IndigoVision

LPR powered by InnoWare

User Guide

IndigoVision

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1 OVERVIEW

The IndigoVision License Plate Recognition system consists of three main components:

- **Innovis Runtime** - This is the core application that performs the License Plate Recognition (LPR) process. It also manages related activities, for example, data and image storage, white/black list checking, communication with external programs and devices. This information is managed in a **Project**.
- **Innovis WatchDog** - This application monitors the Innovis Runtime application and restarts it automatically in the event that the Runtime application stops running.
- **Innovis Wizard** - This application lets you define the Innovis Runtime's basic operating parameters for the project and to monitor the Runtime's activity. It also displays images processed by the LPR.

  It also performs searches in the database for history of stored recognitions and related snapshots taken at the time of the LPR transit.

2 INSTALLATION

To start the installation process, locate and execute the ***Setup_ Innovis_ Runtime_ <version>.exe*** installation file.

Follow the on-screen instructions

For the initial installation ensure that the ***Install VS2010 libraries*** is enabled.

At the end of the installation three application icons are added to your desktop:

- Innovis Runtime
- Innovis WatchDog
- Innovis Wizard

License registration

When you first start the Innovis Runtime application, you are prompted for a License Key string.

Contact **order.mgmt@indigovision.com** for the license key details. In the email provide the following:

- Your order details
- Registration code displayed on screen

After you have your registration key, type or copy-paste it into the license registration key dialog and select ***Register***.

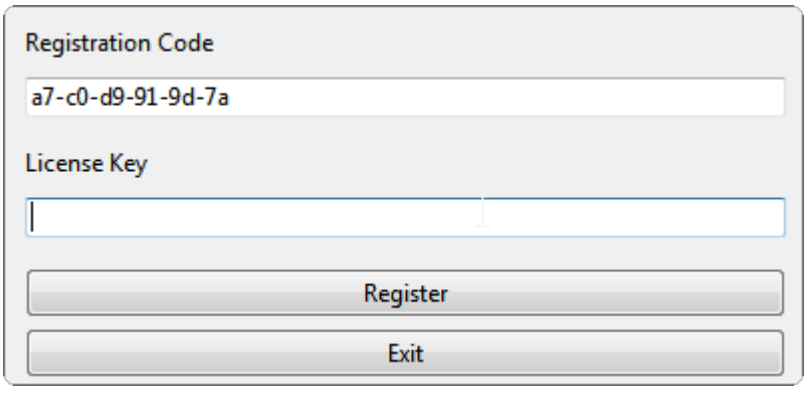

Figure 1: License registration key dialog

Notice *The license is strongly dependent on the hardware configuration of the PC on which the software is being installed. Even slight hardware modifications, such as plugging in a USB key, may deactivate the license. In such case, undo the modification and run the software again.*

Updating the installation

If you need to update your current installation, the new installation overwrites the project folder.

Before running the update setup, if you want to install in the same folder, you need to make a backup of the following folders and files:

- Project folder
- The registration.hex file - contains your license code

Both the ***project*** folder and the ***registration.hex*** file are installed by default in ***\Innovis\Innovis-Runtime***.

3 USING INNOVIS RUNTIME

This application performs the License Plate Recognition (LPR) process. All the configuration is held in a project.

The project is created and configured using the Innovis Wizard. Projects are used to manage configurations, for example, cameras per lane, overview cameras, and integration with Control Center

InnoVis Runtime normally runs in the background and does not have a graphical user interface. To show the GUI right click on the ***systray*** icon and select ***Show Main Window***.

The following window is displayed:

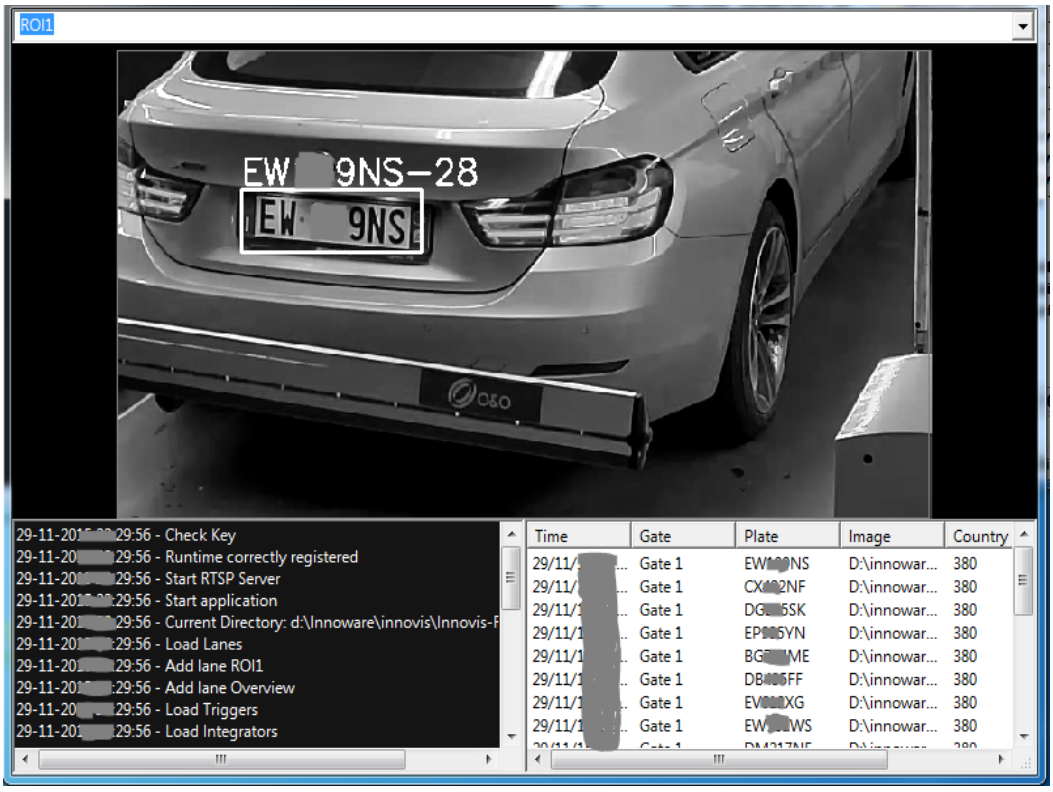

Figure 2: Innovis Runtime main window

Image retrieval

Using the main window it is possible to see the images processed by the LPR module and the results of the recognition process.

Double click on one of the recognition log's lines to open another window that shows the image captured by the LPR camera at the moment of the transit. A close-up of the license plate is also provided.

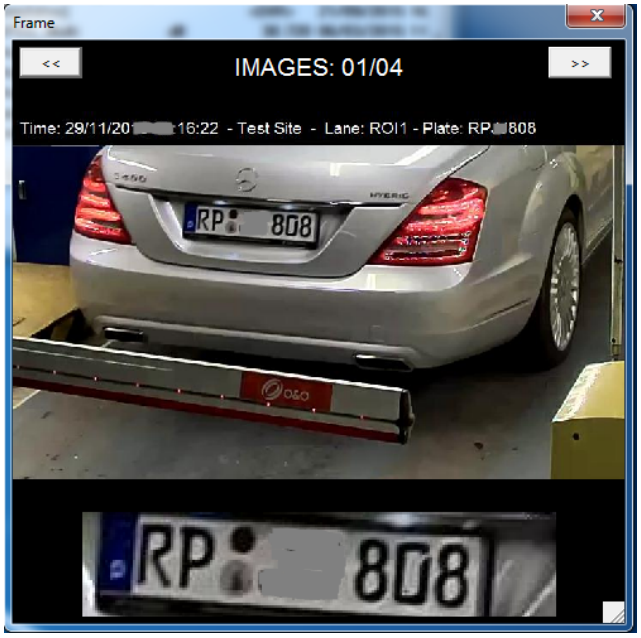

Figure 3: LPR image window

If an overview camera has been defined, in addition to the image captured by the LPR camera, one or more overview images are also displayed. You can define the number of pre- and post-event images to be displayed, as well as the time interval between each frame capture. Use the arrow buttons to scroll through the images.

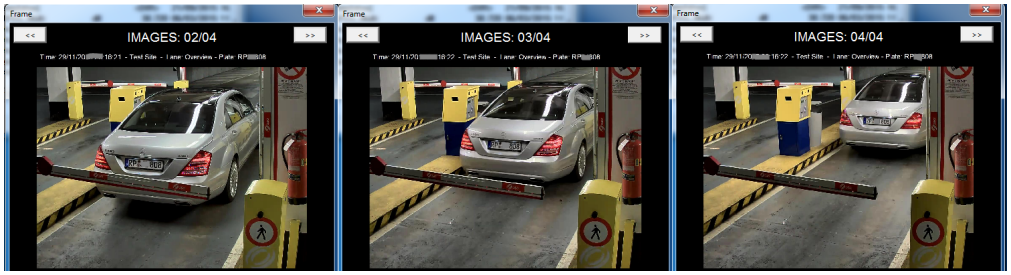

Figure 4: Overview images windows

Left click on the image to zoom-in and right click to zoom-out.

Closing Innovis Runtime

The Innovis Runtime GUI can be hidden by clicking the close button or by right-clicking on the software **systray** icon and selecting ***Hide Main Window***.

From the **systray** icon is also possible to upgrade your license and close the application.

Notice *If you want to permanently stop the Innovis Runtime application you must first stop the Innovis WatchDog application.*

► For more information, *see "Using Innovis WatchDog" on page 11*.

4 USING INNOVIS WATCHDOG

The Innovis WatchDog application automatically starts at boot and checks if Innovis Runtime application is running.

If the Innovis Runtime application is not running, the Innovis WatchDog application restarts it.

The graphical user interface of this application is normally hidden. However to show the user interface, right-click on the **systray** icon and select ***Show Main Window***.

The following window is displayed:

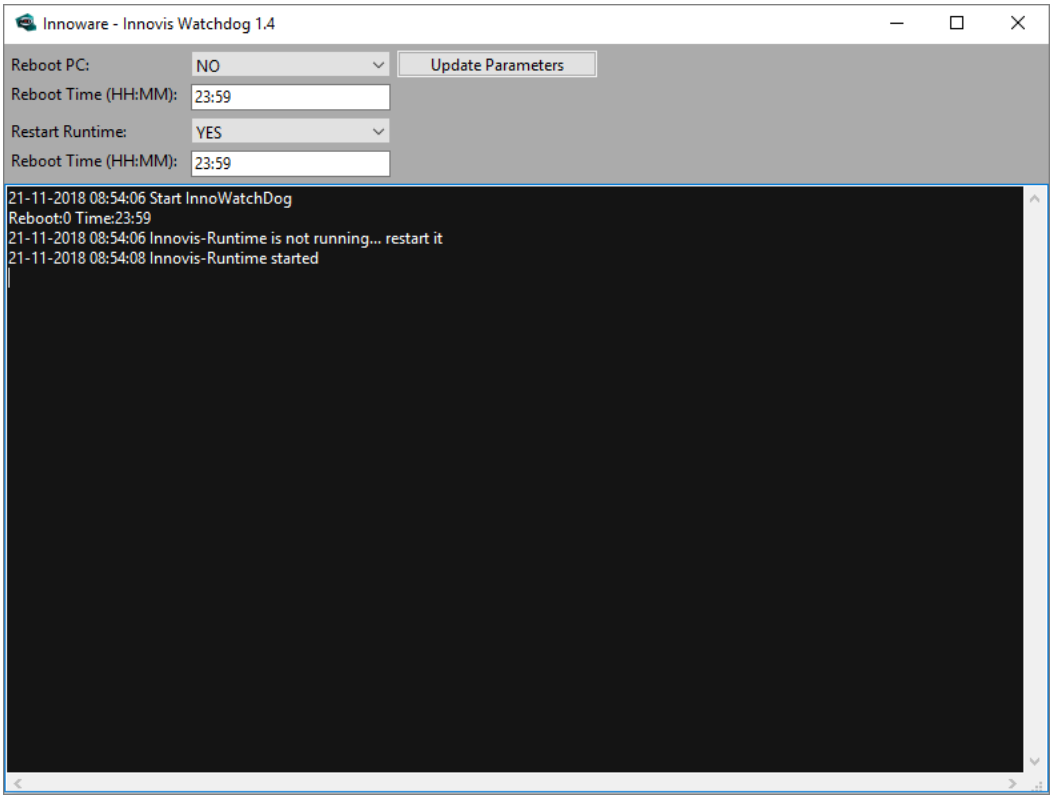

Figure 5: Innovis WatchDog interface

The following settings are available:

- **Reboot PC** - If ***YES*** is selected, your PC will be rebooted at the time specified in the ***Reboot Time*** field.
- **Reboot Runtime** - If ***YES*** is selected, the Innovis Runtime application restarts at the time specified in the ***Reboot Time*** field.
- Click ***Update Parameters*** to apply changes.

5 USING INNOVIS WIZARD

Innovis Wizard is used to perform two tasks:

- Lets you define and modify the operating parameters of Innovis Runtime
- Displays the activity of Innovis Runtime and manages data and images related to license plate recognitions.

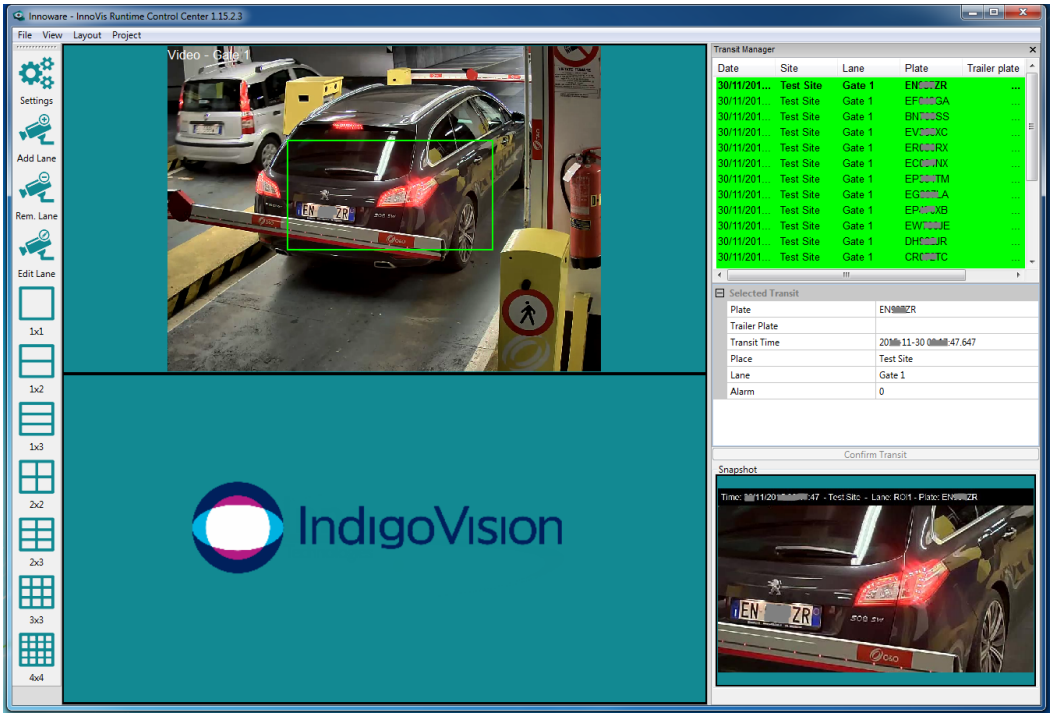

Figure 6: Innovis Wizard user interface

Project setup

Before starting the Innovis Runtime application the basic operating parameters must be defined.

Those parameters are stored in a collection of files saved in the project folder of the Innovis installation.

General parameters

Click ***Settings***  to enter the following general project information:

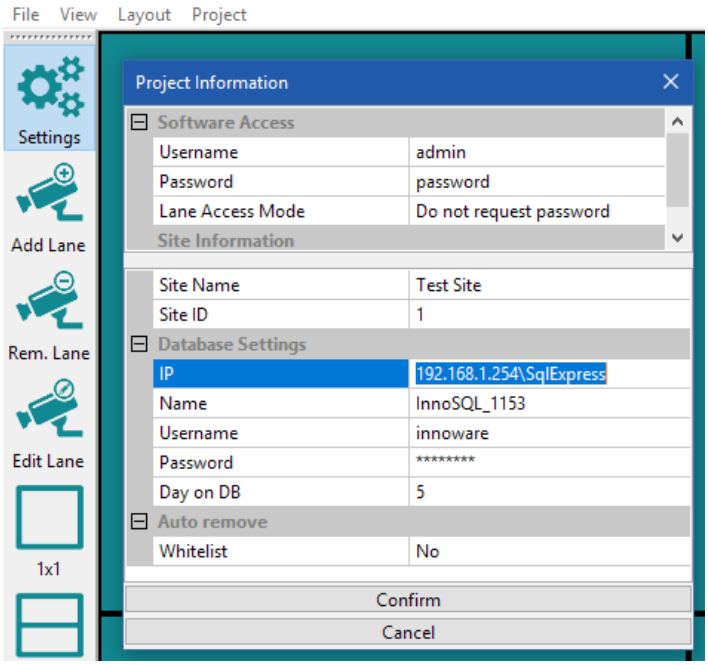

Figure 7: General project settings

Software access

- Username and password of the administrative user
- Whether it is necessary or not to provide the administrative credentials to modify the operating parameters

Site information

- Site name - Name of the site in which Innovis applications are running
- Site ID - Numeric value identifying the site. This is used to retrieve statistics and in case the site will be managed by InnoWeb

Database settings

The data related to license plate recognitions are normally stored in a local database which is located in the Innovis installation folder.

Only if the site is part of a network of sites monitored centrally by InnoWeb, the connection to a central database management system based on Microsoft SQL Server must be defined using the following fields.

- ***IP*** - IP address or host name of the server hosting SQL Server, optionally followed by the instance name
- ***Name*** - Name of the database in which the data are stored
- ***Username & Password*** - Credentials of the database owner
- ***Days in DB*** - Number of days, in terms of data and images, to be stored in the local database before deletion. Only the data already synchronized with the central database will be deleted. If the connection is not available, the recognition data will be stored locally without time limits.

  After the remote connection has been restored, the synchronization is performed automatically. Set a minimum value of 1.

Caution

*Do not set the **Days in DB** to 0.*

Auto remove

The white listed license plates, whose authorization time has expired, that are automatically deleted.

Add new lane

After you have defined the general parameters, click ***Add Lane*** 

You must add at least one Lane.

Up to 16 lanes can be managed by the application.

There are two areas that need to be defined when adding a new lane:

- Video source definition
- Lane operating parameters setup

Video source

- Name: Name of the camera to be used as a source of images.
- Video Source Type: InnoVis is currently capable of supporting:
  - Any RTSP/ONVIF h264 camera
  - Axis (MJPEG and MPEG4)
  - IndigoVision proprietary video streams
  - Basler Pylon protocol
  - HTTP/MJPEG generic cameras

The information requested in the other fields are dependent on the source selected.

For example, selecting RTSP VideoSource, the following options are available

- ***URI***: Uniform Resource Identifier of the video source.
- ***Username & Password***: Credentials needed for accessing the video source.
- ***Max FPS***: Number of Frames per Second to be received and processed.

Caution

The parameters selected for Max FPS can have an impact on your CPU usage. It is recommended that you select values between 5 and 8 FPS for parking and access control and up to 15 FPS for free flowing traffic.

Lane parameters

- ***Lane Name*** - Name of lane to be managed.
- ***Recognition Type*** - Two different operating modes can be selected:
  - ***Parking***: For access control and vehicle speeds up to 50 km/h
  - ***FreeFlow***: For free flowing recognition up to 110 km/h
    For higher speeds, specifically designed applications need to be used.

- ***Use IndigoVision Postprocessor*** - Select ***YES*** to manage the parameters required for integration with IndigoVision Control Center and NVR-AS.

► For more information, *see "Integration with IndigoVision Control Center" on page 21*.

ROI Settings

- ***Char Min Height***: minimum vertical size in pixels of the license plate's characters.
  Note that for optimal performance, the advisable minimum vertical size is 24 pixels.
- ***Char Max Height***: maximum vertical size in pixels of the license plate's characters.
- ***Delta ROI X (%)***: percentage of horizontal dilation of the area, with respect to the license plate position and size, in which to perform the search of the license plate in the subsequent frame.
- ***Delta ROI Y (%)***: percentage of vertical dilation of the area, with respect to the license plate position and size, in which to perform the search of the license plate in the subsequent frame.

Snapshot settings

- ***Snapshot Folder***: file system folder in which to store the snapshots taken at the moment of recognition from the LPR camera.
- ***ONVIF Streaming Port***: TCP port number over which to re-stream the images coming from the video source. Use -1 to disable this feature.
- ***Server Comm. Port***: TCP port number on which the InnoVis' internal server listens for socket connection, Use -1 to disable this feature.
  This feature is only used for integration with third party applications, that have a socket interface for listening for metadata to be parsed and processed. It is not used by the IndigoVision system.
- ***Whitelist Tolerance***: the number of characters, for a given position, by which two plates can differ and still be considered as belonging to the white list.
  It can be useful to still allow access in the event of detection failures due to difficult reading conditions, for example if the license plate is dirty or damaged.
- ***Delta Whitelist***: if active, for each new recognition the license plate code will be automatically added to the white list and the authorization expiration time is set to the moment of the recognition plus the number of minutes set in this field.
  This is useful in situations in which there is limited free parking time after which a toll must be paid, for example, car parks for shopping malls.

ROI (Region Of Interest) definition

The area(s) in which the License Plate Recognition has to be performed can be defined by left-clicking on the image and drawing at least 4 lines to delimit a polygon. Press the Escape key to cancel drawing.

Holding down CTRL while dragging the mouse pointer lets you design rectangular ROIs.

After selecting the last point to complete the polygon, you are prompted to apply the changes and to restart Innovis Runtime. This lets the application use these new settings.

Using the Innovis Wizard you can define only one lane for each camera.

After the initial setting, the definition of all the virtual lanes' ROI can be performed using just the Innovis Wizard.

Remove a lane

To remove a lane click ***Rem. Lane*** and select the name of the lane to be removed.

You are prompted to also remove the associated video source.

Edit a lane

Click Edit Lane and select the name of the lane to be modified.

After selecting the lane to edit, click ***OK*** to open the operating parameters window.

If required, the video source parameters can be modified.

Only the operating parameters of the video source can be changed. You cannot change the type of source.

► For more information, *see "Add new lane" on page 15*

All the operations described above can also be performed by selecting the relevant items of the ***Project*** menu. In addition to the editing options, you can manually restart Innovis Runtime.

You are prompted to perform a restart any time the operating parameters are changed.

After a new project has been defined, Innovis Runtime must be started manually or by accepting the prompts that are displayed after making a change to the project settings.

Monitoring activity

Innovis Wizard, in addition to the project definition functionality, also lets you monitor the general activity of the Innovis Runtime application.

Through its interface, the images coming from up to 16 lanes can be displayed simultaneously.

The layout of the interface can be selected using the layout icons on the left side of the main window or selecting the item from the ***Layout*** menu.

Using the ***View*** menu you have access to other monitoring and management options.

Project

The project option lets you review the main operating parameters of the project.

Transit Manager

The Transit Manager displays real-time results of the license plate recognition and the related snapshots

The log's data rows have different background colors according to the result of the check against the license plate black/white list:

- Green: in White list
- Yellow: in White list – authorization expired

- Red: not in White list
- Black: in Black list

Double-click a row in the results log to display the image captured by the LPR camera.

If an overview camera has been defined in the project, the related overview images are shown.

Left-click on an image to zoom in and right-click to zoom out.

Use the left and right arrow buttons on the screen to browse through the images.

Transit Database Manager

The Transit Database Manager lets you perform searches in the recognitions database.

The searches are based on:

- License plate code, or a part of it:
  - Underscore (_) sign is the wildcard for a single character.
  - The percentage (%) symbol is the substitute for zero or more characters.
- Time interval
- Type of alarm detected

Click ***Execute Query*** to find and display the records that match the search criteria.

Double-click a row in the results log to display the image captured by the LPR camera.

If an overview camera has been defined in the project, the related overview images are shown.

Left-click on an image to zoom in and right-click to zoom out.

Use the left and right arrow buttons on the screen to browse through the images.

Click ***Export Results*** to export the retrieved data to an Excel file for further statistical analysis.

Black/White List Manager

The Black/White List Manager lets you manage a list of White (transit allowed) or Black (sensitive license plates, often related to criminal actions) vehicles.

To avoid possible errors and speed up data entry, the license plate code can be inserted automatically by right-clicking on a record in the Transit Manager's license plate log.

The ***Badge Code*** field is designed to host the ID of a badge or of any other device used for authentication by an access control system.

This value can be sent to a serial port, whether local, connected via network or supported cameras and converted into the Wiegand protocol to allow Innovis applications to act like an access control authorization device.

If you need to insert many license plates into these lists, the import can be performed from an Excel file.

License plate list template

The following defines the Excel spreadsheet column headings that are required when creating a license plate list for import.

- `Name`
- `Surname`

- Address
- Zip
- City
- Phone
- Plate
- AuthorizationStart
- AuthorizationStop
- Blacklist

  0= Not in blacklist, 1=in blacklist. This value is set according to the choice made using the white/black list manager of the Innovis Wizard. If set to 1, the dates, even if present, are ignored.
- Description
- IDBadge

Templates Manager

The term **template** refers to a specific combination of numbers, letters, spaces and symbols that, together with other details, identifies a specific country's license plates.

The LPR applications are country and font independent. Therefore the use of templates is not strictly required.

The use of templates lets the system resolve ambiguities, for example 1 and "I", 0 and "O". This improves the recognition accuracy.

- ***Use Template***: Enables template management.
- ***Discard res. If templ. not found***: if enabled, the recognition results that don't belong to any of the enabled templates will be discarded. This can be useful in the case of wide fields of view in which character strings other than a license plate could be seen, like on trucks and similar vehicles.
- ***Discard Min.Th(%)***: the percentage of confidence below which a recognized license plate is not considered to belong to any template and consequently discarded if the previous parameter is enabled.
- ***Force characters substitution***: if enabled, ambiguities resolution in accordance with the template rules will be performed.
- ***Substitution Min. Th. (%)***: the percentage of confidence above which a recognized license plate is considered to belong to some templates.

  If the previous parameter is enabled, the character substitution will be performed.

Currently the following country templates are provided:

- ITA - Italy
- FRA - France
- BEL - Belgium
- NLD - Netherlands
- ESP - Spain
- PRT - Portugal
- GBR - United Kingdom
- LUX - Luxemburg
- ZAF - South Africa
- MLT - Malta

Templates for other countries may be available on request.

A INTEGRATION WITH INDIGOVISION CONTROL CENTER

The integration between the LPR applications and IndigoVision Control Center is managed using a post-processing plugin, included with the LPR installation files.

The integration is enabled by selecting YES to the related parameter in the lane setup window:

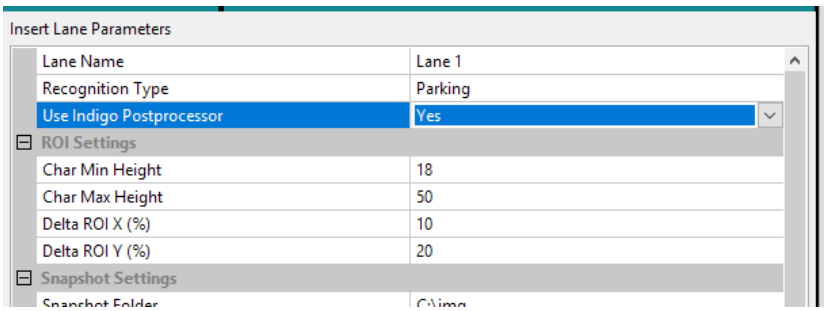

Figure 8: Enable integration plugin for post-processing data

Based on the data coming from the lane, the plugin performs the following actions:

- Checks the presence of the license plate in the white or black list
- Creates a bookmark on the NVR
- Sends a data record to the NVR
- Generates an alarm in the Alarm server, if configured in IndigoVision Control Center.

Below is an example list of the parameters that can be managed by the plugin:

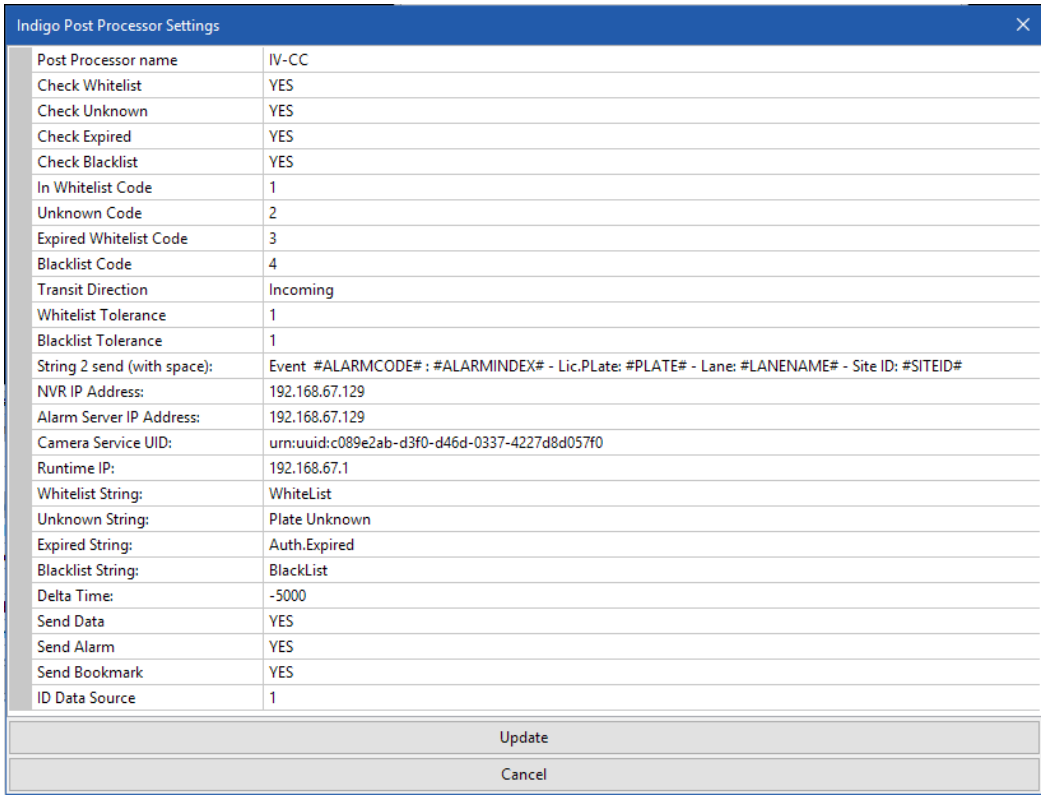

Figure 9: Example of data processed by the Innovis plugin

Data managed by the integration plugin

Data parameter	Description
Check Whitelist/Unknown/Expired/Blacklist	Allows enabling/disabling the related controls. If all the options are disabled, the IndigoVision Postprocessor will send the data related to each transit, no matter the alarm condition.
In Whitelist/Expired/Unknown/Blacklist code	Associates each event with an IndigoVision Control Center external detector input number.
Transit direction	Incoming or outgoing.
Whitelist/Blacklist Tolerance	Number of different characters that makes equivalent two license plates codes.
String to Send	Content of the string to send as bookmark or data record. This can be composed by a mix of static words and dynamic tags, delimited by the hash sign (#) and spaces: #DATETIME# = Date/Time of the transit #OWNERNAME# #OWNERSURNAME# = Vehicle Owner #PLATE# = License Plate #LANENAME# = Lane Name #LANEID# = Lane ID #SITEID# = Site ID #BADGEID# = Badge code (for Wiegand integration) #IMGFILE# = Image file name and path #TRANSITDIR# = Transit direction

Data parameter	Description
	#ALARMCODE# = Alarm Code #ALARMINDEX# = Alarm Description
NVP IP Address	The IP address of the IndigoVision NVR. This allows bookmarks to be sent to the appropriate NVR. Care should be taken to choose the appropriate NVR for the camera in question.
Alarm Server IP Address	The IP address of the Alarm Server. In most cases this will be the same as the IP address of the NVR.
Camera Service UID	Camera Service ID as per the camera's properties in IndigoVision Control Center. This can be copied directly from the Control Center user interface, on the **Setup** screen.
Runtime IP	IP address of the workstation on which InnoVis is running. To be used in the definition of the external alarm source in the IndigoVision Control Center.
Whitelist/Unknown/Expired/Blacklist String	Text description to be used for alarm events within the bookmark string.. Used to assign a value to the #ALARMINDEX# tag within the bookmark.
Delta Time	Number of seconds to be subtracted (typical use) or to be added to the actual recognition time to obtain the time at which the Bookmark and/or Data Records are set in IndigoVision Control Center. Anticipating the reading time allows you to start playing the recorded video immediately before the vehicle passes.
Send Data/Send Alarm/Send Bookmark	Flags to enable/disable sending the related events to IndigoVision Control Center.
ID Data Source	The ID of the Data Source linked to the lane.