Case Study - Mada (Lebanon)

Silvanet Stops Fire in Lebanon: Ultra-Early Detection Prevents Potential Catastrophe

In December 2023, a seemingly small fire in Lebanon could have escalated into a devastating event. Thanks to Dryad's Silvanet system, the fire was detected early, allowing for a timely and safe resolution. This case study highlights the vital role of technology in wildfire prevention and showcases how Silvanet made a difference in Lebanon.

Background: Lebanon's Escalating Wildfire Threat

Lebanon is home to 139,000 hectares of forest, covering around 13% of its land area. These ecosystems, including the iconic cedar forests, face increased risks from wildfires, which are becoming more frequent due to long droughts and changing environmental conditions. Each year, Lebanon loses around 1,500 hectares of forest to wildfires, putting lives, property, and biodiversity at risk.

In June 2023, a massive fire swept through the mountainous Akkar region, destroying 90 hectares of forest, homes, and centuries-old trees. Local government and community groups scrambled to protect homes and forests, often with limited resources. Khaled Taleb of the Akkar Trail Association, a community-based firefighting group, reflected, "We have protected thousands of hectares using two locally equipped vehicles. With more support, we could avoid further tragedy and losses."

While Lebanon has shown resilience in responding to wildfires, the real solution lies in prevention. Climate change is making conditions more favorable for fires, with July 4, 2023, marking the hottest day on record globally. Each wildfire costs Lebanon around US$296 per hectare in lost economic value, according to the World Bank. Protecting these forests is critical to safeguarding biodiversity and the livelihoods of local communities.

The Solution: Silvanet's Ultra-Early Detection Technology

In response to these growing threats, Dryad Networks partnered with Mada®, a leading telecommunications provider in the Middle East and Africa, to deploy Silvanet at a pilot site in Lebanon. This collaboration brought Dryad's ultra-early detection system to a forest near Deir Mar Moussa in central Lebanon, where 91 sensors and two gateways were installed to cover a 78-hectare area.

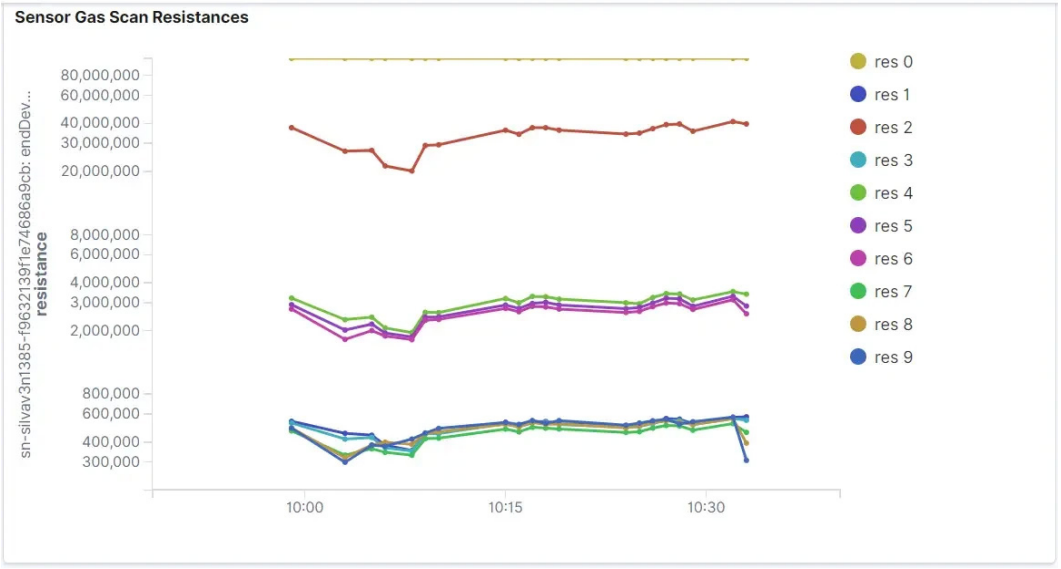
Silvanet's technology uses solar-powered gas sensors and artificial intelligence (AI) to detect early signs of combustion, such as changes in air composition, long before a fire becomes visible. By catching fires in their earliest stages, Silvanet provides a crucial time window for response teams to act before the situation escalates.

The Incident: A Fire Detected Before Becoming a Threat

On the morning of December 11, 2023, Silvanet detected a sudden change in air composition at the deployment site. By 10:33 AM, the system had identified the source: an illegal fire started by a farmer burning dry grapevines. With a 70% probability of smoke detected, Silvanet's AI system triggered an alert, notifying Mada and local authorities.

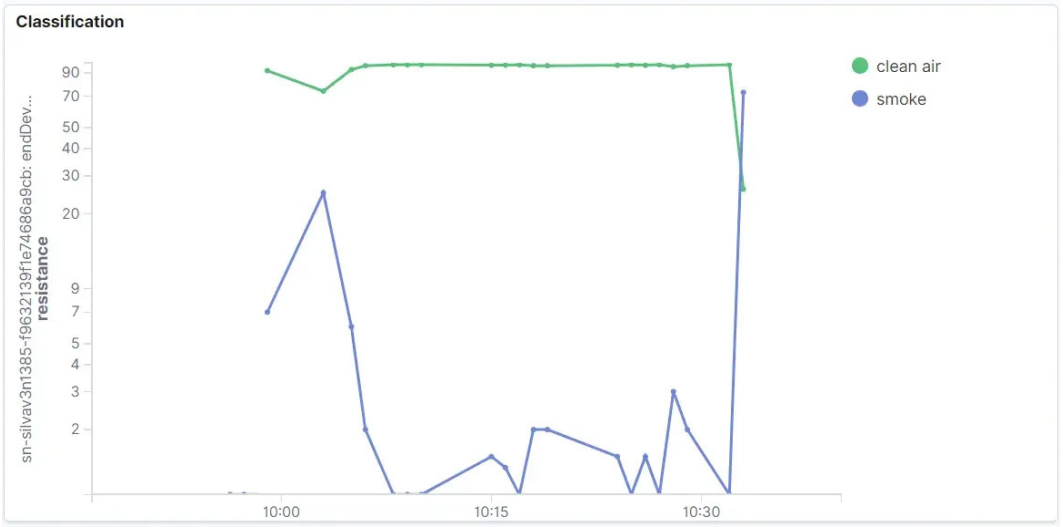
Within 30 minutes, responders were on-site, extinguishing the fire before it could spread to the surrounding forest. This rapid detection and intervention saved the area from potential devastation.

The graph below displays gas readings captured by the Bosch BME688 sensor, which is sensitive to key wildfire indicators like hydrogen, carbon monoxide (CO), and volatile organic compounds (VOCs). These gases signal the early stages of combustion, allowing for ultra-early detection before flames are visible.



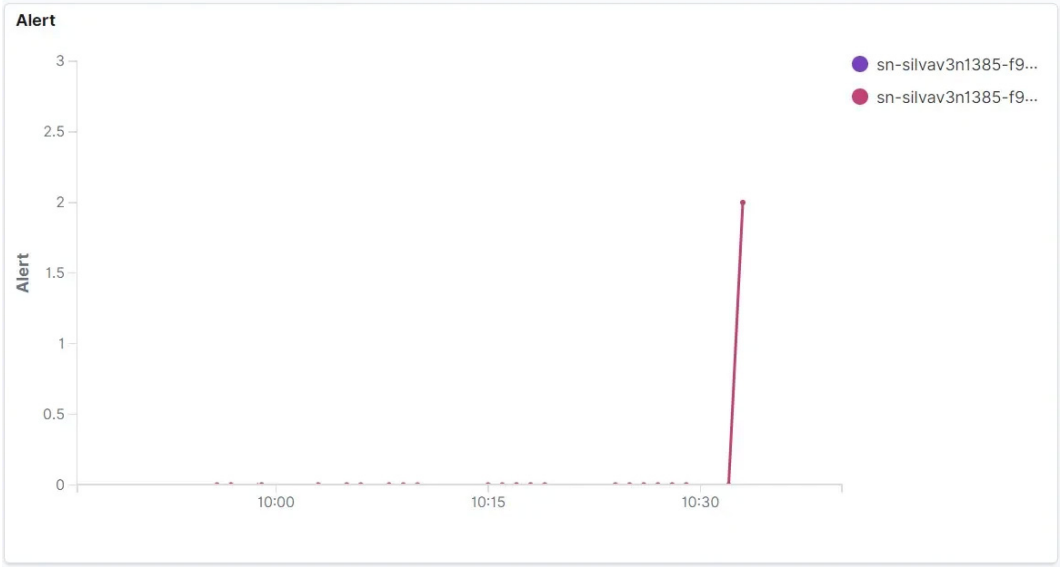
Sensor gas scan resistances

The next graph highlights Silvanet's AI in action, analyzing the gas readings in real-time. Artificial intelligence continuously monitors these gas patterns, gradually increasing the probability of smoke detection.



Classification

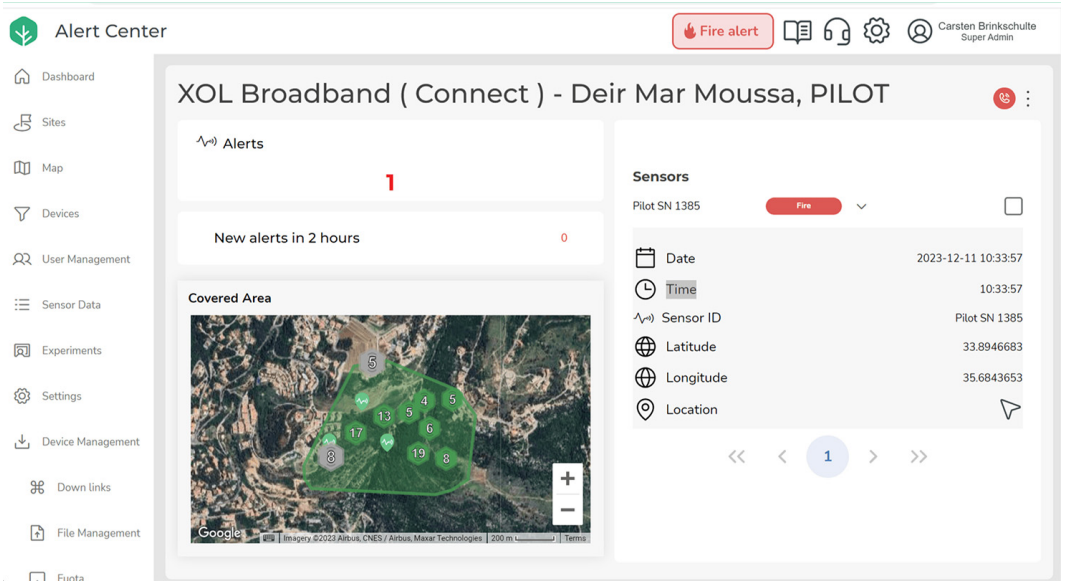
At 10:33 AM, the AI model surpasses the 50% confidence threshold, reaching 70% probability of a fire, thereby triggering an alert, as seen in the following graph.



Alerts

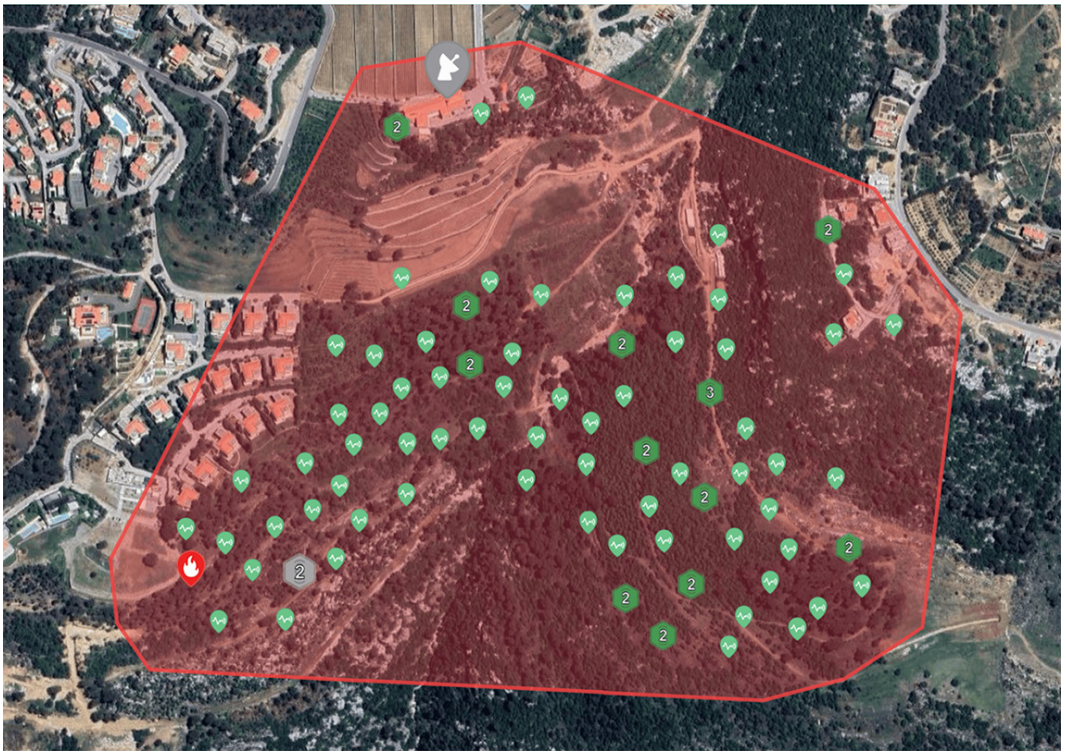
Why Silvanet Made the Difference

The success of Silvanet lies in its ability to provide ultra-early detection. Unlike traditional fire detection systems that rely on cameras or satellites to spot flames, Silvanet works by sensing the gases produced during the very first stages of combustion. This gives authorities precious time to act, often before a fire becomes visible.



Silvanet Site Management app - Alert Center

Silvanet's AI-driven detection models are finely tuned to the specific environmental conditions of each deployment, reducing the chances of false alarms and improving the accuracy of alerts. This precision is particularly valuable in regions like Lebanon, where even a small fire can quickly grow into a large-scale disaster.



Silvanet Site Management app - Map View

Looking Ahead: Expansion of Silvanet in Lebanon

Following the success of the pilot, Mada plans to extend the deployment to safeguard the Mount Lebanon region. This initiative aims to protect the delicate ecosystems that stretch across the country, ensuring that critical habitats and communities are safe from the increasing threat of wildfires.

Conclusion

Dryad's Silvanet system is proving that ultra-early detection is not just a concept but a real, actionable solution that can help save lives and protect ecosystems. The success in Lebanon highlights the global need for innovative, scalable solutions like Silvanet, which can make a significant impact in wildfire-prone regions.

Together with partners like Mada, Dryad is working to create a future where wildfires can be detected and stopped before they cause irreparable damage.

Testimonials

"Our collaboration with Dryad reflects our mission to **leverage cutting-edge technology to protect our environment**. Silvanet's ability to detect and prevent fires early has already made a **tangible impact on the safety of our forests**."

Dr. Nassif Bechara, General Manager, Mada

"The incident in Lebanon shows just how e**ffective ultra-early detection can be in preventing devastating wildfires**. We're committed to continuously improving our technology to meet the challenges of an increasingly wildfire-prone world."

Carsten Brinkschulte, CEO, Dryad Networks