

SPATIALVIDEO

Bringing GIS Technology to Video Security

A Message from Larry E. Newman, President, P.E., LEED AP

SPATIALVIDEO

Greetings from Spatial Systems Associates, Inc. (SSA) and Happy New Year (well, I guess it's not so new anymore). SSA is back in a growth mode with several new projects that we were awarded late last year. We hired a couple of new staff members in January, and we look forward to incorporating them into the Spatial family.

Within this newsletter we are introducing you to two new applications that have been developed over the last year—SpatialVideo and SpatialLeak, our Natural Gas Leak Detection application. We are also reporting on an implementation of our SpatialMMS application at the Maryland State Archives. SpatialVideo is part of a larger application that we are developing, SpatialSecurity. Our next newsletter will provide more information on the larger SpatialSecurity application, but I wanted to spend a little time sharing with our clients the functionality of SpatialVideo, which is now available.

Video Security technology takes many forms today, but essentially it is the integration of video cameras, video recorders, software that allows the user to review in real time and historically what the cameras have "seen," and possibly incorporation of software that will analyze the video stream either in real time or offline to identify events that the video system has recorded. A video system can include literally thousands of cameras, recorders, display monitors, and analytics that most often does not have a convenient locational or spatial visualization context.

Our SpatialVideo product is built on standard Esri technology. SpatialVideo

brings locational awareness to an existing video system and provides the ability to answer such questions as:

- » **WHERE** are the cameras deployed on my video system?
- » What is the **areal extent** of what each of the cameras can see?
- » What is the **areal extent** of what is not covered by my present video system?
- » When an event is reported, by whatever means, what camera in my system is most likely to be able to see what is going on?
- » As an event unfolds, what additional cameras should I be looking at to track the event?

SpatialVideo allows an operator not only to know what cameras are available, but provides the ability to send commands to the video system to display one or more cameras on specific screens in an emergency command center or in a staffed surveillance center. Further, properly configured, SpatialVideo can provide alerts to security personnel that an event has occurred (based for example on video analytics), where it has occurred, and identify the most appropriate camera to view to follow up on the event.

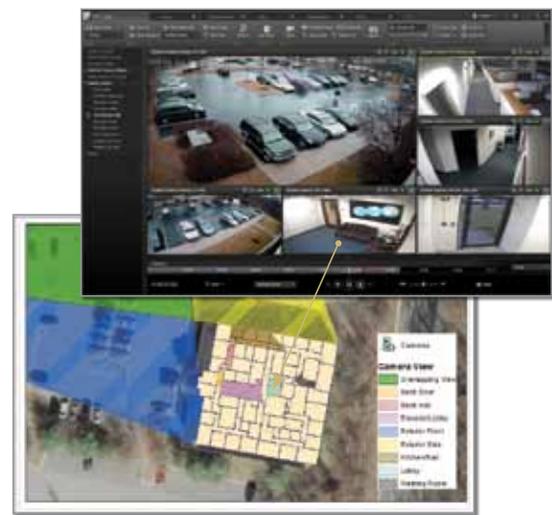
Video analytics increases the value of standard video camera and recording technology by the addition of continuous automated monitoring. Whether the intent is to:

- » Detect movement and draw attention of monitoring staff to an event
- » Count the number of people or vehicles traversing within the range of a camera
- » Attempt to identify individuals through face recognition analysis

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This graphic depicts the location of video cameras on the outside and inside second floor of the subject building. The spatial extent of what is visible to each camera is shown in plan view, and the identity of each camera is defined in the accompanying legend. For the exterior cameras, areas that are visible to multiple cameras are shown as "overlapping view." The image then shows the layout of the video camera display from the video system, highlighting in particular one camera image and the space within the building that the subject camera is recording.

- » Identify when an object is left behind or taken

Or any similar analysis, video analytics combined with a spatially-aware video system provides the best possible active/passive approach to securing a campus, building or suite. We would be happy to demonstrate our new SpatialVideo application to you if you or your organization has an interest in this new approach to using Esri's GIS technology. Please email us at Security@spatialsys.com for further information. [SSA](http://www.spatialsys.com)

SOLUTIONS in the SPOTLIGHT

City of Charlottesville Natural Gas Leak Detection Application

By Patrick McLoughlin, GISP
Project Manager



Pipeline safety regulations have been in place since the early 1970's. The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) is responsible for administering these regulatory requirements assuring the safe transportation of natural gas, petroleum, and other hazardous materials by pipeline. Gas operators, like the City of Charlottesville's Department of Public Utilities – Gas, are mandated to meet these regulatory requirements.

One of these regulations is the Distribution Integrity Management Program (DIMP), which requires gas distribution operators to develop, write, and implement a program that details the understanding, evaluation, measurement/monitoring, and reporting of the gas distribution system. One of these areas, Knowledge, involves the updating of maps, drawings, or sketches with the latest infrastructure informa-

tion available. As a result of this, many gas operators have implemented GIS technology as a way to manage and map their gas infrastructure as part of DIMP's Knowledge component.

Also part of DIMP, gas distribution operators are responsible for ensuring their system is operating correctly and safely. One of the safety requirements is to perform leakage surveys of the distribution system. Under Code of Federal Regulations (CFR) 49, Part 192.723, operators are responsible for completing scheduled surveys of their distribution system. Specifically, this regulation requires "the following minimum requirements:(1) A leakage survey with leak detector equipment must be conducted in business districts, including tests of the atmosphere in gas, electric, telephone, sewer, and water system manholes, at cracks in pavement and sidewalks, and at other locations providing an opportunity for finding gas leaks, at intervals not exceeding 15 months, but at least once each calendar year.(2) A leakage survey with leak detector equipment must be conducted outside business districts as frequently as necessary, but at least once every 5 calendar years at intervals not exceeding 63 months. However, for cathodically unprotected distribution lines subject to § 192.465(e) on which electrical surveys for corrosion are impractical, a leakage survey must be conducted at least once every 3 calendar years at intervals not exceeding 39 months¹."

These leak surveys are completed using methane gas detectors that read the amount of gas emitting from the distribution system. The amount of methane gas read on the locating device then determines the severity classification of the leak and, in turn, the appropriate response time. These inspection procedures involve recording the leak information on paper maps or ledgers, which assist in completing the hand written leak report forms. This process can be time consuming and vulnerable to the elements in the field. Additionally, many leakage survey crews

rely on phones to relay information which could potentially contribute to misinformation should service be an issue. The Department of Public Utilities – Gas in the City of Charlottesville, Virginia, has been using GIS technology since the mid-1990's and was eager to utilize their existing, comprehensive GIS to assist in streamlining the survey process in meeting the CFR 49 requirements.

To accomplish this, SSA worked with the Department to build a Leak Detection Application that provides the leakage survey crews with mobile access to the GIS-based distribution data, the ability to track the location of what has been surveyed and auto-document and communicate methane gas leaks as they are found to expedite the repair process.

The Leak Detection Application uses Esri's ArcGIS Mobile technology with a GPS and cellular network enabled tablet. This allows the survey crew to complete their existing survey process, but removes the need for paper maps. All of the gas data and associated attribute information is available to the survey crews in the field, as well as traditional base map information (planimetrics, orthophotography, etc.) The core application functionality includes:

- » GPS tracking of all lines inspected with time/date stamp and inspector information for archiving purposes
- » GPS leak location point populated with leak and GIS infrastructure information
- » Auto generation of leak report
- » Leak alert system providing the dispatch center with a leak report form showing location of leak, leak severity, and necessary repair information
- » On-the-fly data updates to distribution operator server via ArcGIS Server using a wireless web connection
- » Mobile cache updates in areas without wireless connectivity—auto-sync occurs when web is available

In addition to the Leak Detection Survey, the crew is also responsible for identifying atmospheric corrosion on gas meters that are in need of paint as well as locating the site where meter guards need to be placed.

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<http://www.phmsa.dot.gov/portal/site/PHMSA/menuitem.ebdc7a8a7e39f2e55cf2031050248a0c/?vgnextoid=a7c6ca170a574110VgnVCM1000009ed07898RCRD&vgnnextchannel=67027e2cd44d3110VgnVCM1000009ed07898RCRD&vgnnextfmt=print#page5>

PRODUCTS in the SPOTLIGHT

SpatialMMS: Monitoring the Archives

By **Eric Stetser, GISP**
Vice President



Working to conserve Maryland's history, the Maryland State Archives has implemented our SpatialMMS technology. As the historical agency for government records of permanent value, beyond paper materials, the archives also protects film based items, photographs, art work, maps, artifacts (such as the U.S.S. Maryland silver service), and battle flags dating back to the Civil War. The Archives' mission is to conserve these items for as long as possible for use and reference by future generations. Ideally this would be forever, but in reality, may be limited to hundreds of years due to natural aging and decay processes.

Housed within the Edward C. Papenfuse building in Annapolis, MD, the Archives occupies a 100,000 square foot building which was specifically designed and constructed for its needs. The building was opened in 1986 on schedule and under budget. Key aspects of the design included a public search room, light management (UV radiation is bad for documents as well as our skin), and HVAC systems which target specific temperature and humidity lev-

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els to maximize the life expectancy of the stored items.

Despite the efforts of the original design, it was believed that the Archives building may not be functioning optimally to protect the stored items as evidenced by mold growth in some areas indicating temperature and humidity problems. To help understand and monitor the indoor environment, the Archives adopted the use of SpatialMMS based on its real-time data collection, alerting, and reporting capabilities in the areas of temperature and humidity.

Previous efforts to analyze these variables involved using temporary sensors which were retrieved periodically to have their memory downloaded to a computer for analysis via spreadsheet or specialized desktop software. While helpful, this approach was very labor intensive and did not perform consistently.

The SpatialMMS system covers all areas of the 5 floor building with an array of 64 sensors, each capable of reporting temperature and humidity. Readings are taken from each sensor every five minutes; the information is stored for future analysis as well as compared to acceptable ranges. If the temperature or humidity is out of range, an email alert is sent to the Head of Conservation. Using SpatialMMS' map based interface, the Head of Conservation can then investigate the problem area including nearby sensors to determine what actions should be taken to protect the archived materials.

The Archives has also become a significant electronic data repository as our



society and government has moved from paper to digital medium. As such, the Archives building also supports a significant computer infrastructure including server rooms/data centers to provide search indexing and electronic document retrieval via the Internet (<http://msa.maryland.gov/>). SpatialMMS is also helping to protect these resources with temperature/humidity alerts directed to the IT staff to ensure 24x7x365 availability.

Using SpatialMMS' historical analysis capabilities, Archives staff can now communicate with the HVAC operations staff using location specific graphs depicting temperature or humidity at specific times to show trends key to correcting the system to meet their objectives. [SSA](#)

CHARLOTTESVILLE, VA | *Continued from the preceding page*

Both of these surveys are now completed at the same time as the leak detection collection. The application allows the user to add a point where paint or a meter guard is needed and populate Department specific information within the point. A report is then auto-generated using the underlying GIS data and the new point feature, and emailed to the maintenance group responsible for paint and repair.

The Leak Detection Application is providing the City of Charlottesville with a streamlined approach for completing the federally regulated leakage surveys. By providing the leakage surveyors the comprehensive source gas infrastructure at their fingertips and a mechanism to quickly record and communicate gas leak locations, the job of leakage surveys can be completed more quickly and efficiently. In the event of a major gas leak, the GPS's location information can be quickly referenced to determine when the infrastructure was last inspected to ensure compliance with the federal regulations. [SSA](#)

SSA, INC.

COMPLETE GIS AND FMIS IMPLEMENTATION AND SUPPORT SERVICES

GIS & FMIS

GIS

GEOGRAPHIC INFORMATION SYSTEMS

Needs/Cost Benefit Analysis

Excited, curious, or confused about the potential for GIS in your organization? Spatial Systems has been implementing these technologies for years. Allow us to evaluate your needs, project the potential for savings or increased revenues, and otherwise explain the potential for GIS in your business.

GIS Systems/On-Site Consulting

Maybe you need a little help bringing it all together. No one ever said GIS could be integrated overnight. Let us come on-site, provide implementation management and QA/QC to help you implement this time and money saving technology.

Web-Based Hosting

Perhaps you don't really want the hassle of building and maintaining a GIS internally. Consider allowing Spatial Systems to host your GIS data or its services and make GIS functionality available to you and/or your clients over the internet.

Wide-Format Scanning

Make it digital! Convert maps, blueprints, and imagery into a new theme/layer for your GIS. Unlimited length specifications with widths accepted up to 50" B/W, full-color, with various resolutions and output formats available.

Analysis

If you simply want to be able to take advantage of the ability of GIS technology to help meet the needs of your organization without the bother and cost of acquiring GIS software and learning to use it, Spatial Systems offers the services of our experienced staff to perform analysis and produce suitable reports and cartography for you.

Vectorization

Take all of your hardcopy or image files and turn them into topologically structured GIS compatible layers, with attribute links to your database.

Integration

Combine the new datasets with your existing data or models to fully integrate GIS technology with your legacy data systems.

FMIS

FACILITIES MANAGEMENT INFORMATION SYSTEMS

System Design

We specialize in the use of legacy systems and data in the implementation of our SpatialMMS product line. Allow us to sit down with you to understand your need for FMIS technology and to recommend the most effective approach to implementation.

Data Development

Whether you have no as-builts or a sophisticated Building Information Model (BIM), or anything in between, Spatial Systems is prepared to use what is currently available in the establishment of a consistent and accurate dataset that is customized for your facility. When necessary, our field staff will gather relevant information on-site to meet the requirements of your desired functionality.

Monitoring Tools

Spatial Systems will arrange, when necessary, for the installation of energy, water, and indoor environmental sensors to capture relevant data for your facility. If your facility already has a monitoring or other control system, Spatial Systems will integrate our SpatialMMS tools to use the output from those systems to the extent permitted by your other vendors.

Dashboard Customization

SpatialMMS utilizes a fully customizable dashboard for your interface with the system. By understanding your specific requirements, we will deliver a web-based solution that meets your needs.

Hosting

If preferred, Spatial Systems will host your FMIS data and interface on our in-house servers. There is no need to purchase hardware or software to take advantage of this technology, and access to your facility data can be made available to anyone you designate who has access to the internet.

Alerts

If any of the monitoring technology detects that the readings from a sensor fall outside of parameters that you establish, SpatialMMS can generate an alert in the form of an email, a mail message, or establishment of a new work order in your existing work order management system.

Reports

Reports from SpatialMMS can be generated on demand or on a regularly scheduled basis to confirm for you that the building systems are operating properly and to report the periodic results of automated analysis of the collected data.

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