



Sandia Plays Key Role in Homeland Security

Laboratory Helps U.S. Agencies and Departments Protect Critical Assets

Digital video recorders are playing an ever more prominent role in protecting critical government assets.

At Sandia National Laboratories, a U.S. National Nuclear Security Administration research and development facility, advanced security equipment from private sector manufacturers is subjected to rigorous testing.

The facility, based in Albuquerque, New Mexico, has a broad mandate that ranges from the safety of the U.S. nuclear stockpile to the global fight against terrorism. It is the job of personnel at Sandia's Intrusion Detection Test Facility to subject security equipment to in-depth functionality and performance tests. Sensors, video equipment and algorithm-based object recognition and tracking systems are all put through their paces in a series of advanced intrusion detection scenarios run in both indoor and outdoor laboratories.



Sandia uses March Networks™ 4000 Series DVRs around the clock to capture video from tests and field operations, says video technology engineer Dave Furgal. Some of the facility's most interesting test data comes randomly as a result of environmental effects or unplanned events, such as a coyote or rabbit triggering an alarm in the middle of the night.

The test facility was initially established to evaluate sensors, and it used video surveil-lance to provide visual verification of the alarm data. Eventually, Furgal says, the use of video technology for alarm assessment purposes became its own area of investigation.

"It's important, because you don't have detection without some type of visual verification," explains Furgal. "You either send out a patrol to the location of the alarm or you use video to see if you can identify the cause."

Digital video

The facility had tested DVRs three years ago, says Furgal, but continued to use time-lapse VCRs to record video from its tests until 2003.

"Since 2001, DVRs have really made an impact on the marketplace, but many

government agencies are still using older technology," he says. "When new technology comes out, the government doesn't instantaneously run to implement it, because the technology needs to mature, operating experience and test data needs to be gained from initial installations and, of course, there are the omnipresent budget constraints.

"As time passed, however, push came to shove," Furgal continues. "Our VHS recorders were becoming non-functional at that point due to a common-mode failure, so rather than spend any more money fixing them, we decided to join the 21st century and go digital, with an eye on future test and video equipment interface requirements."

Based on a technology investigation of competitive DVRs, Sandia selected March Networks 4000 Series DVRs with external RAID storage for use in its test facility. Each DVR has high frame rate and video resolution capabilities, an Ethernet network interface, a Linux-based operating system, mass storage options, docking station architecture and easy to use operator interfaces.

"With minimal training, we were reliably acquiring, archiving and playing back test



and alarm video data," says Furgal. "Gone are the days of winding through VHS tapes to find a test or alarm video record. We can now search and playback the video information needed in less than a minute. The DVRs are presently collecting video at both our interior and exterior test sites and we plan to connect the systems together soon via an encrypted wireless link so that we can remotely access live and recorded video information."

The DVRs at the test facility record video from eight cameras at 15 frames per second, easily providing the playback resolution of 720 x 480 pixels required by Sandia.

External RAID storage devices ranging from 1.5 to 3.6 TB per DVR, in addition to internal hard-drive storage of up to 1.2 TB, provide the test facility with one to two months' worth of video storage from cameras recording 24/7.

Recognition and tracking

Another factor that led to the decision to use the March Networks DVRs, says Furgal, was their ability to interface with an algorithmbased object recognition and tracking (ABORAT) video motion detection system from software manufacturer ObjectVideo. ObjectVideo software detects, assesses and tracks potential security threats in real-time, distinguishing, for example, between flying birds, blowing debris, and personnel and vehicle movements.

Algorithms and rules related to the size and shape of the object and the speed, direction and pattern of movement enhance the intelligence beyond existing DVR motion detection capabilities to further reduce the frequency of false and nuisance alarms, as well as the number of people required to investigate them.

National standards

Testing of sensors and intrusion detection products was identified as a priority for Sandia in the 1970's because there were no national standards and government agencies and organizations needed help making the right procurement decisions, says Furgal.

"The government was buying systems that often didn't deliver the performance required. The test facility was established to determine if security components met critical asset protection security requirements, to identify equipment and technology vulnerabilities, and to assess their effectiveness."

At present, the facility is providing assistance to several government organizations and agencies, and expects continued growth as requests for test information and consultation assistance increases.

near Albuquerque, New Mexico.

"We get asked our opinion about sensors, cameras, video switching and processing equipment, communication links, DVRs, and motion detection systems," says Furgal. "They'll tell us what their application is and ask us what we suggest. Often we'll go to their site to see what currently exists to help in that determination.

"Historically, we would have entered into an agreement with another government agency and conducted a formal investigation, reported on the findings, and made recommendations.

"But because of changes in the world of security since 9/11, a lot of people want an answer right away. I have to install a system next month,' they say. Based on what little you know today, what should we install?"

