auto Intellect™
at the heart of Chel'yabinsk "Safe City"

In the aim of increasing the effectiveness of the response capabilities of the CIAD (central internal affairs directorate -head office of regional or city police) of Chel'yabinsk Region as well as with the goal of recording video information from main points and critical facilities in Chel'yabinsk, AxxonSoft Auto-Intellect was chosen through a tender organized under the "Safe City" project. This is a scalable security ANPR system that incorporates license plate recognition capabilities and various detectors into a powerful complex and provides even more functionality by using network functions of the core Intellect security complex.

Client

The client of the "Safe City" project in Chel'yabinsk is the CIAD of the Russian Federation for the Ural Federal Region. It is the district sub-department of the Ministry of Internal Affairs of the Russian Federation, responsible for internal affairs agencies in the fight with crime in the Ural Federal Region. CIAD liaisons with the Authorized Representative of the President of the Russian Federation in the Ural Federal Region. "The operations of the "Safe City" will be accomplished by a specially created sub-department under the IAD (internal affairs directorate - a local office of regional or city police) of Chel'yabinsk," informed Valentin Tsatsin, head of the Department of Communications and Automation of the CIAD in Chel'yabinsk oblast.

Situation

The realization of the "Safe City" project was performed under the oblast's comprehensive program for preventing crime and strengthening the fight with criminals in Chel'yabinsk oblast for the years 2006-2008. For this, in 2006 a tender for the creation of the pilot "Safe City" project was held in Chel'yabinsk. During the first stage, four parts of the city were to be equipped with video surveillance equipment. In one of the city areas, the system was supposed to take over all functions of video surveillance, identification and recognition of license plate numbers at one of the main intersections of the city. This was one of the main system requirements on the part of the STSI (state traffic safety inspectorate –trafic police) of Chel'yabinsk.

Project Aim

The "Safe City" project was intended for creating a system of remote centralized video surveillance over the situation on all streets in the city. The aim of its creation is to increase the effectiveness of the response capabilities of the Chel'yabinsk police, as well as the opportunity to register for later use the video information from main points and critical facilities in

the city," informed Valentin Tsatsin, head of the Department of Communications and Automation of the Ministry of Internal Affairs in Chel'yabinsk oblast.

System requirements

Depending on the specifics of the areas under video surveillance, the client put forward various requirements for the system. If the area was designated for public safety objectives as articulated by the police, then the AxxonSoft solution had to meet the following system requirements for video surveillance:

- *Gathering of high quality video images sufficient for further analysis and processing by various detectors and modules*
- *Abandoned objects tracking*
- *Facial recognition*
- *Recognition of situations where someone is running away or displays unconventional behavior*

For traffic areas designated under the objectives of the STSI, the client put forward the following system requirements for video surveillance:

- *Gathering of high quality video images sufficient for further analysis and processing by various detectors and modules*
- *Identification of violations of road regulations by automobiles*
- *Documenting long-term stops of automobiles at intersections*
- *Recognition and identification of license plate numbers*
- *Storage and archiving of recognized numbers database*
- *Identification of red light drive-throughs*
- *Comparison of recognized license plate numbers with databases of automobiles being searched for (i.e. stolen cars DB)*

Working off of these requirements, the choice of specialized security software was made.

Criteria for Choosing the Company to Produce the Security Program

During the security program selection process, an analysis was conducted of the vendors and available Russian and foreign systems of video surveillance. "The main criteria for

the choice were: complete solutions and modules available that allow for the realization of all the customer system requirements, a list of integrated equipment, flexibility in the development and scale-up of the system, and the commitment by the producer of the security program to offer comprehensive support in the installation and customizing of the system according to the system requirements, as well as any necessary revisions and support for the product," informed Andrei Shvel, technical director of the company ASTRA ST.

Before the choice of the AxxonSoft Auto-Intellect was clear, ASTRA-ST specialists conducted tests of the demo versions of the security programs from various producers. During the testing, emphasis was placed on the product compatibility with the selected equipment, the work of the main modules, the ergonomics of the workplace of the operator and the administrator, and the ease of installation and setup. Many products did not have the necessary selection of modules and therefore were tossed out at the testing stage; besides, the integration of several products into one was not reviewed in connection with expenses of the integration. One of the main requirements for the security program was its compatibility with IP-video cameras, since initially the "Safe City" project drafted IP-video cameras to be used as the sources of the video signal.

Many solutions currently offered in the market of security systems are configured only for video capture cards (grabbers), which has made their use impossible for this project. For the implementation of such solutions, it would be necessary for the equipped facility to be located in immediate proximity with the object of surveillance.

"Having analyzed the solutions offered on the market and conducted meetings with security program producers, the AxxonSoft platform, Intellect has been chosen, for it most completely satisfied the objectives set out by the "Safe City" project and moreover includes a selection of modules necessary for the realization of the established objectives," informed Alexei Zaharov, the main specialist for ACS at ASTRA-ST. He considers that the modular design of the security program will allow in the future to develop the system's functionality without changes to the existing core. The use of precisely this product will allow for the establishment of a united center of video monitoring. With the help of remote work places this will provide communications between regional centers and the center core. "The flexibility of the producer – AxxonSoft – played an important role in the selection of this system, since the company will customize its system to meet the established objectives," observed A. Zaharov.

Description of solutions

Two options of the equipment set were implemented for the formation, initial processing, and preparation of video images for transfer. It is an IP-video camera assembly. The second is a controlled IP-video camera assembly with a PTZ-unit, coupled with a transfactor (variable magnification zoom lens) of 28x zoom and a telemetry box with the video server.

The use of the IP video camera allows for the future step-by-step development and scale-up of the system through the installation of additional video cameras at new sites where the communications network is extended. Analog cameras are used in assembly with a PTZ-unit. . These video cameras are installed wherever video surveillance covers large areas as well as in places where large crowds gather, and allow for surveillance to be conducted on adjoining area through the use of optical zoom (up to 28x).

The fiber optic communications line created with the use of EPON technology is used as part of the main data transfer line from video surveillance locations to the data processing and storage center. Connection of the video cameras with the main communications line is realized using the technology of Ethernet switches, allowing for the minimization of the likelihood of micro segment collisions and providing a guaranteed transfer of video traffic without delay or failures from the main data transfer line to broadband networks. The uncontrolled switchboard and media converters are used to facilitate communications with the main data transfer line. The use of such a network topology allows for the organization of a unified, centralized data processing and storage center, and also the organization of the necessary number of remote video monitoring centers.

To minimize the burden on system operators and increase the effectiveness of their work, a specialized security program is used to perform the following functions.

- *Facial recognition*
- *Identification of violations of road regulations by automobiles*
- *Fixation of long-term stops of automobiles at intersections*
- *Recognition and identification of license plate numbers*
- *Storage and archiving or recognized numbers*
- *Identification of red light drive-throughs*
- *Comparison of recognized license plate numbers with databases of automobiles being searched for*

Installation

The project installation was carried out together with department personnel from the consulting firms AxxonSoft EXPERT and ASTRA ST, which at the initial stage configured the set-up of the software.

Expected results

Over the course of the project's implementation, the CIAD management of Chel'yabinsk oblast expects the following results:

1. *An increase in the effectiveness in the arrests of lawbreakers "in hot pursuit" as a result of timely detection of their crimes*
2. *An increase in the percentage of crimes solved, including those committed outside the zone of video surveillance thanks to the use*

of reliable, efficient, and accessible footage about the events and individuals connected with the time, place, and act of law violation.

3. A reduction in the level of criminality on streets controlled by video surveillance.

4. An increase in the effectiveness of patrols and law enforcement agencies, thanks to the provision of trustworthy, detailed information about relevant events, appearance and movements of lawbreakers.

5. An increase in the effectiveness of the administration of law enforcement agencies who now have precise, important, and effective information about the situation on city streets

6. The provision of additional control over the work of law enforcement personnel

7. An increase in the level of citizens' trust in police.

8. Better investigations of car-jackings through the use of automatic license plate recognition

9. An increase in the percentage of car-jackings solved through the use of video archives of traffic at intersections and on streets.

10. The automatic registration of violations of road regulations by automobiles with the registration of their license plate numbers

Evaluation of effectiveness

"The Auto-Intellect system in Chel'yabinsk, implemented under the "Safe City" project in 2007 was used to supervise large-scale events and in the investigation of crimes. The system was required for investigating transportation-related events," informed Igor Ivanov, head of the Chel'yabinsk IAD.

In 2007, through this project, 10 video surveillance stations were installed, three of which were used to fulfill the objectives of the STSI. These STSI stations were installed at main highways in the city and provide surveillance over every traffic lane as well as over the overall situation on the highways. The remaining video surveillance stations are located in various regions of the city and provide monitoring of areas where large crowds gather and the adjoining territory.

Perspectives

In 2008, the further development of the "Safe City" project is planned, including the expansion of the data processing and storage center. Every year in the future the system will be enlarged through the installation of new video surveillance stations and the expansion of the data processing and storage center. Under the STSI objectives, an installation of speed traps is planned alongside video surveillance

equipment. Also, the completion and full equipment of functional system modules, the development of a module for identifying traffic violations during red lights, and the creation of the automated workplace for the STSI are all planned. The urgency of solving this issue is connected with the fact that starting from July 2008, an introduction of an automated system of video recording of traffic violations is planned for the city roads.

Under this project, the use of transport detectors from the NTS Module company is also planned, which have already been featured within the Auto-Intellect system. Thanks to this, Auto-Intellect will allow for the classification of transportation types: motorcycles, light and heavy automobiles, and buses and then register traffic violations e.g. exceeding the speed limit, driving in the oncoming traffic lane, prohibited reversing, and violation of vehicles selective exclusion signs. This detector also will help detect traffic jams.

Data received by the system's detectors will allow for the collection of traffic statistics and the calculation of traffic flows with a focus on real road conditions. An important factor for employees of the Chel'yabinsk STSI is the fact that the moving vehicle detector can work together with the ANPR module for identifying license plate numbers and measure the speed of moving vehicles through video recordings and radar.

About the partner

ASTRA ST is the largest system integrator in the Ural region, which according to data from independent expert analysis holds several leading positions in IT markets. The main LOB of the company are the following:

• Design of computer networks, automated systems, fire safety systems, power supply systems, video surveillance and access control

• The organizational and technical provision of information protection

• Servicing of a center for electronic signature verification

• Communications, Internet, and video-conferencing services

• Development of security programs and databases

• Protected data transfers, processing, and information storages solutions

• Development of software and data bases

• System administration. Supply of equipment and warranty, and post warranty technical servicing