Kiev intersections are under the control of Intellect

Kiev is a large city with a population of around 3 million people. Like any metropolis, the regulation of traffic flows in the urban center is an important task. Its solution has been entrusted to a system powered by Intellect.

Situation

Traffic Jams Downtown and Heavy Traffic Uptown

To reduce congestion on the roads, the city administration enforced a range of special measures and limitations, including those concerning cargo transportation. However in spite of the fact that trucks without special permission were banned from entering the city center, many drivers violated that ban. Stopping every truck for document inspection could result in massive traffic jams. In order to solve this problem, city officials decided on deployment if an intelligent video surveillance system for traffic monitoring.

Choice of Solution

High Recognition Accuracy and Image Quality despite Low-Speed Channels

With regard to the installation of the traffic video monitoring system, the following objectives were laid out: recognition of automobile types heading for the city center, identification of license plate numbers for all trucks and verification of whether trucks entering the city center have appropriate permission. If there is no permission, then an alarm message should pop up on the monitor. In choosing a system which would become the basis for future solutions, many factors were reviewed. The system should recognize number plates with great probability, possess a distributed architecture and capacity for expansion, be able to operate through low-speed data transfer channels, provide high image quality when frame size is limited, and finally have the capability of working with radar guns and collecting statistical information about the types of vehicles in the center. Consequently, it was planned to integrate the video surveillance system with a traffic control system; therefore the ability to integrate was also an important factor.

The Intellect platform completely satisfied all of the listed requirements. The necessary video analysis functions were achieved through the help of included modules for license plate recognition and traffic control. Integration with hardware for detecting speed – radar guns – was also completed by the Radar module. The installation of the system at two intersections was done by two firms – Ista Group and Infotex. The company Gabitus-Plus also acted as a system integrator. Besides, timeline was extremely important in factoring the decision. Intellect could be rolled out and configured quickly, thus allowed for the efficient inspection of its functionality and timely presentation to the Kiev State Traffic Police Authorities.

In order to verify the system's functionality and obtain statistical data about traffic in the center of Kiev, two intersections – at Bozhenko and Federova streets and at Tolstoy and Zhilyanskii streets - were chosen first. A sign was installed, banning trucks along Federov and Tolstoy streets into the city center. In the future, more than 100 intersections, entrances to the city, and bridges over the Dnipr are to be equipped with the same system, with the option of future functionality developments. Under this plan, collected and processed information must be transferred to various departments – the State Traffic Police Authorities, the city administration, and the KievDorService communal enterprise, which is engaged in installing automated systems for traffic control and parking facilities, the construction of parking lots, and the attracting investment for developing road infrastructure. The introduction of this system is one of the steps in an exhaustive program for the Kiev city planned development.

Solution

Rationality in Everything

The installed system had to be able to control traffic flow in one direction – into the center of the city along all traffic lanes – two or three accordingly for two streets. Work on installing the cameras was to be carried out without halting traffic.

It must be mentioned that the rules regarding installing license plate recognition cameras differ greatly from those concerning traffic control cameras. In the first instance, there weren't any acceptable fixtures in the streets (pedestrian bridges, viaducts, pipelines, etc.), where the cameras

could be firmly fastened over the roadways. Therefore, a compromise was made to place cameras on Federov Street on one beam at a height of 5.5-6m off the ground, above the trolleybus cables. On Tolstoy Street, the cameras were installed on a post at a height of 8m off the ground. With this, it was possible not to go beyond the angles of deviation for ANPR cameras from the traffic lane axis and still provide a sufficient (around 30m wide) coverage for the cameras controlling traffic flows.

JVC TK-C920EA cameras were chosen for the license plate recognition as they feature a wide range of configurations. The most important attribute for achieving the aim of recognition was the adjustable opening time of the electronic camera shutter. In conjunction with the COMPUTAR varifocal lenses, this provided a clear image of vehicles both during the day and at night.

Servers running AxxonSoft software were positioned in small rented offices in the near proximity – one server for every intersection. This allowed the project to save money on protecting the servers from weather conditions. Video signals from the cameras were converted and transferred to the servers through twisted pair wire on Federov Street and through an optical cable on Tolstoy street.

"Algorithms for recognizing license plate numbers and tracking traffic flows dominated the processing power of the 2.4 GHz Intel Core 2 Duo processors. Under these settings, the video recording and displaying tasks at the rate of 100 fps from all four cameras went simply unnoticed. This once again confirmed the high rationality behind the Intellect video system," noted Igor Voidevich, the leading specialist for Gabitus-Plus.

The main difficulty for transferring information from remote workplaces were unstable Internet channels with bandwidth less than 1Mb/s. However, in spite of this, at the office of the KievDorService company and during the presentation of the system to the Kiev State Traffic Police the system managed to display video at about 1.5-2 fps for each camera, as well as provide full detailed information about traffic and recognized license plate numbers from both streets. This allowed the officials to real-time effectively evaluate the environment on both streets.

Effect and Perspectives

754 Registered Violations in One Month of Operation

The installed system powered by AxxonSoft solutions received high marks by the city administration. First deputy director of the Kiev city administration Denis Bass commented at the system's presentation that "for one month of operations and only at the intersection of Federov and Bozhenko streets, 754 vehicles violating the ban on entrance into the city center were registered by the video system. Besides, whereas traffic police officers are currently needed to attend to traffic jams, with the introduction of this new system, computers will take over control over the roads. The largest European cities have operated in a similar fashion for a long time now."

As of now, many of the capabilities of the module for controlling traffic flows included in the Intellect platform are not being used. Among these are the identification of traffic law violations e.g. speeding, control over rules governing lane traffic, and the assessment of traffic flow and density patterns. However, in the future, the system and its range of objectives will be expanded, thus the capabilities of the installed module will be completely utilized.

"We are not planning on waiting another year to launch the system. Video surveillance systems have already been installed in the central parts of the city – at Kreshatike, on Hmelnitskoi and Zhilyanckii streets, and on Pobedii Prospect. This system is extremely important for the city, because such solutions enable us to eliminate 20% of the traffic jams without reconstructing road junctions," emphasized Denis Bass.

Incidentally, a serious road accident was recorded already at the time of installing the system components and configuring the cameras for control over traffic flows at the intersection of Tolstoy and Zhilyanskii streets. It occurred due to a traffic violation by a taxi driver who ignored the sign indicating "movement only straight ahead and to the right" and tried to make a left turn. Unfortunately, similar events constantly occur in large cities. Therefore, one can be confident, that the widespread application of the system using all its capabilities will be very much in demand in Kiev.

Associates

The Kiev company, Gabitus-Plus, an AxxonSoft partner in Ukraine, has wide-ranging and rich experience in installing the most advanced security systems and offers only verified solutions to its customers. The main activities of the company include project design, installation, servicing, and support of digital video surveillance systems, audio and video registration equipment, access control systems, and remote video control systems. Its most prominent projects have included Raiffaizen Bank Aval, the Krivorozhskii state mining and smelting plant Krivorozhstal, the Velika Kishenya retail chain and the Epicenter joint enterprise.