Huntsville Engineering and Support Center

US ARMY CORPS of ENGINEERS

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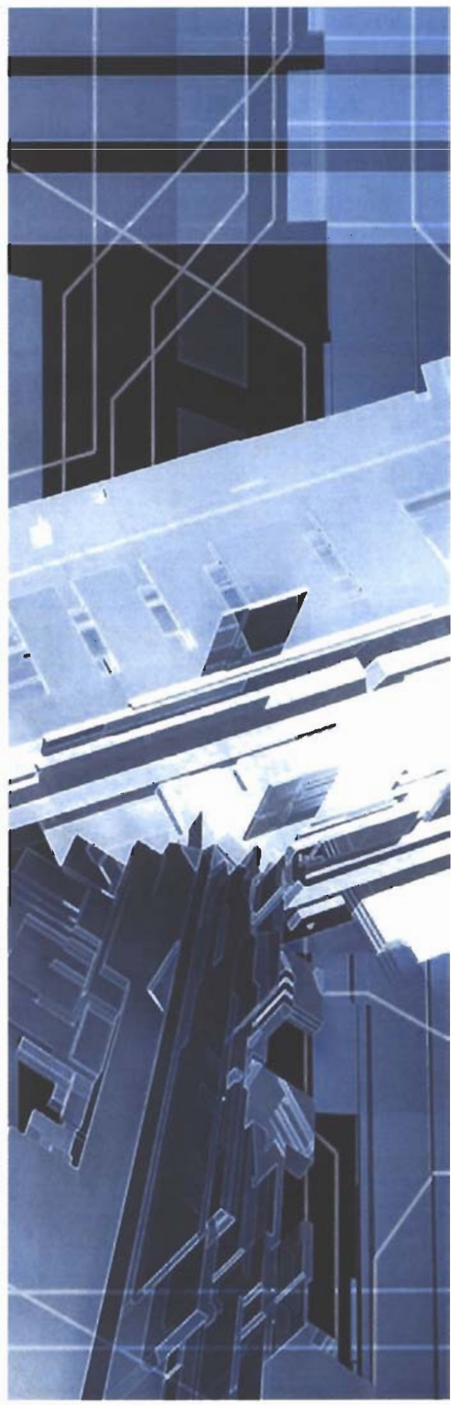
FT. SILL, OKLAHOMA

New LonWorks Based Utility Monitoring and Control System Project

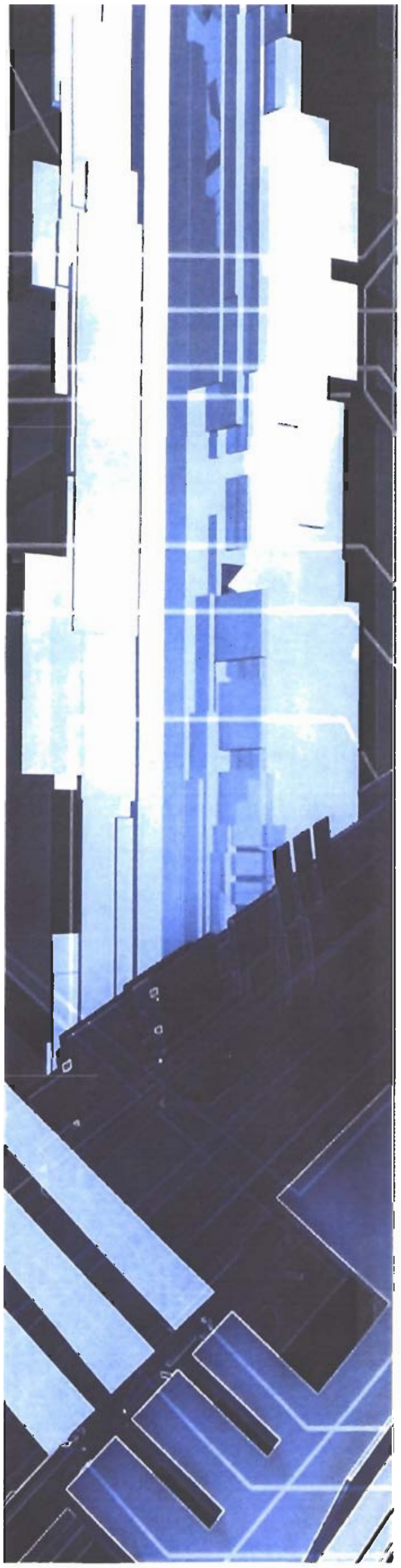


Ft. Sill, Oklahoma received $1.2 million dollars through the Energy Conservation Investment Program (ECIP) in 2004 to build a new Utility Monitoring and Control System (UMCS). The Post had two existing UMCS, one of which was becoming harder and more expensive to operate and maintain. The main goals of the project was to 1) upgrade/replace old UMCS technology, 2) provide improved HVAC control sequences with direct digital control capability, 3) incorporate a post-wide electrical demand limiting strategy limit peak electric demand, and 5) improve monitoring and alarming of critical HVAC systems.

Tulsa District Corps of Engineers approached the U.S. Army Engineering Support Center Huntsville to contract the A/E design services and construction services for the UMCS project. USAESC selected EMC Engineers, Inc. (EMC), Alpharetta, Georgia, to support the scoping, survey, and design of the project. There was a large choice of possible buildings and systems to incorporate into the project. EMC made an initial visit to the Post to help scope which buildings and systems should be included in the project, within the ECIP funding limits. The proposed project included numerous central chiller plants, large administrative buildings, barracks, chapels, and the electrical substation.

With the approval of the selected buildings by Ft. Sill and the Corps of Engineers, EMC did a detailed survey of the HVAC systems and their associated controls system. EMC then prepared a preliminary design package with building-by-building control schematics, detailed sequences,

SEE FT. SILL PAGE 2



FT. SILL continued from page 1

package with building-by-building control schematics, detailed sequences, setpoint-alarm tables, and other design notes for contractor review and pricing. EMC also prepared detailed logic diagrams showing LonWorks data transfer requirements for I/O, control loop, setpoint, scheduling, trending, and alarming.

The Corps of Engineers was in the process of completing the final drafts of the new Unified Specifications UFGS-15951 "Direct Digital Control for HVAC" And UFGS-13801 "Utility Monitoring and Control System", for LonWorks based control systems during the time of the survey and design. It was decided by the Post and Corps to use the new specifications in order to construct an LNS based, LonWorks system, with a web-based operator workstation-server. The Corps selected Tour Andover Controls (TAC) of Carrolton, Texas, from the UMCS II contractors.

In September 2004, Tour Andover Controls was awarded the task order for the project to provide UMCS in 16 buildings during Phase I of the project. A firm fixed price award was made to TAC. TAC is to act as a general contractor following the methodology developed by the Huntsville COE UMCSII team.

Included in the UMCS II methodologies is the completion of the design of the buildings, development of a energy monitoring and load shedding sequences, factory test, installation; performance verification tests (PVT), extensive suite of training modules and comprehensive documentation.

The factory test was completed in November of 2004 and TAC is currently on-post implementing the individual buildings. Construction completion and PVT is scheduled for October 2005 with final testing in February 2006.

Intelligent Video

A number of advances in video signal analysis software are rapidly changing the way CCTV systems are used in security applications. This new back end software automates many of the decision making processes that are required of the security officer monitoring the CCTV section of the security console. This allows the security designer to provide effective security monitoring and protection at many sites that previously presented very challenging security situations.

Historically, the use of CCTV systems in high security applications has relied on fixed cameras viewing a fixed line of demarcation between secure and nonsecure spaces. This was typically defined physically with fencing and electronically with various intrusion detection devices. The CCTV system was then integrated with the intrusion detection system to, upon alarm, automatically provide a view of the zone within which the motion was detected. This alarm video could include a pre-alarm segment a few seconds in length as well as real time, live video, depending on the hardware and software in the system.

A long sought after goal has been the combination of intrusion detection and CCTV functions. This resulted in the emergence of video motion detection (VMD) algorithms and hardware in the early 1980's. The difficulty with this particular form of convergence was that the VMD algorithms were too sensitive. Future development efforts were aimed at selectively desensitizing the algorithm to reduce nuisance alarms without lowering the probability of detection of events that represent actual or attempted intrusions. However the features that have recently become available seem to address most of the problems we as designers have had in implementing video based motion detection. Specific features that are now available include:

1. Motion Detection: The basic video motion detection functions are still there. This has long been recognized as the most sensitive means by which to detect motion in a specified volume.

2. Object Identification: Object identification is the feature that clearly identifies the new generation of video motion detection, or is as it has come to be called, intelligent video. The new signal analysis software has filters embodied in the algorithms that are applied to the detected object in motion. These filters attempt to categorize the object causing the motion. These filters vary from manufacturer to manufacturer, but generally include items such as the height to width ratio, size, speed, location, shape, and nature of motion. *(Footnote 1. The nature of motion is an interesting filter. Some objects in motion, such as cars, have their complete mass moving in the same direction and at the same speed. Conversely, an individual walking forward will normally be swinging his/her arms. One arm will be moving backwards, away from the motion of the main part of the individual, while the other arm will be swinging forward at a speed greater than the main part of the individual. This type of information is used in the algorithm to identify and segregate a walking person from other types of moving object.)*

SEE INTELLIGENT VIDEO PAGE 4

Intelligent Video

- Object Tracking: Once an object in motion has been detected, the software can direct the viewing pan, tilt, and zoom (PTZ) camera to follow the object in motion. This greatly reduces the concern that the object causing the alarm will leave the detection volume before the monitoring officer or the CCTV system will get a clear picture of the alarm-initiating event. This also allows the console officer to focus on evaluating the threat presented by the detected object and not on controlling the array of cameras to follow the object. With traditional technology, this concern was often addressed using pre-alarm video recording so that the monitoring officer can view those events leading up to the initiation of an alarm.

- Objects Separated or Left Behind: Most of the intelligent video products will detect a person leaving behind a carried object such as a briefcase, package, or roll-along suitcase. This provides a much needed tool to the console operator in detecting someone setting down a package and then walking away, especially in crowded public settings with extensive foot traffic.

All of the above features operate on the video signal from individual cameras. Several software packagess. control the output of multiple cameras and combine them into a single graphical representation of the entire site. These packages offer the features discussed above such as motion detection, object identification, and object tracking. These packages take the information from individual cameras and generate a display summarizing graphically the movement of objects on an entire site. This application normally requires a combination of fixed and PTZ cameras at precisely known locations. Once a moving object is detected, the video signals from multiple cameras can be used to determine the location of the object which can be displayed on a digital aerial image of the site. This graphical overview of the site normally uses various icons to represent the types of objects being tracked. Specific images of individual tracked objects can be called up from the site overview graphic.

As the threats to our nation's assets become more intense and site security requirements are heightened, new and enhanced tools are required. Enhanced use of the CCTV subsystem provides for efficient and definitive presentation of visual information as well as automated identification and decision-making tools. This will assist the security designer in meeting these new challenges.

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