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Emerging Video Surveillance and Monitoring Technologies

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EMERGING VIDEO SURVEILLANCE AND MONITORING TECHNOLOGIES

THE NEED

Security in homes and businesses has taken a top priority in both new and existing facility construction spotlighted by the event of Sep. 11. Video surveillance, alarm system, and controlled access appear to become the first establishment which the construction industry as well as the security industry employs new technology for in order to protect homes and businesses from inside culprits as well as outside intruders. Video surveillance has been one of the most important security equipment.



FIGURE 1 WEB-CAMERA IMAGES INTEGRATED INTO A TERMINALS WEBSITE
(COURTESY OF NASCENT SOFTWARE)

The traditional video surveillance applications have some limitations; 1) one unit per one person in one place, 2) the limited area for surveillance due to the location of cameras 3) increasing operating cost, 4) hard reductions in theft and claim rates over the long term. Recently, video technology has grown by leaps and bounds throughout the last few years due to the steep development of Information Technology (IT). The newest video surveillance technologies seem to be taking two aspects: 1) Digital Video



Surveillance (DVS) of a turn toward digital video servers using Internet access, and 2) Multi-modal User Interface (MUI).

THE TECHNOLOGY

DVS

DVS applications which were provided by Nascent Software are focusing on the interconnected inter-modal supply chain revolving around two main functions, monitoring and security. In many facilities, building-mounted cameras hardwired to indoor TV monitors enable supervisors to monitor requiring other security personnel to verify the situations in fields.

This traditional environment is not capable of extending information over this digital landscape to the computers of remote users. Recently, Nascent software provides the security market with a PC based DVS system supplemented with a web-enabled application, RemoteView which allows multiple users to monitor live video via TCP/IP.



FIGURE 2 NASCENT SOFTWARE'S REMOTEVIEW MONITORING INTERFACE (COURTESY OF NASCENT SOFTWARE)

Nascent 's DVS system with its RemoteView provides remotely accessible, cost-effective digital video solutions with expanding global Internet Protocol (IP) network infrastructures and increasing Internet bandwidth capacities. Three types of DVS systems are available to users; 1) Web-camera systems, 2) Live monitoring systems, and 3) PC-based DVS security systems.

Recently, Web-cameras associated with Internet browser installed on a PC allow user to notify the current state of activity on target area displaying saved images on an Internet Website providing some benefits such as inexpensive, easy to install, and no need of special software for configuring. Nascent Software, with its RemoteView system, offers users full-motion video for operations or security monitoring through a more stable and flexible web-enabled client/server application. This system is especially useful to remote



operations or equipment management providing real-time monitoring. That is Nascent's system focuses specifically on providing expanded surveillance and security features that can enhance and expand the capabilities of loss prevention, claims and security personnel. Thus, Nascent's DVS system which is an extension of its RemoteView product allows local and remote security staffs to simultaneously monitor and control the cameras with perimeter and building-based monitoring and recording of activities throughout one or more facilities.



FIGURE 3 NASCENT SOFTWARE'S DVS CONFIGURATION SCREENS (COURTESY OF NASCENT SOFTWARE)

MUI

Modular Video Imagery Exploitation Work Station (MVIEWWS) showing the multi-modal user interface as a key feature developed by SRI International is a demonstration system for annotating, indexing from video streams for surveillance and intelligence application. This system allows a single operator to view and annotate video data with real-time monitoring. This system accepts voice and pen input which are converted by talking, pointing, and drawing as natural ways for humans to convey information. This system automatically records the operator's verbal comments and drawings on the video image, and associates them with specific frames in the video sequence. MVIEWWS is a video exploitation that can be adapted for a wide variety of surveillance, monitoring, and intelligence applications; 1) Control, tasking, and management of multiple video sensors and mobile sensor platforms, 2) Automated target detection, tracking and real-time geolocation, 3) Authoring of multimedia reports, 4) Analysis of surveillance video data, and 5) Real-time collaboration among multiple analysis. Unlike most surveillance systems that are in a fixed location, MVIEWWS is targeted at a mobile sensor problem, especially where a single platform might carry several sensors.



THE BENEFITS

DVS

- Enhancing security and operations monitoring capabilities allows remote operations or equipment management in real-time monitoring
- Reducing the operating cost with each area
- A more stable and flexible web-enabled client/server application
- Reducing reliance on onsite security guards and responding much faster
- Dedicated to the highest technology in the integration of various systems that exist in major commercial projects
- Low insurance claims and premiums



FIGURE 4 NASCENT SOFTWARE'S DVS SYSTEM INTERFACE (COURTESY OF NASCENT SOFTWARE)

MUI

- Automatic detection and tracking of moving objects
- Reducing labor cost due to the operation by a single operator
- Wireless transmission of the extracted information to remote PDAs
- Providing user friendly interface via talking, pointing, and drawing
- Easy to store and replay data
- A wide range of applications for surveillance and monitoring
- Low insurance claims and premiums



STATUS

DVS

This system is being applied to Gate and Equipment Control operations within Maersk Sealand - Charleston Terminal. Nascent Software with its RemoteView system enables viewers full-motion video for operations or security monitoring through a more stable and flexible web-enabled client/server application. Through the application users have the ability to view and control multiple cameras deployed around the world, while gaining the ability to archive images they see at the push of a button. Being completely Internet-enabled, systems are especially useful to remote operations or equipment management tasked with coordinating real-time yard, marine and security operations for several facilities. The architecture composed of this system involves an IP-connected, Windows 2000 Server connecting a series of up to 32 cameras installed throughout a facility. These cameras can focus on gate area, perimeter fences, building entryways and container yards.

MUI

As the control problem to multiple mobile platforms, Small Unit Operations (SUO) focusing on the tele-operation of the robot and its onboard equipment of is in progress.

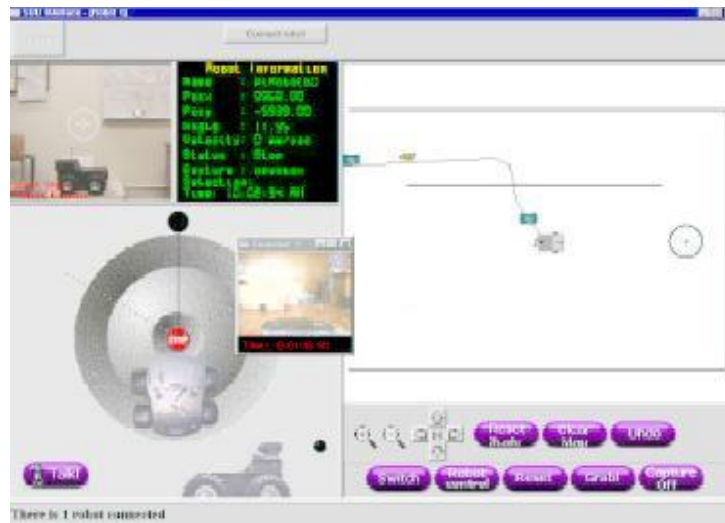


FIGURE 5 THE SUO INTERFACE (COURTESY OF SRI INTERNATIONAL)

The user is provided with a range of multi-modal commands with which to operate any camera and device on any connected robot. Gesture driven commands on live video, vision algorithms, visual feedback, and direct manipulation are the key features of this interface (Figure 5). In another MVIEW project, integrated several image functions, such as stabilization and extraction of selected regions, as well as two object



tracking algorithms have been integrated. Moreover, a geolocation component allows the mapping of objects from the 3D, video, world to 2D (Figure 6).

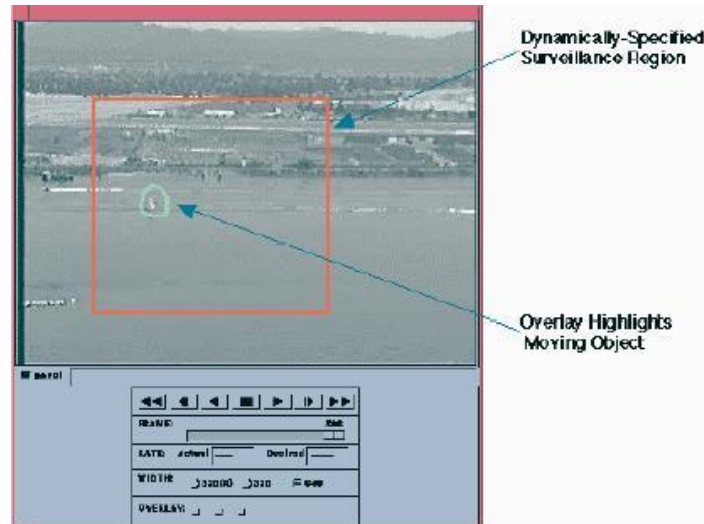


FIGURE 6 TRACKING IN MViews (COURTESY OF SRI INTERNATIONAL)

BARRIERS

- WELL ORGANIZED DESIGN AND INSTALLATION OF IP-NETWORKS ARE REQUIRED. (DVS)
- REMOTE VIEWERS CAN BE LACKING IN SPECIFIC SECURITY FEATURES OF INTEREST TO LOCAL VIEWERS. (DVS)
- WELL ORGANIZED SYSTEMS IN INITIAL PHASE ARE REQUIRED. (MUI)
- INITIAL COST FOR INSTALLATION OF INSTRUMENT CAN BE HIGHER THAN THAT OF TRADITIONAL SYSTEMS.
- LACK OF FAMILIARITY FOR MAINTENANCE BY PRACTICING ENGINEERS MAY CAUSE HIGHER COST AND LOWER PRODUCTIVITY THAN EXPECTED.

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REVIEWERS

Peer reviewed as an emerging construction technology

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