# Spotting wildfires with Axis.

## Nevada Seismological Laboratory deploys Axis network cameras as early detection system for national and local firefighting services.

**Organization:**
Nevada Seismological Laboratory

**Location:**
Reno, Nevada, USA

**Industry segment:**
Government

**Application:**
Remote monitoring, fire detection

### Mission

With record drought conditions in California and Nevada, the number of wildfires continues to escalate. Knowing that early detection could save countless acres of cherished landscapes, while saving millions of dollars in property damage and potentially lives, the National Seismological Laboratory (NSL) at the University of Nevada, Reno, set out to create a sophisticated network of high-definition IP video cameras to help fire spotters see beyond the limitations of the human eye.

### Solution

Working in partnership with the Bureau of Land Management and United States Forest Service, NSL began deploying a series of Axis pan/tilt/zoom (PTZ) HD-resolution network cameras on mountaintops and fire towers across the states of Nevada and Eastern California.

These cameras stream the video to various incident command centers through high-speed microwave radios supported by an array of solar-powered batteries. The video is also posted to the NSL web site where can be viewed live and in time-lapse mode by various agencies and the public at large.

### Result

Using time-lapse views of camera footage, fire spotters can easily discern the difference between a dust cloud and a smoke plume. At night, the near-IR sensitivity of the cameras help fire spotters distinguish the difference between car headlights and the unique flicker of a fire. Through this early detection system, NSL has provided firefighting services the timely information they need to quickly marshal the appropriate resources and combat blazes before they spread.

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# Getting the jump on wildfires

When it comes to fighting wildfires, early detection can be the difference between extinguishing a small blaze and battling a raging inferno threatening to consume homes and thousands of acres of forest. In the past, the United States Forest Service and the Bureau of Land Management relied on fire spotters atop lookout towers and the occasional Good Samaritan phoning in reports of suspicious smoke or flames. But as the incidents of wildfires began to escalate in the Tahoe Basin and other drought-ridden areas of Nevada, the Nevada Seismological Laboratory at the University of Nevada, Reno, knew something more needed to be done to help protect state forests and wildlands from destruction.

"The idea of placing a network of IP cameras strategically throughout Nevada and eastern California came from the HPWREN (Research and Education) Network run by the University of California, San Diego," noted Graham Kent, Director of the Nevada Seismological Laboratory at the University of Nevada, Reno. "They had done it, but without a focus on early detection. We wanted to expand on that."

The goal was to augment human spotters with high-resolution cameras capable of seeing beyond what's possible with the human eye and binoculars. NSL created proprietary software that would allow fire spotters to view time-lapsed sequences of high-quality HD video images on demand to detect smoke plumes that may have gone unnoticed if they were simply scanning the horizon at random intervals.

## Creating a network of long-range spotters

Devising a way to power these cameras and transmit images to command centers across the state required some creative thinking.

"Since it would be impractical to string cable to these remote sites, we opted for microwave radio transmitters which would give us sufficient bandwidth for the HDTV quality images our Axis cameras were sending at one or two frames per second," said David Slater, Networking Specialist for the Nevada Seismological Laboratory. "The radio transmitters would also enable the command center to remotely control the PTZ cameras to zoom in for a closer look at any questionable events."

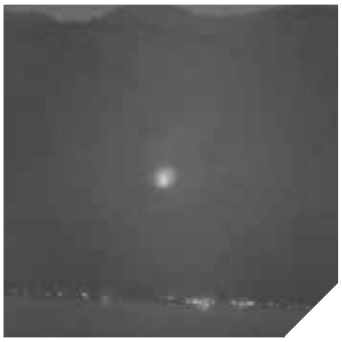
"We use solar panels at each site to charge a series of AGM Deep Cycle batteries that power the cameras. To conserve energy, we installed a device to monitor the voltage on the battery bank and automatically turn the cameras off and on."

NSL uses AXIS Q6045-E PTZ Dome Network Cameras and AXIS Q6045-E Mk II PTZ Dome Network Cameras at its sites. "We especially like the 32x zoom on the Mk II cameras because we can get a really close up, look at something, and ascertain whether it's a smoke plume or just a dust cloud," added Slater.

"From some of our locations we've been able to detect several fires starting to burn as far away as 130 miles," said Graham Kent.

Eventually NSL plans to add AXIS P1428-E Network Cameras with 4K resolution to the system as well. To conserve bandwidth consumption, those extremely high-resolution cameras will transmit at half a dozen frames per minute.

Currently, NSL has strategically deployed cameras in and around Lake Tahoe, central and northern Nevada, and hopes to expand coverage to more areas in the near future.



"A big advantage the Axis cameras have over a ranger just sitting in the tower with a pair of binoculars is that these cameras can see the near infrared glow coming off smoke, something that's undetectable by the human eye."

David Slater, Networking Specialist at the Nevada Seismological Laboratory, University of Nevada, Reno.

## Adding drone spotters to the mix

NSL recently completed testing on a drone application for its fire spotting system using AXIS M1025 and AXIS M1054 Network Cameras. "We mounted a light-weight, HDTV-resolution Axis camera on a small drone equipped with a battery pack and an IP radio, and streamed the images live to my laptop," Slater explained. "The range was limited, but the picture quality was so much better than a typical composite VGA video that you'd get with a bullet camera."

Now that they have a proof of concept, NSL plans to launch a bigger drone with a bigger Axis camera and a more powerful antenna and fly it over a controlled burn. "Ultimately, we'd like to have all our mountaintop cameras be the stable backbone of our operation and once someone spots the fire, we can launch the drone and give firefighters early intel on the situation," Kent speculated. "We'll also stream the footage to our live web site for the world to see."

The NSL applied to the Federal Aviation Administration (FAA) for a Certificate of Authorization and is currently awaiting permission to fly the larger drones at higher altitudes to cover more area.

"A few years ago, the only fire spotting tools we had were rangers with binoculars and walkie-talkies, or maybe low resolution, analog closed circuit TV cameras," Kent concluded. "With the IP-based, HDTV and 4K Axis cameras, the amount of information we provide to fight fires today is incredible. It's a real game changer."

## Going beyond fire detection

Because Axis cameras are connected by a private microwave network, NSL has been able to track multiple hazardous conditions from lightning strikes to seismological activity to flooding, snowfall and more.

The National Weather Service in Reno uses the time-lapse video from the NSL system in conjunction with its radar maps to look at thunderstorm development and monitor the evolution of extreme weather patterns. Posting live video to the NSL web site also provides a public relations bonanza for various Chamber of Commerce organizations, drawing residents and potential visitors to the beautiful weather at Lake Tahoe, the pristine snow conditions at Homewood Ski Resort or hundreds of other destinations in both states.

NEVADA Seismological Laboratory

Alert Tahoe

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# About Axis Communications

Axis offers intelligent security solutions that enable a smarter, safer world. As the global market leader in network video, Axis is driving the industry by continually launching innovative network products based on an open platform - delivering high value to customers through a global partner network. Axis has long-term relationships with partners and provides them with knowledge and ground-breaking network products in existing and new markets.

Axis has more than 2,000 dedicated employees in more than 40 countries around the world, supported by a network of over 75,000 partners across 179 countries. Founded in 1984, Axis is a Sweden-based company listed on NASDAQ Stockholm under the ticker AXIS.

For more information about Axis, please visit our website www.axis.com.



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