

TRAFFIC SURVEILLANCE

IN CAIRO



LOGIPIX TRAFFIC SURVEILLANCE IN CAIRO

Motivation

With the population density of Cairo at historical high and increasing, so does the number of vehicles and therefore the traffic offenses caused by them. Chaotic traffic flow in downtown repeatedly causes traffic jams, that not only make uncomfortable the everyday life but also increase transport time impeding the economic development.

The aim of Arab International Optronics company was to reform the quality of traffic creating order on the streets. In Cairo there was an urgent call to install a reliable traffic surveillance system, which helps to satisfy the needs of the citizens to live a safer, more convenient and happy life in the capital. AIO selected LOGIPIX from many professional security industry companies as the system best serves the requirements of the city and even it could exceed the utmost expectations. Cairo is entering to the modern era as a fast developing metropolis and LOGIPIX Traffic Surveillance System is a great supporter in this process.

The mission of the system

The main goal of the LOGIPIX Traffic Surveillance System is to help managing the traffic flow and to maintain the security in everyday traffic by automatically detecting and recording several types of traffic violations in problematic intersections.

LOGIPIX is a multi-purpose system. Beside it provides traffic surveillance functions it is also suitable for city surveillance. The system maintains security on the streets by recording any suspicious, violent and crime activity on high quality security footage. On these recordings all faces can be recognized even at far distances for future identification.

LOGIPIX traffic surveillance functions:

- **Speeding detection**
- **Red light violation detection**
- **Stop line violation detection**
- **One-way traffic violation detection**
- **Wrong way traffic violation detection**
- **Traffic Counting**

LOGIPIX city surveillance functions:

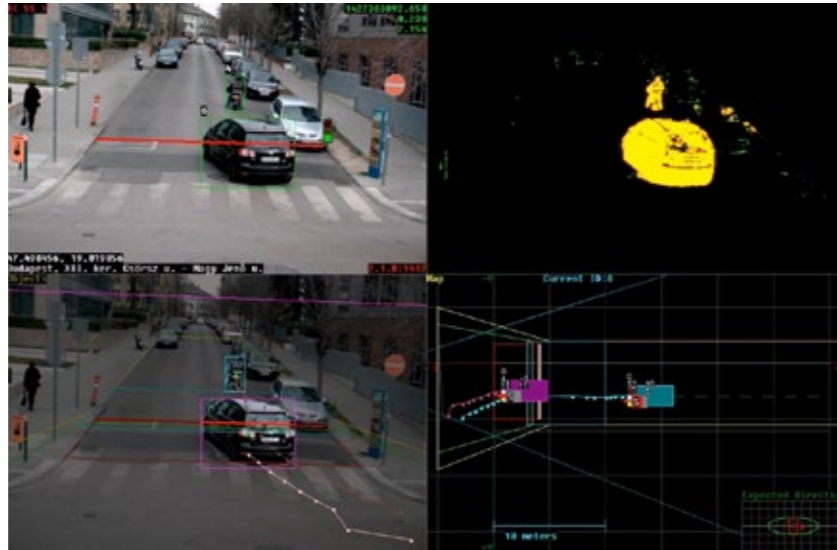
- **Real time monitoring of all cameras**
- **Easy archive playback as all camera images are recorded**
- **Fast PTZ camera control**

Solution

The system provides continuous monitoring of the traffic situation 24/7, and records traffic violations in the intersections. The operation of the system covers the entire workflow from violation detection and recording to traffic citation. At the current state of the project 70 intersections have been equipped by LOGIPIX components and in the next phase further 250 intersections will be.

In the system of Cairo a LOGIPIX Network Video Recorder with VCA module is being installed at every observed intersections. Four 20 megapixel Logipix ONE cameras are connected to each NVR, monitoring one direction of the vehicles. Besides the traffic cameras a LOGIPIX Full HD PTZ is placed as well. LOGIPIX ONE cameras are working synchronized

with integrated IR flashes and monitoring the car lanes of the intersections. The controllers of the traffic lights are connected to the Network Video Recorders through an I/O panel, thus the states of the traffic lights can be visualized as well on the images. The traffic violation detection is being performed automatically by Video Content Analysis applications. Human resources are only needed to confirm violations in an extremely simple dedicated software. They are being run by the Network Video Recorder which works on-site with real time images. With this structure the system can be immensely bandwidth-effective. After local image processing, only a small amount of data should be transmitted to the servers and to the clients.



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The LOGIPIX Traffic Surveillance System does not simply detect and record the violations but manages them. It automatically recognizes the license plates and collects vehicle data and owner details. These are provided by the integrated license plate recognition software and the connected vehicle database. The system creates a detailed violation package and as an end result an issuable violation report.

LOGIPIX goes beyond simple traffic surveillance. Besides its intelligent and advanced automated violation detection methods, it is able to fulfill city surveillance tasks as well. Together with the 20 MP IP camera, a Full HD PTZ camera is installed too in the intersections, that continuously scan the surrounding environment. Both types of cameras ensure real time monitoring of the urban area in the control rooms.



Products used in the project

- **Control Center software**
- **Violation Management Client**
- **Logipix NVR-VCA Rack Mount**
- **Logipix ONE 20 MP WDR camera**
- **Logipix Full HD PTZ camera**

Benefits

Owing to the high precision VCA function the LOGIPIX System is able to accurately detect several types of traffic violations automatically in the intersections and counts the passing vehicles. Associated third-party elements provide exact vehicle data of the offenders also automatically. Therefore the authorized officers only need to confirm the created violation packages in an extremely user friendly software, which greatly facilitate and accelerate the whole process.



All the system functions are provided at each intersection by the basic hardware with appropriate licenses. This way purchase cost, installation and maintenance costs can be drastically decreased.

The worldwide unique 20 Megapixel camera generates high speed, 20 FPS JPEG2000 video stream, wherein even fast motions seem to be continuous. Every license plates can be recognized in the large-scale monitored area. Together with the integrated LOGIPIX IR Flash, the camera provides stunning images no matter if it's day or night.

Images in the LOGIPIX System are compressed individually with the visually lossless JPEG2000 compression standard. The embedded multi-resolution capability of the JPEG2000 is the key factor of the dynamic bandwidth management function.

Due to their wide dynamic range feature, LOGIPIX ONE cameras together with the IR flashes provide clear and sharp images of the license plates in even the most extreme light conditions.

As the system provides traffic counting information as well, traffic flow can be effectively managed both automatically and by real-time operators in the monitoring room.



System overview

In the intersections each vehicle direction is covered by a single 20 Megapixel IP camera even if it includes several lanes. An integrated, synchronized IR flash works in cohesion with the camera, providing detailed images at night as well.

All cameras and traffic light signals are connected to the locally installed LOGIPIX Network Video Recorder. The LNVR records all the images and analyzes them to track each vehicles.

If a vehicle breaks the traffic rule, the VCA module automatically detects it with high precision. It marks 5 corresponding images that show the offending vehicle and creates a violation package that contains the automatically cropped license plates as well. These packages are then sent to the Violation Management Center via WiMAX wireless communication.



This unique architecture also allows optimizing the bandwidths from each of the traffic junctions to the central control rooms. This is performed by pulling only the required data/pixels from the video images by using JPEG2000 visually lossless compression. At the same time LOGIPIX is able to store typically over one month of videos on-site itself.

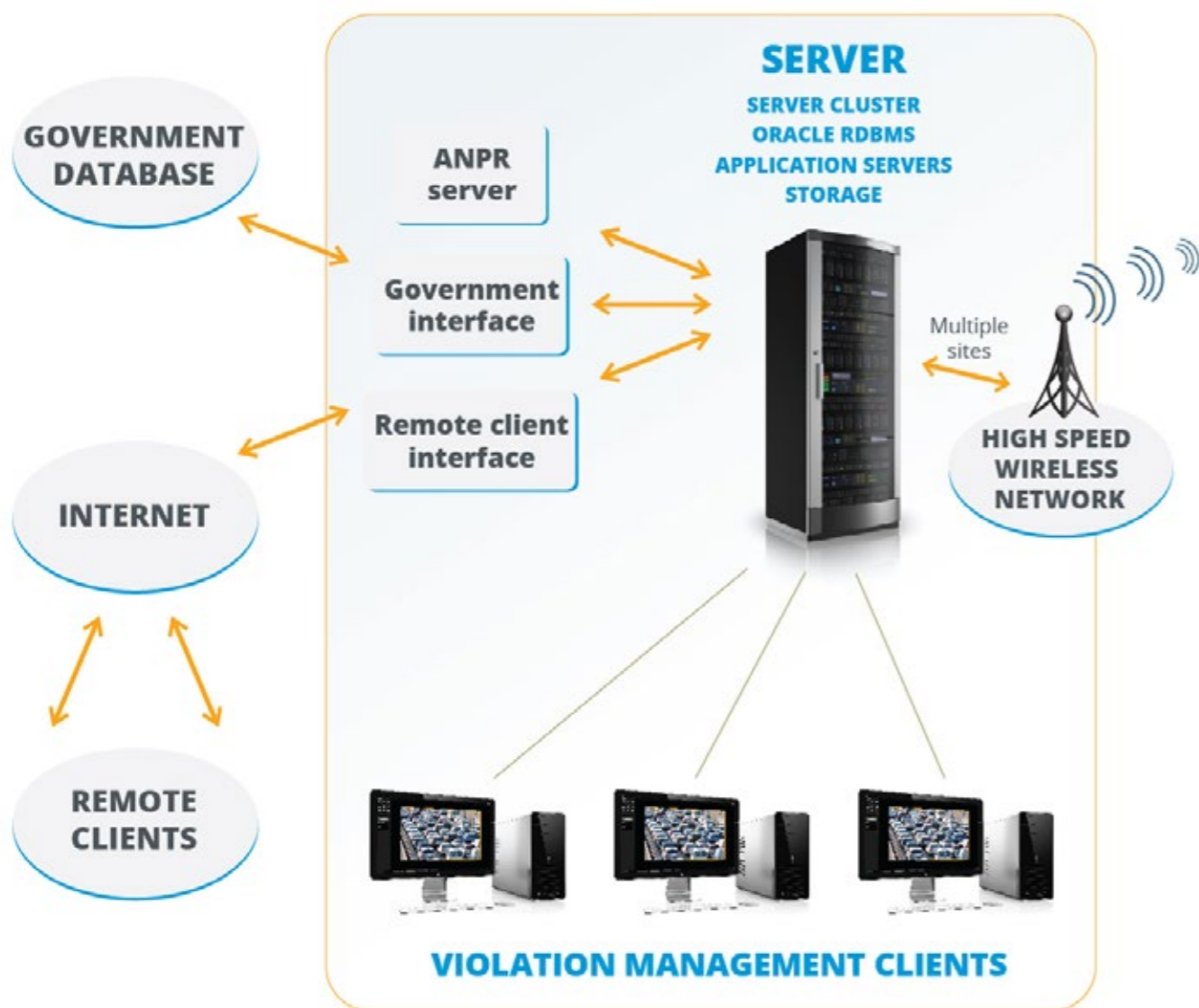
The violation packages with the processed camera images are arriving to the Violation Management Center via high speed wireless network.

The Violation Management Server manages the violation packages, stores them in a centralized database, and it downloads several images of the offending vehicle to a centralized

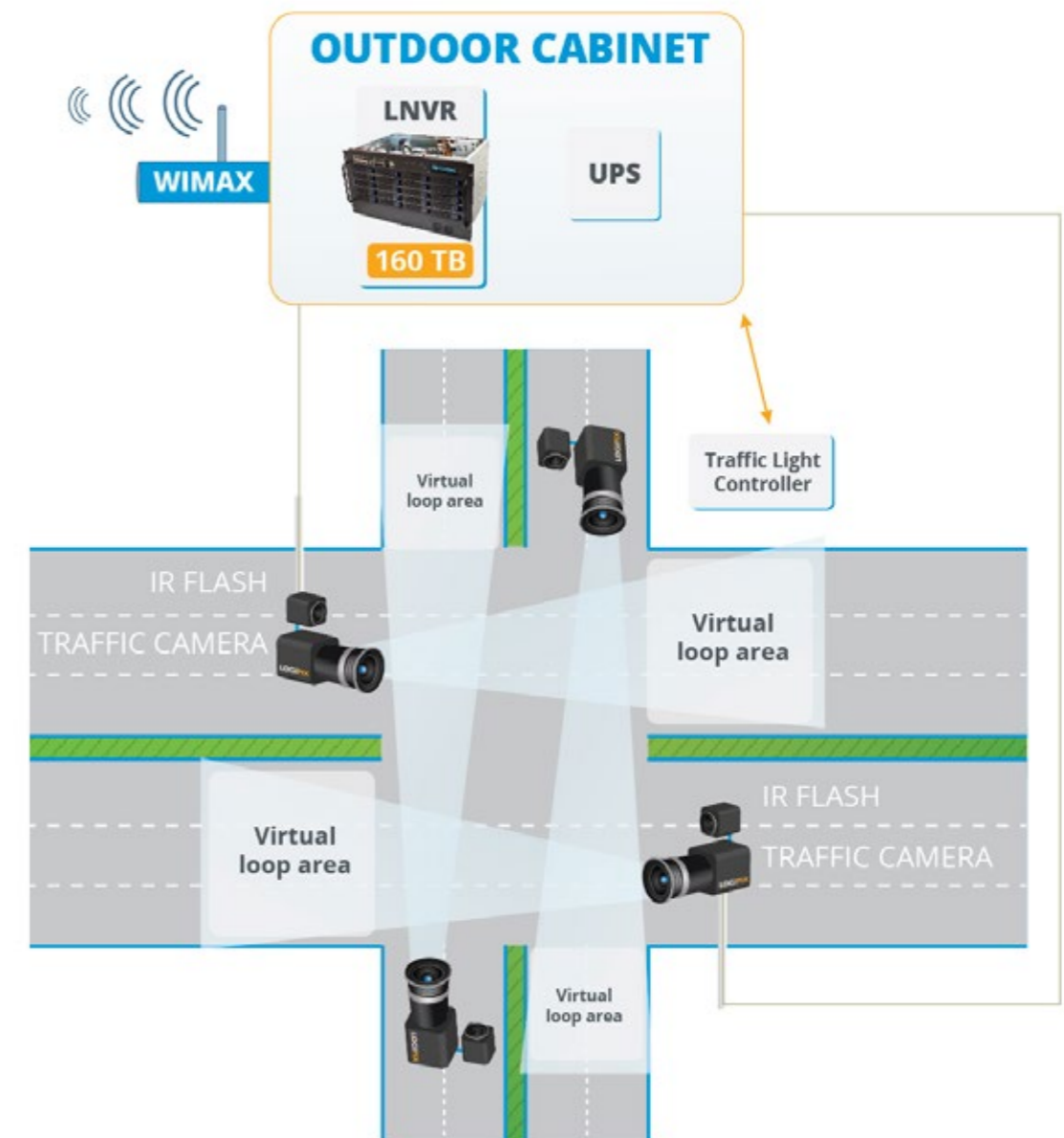
image container. It maintains communication with the Automatic Number Plate Recognition Server, the Government database and transmit violation packages to the violation management clients.

The LOGIPIX Traffic System works in a unique way, it uses country specified, centralized automatic number plate recognition. The server sends the cropped license plates to a third-party, centralized automatic license plate recognition software for character recognition. The ANPR recognizes the characters of the license plate, transforms it and sends back the license plate data in ASCII text format to the server for further processing.

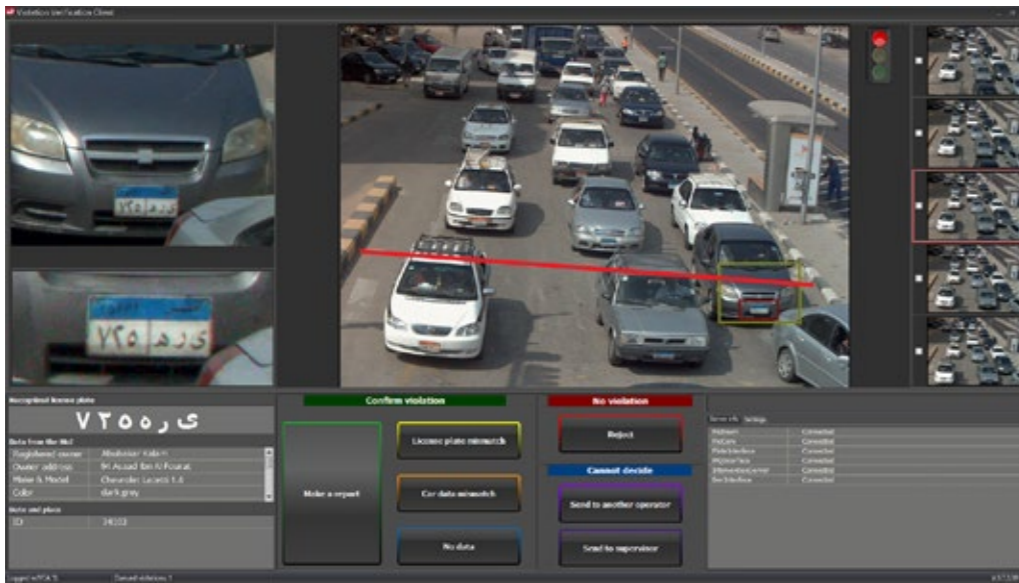
VIOLATION MANAGEMENT CENTER



ON-SITE SYSTEM STRUCTURE



The LOGIPIX Traffic Surveillance System automatically requests the exact vehicle data from the Ministry of Interior based on the recognized plate number information. Among others the query provides information of vehicle model, color and year of manufacture. As a final step the violation packages are processed by authorized operators using the Violation Management Client. This is a user-friendly software for confirming the automatically detected traffic violations. The aim of the software is to effectively process the largest number of violations with the smallest human effort. It helps to reach the 1.000 citations/24hours/camera rate.



Distributed control rooms

In Cairo two monitoring centers operate within the LOGIPIX System in two different locations. Both centers are designed for real-time operation, but inside one of them the violation management center has been set as well. They are able to fully control the IP video system in real-time. Basically one of them is intended to concentrate only on city surveillance tasks, and the purpose of the other is to fulfill traffic surveillance. There is a 5 Gbit, high speed, wireless communication line between the two monitoring centers.

A huge video wall and a couple of workplaces serves the operators for real-time monitoring at each control rooms. They use the industries most reliable and user-friendly VMS, the Control Center software. The program provides versatile functions to get fast the most detailed live videos of the occurring situations and to watch back archive footage.



In the Violation Management Control Room there are 20+1 workplaces for the operators and for the supervisor to confirm the huge number of processed traffic violations. The police officers use the Violation Management Clients to confirm the automatically detected violations. The user friendly design of this software ensures daily 10000 citations throughput for each workstation. This high performance is essential, because on the streets of Cairo every camera could detect thousands of violations every day.

The confirmed violation report can be automatically exported for the government summon issuing system. This export contains every essential information of the violation, such as pictures about the violation, car data, date and time, and violation types. The format of the export is customer dependent, usually it's a simple XML file. Additionally the Logipix Traffic system could generate a complete police report. This PDF file contains the images, and the violation details, according to the user defined format.



Summary

LOGIPIX System is maintaining the security in Cairo's everyday traffic by precisely detecting and recording several types of traffic violations resulting irrefutable evidences for local authorities. System components are installed in 70 busy intersections and in the next phase of the project, further 250 intersections will be equipped with LOGIPIX devices.

As drivers know that all their offending actions could be captured, they will comply with traffic rules. A well-functioning system, just like LOGIPIX helps improve traffic moral therefore the throughput of roads can be increased, traffic jams can be reduced and transport time and costs can be lowered.

Beside ensuring the security of the traffic, the multi-purpose system fulfills city surveillance tasks as well providing high quality security footage of the intersections' environment wherein every faces can be recognized even from far distances.

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