AutoCode

A series of Windows-based VMS plug-ins to capture every fine detail of traffic flow developed by VIT

T he purpose of AutoCode is to extend the functionality of your video management software (VMS) with license plate recognition, whether your CCTV system is already functioning or currently under design. AutoCode is already integrated with three world's remarkable large-scale VMSes:

- **XProtect (by Milestone Systems)**

- **Mainconsole/Crystal (by NUUO)**

- **Intellect Enterprise (by AxxonSoft)**

In this specification, you will find the following information on AutoCode:

- Basic working principle
- Application areas
- Licensing parameters

- Key features
- System requirements
- About developer

Basic working principle

When integrated into a VMS, AutoCode gets live or preliminary recorded video stream(s) from VMS sources. The video frames are processed with the license plate recognition engine, AutoSDK[1], which is embedded into the plug-in. The events (recognized license plate numbers) are linked with the video fragments on which corresponding vehicles were detected. Those events are then send to VMS.

The events can also be saved into your CCTV database for further searching, analysis and reporting. Optionally, the database may also contain the generated cropped images with the detected vehicles and their license plates visible. Consequently, the LPR events serve as a basis for high-level business & security logics (see Application areas).

Key features

License plate recognition

- Recognition of license plates of up to 50 countries[2]. For each country, we have developed a specific recognition algorithm (aka country module).

- Recognition of single- and double-line license plates.

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[1] AutoSDK is a software development kit for LPR, which consists of C/C++ runtime libraries and header files; the SDK is available as an OEM component — check out the specification on `http://vit.community`.

[2] The actual list of countries supported by our recognition engine, AutoSDK, can be found on our wiki ("AutoSDK: supported countries" article).

- Recognition of up to 20 plates in the same frame, which allows **multi-lane surveillance**.

- Single frame processing takes 10-100 ms (depending on resolution), which facilitates **real-time traffic control**.

- Maximum vehicle speed for its license plate to be recognized is 250 km/h (under proper camera settings[3], see System requirements).

- Determining the direction of vehicle movement.

Device compatibility

Due to permanently increasing number of devices supported by XProtect, Intellect Enterprise and Mainconsole/Crystal, AutoCode is compatible with almost every security camera.

Integration of new license plate templates

There is a possibility of rapid on-demand addition of license plate templates (aka license plate layouts) that are not recognized by any of AutoSDK's country modules yet. Also, we assist in:

- adjusting the recognition accuracy in order to increase recognition rates (in installation conditions of a particular customer);

- integrating AutoCode's LPR functionality with third parties software and hardware (see Additional functionality).

Additional functionality

Depending on customer's needs and used VMS, we offer additional software modules as part of AutoCode distribution package[4]:

- (free) plug-ins for VMS client applications (see End-user interface).

- plug-ins for events filtering and flexible communication with external databases, which help implementing advanced surveillance system reactions; typical usage scenarios (like searching license numbers in various sources or calculating time spent by vehicles on the parking) are supplied as ready-to-use scripts;

- plug-ins for communication with third parties vehicle scales.

End-user interface

For every VMS that integrates AutoSDK, we supply a free plug-in for a client application. Each plug-in was created for surveillance system operators' convenience in:

- matching the LPR meta data with video fragments and additional information from external sources (in one place);

- filtering events to find specific vehicle numbers (by a few criteria);

- generating reports with pre-filtered events.

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[3] We have gathered our experience in a manual which we strongly recommend to get acquainted with,"License Plate Recognition Cameras Selection, Setup and Installation Guide". You can find it on our wiki or on `http://vit.community`.

[4] You may find the integration facts on `http://vit.community`.

End-user interface of AutoCode, when integrated into Intellect Enterprise. Events matching with the video fragments.
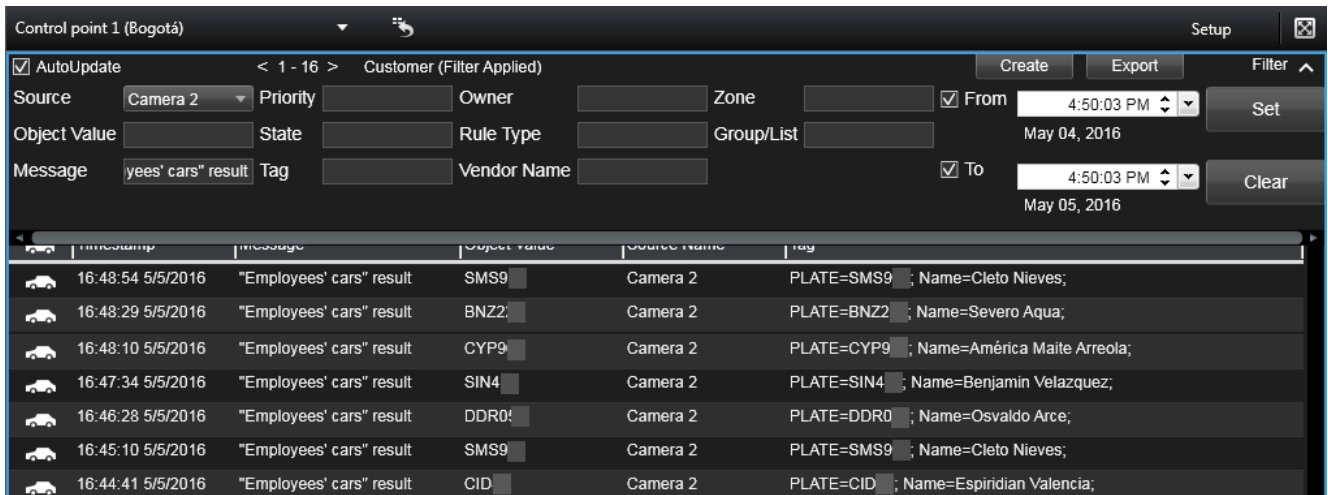
End-user interface of AutoCode, when integrated into XProtect Smart Client. Events filtering functionality and the LPR results listview.

Documentation

Comprehensive manuals for administrators and end-users is provided (in English or Russian).

Localization

AutoCode UI language	Intellect Enterprise	Mainconsole/Crystal	XProtect
English	✓	✓	✓
Russian	✓	✓	✓
Spanish	✓	✓	
Portuguese	✓		

Application areas

> For detailed information, consider our "LPR: application areas" white paper. You can find it on our wiki.

Access control

Installation zones:

- Premises with limited access: logistics centers, warehouses, factories, grain elevators, mining plants, oil refineries, marine ports, airsides, customs/border, private parking lots (at banks, hotels and resorts, residential areas, education campuses).

- Premises with (conditionally) free access: public parking lots (at shopping malls, business centers, exhibition centers, airports).

Benefits:

- automates vehicles access either at entrances to secured facilities or within them, thus saves operators' time for more exacting tasks than manual vehicles documenting;

- provides hands-free access to employees and pre-registered facility visitors (due to automatic search of recognized license numbers in pre-defined "black", "white", guests or priority clients lists[5]); the operator may be alerted in case of unathorized vehicle's arrival or positive search result in the list of undesired visitors;

- can feed license plate recognition results into a billing system.

Law enforcement

Installation zones: urban and non-urban roads.

Benefits:
Advances search of car thieves, vehicle cloners and ticket non-payers due to automatic generation of alarms and flexible filtering & archiving functionality.

Statistics gathering

Installation zones: warehouses, logistics centers, customs, shopping malls, exposition centers, city streets, parking zones, public transport/taxi zones, repair shops, gas stations, carwashes.

Benefits:

- helps to optimize operations when used in warehousing and ligistics, e.g. meeting time limitations and automatically documenting vehicles while unloading, weighing, inspection;

- simplifies monitoring of zones occupancy at large and/or multi-level parkings;

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[5] the "list" may be represented as a piece of functionality within a VMS or as an external source of information

- helps to detect and prevent traffic congestions;

- provides valuable data on traffic density to be used in road maintenance and development;

- provides valuable data for quantitative marketing researches and loyalty programs development.

System requirements

> Apart from the requirements for AutoCode platform described here, it is implied that the customer has taken into account the requirements for software/hardware platform of used VMS.

Video content quality

To obtain the best results from the AutoSDK recognition engine, adjust camera and illumination to capture license plates in focus and with good contrast (both during the day and at night). The best possible quality of a license plate image within the frame is the **essential requirement** that, if not met, makes it very difficult to receive satisfactory recognition results[6].

- Minimal height of the symbols on the license plate:
    - 14-20 px for cameras with no hardware compression (analog, machine vision cameras);
    - 20-30 px for cameras with hardware compression (IP-cameras).

- Optimal recognition camera angles:
    - vertical — 18-20 (maximum — 30) degrees;
    - horizontal — 5-10 (maximum — 20) degrees.

- Angle of a license plate on the image: up to 5-10 degrees.

Integrated VMS versions

- XProtect (Milestone): versions with support of plug-in integration via MIP SDK (Express, Professional, Enterprise, Expert, Corporate versions);

- Intellect Enterprise (Axxon): version 4.9.4 or later;

- Mainconsole, Crystal (NUUO): version 4.0 or later.

Operating system

Windows 7 Ultimate, Windows 7 Professional, Windows 7 Enterprise, Windows 8 Enterprise, Windows 8 Pro, Windows 8.1 Enterprise, Windows 8.1 Pro, Windows 10, Windows Server 2008 R2, Windows Server 2012, Windows Server 2012 R2.

CPU

x86 (x86-32, x86-64) architecture is supported. The CPU model is selected individually in accordance with:

- number of traffic lanes to be monitored;

- video framerate & resolution;

- CPU resourses taken by video decoding[7];

- customer's specific operational requirements.

When adding one or more lanes for recognition, CPU load increases linearly. As an example, consider the table below (resolution: 720x576, codecs: Xvid or MJPEG).

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[6] You will find the detailed recommendations in our "License Plate Recognition Cameras Selection, Setup and Installation Guide".

[7] AutoSDK processes the 8 bpp RAW stream.

Recommended LPR server configurations depending on cameras number and framerate

Framerate	4 cameras	10 cameras	20 cameras
6 fps	Intel Core i5-2500, 4Gb RAM	Intel Core i5-2500, 8Gb RAM	Intel Core i7-2600, 8Gb RAM
30 fps	Intel Xeon E5620, 4Gb RAM	Intel Core i7-3930K, 8Gb RAM	2x Xeon-E5 2630 v3, 16Gb RAM

RAM

2Gb and more. Processing data from 1 traffic lane uses approximately up to 250 Mb. Adding recognition channels requires respective adjustments to the amount of RAM.

Licensing parameters

> You may find detailed information on VIT licensing on our wiki.

Video processing speed

Depending on the speed of vehicles in surveillance area, the LPR module is provided in one of two possible modes:

AutoCode (based on AutoSDK "freeflow" mode) Speed of vehicles: up to 220 km/h. Video processing speed: determined by video framerate and CPU capacity.

AutoCode Lite (based on AutoSDK "parking" mode) Speed of vehicles: up to 20 km/h. Video processing speed: up to 6 fps.

Countries

Number of issuer-countries which license plates are to be recognized with AutoCode.

Monitored lanes

Maximum number of traffic lanes that can be monitored with the help of AutoCode. The number of lanes is summed from all cameras used for LPR.

About developer

Video Internet Technologies Ltd. started its activity on video analytics market in 2005 with its head office in Kyiv, Ukraine. Our road safety products (AutoSDK, AutoCode, Overseer, OutdoorBox, EDGE) operate as standalone solutions and components in more than 1000+ installations worldwide. We have technological partnerships with world's leading vendors of surveillance equipment and video management software.

Find more at http://vit.community.

We provide full national and international technical support:

- unlimited number of cases
- consultation on software functionality, installation and configuration
- consultation on products inte-
- gration with third party systems/devices
- identification and elimination of software malfunctions
- updates to new versions and
- critical patches provision
- online support: phone consultation, chat, remote desktop connection
- offline support: email