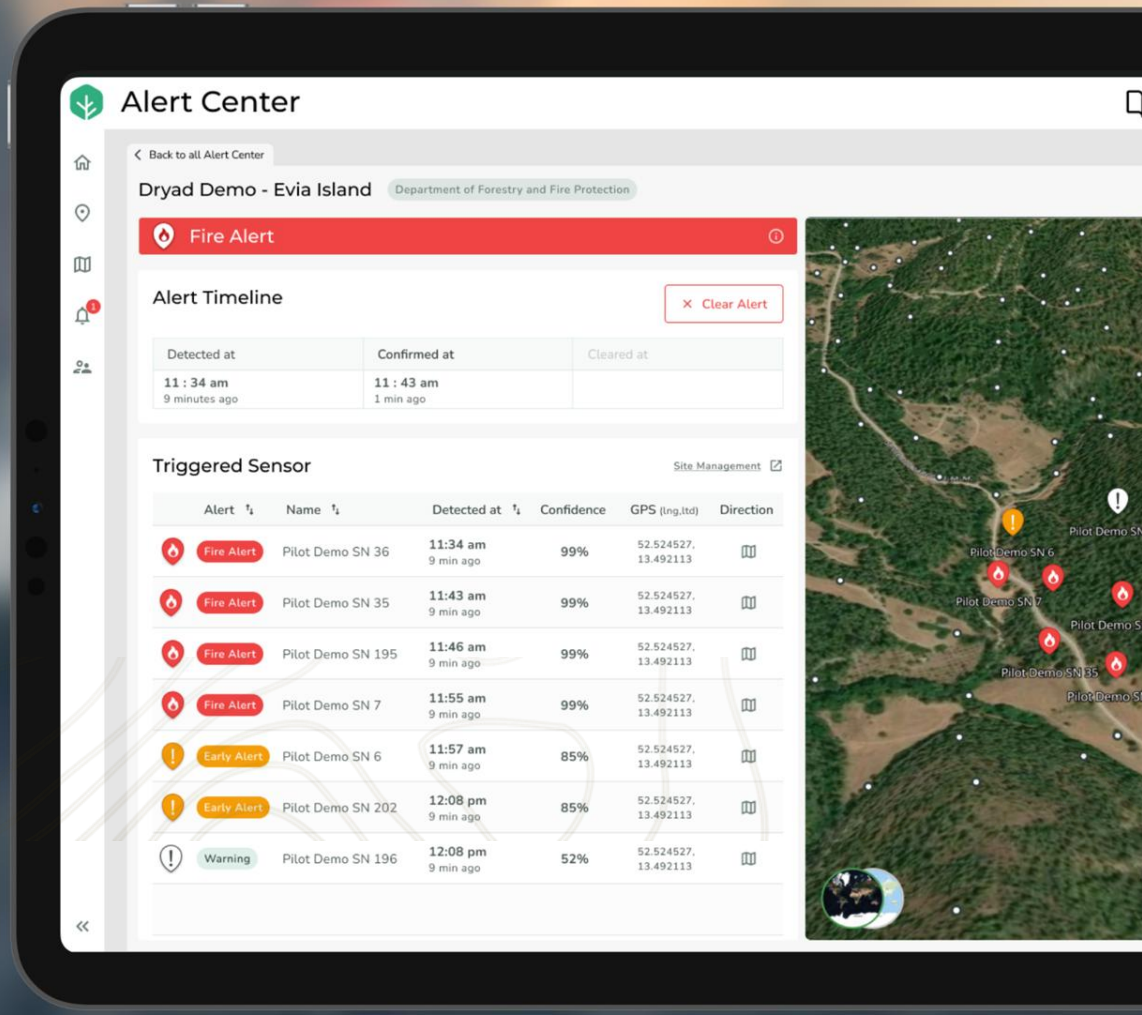
3. LoRaWAN NETWORK
TRANSMITS DATA

4. USERS GET AN
EARLY ALERT.

Smarter & Real-Time Alerts

Our sensors trigger alerts within minutes of ignition, enabling early action.

- 24/7 Monitoring at Scale
- Multi-Channel Notifications (Alerts sent via API, SMS, and/or email)
- AI-Powered Accuracy



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Initiation of the Pit Fire

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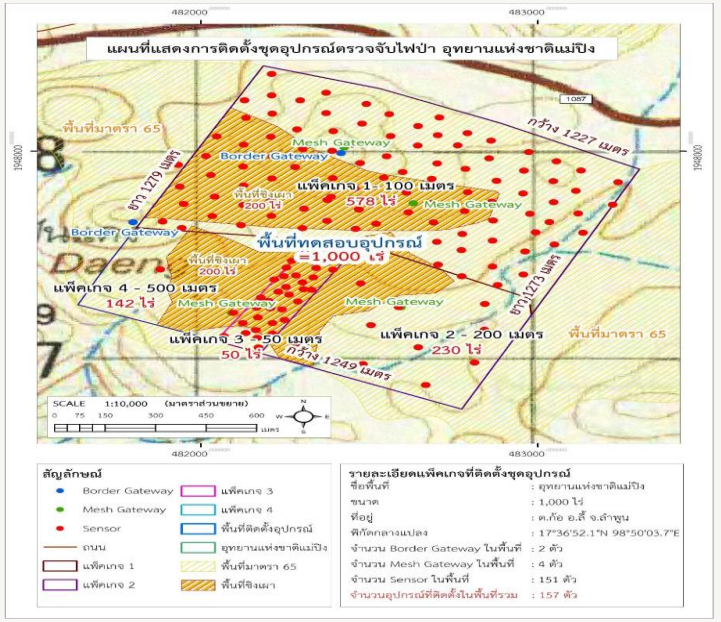
Case Study: AI-Powered Wildfire Detection in Siam International - Mae Ping National Park



Pilot Deployment Overview

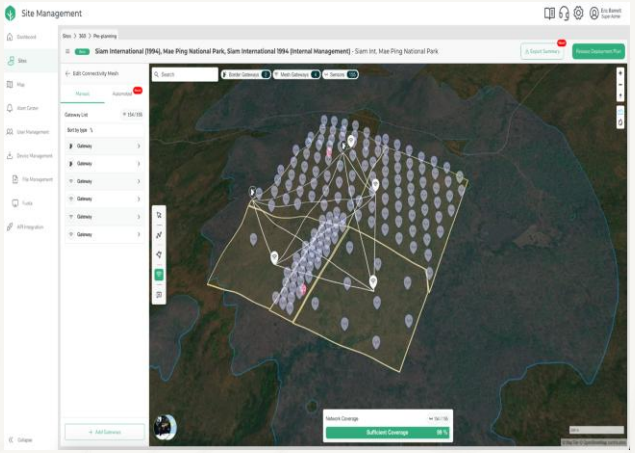
- **150** AI-Powered Sensors for wildfire detection.
- **6** Mesh Gateways.
- **2** Border Gateways.

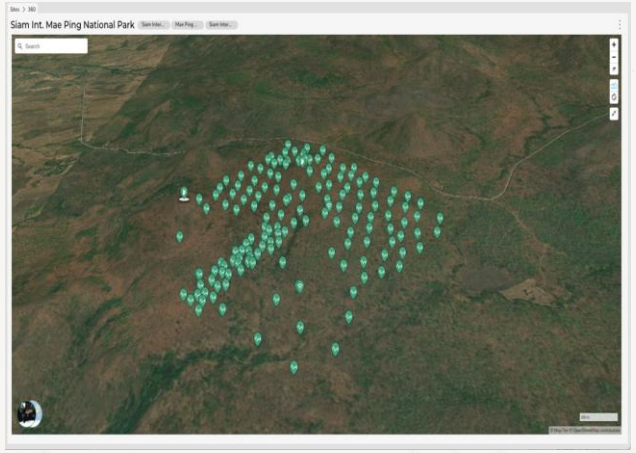
Smart Planning

- **Cloud-based** mapping for optimized placement.
- **High-risk zone** prioritization with dynamic density.
- Automated geolocation for **precise installation**.

Fast Execution & Scalability

- Tree-mounted sensors (3m height) for **optimal coverage**.
- Full deployment in 15 days, ensuring **scalability**.





Mae Ping National Park, Lamphun, Thailand
Deployment area - 160 hectares

Case Study: Validating AI Driven Wildfire Detection

Controlled Burn Test (19.02.2025)

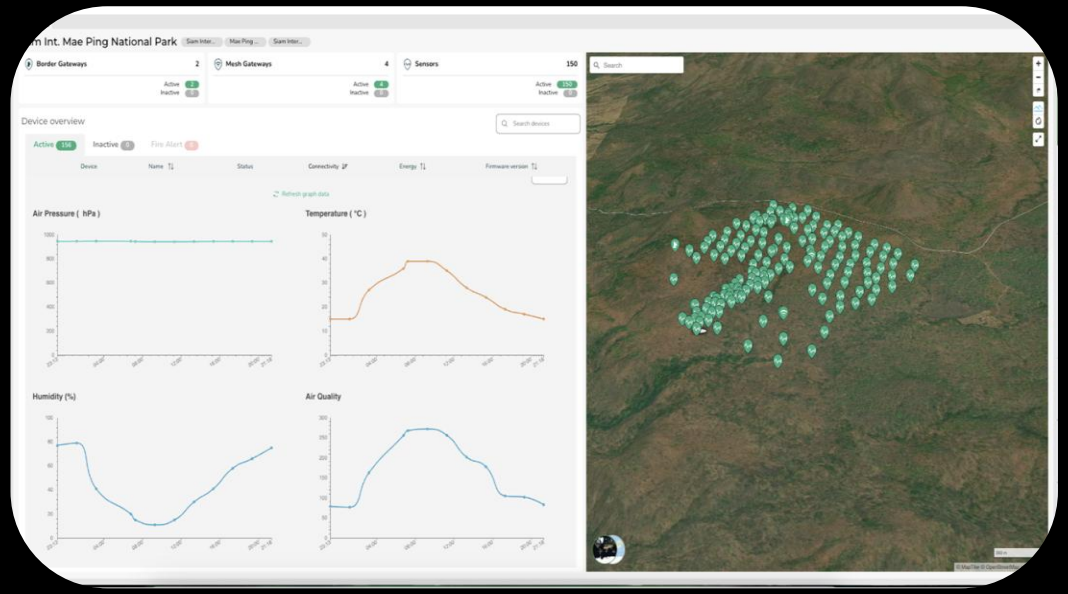
- Test Area: **3ha**
- Burn Duration: **2.5 hours,** closely monitored.

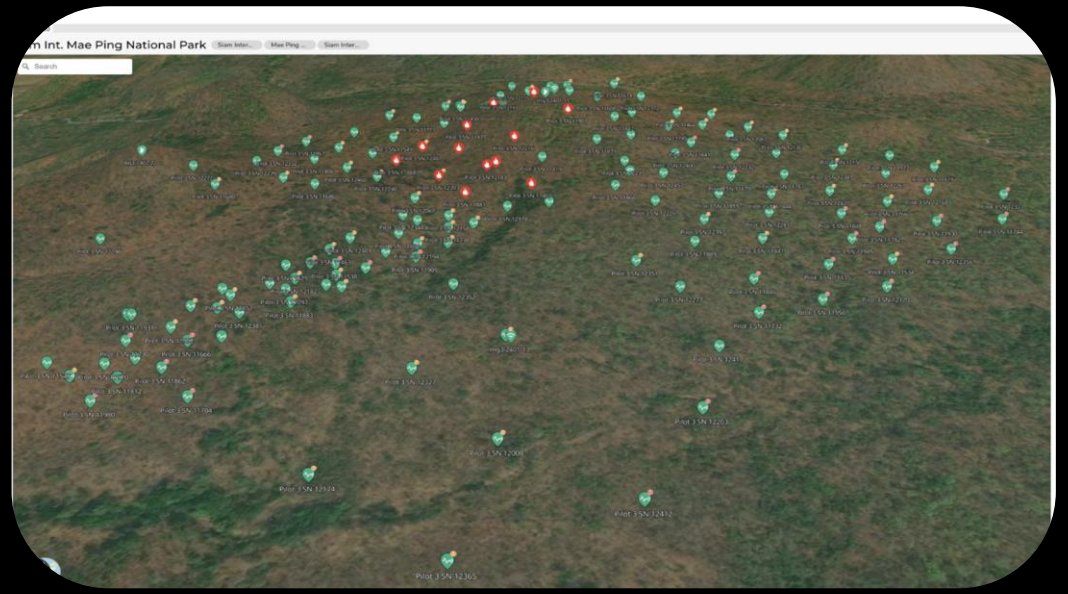
Detection Performance

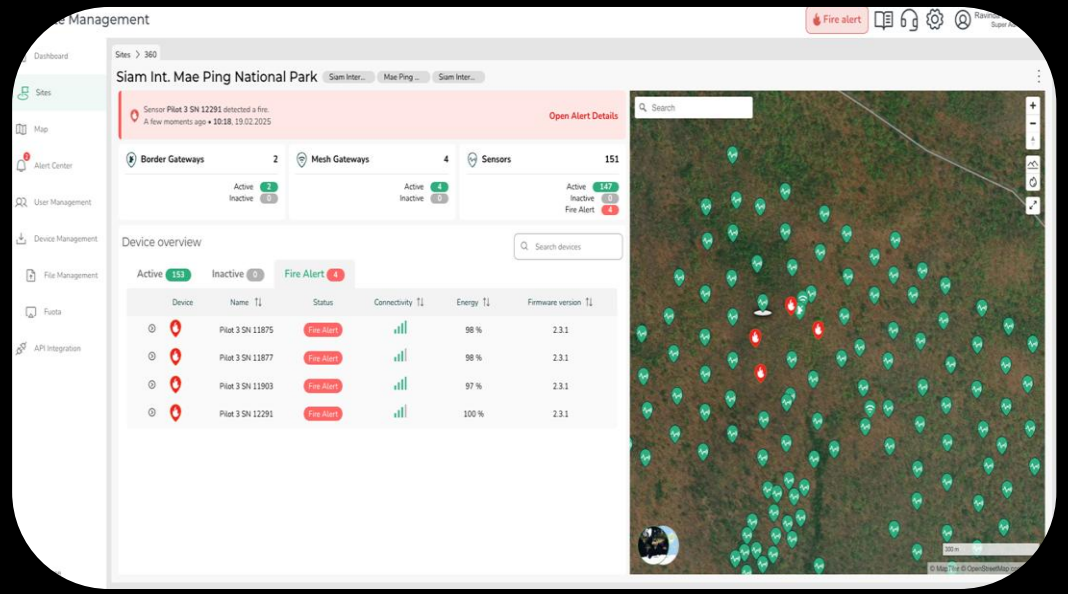
- First sensor detected fire within **7 minutes** of ignition.
- **13 sensors** triggered alerts, confirming system responsiveness.
- All gateways & sensors remain operational post-burn.

Key Takeaways

- Ultra-fast detection minimizes fire spread risk.
- System resilience validated in extreme conditions.
- Scalability for future wildfire prevention efforts.







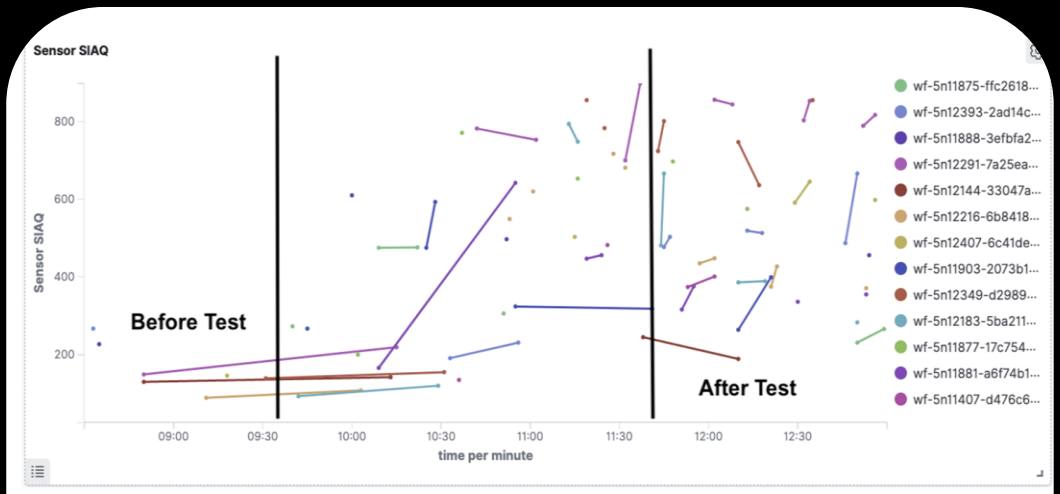
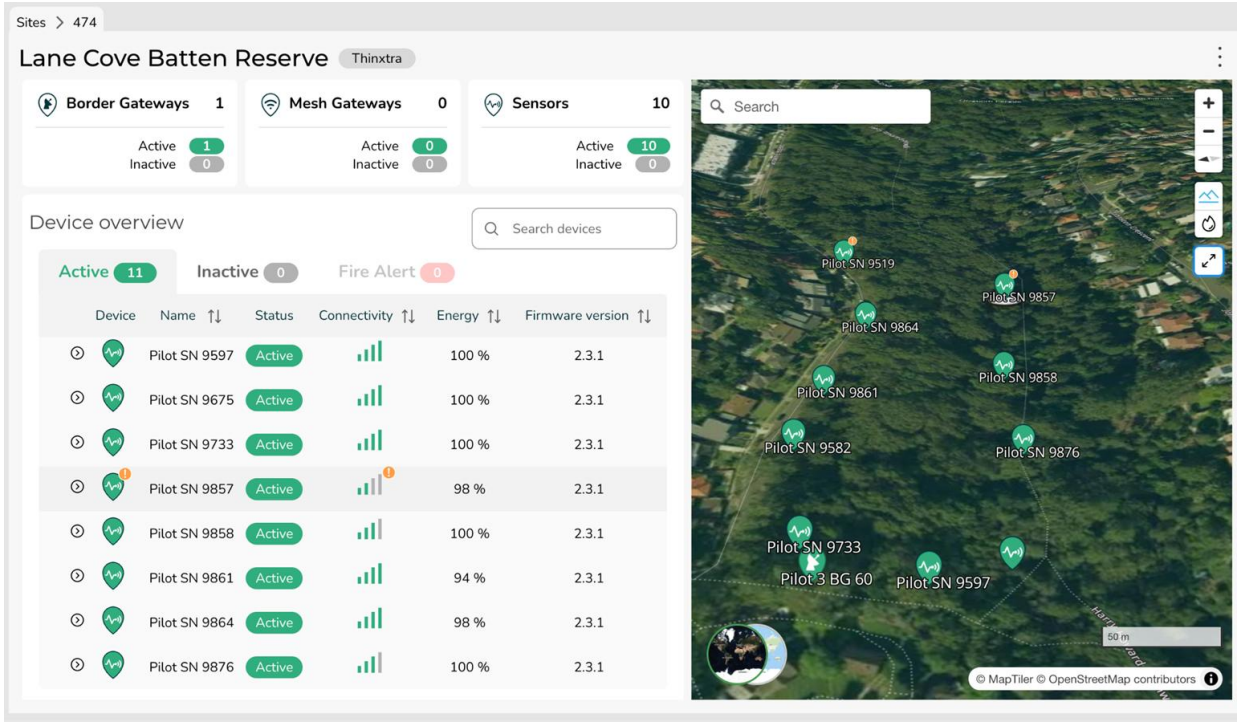


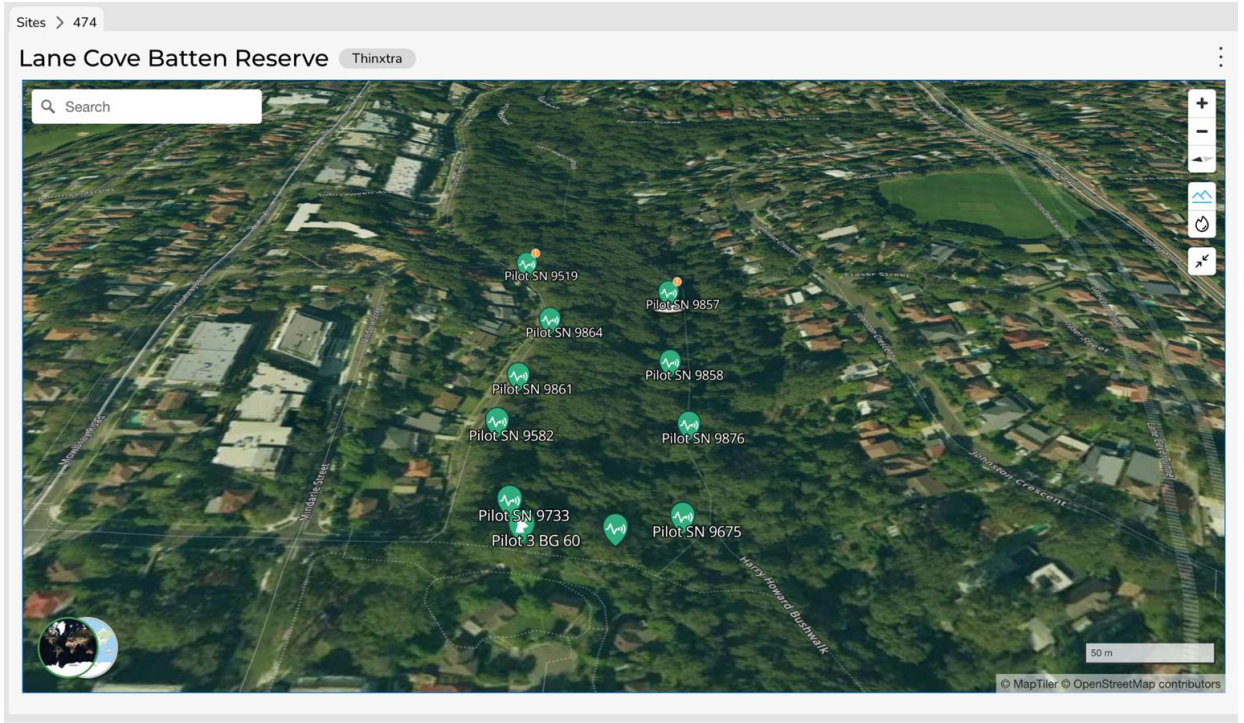
Figure X: Sensor air quality (SIAQ) readings over the test period, showing a decline in air quality. A maximum AQ of **898** was recorded, with both sensors detecting the change.

Western Sydney Sundowner: 28 August – Register Online https://arcia.org.au



Lane Cove Batten Reserve NSW

- 10 sensors
- Border Gateway
- Monitors environmental data
- Demo



INTRODUCING SILVAGUARD

A NEXT-GENERATION FIRE SUPPRESSION SYSTEM

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A NEXT-GENERATION FIRE SUPPRESSION SYSTEM

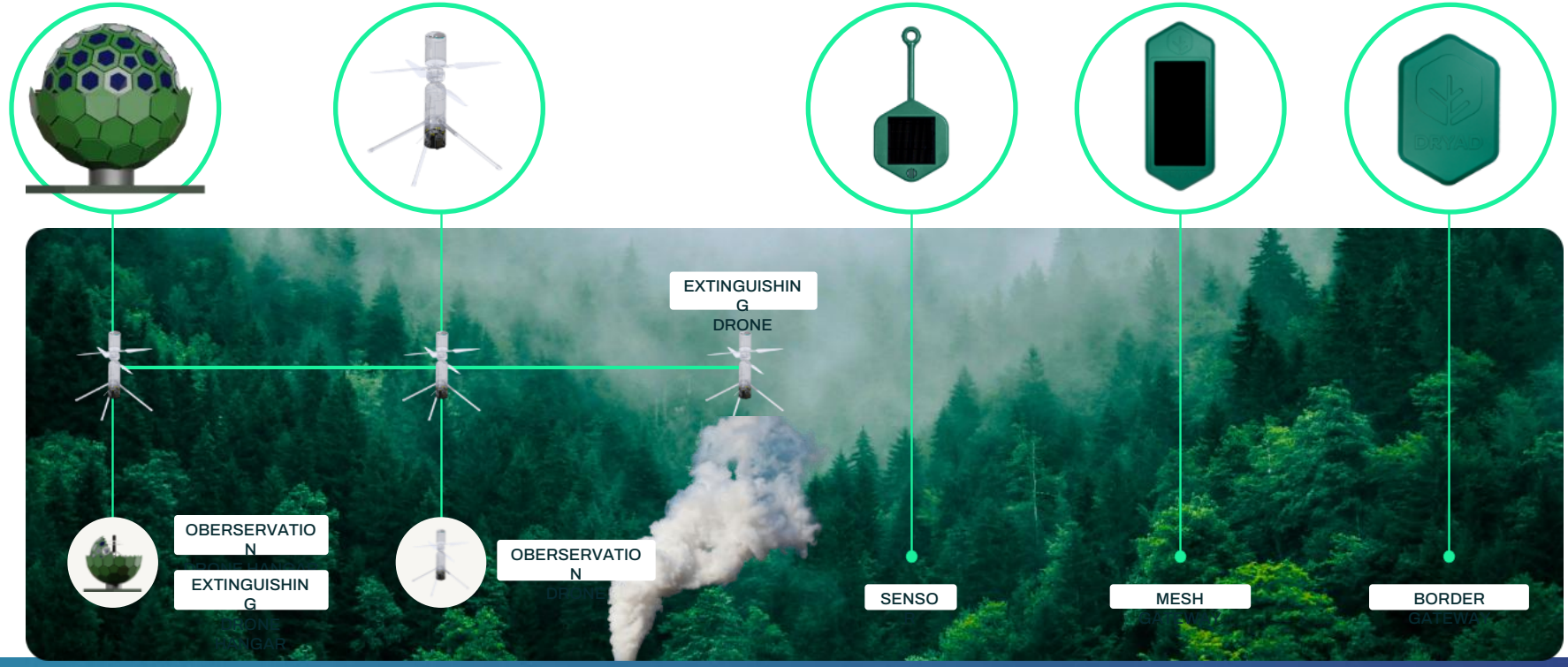
SilvaGuard Bushfire Suppression System

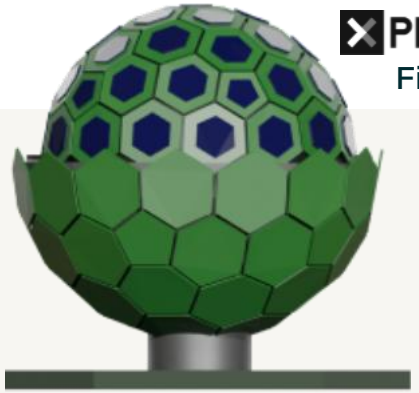
Autonomous fire suppression drone compliments Dryad's Silvanet ultra-early wildfire detection.

Innovation: SilvaGuard is a revolutionary drone-based solution for early fire suppression using acoustic waves.

Problem: current systems rely on human operators, require significant power, data, stable communication.

Solution: fully autonomous drone system to fast fire response.





XPRIZE Finalist

Silvaguard Unique Approach

- Fully autonomous operation
- Acoustic Fire Suppression
- Solar-Powered Drone Hangars
- Event Cameras for Obstacle Avoidance

Dryad's Contribution to Net-Zero Initiatives

Dryad combats bushfires with ultra-early detection using AI-powered, solar sensors and IoT networks, protecting ecosystems and communities.

2.8Mn
Hectares Forest Saved From Wildfires

1.1Bn
Tonnes Co2 Emissions Prevented

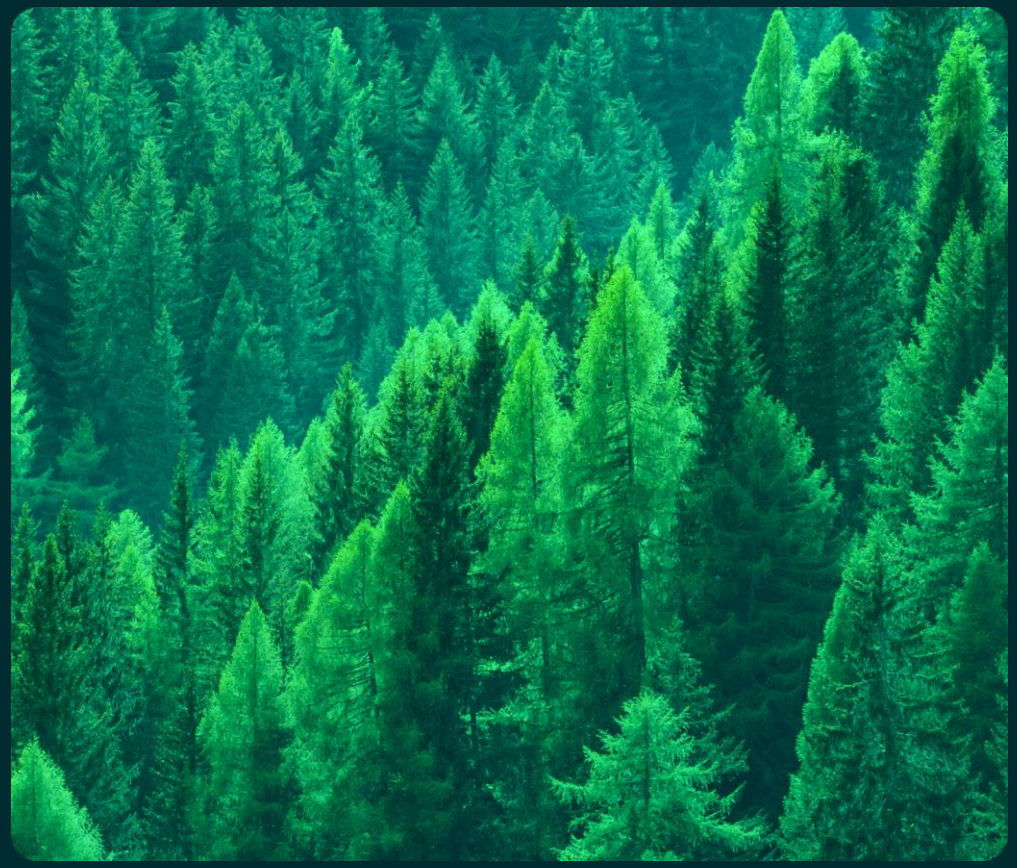
166Mn
Animals Saved From Wildfires

$21Bn
Protected Economic Loss

Western Sydney Sundowner: 28 August – Register Online https://arcia.org.au

Join the fire prevention revolution

Let’s build a shared vision for a safer, greener, and net-zero future.

Website: www.dryad.net

Email: sohan@dryad.net