Northeast GAS ASSOCIATION
NYSEARCH

Technology Brief

Advanced Video Surveillance System

Description: **Alpha prototype development complete.**
Status: **Testing in varying field conditions ongoing.**

BENEFITS

Pipeline damages are a major concern to gas industry utility operators. Although there have been major improvements in "one call" system operations and pipeline mark-outs, damages still occur. The objective of the Advanced Video Surveillance System project is to develop a self-contained portable system that has the ability to detect excavating equipment typically used by third party excavators that could potentially damage a pipeline. Once the detection is made, an alarm is sent to a remote location warning the pipeline operator that a potential damage exists. The project builds on a previous PLE project performed for the military that had a detection area of one (1) meter wide and 100 meters long. The major benefit of having such a system is to provide pipeline operators with remote monitoring capability for a variety of short length pipeline sections (250 to 1000 feet) that are considered to be critical to the system and/or greater risk of damage by outside forces. Operators will have the ability to remotely view the site being monitored and, if necessary, respond to the location to prevent potential damage from occurring.

BACKGROUND

Damages caused by construction equipment such as backhoes, Horizontal Directional Drilling (HDD) machines, etc. can be a significant threat and can cause significant loss of property and/or jeopardize public safety. One solution to help mitigate damage involves installing a remote monitoring system. Remote monitoring technologies tested to date are better suited for long pipeline runs, ten miles or greater, typical of those operated by interstate transmission companies. Some of these technologies are costly to purchase and install. There are no technologies on the market today that can be quickly installed, at reasonable cost, that are also capable of monitoring shorter length pipeline sections.

NYSEARCH is continually seeking new technologies/solutions to prevent pipeline damages caused by outside excavators. One particular technology that shows promise involves the use of video imaging systems. In recent years, there has been significant improvement made in smart camera/video imaging systems that can send alarms wirelessly to a remote location or control center. Although there are several systems on the market developed for security applications for detecting intruders, there was no known video system(s) capable of detecting excavating events (Figure 1) for the gas industry.

Figure 1: Prototype Type Video System

NYSEARCH has been working with PLE Communications, a video imaging company that develops smart video imaging systems for the US military and other agencies.

TECHNICAL APPROACH

The first phase of the project was devoted to gathering field video data of various types of equipment typically used by third parties. These included small and large backhoes, HDD machines, hand shovel, pavement breaker, post hole and drills (Figure 2). PLE analyzed the video segments and developed new algorithms/ software to capture the digging motions of the equipment and tools selected. Field tests performed both rural and city settings were successful at detecting backhoes, shovel/ posthole digging and pavement breaker

Figure 2: Backhoe Excavation — Urban Site

operation with no false alarms recorded. As a result of this effort, a second project phase was approved for PLE to take their existing system and reduce its size to develop a small form self-contained video system.

The new small form camera system is powered by 110 volt supply, generator, or in some cases, a solar/battery setup. This includes a pan-tilt-zoom camera that provides detection coverage up to 250 feet in length. PLE's analytical software detects and alarms on third party excavating event only. Nuisance alarms and/or false alarms (such as nearby traffic, blowing leaves, shadows, etc.) are eliminated during the analysis process. In addition, the pipeline operator will have the flexibility to identify and exclude certain areas or zones from the cameras field of view, if desired (Figure 3).

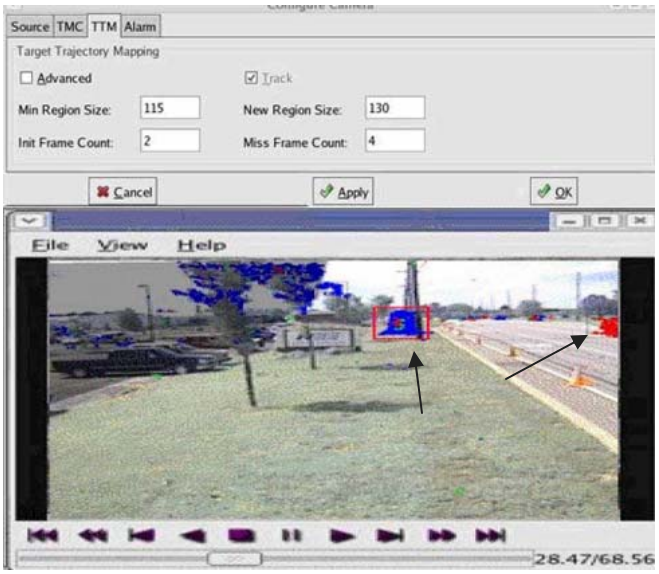

Figure 3: User Interface — Alarm Event (Red Box)

PROGRAM STATUS

PLE is developing two "beta" prototype systems that are being field tested by NYSEARCH member companies. Testing will determine whether there are any additional efforts needed prior to commercialization.

Highlights

- Remote video detection for excavating events over short pipeline sections
- Portable self-contained system
- Relative low cost – easy to install
- Communications via Email and Web interface

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