LILIN Navigator Aida Software User Manual

Chapter 1.0 Introduction

Aida Number Plate Recognition Engine

LILIN ANPR Aida number plate recognition system uses the latest deep learning technology for number plate recognition. Deep learning is introduced by the concept where the machine is told to learn what to look for, the plates, the digits, and the objects. It works out the most descriptive and obvious features for the plate, the digit or the object. In other words, deep learning is told to discover the underlying patterns in classes of images that can give much better result than traditional computer vision based number plate recognition.

Navigator Enterprise/Corporate using Aida Number Plate Recognition Engine

Navigator Aida Number Plate Recognition (ANPR) can support features including denial list and allowed list for gate control automation or city surveillance purposes. The purpose of denial list is to prevent unauthorized vehicles entering an area, thus the system can pop up a window for alarm notification, whereas allowed list can provide access to the area by opening the gate. LILIN Navigator ANPR license plate recognition can also set exclude list to increase the recognition rate.

In addition, LILIN ANPR license plate recognition system provides other features including recognition percentage filterer, license plate angle correction, license plate character length, and the character size for better recognition rate.

Features of Aida Number Plate Recognition Engine

- Support up to 1080P resolution at 48 FPS.
- Support 2/4/6/8 channels recognition via Navigator.
- Each channel can recognize up to 6 car plates.
- Support group denial list, allowed list and exclusion list setting.
- License plate character size and license plate character length can be set.
- Support real-time and video playback identification display.
- Support for license plate JPEG snapshots.
- Support LILIN IO Box interfacing external devices for gate control.
- Support database synchronization for denial list and allowed list.
- Support up to 200 km recognition speed.
- Support HTTP SDK integration.
- Support LILIN Navigator.

Chapter 2.0 Before Using This Aida Engine

Please read LILIN IP camera user manual for operating LILIN camera. This user manual only focuses on the Aida Engine feature of the software. Aida Engine software is a demo program that allows you to verify recognition results, after LILIN Aida Engine is properly installed.

Chapter 2.0.1 Caution

Do not use the number plate recognition system with the gate or barrier control for vehicle speed over 10KM/h or 6MPH due to recognition rate limitation. This will cause a vehicle crash or accident to the gate or barrier control.

Chapter 2.0.2 Using NVidia Driver

Software Requirements (if NVidia gets used)

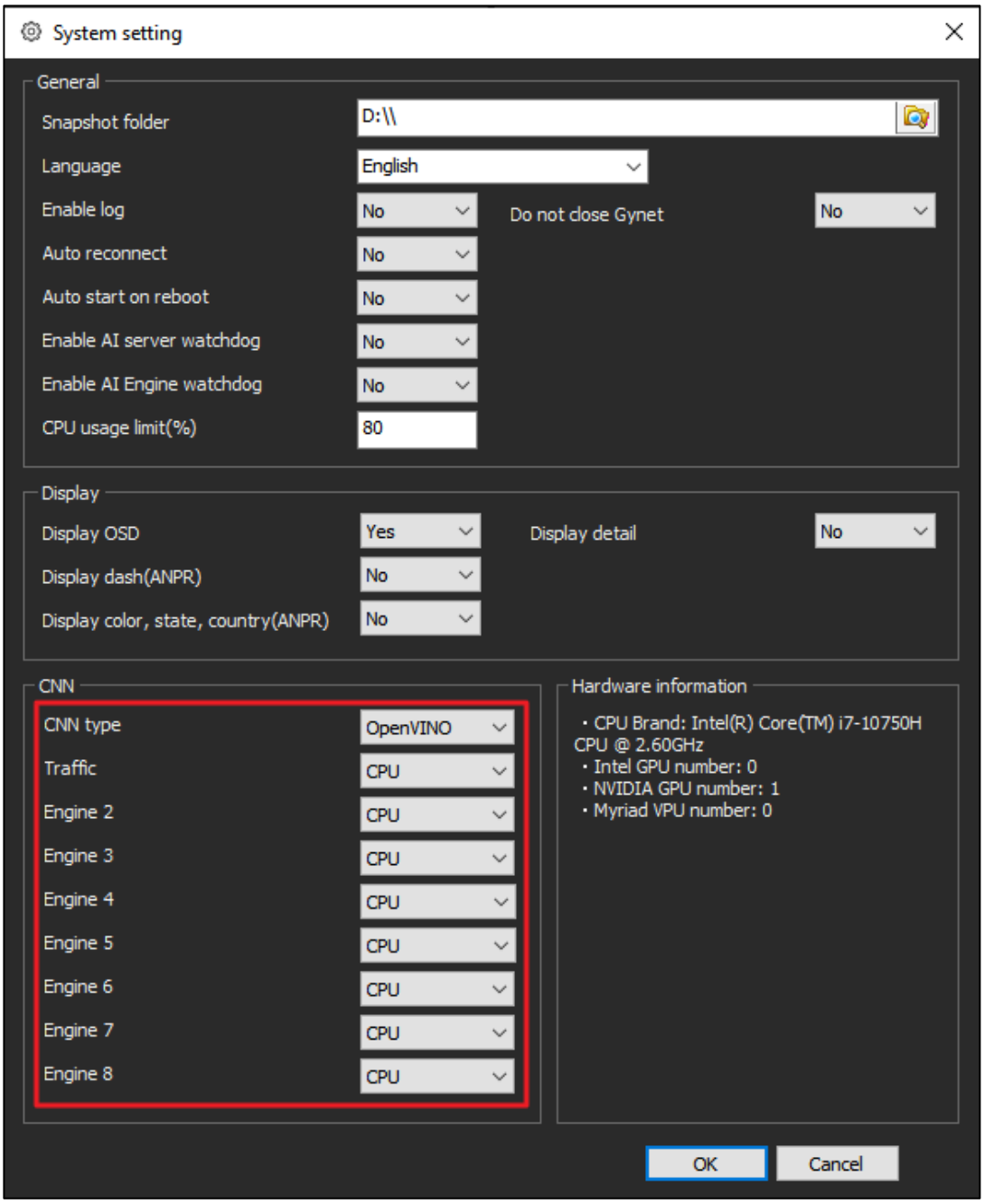
1. NVidia Driver version 400 or later
2. NVidia Cuda 10.2 or above
3. NVidia cuDNN 10.2 or above
4. Windows 10 with DirectX 12 installed via Windows update1
5. Please install Windows 10 OS version 1903 or above.

Hardware Requirements

- Intel® i7 or above recommended, 6th to 9th generation Intel® Core™ and Intel® Xeon® processors
- Intel® UHD Graphics 630 or above
- Intel® Movidius™ NCS2
- System RAM 16G (recommended)

Chapter 2.0.3 Using Intel HD Graphics Driver (Recommended)

If you prefer to use Intel internal UHD Graphics, LILIN Aida Engine has built-in OpenVINO™ driver. After install LILIN Aida Engine, enable OpenVINO CNN type.



Chapter 2.0.4 Using Intel Movidius™ Driver

If you prefer to use Intel internal HD Graphics, LILIN Aida Engine has built-in OpenVINO™ driver. After install LILIN Aida Engine, enable the OpenVINO CNN type with VPU driver.

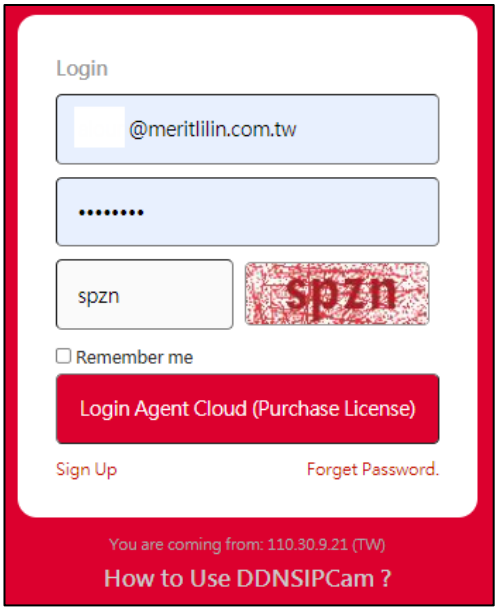
Note: OpenVINO and NVidia engines cannot be mixed in one system.

Chapter 3.0 How to Purchase an Aida Engine

After installing ANPR Aida Engine, double click on the AIEngine.exe for launching the application. Click on ? for About dialogue. Email System ID to LILIN sales person for trial or purchasing purposes. After purchasing, the Unlocking Key will be sent to you. Please paste the Unlocking Key into About dialog for using Aida Engine.

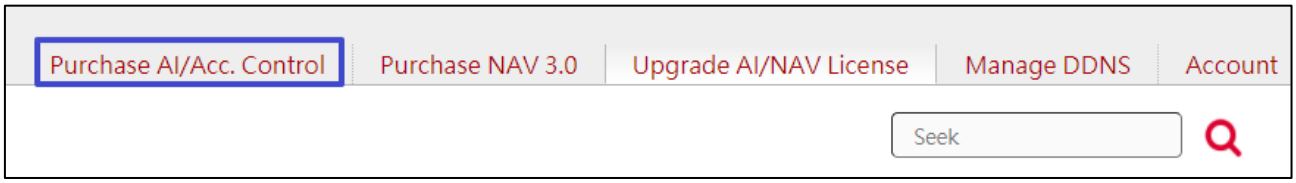
Chapter 3.1 How to Get a Trial License

To get a trial license, visit https://www.ddnsipcam.com for registering an account.

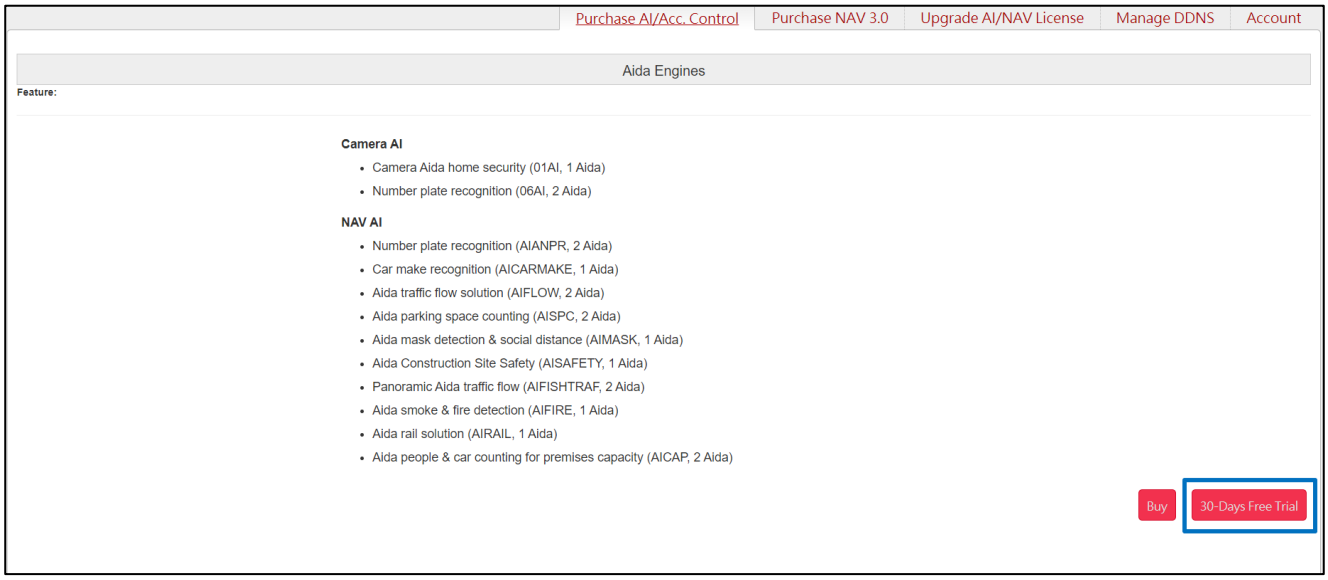


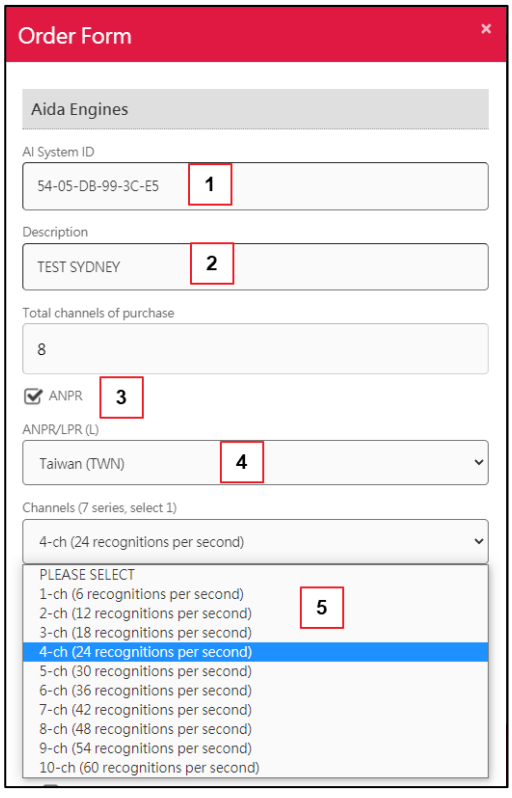
Once an account gets registered, and after key in your email and password and the captcha code, click on Login Agent Cloud (Purchase License).

Then go to the Purchase AI tab



Then click on 30 days free trial button





1. Type your AIDA system ID

2. Type a description

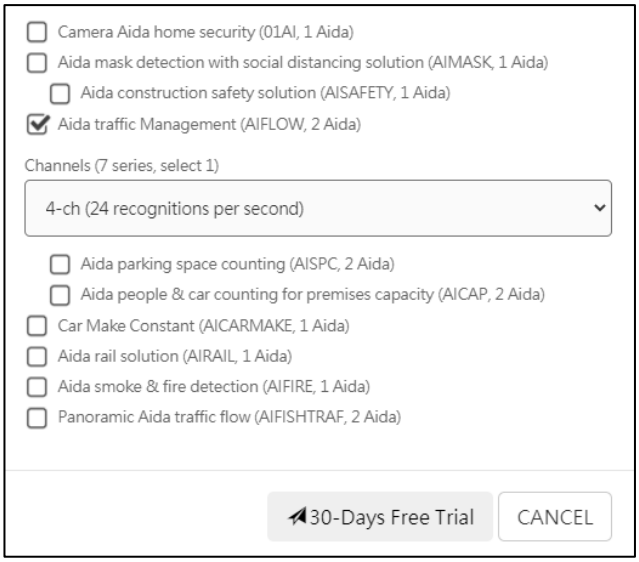
This case is for information only

3. Select ANPR if you need ANPR function

4. Select a country you want

5. Select your required number of channels

If you need other function such as Aida Traffic Management, please repeat step 5.



When you finish, click on 30-Days Free Trial
You will receive in your registered mailbox your license key, also you can verify the functions you requested.

Dear LILIN Customer:

Thank you for purchasing LILIN Aida functions.
This email contains 30 days trial license. We are currently waiting for your payment.
You are free to cancel this purchase order during this trial period.

Once we have received your payment, you agree the trial test and confirm the purchase order. There is no refund allowed. After we receive your payment,

1. Invoice and permanent license key will be sent to your mail address.
2. Permanent license key will be sent to your email address and be updated on LILIN Agent Cloud.
3. There is no refund available.

The unlocking key of Aida functions for 30-day trial is:

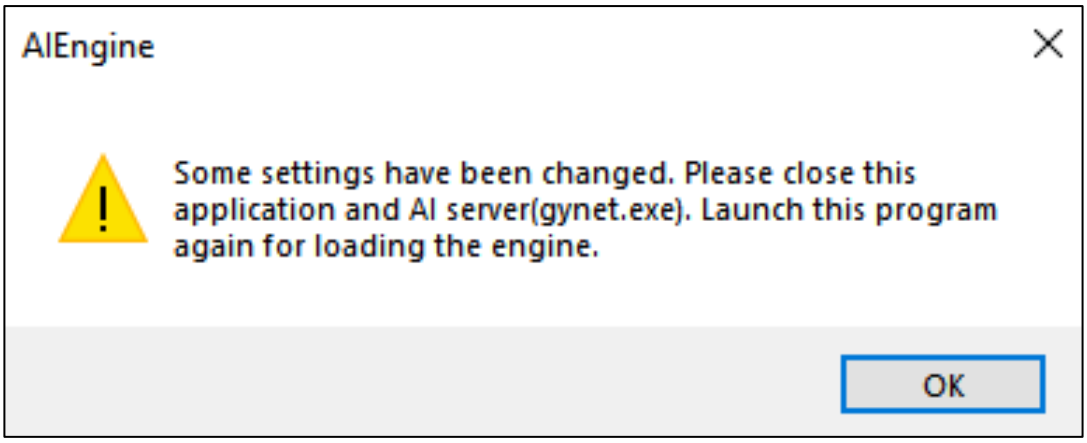
System ID: 54-05-DB-99-3C-E5

Functions Requested:
ANPR (Taiwan) 4CH 24FPS
AIFLOW 4CH 24FPS

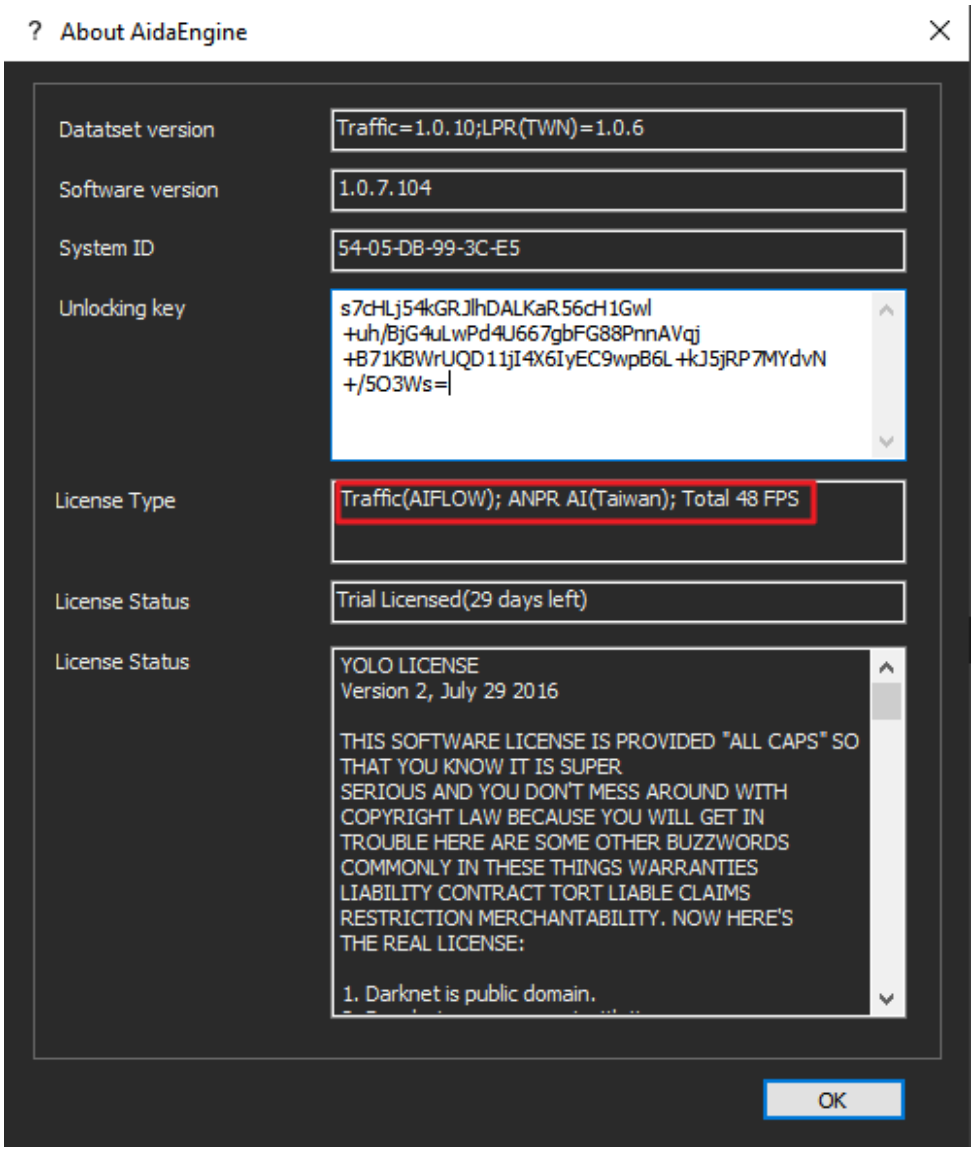
Unlocking Key: s7cHLj54kGRJlhDALKaR56cH1Gwl+uh/BjG4uLwPd4U667gbFG88PnnAVqj+B71KBWrUQD11jI4X6IyEC9wpB6L+kJ5jRP7MYdvN+/5O3Ws=

Go back to AIDA software
Click on the top right “?”

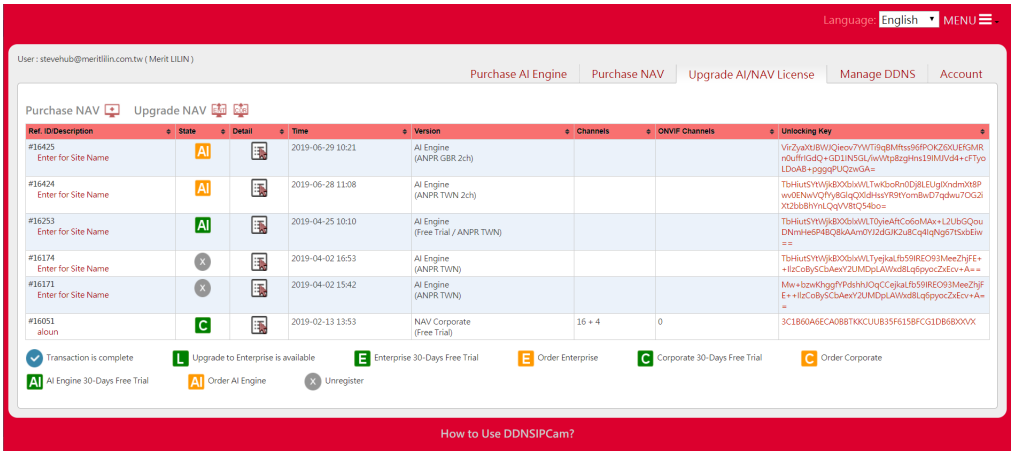
Key-in the license key, you will get a pop-up message asking to re-launch the AIDA software.



Go back to “?” to check the function you applied are correct



You are able to manage the license keys for Aida Engine or Navigator below:



Chapter 3.2 The Following Situations Where Aida Engine Might not Work

- During a rainy day, the rain drops block the field of view of the detected number plates or objects.
- In foggy environment, the fog blocks the detected number plates or objects.
- The reflection caused by sunshine and mirror
- The large object blocks the license plates.
- Blurry video in a strong wind installation

Chapter 3.3 ANPR & Traffic Object Recognition Requirement

For traffic object recognition, the object needs to be 100x100 pixels in resolution for recognition. For number plate, the plate resolution needs to be 100 x 100 pixels in resolution for recognition.

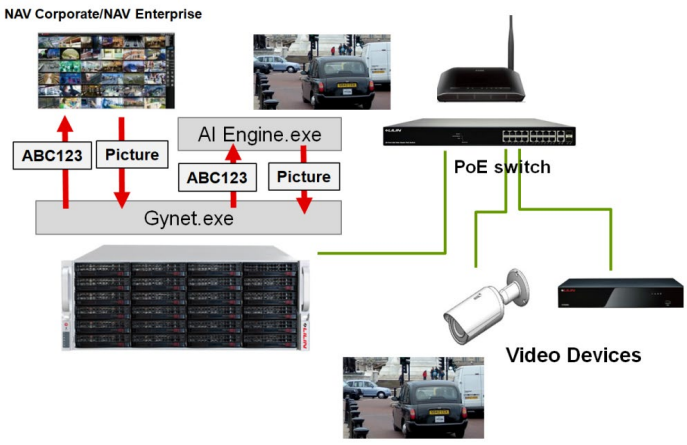
Chapter 3.4 Who Needs this Aida Engines

The following developers are suitable for using LILIN Aida Engines

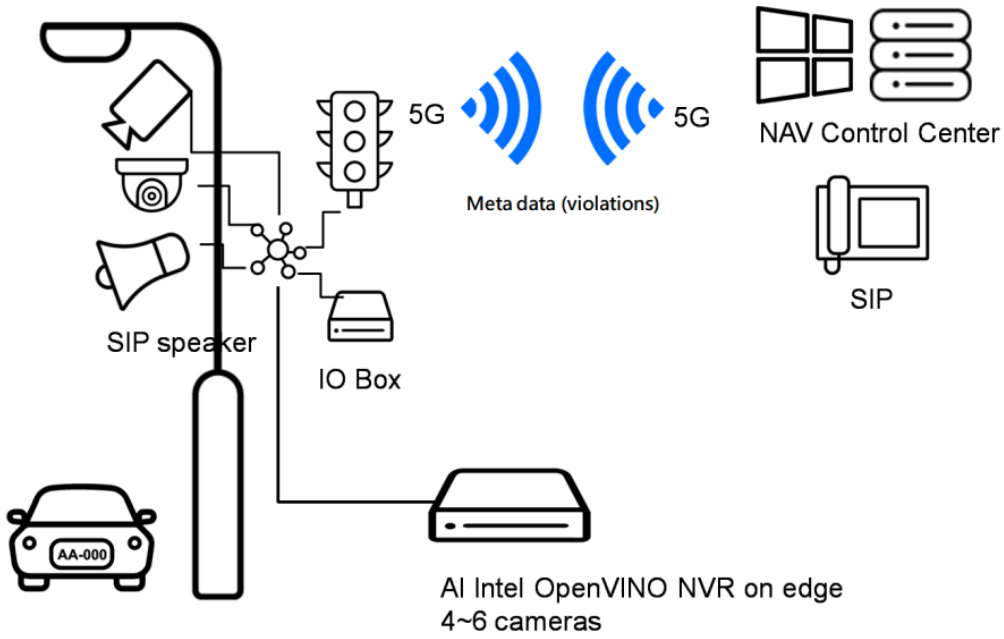
- System integrators for car park automation
- Software developers for building automation
- Traffic management system developers
- Developers of VMS companies
- Number plate recognition system installers of LILIN NAV

Chapter 3.5 The System Diagram of Aida Engine

The system consists of GYNet.exe, Aida Engine, and a demo program, AI Engine.exe. By default GYNet is installed at “C:\Program Files\AI Engine” with port 8592 opened for other VMS to interface.

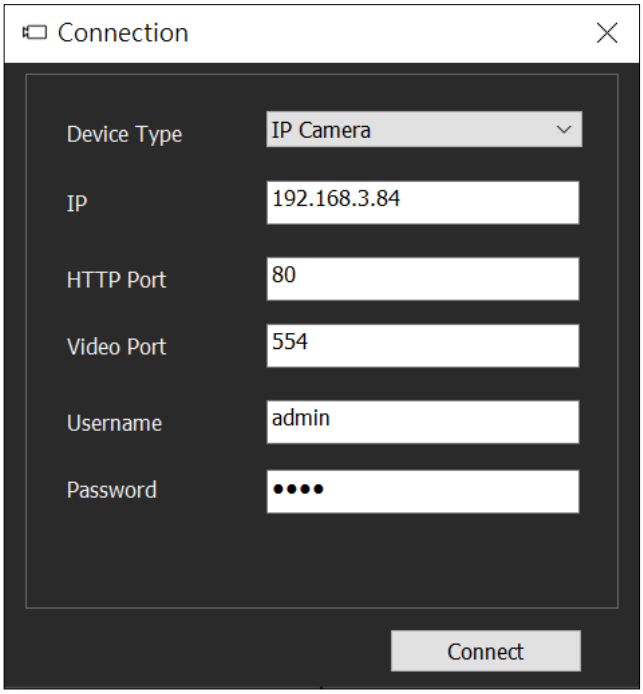


Chapter 3.6 The System Diagram of Traffic Detection



Chapter 4.0 Test Camera via LILIN Aida Engine

Select a channel and click on the camera icon . Enter IP address, port number, username and password. Click on Connect for connecting the video.

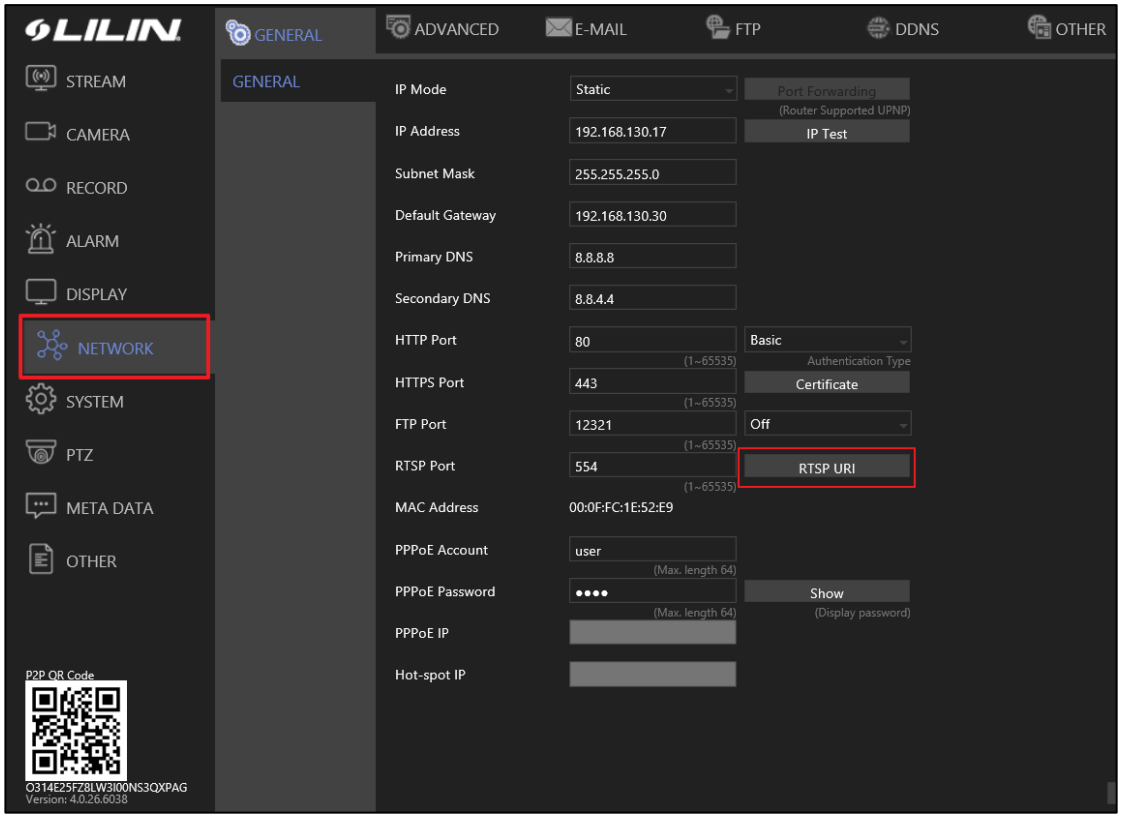


You can also use RTSP in AIDA for analysis.

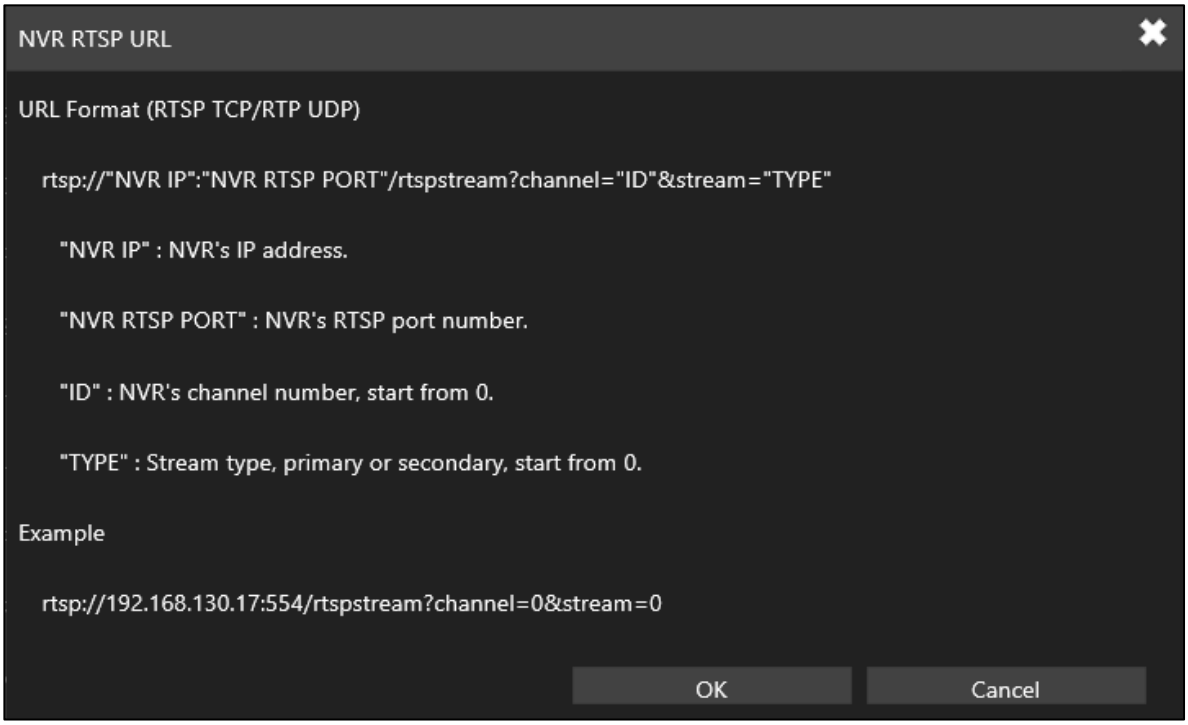
First, you need to make sure CGI is correct and working in VLC player.

In my example I use NVR5832 IP address is 192.168.110.175

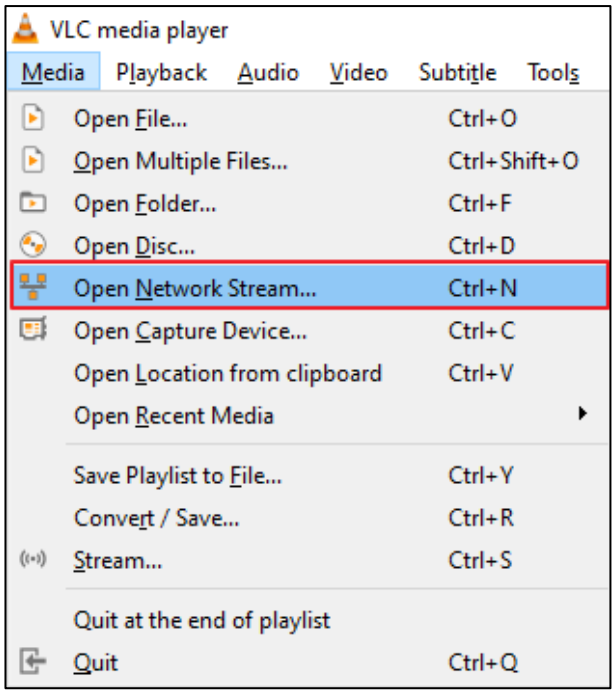
First open NVR5832 IE interface, go to Network then click on RTSP URL



You will have a popup message teaching you how to write the command.

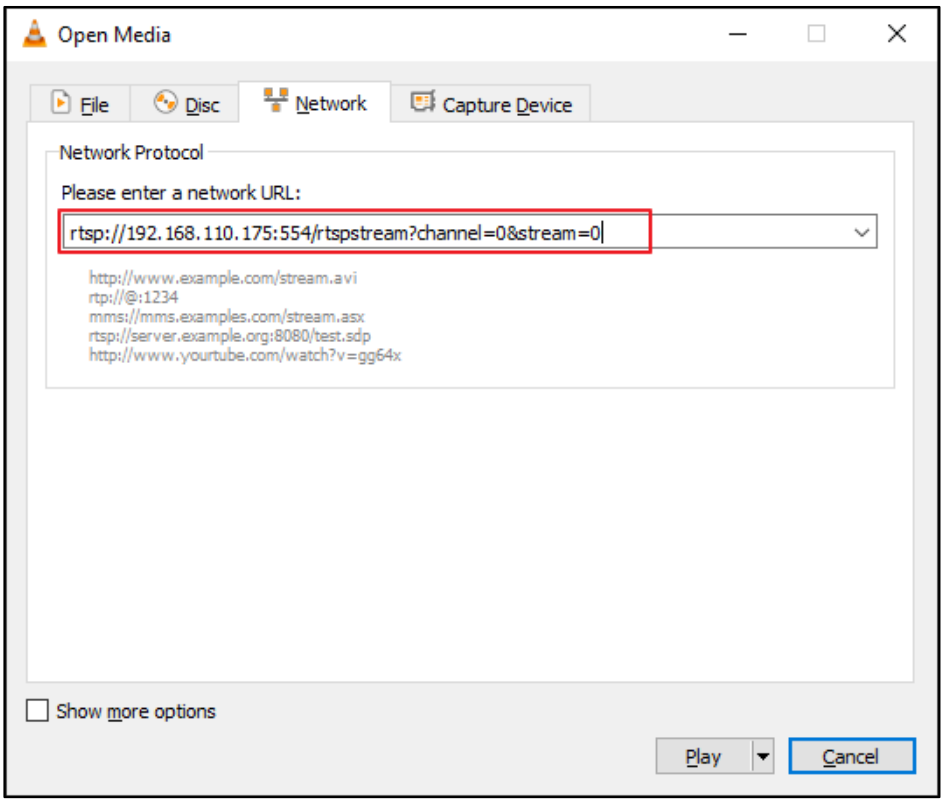


Open VLC, go to Media and select Open Network Stream.

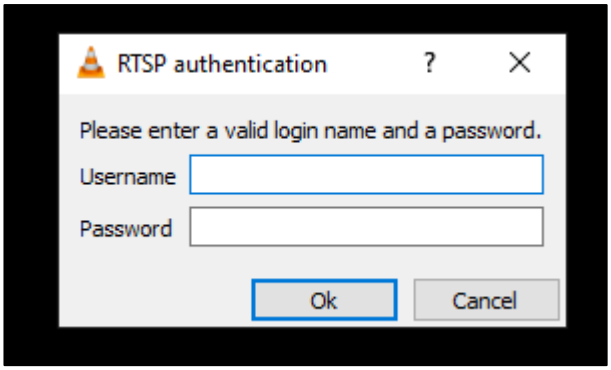


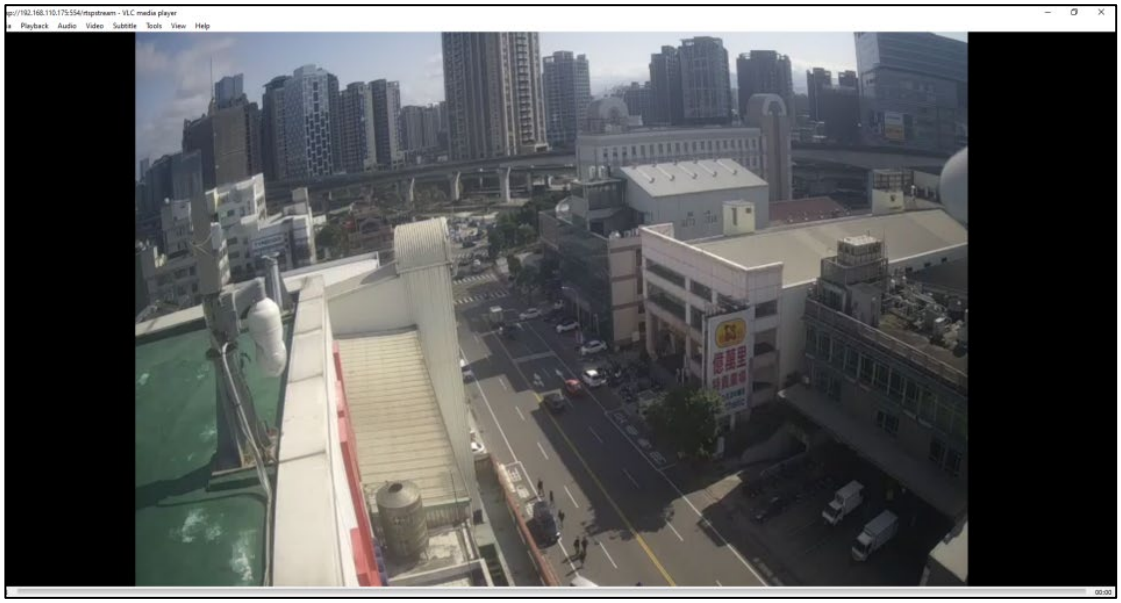
Then type the command

If you want to display the secondary stream, choose 0 key following command, then click on Play
rtsp://192.168.110.175:554/rtspstream?channel=0&stream=0

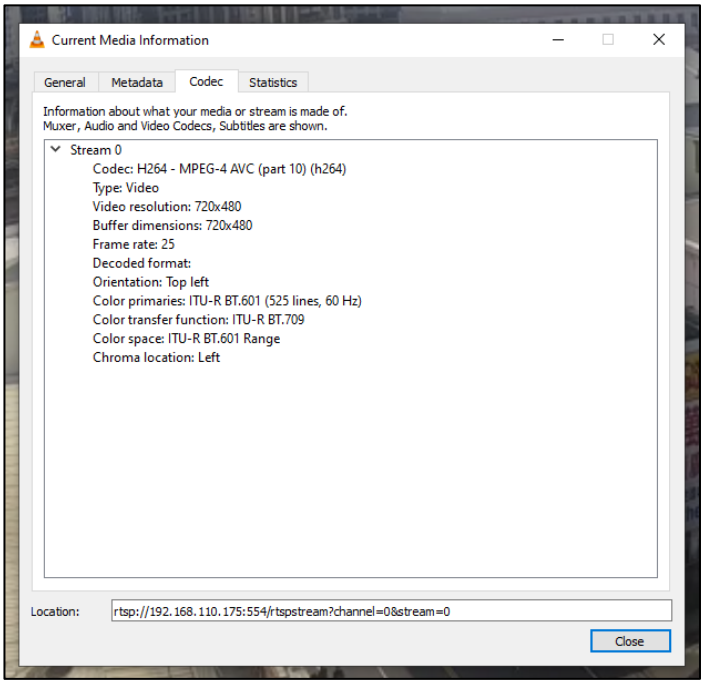


Type your NVR username and password, then press OK.

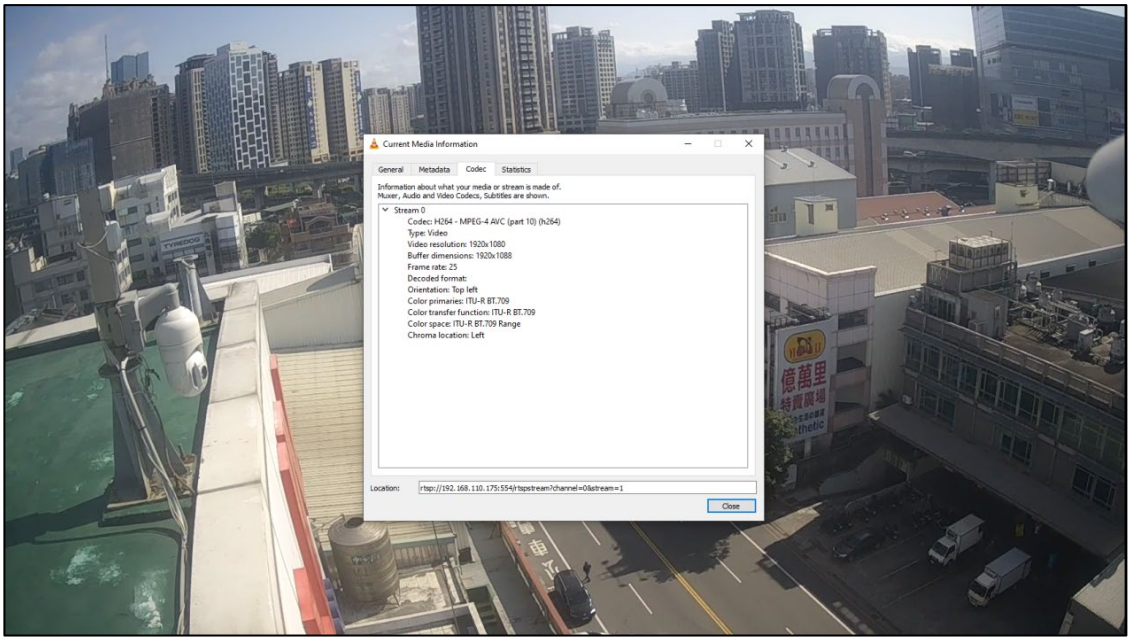




Click on codec information, you will see that the current resolution is 720 x 480

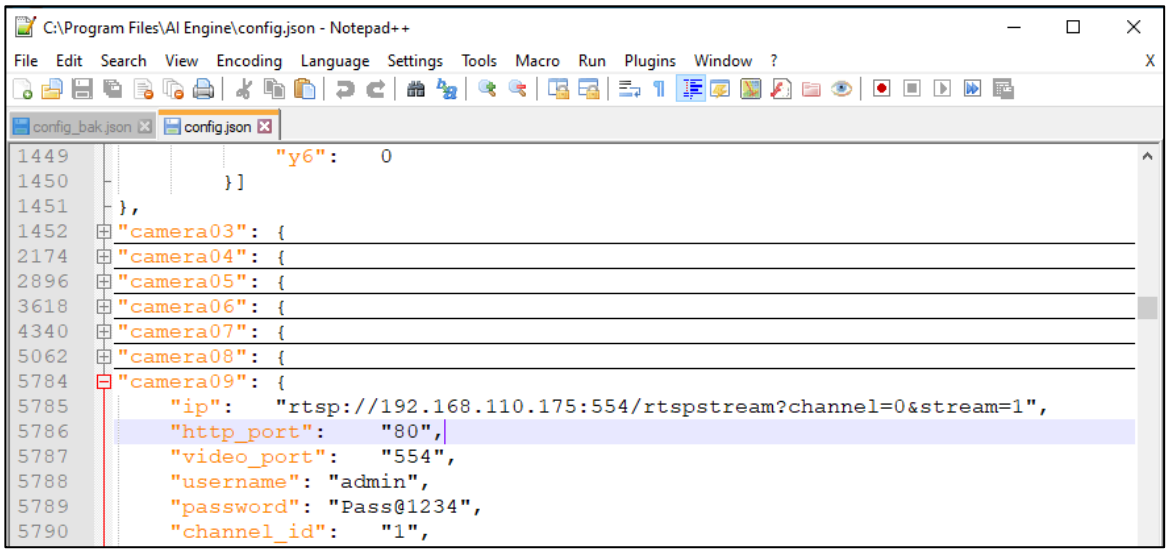


If you want to display main stream, choose 1
rtsp://192.168.110.175:554/rtspstream?channel=0&stream=1



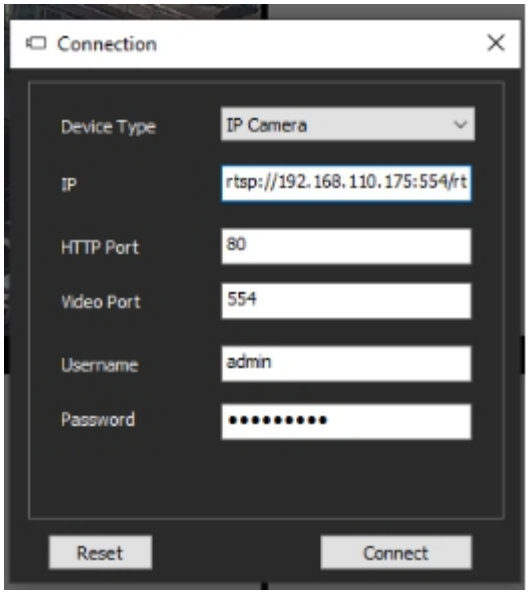
There are two scenarios.

First one is customer no need sees live image, he only wants to know the recognition result.



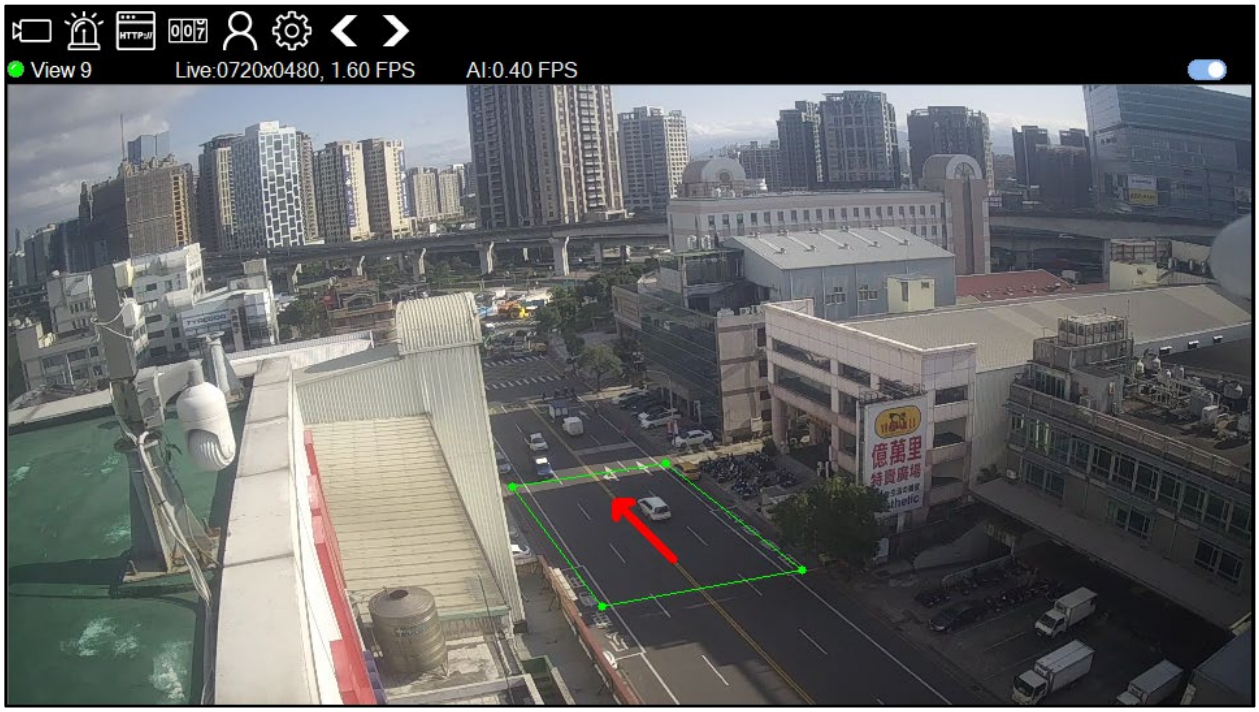
So, in this case, need to change the config.json file, then run gynet program.

Second, if a customer wants to see the live image, then need to set the usual page.



- Device Type: Select IP camera
- IP: Paste the command string rtsp://192.168.110.175:554/rtspstream?channel=0&stream=1 in this field.
- HTTP Port: 80
- Video Port: 554
- Username: Type your NVR username
- Password: Type your NVR password
- Connect: Click on Connect to finish the setting.

You can now see your NVR or DHD device stream in AIDA



Chapter 4.1 The Advantages of Aida Based Number Plate Recognitions

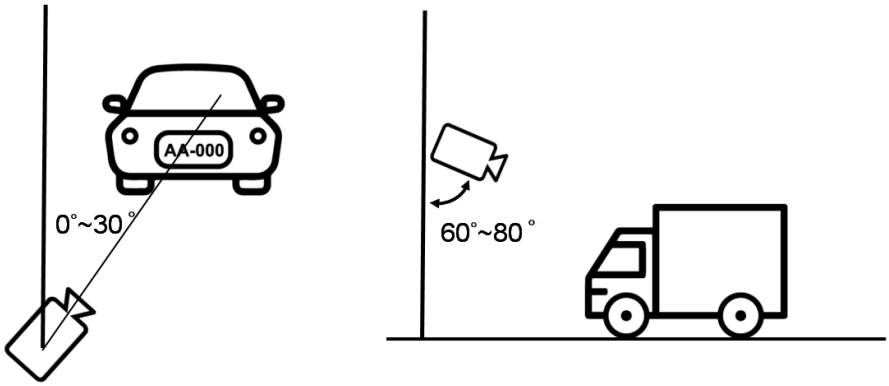
The traditional computer vision technique requires image processing for edge detection, corner detection, and object detection for number plates. The difficulty with this approach of feature extraction in image classification is that you have to choose which features to look for by a given image. This becomes difficult and pretty much impossible when the number of classes, the plates and the digits, you are trying to classify.

Deep learning is introduced by the concept where the machine is told to learn what to look for. It works out the most descriptive and obvious features for each object, the plate or the digit. In other words, deep learning is told to discover the underlying patterns in classes of plate and digital images that can give much better result than traditional computer vision based number plate recognition.

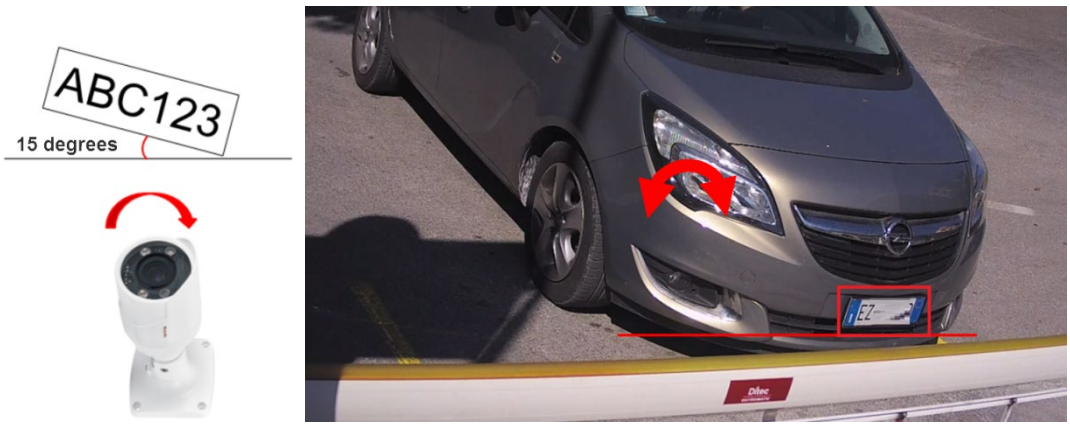
Chapter 4.2 Recommended Camera Installation

Camera installation angle and video quality will affect the recognition rate. A good camera installation can increase accuracy rate.

- Do not aim camera direct to headlight.
- Do not install camera less than 60 degrees vertically in between the camera and the pole.
- Do not point the camera to the license plate at wide angle (more than 30 degrees) horizontally.

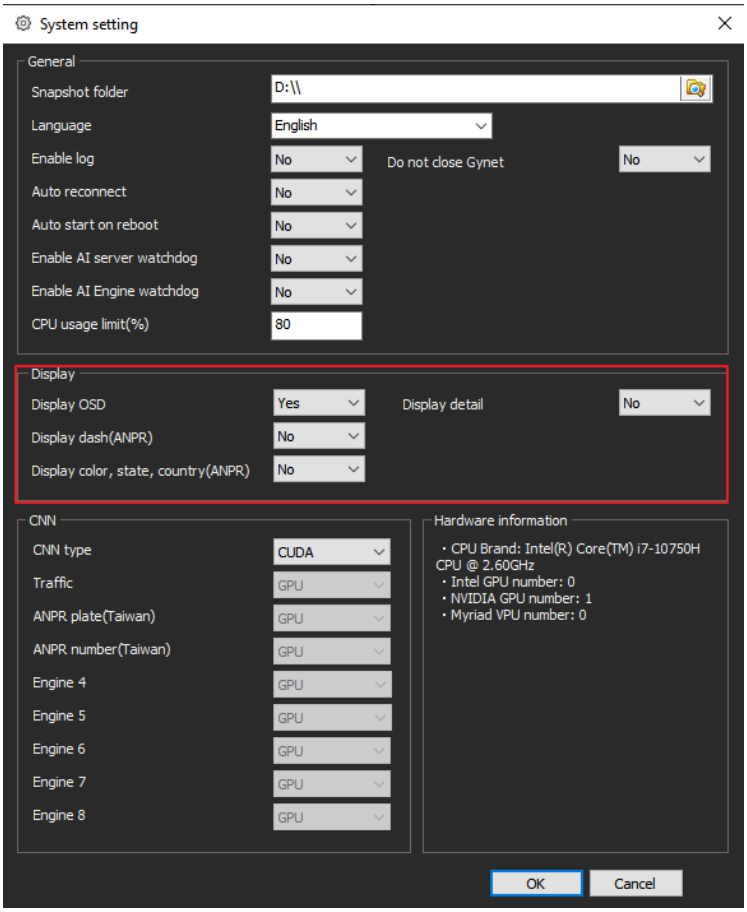


The angle of the license plate cannot exceed 15 degrees. To increase recognition rate, please rotate the camera to the same angle of the license plate.



Chapter 4.3 Display State & Dash

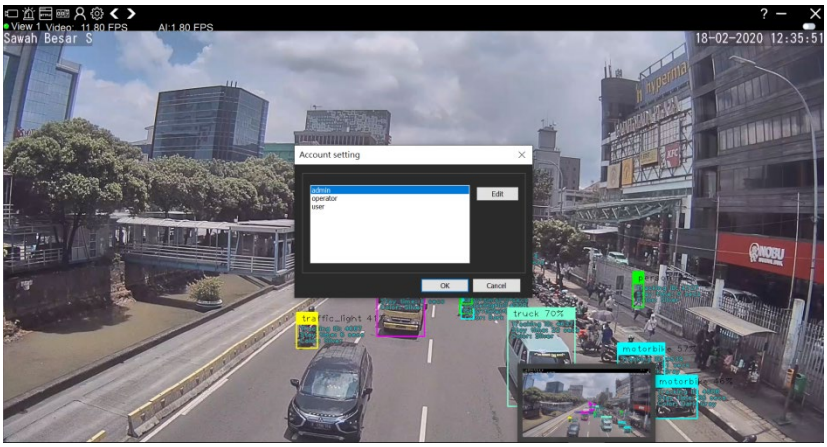
For some countries, ANPR Aida Engine is able to detect states or provinces such as the USA and Indonesia. Please enable Display state and country option. For Taiwan plate, you can enable the Dash option for showing "-" for number plates.

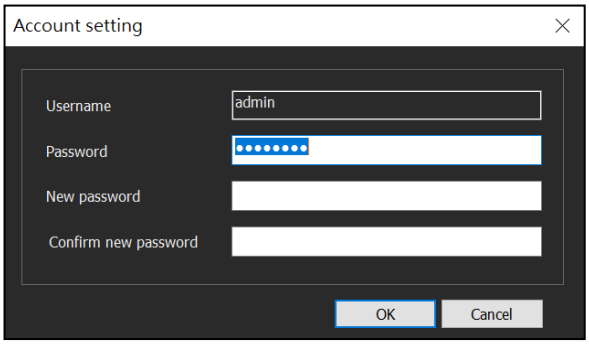


Note: Once the settings are changed, please reload Aida Engine or Navigator software.

Chapter 4.4 Login of Aida Software

There are three roles, admin, operator, and user, for accessing the system. Please setup username and password for accessing Aida software. Click on button for changing username and password.



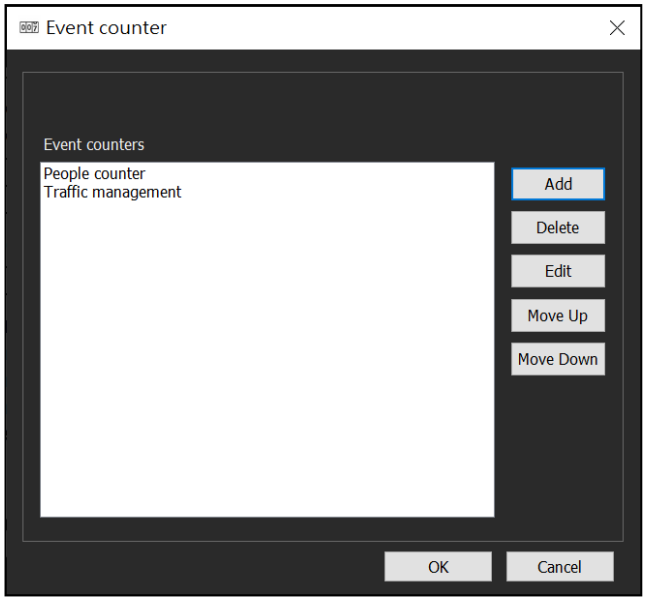


admin	V	V	V	V	V	V
operator	V	V	V	V	-	-
user	V	-	-	-	-	-

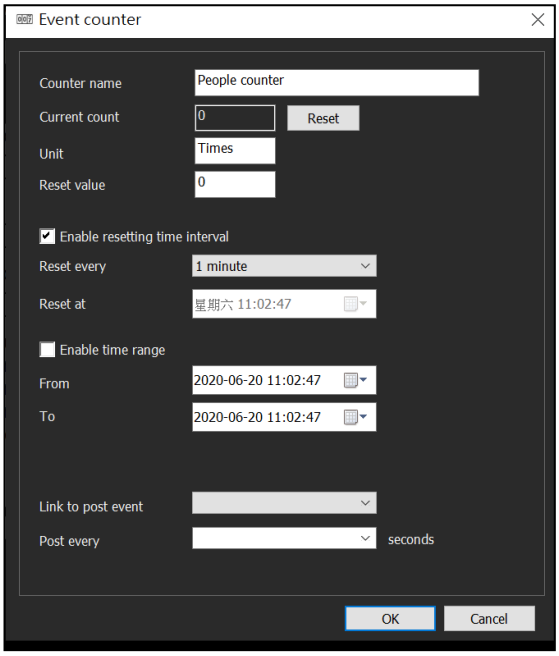
Chapter 4.5 Event Counter of Aida Software

The event counter of Aida software can be used for counting traffic queuing, people density, and social distancing. To set the event counters, follow the steps below:

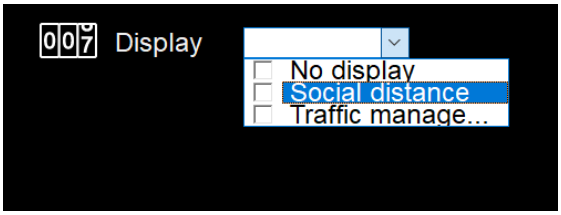
Click on the counter button for launching event counter dialogue box. Click on Add, Delete, and Edit buttons for editing event counters.



Give a name of the counter for identification purpose. The reset value is for resetting of the counter. For example, for car park application, you are able to reset the counter every day.

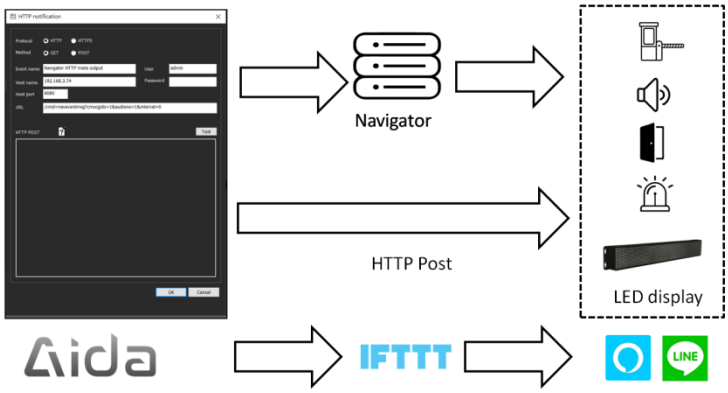


To display the counter on the video of Aida software, select the counter you created for displaying purpose. There are up to 4 counters that can be displayed.



Chapter 4.6 HTTP Post of Aida Software

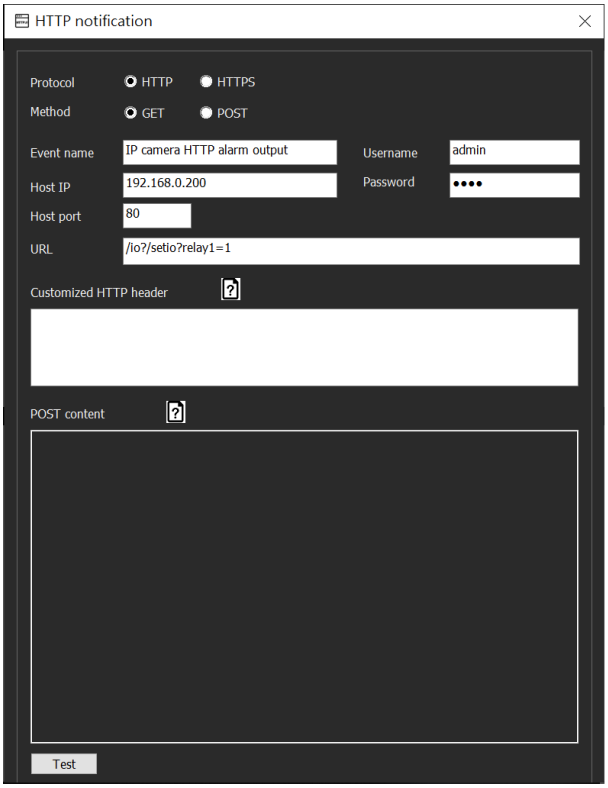
HTTP Post can notify other systems for integration purpose. See examples below:

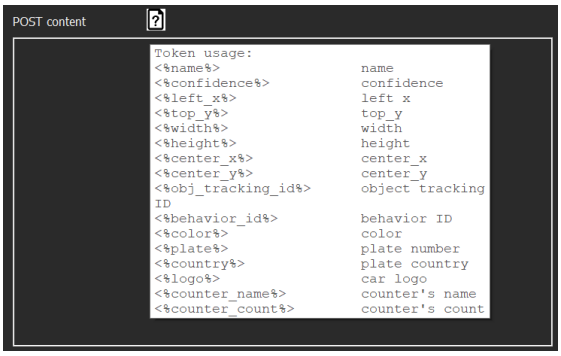


Click on icon to launch HTTP notification dialogue box. There are few pre-programmed HTTP CGI commands for interfacing LILIN NVR or IP camera. Click on Add, Delete, and Edit buttons for editing the HTTP Post commands.

For example, to control IP camera's relay output, follow the steps below:

- **Protocol**: Select HTTP port (default) for communication purpose.
- **Method**: Select the target device HTTP protocol method.
- **Event name**: Specify an event name.
- **Username and password**: Enter the username and password of the target device.
- **HTTP Port**: The port number of the target device.
- **URL**: The CGI command of the IP camera for reply triggering output.
- Customized HTTP header
- **Post content**: Customized contents of the AI recognition result including "counter", bonding boxes, number plate, and others.



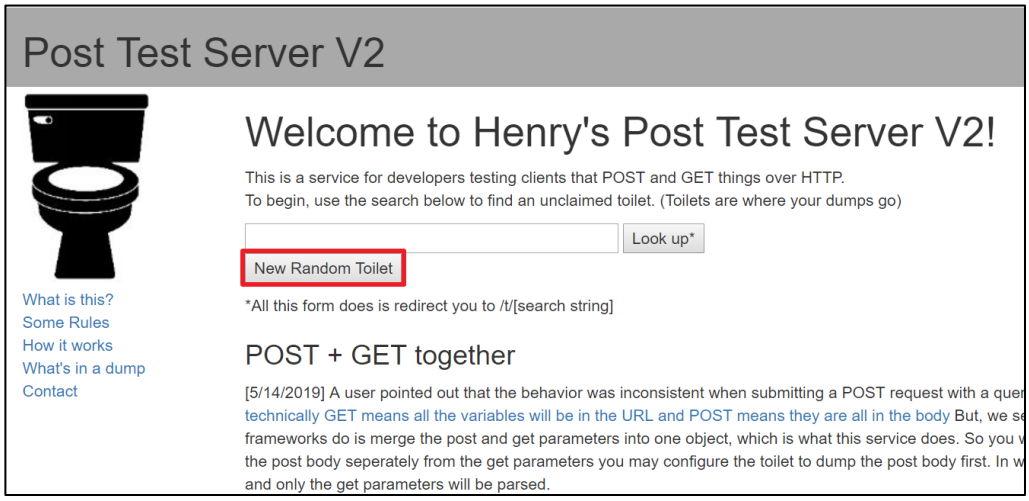


Chapter 4.7 How to test if HTTP POST URL is successfully sent by the AIDA software

You need a service that can receive http post from AIDA software

Open your internet browser and key-in https://ptsv2.com/

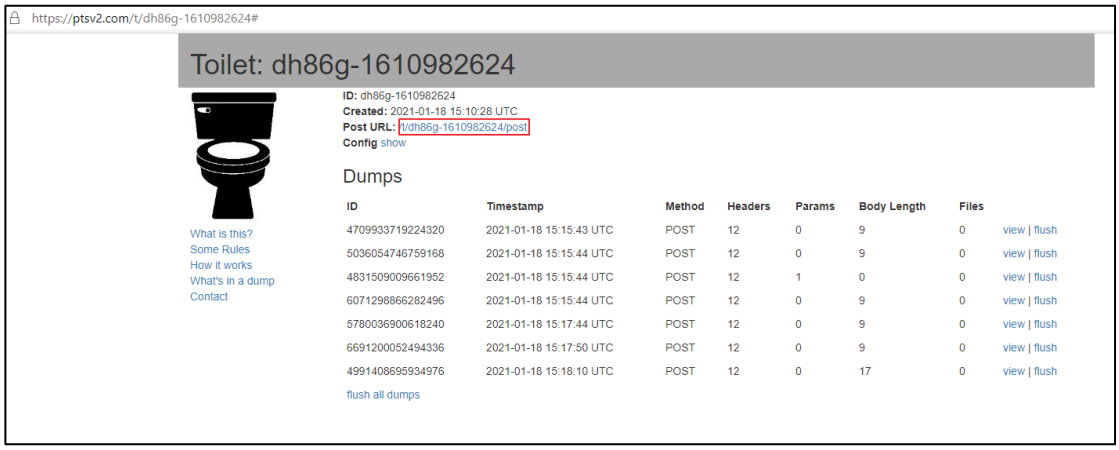
After a behavior is detected, we want to send a value or test to free

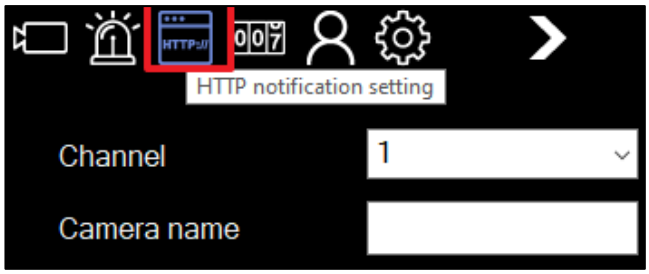


Click on **New Random Toilet**
You will see a post URL on the third line, each time is different. Copy this path for Aida setting

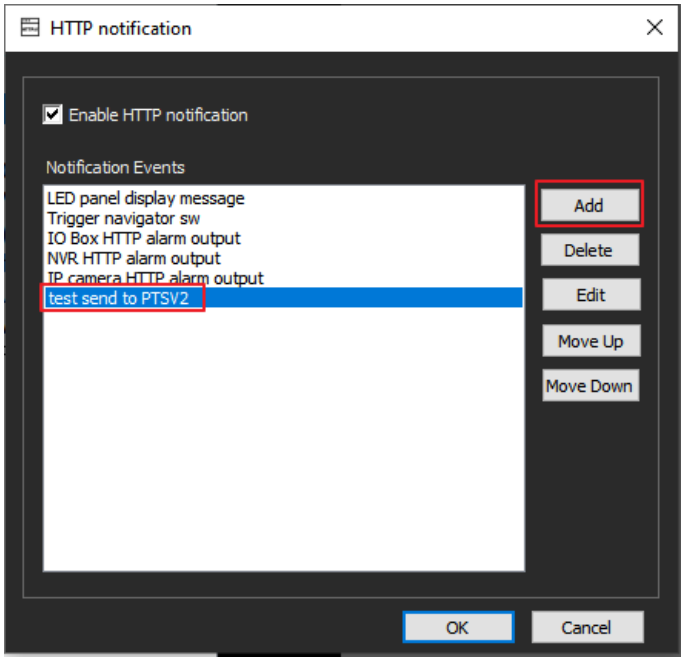
/t/dh86g-1610982624/post

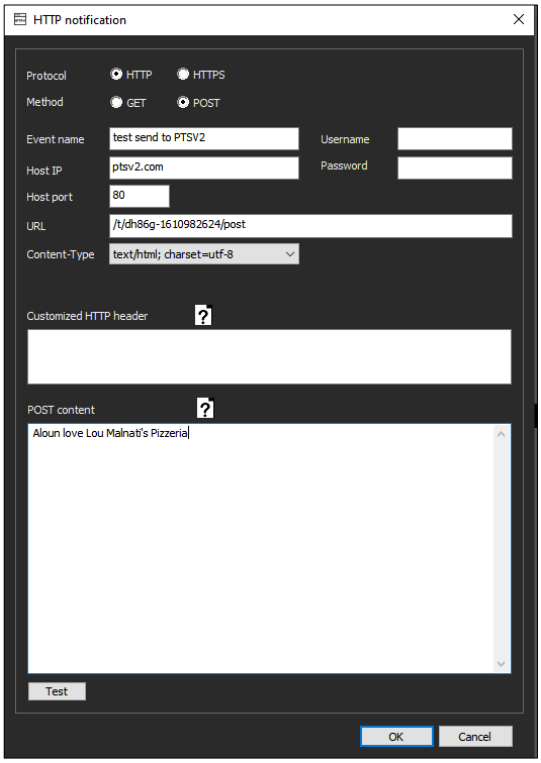
https://ptsv2.com/t/dh86g-1610982624#





Add a new rule and name it TEST SEND TO PTSV2

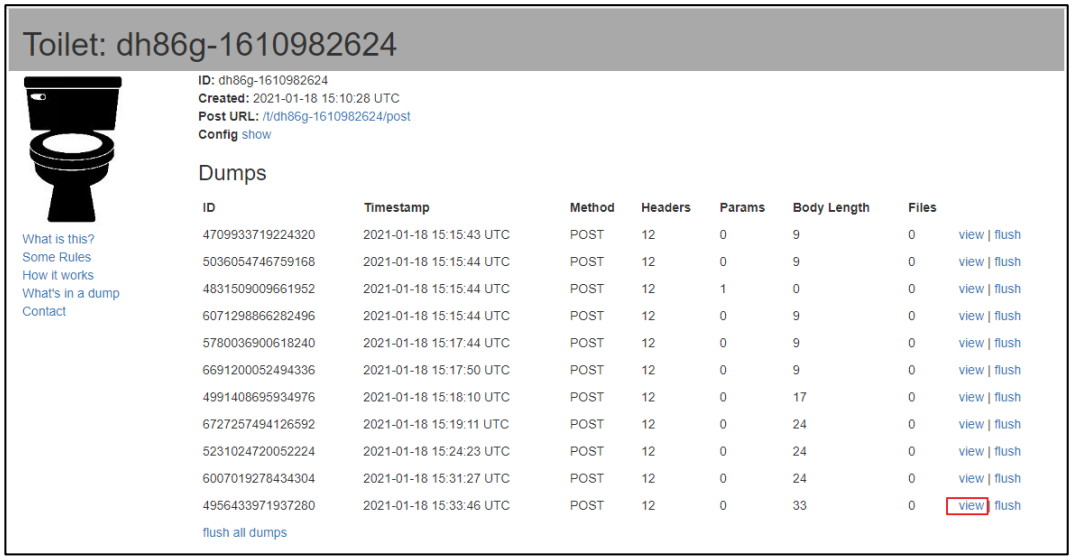


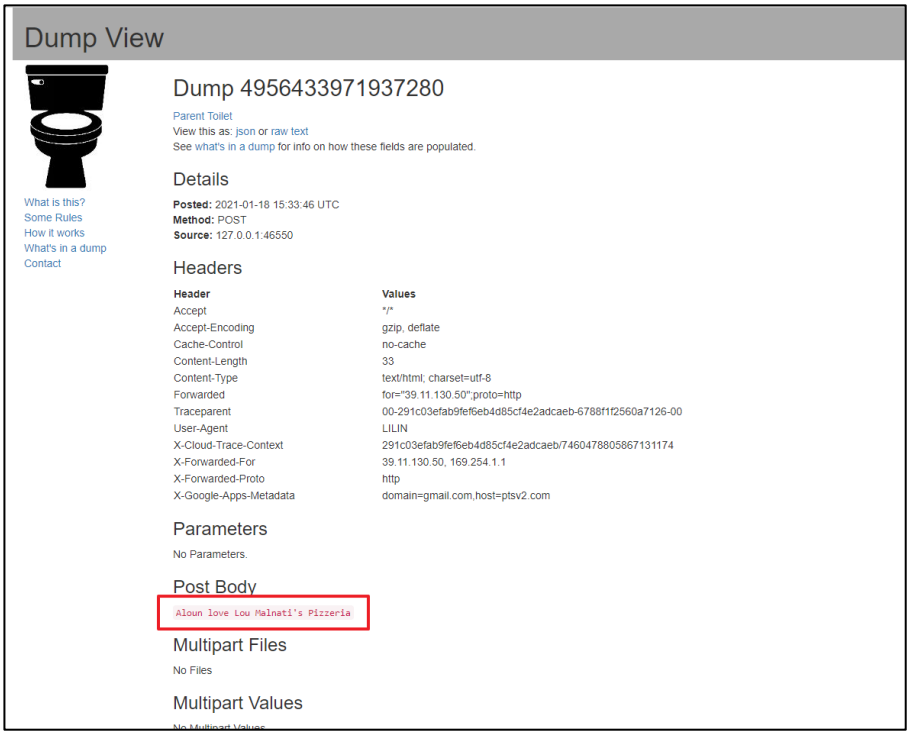


- **Protocol:** Select HTTP protocol
- **Method**: Select Post Method
- **Event Name**: test send to PTSV2
- **Host IP**: ptsv2.com
- **Host Port**: Port is 80
- **URL**: Paste the URL provided by PTSV2
- **Customized HTTP header**: /t/dh86g-1610982624/post
- **Post content**: Type a sentence or metadata string
- **Test**: Click on Test

Go back your browser and click refresh

You will see a new event, click on view for details



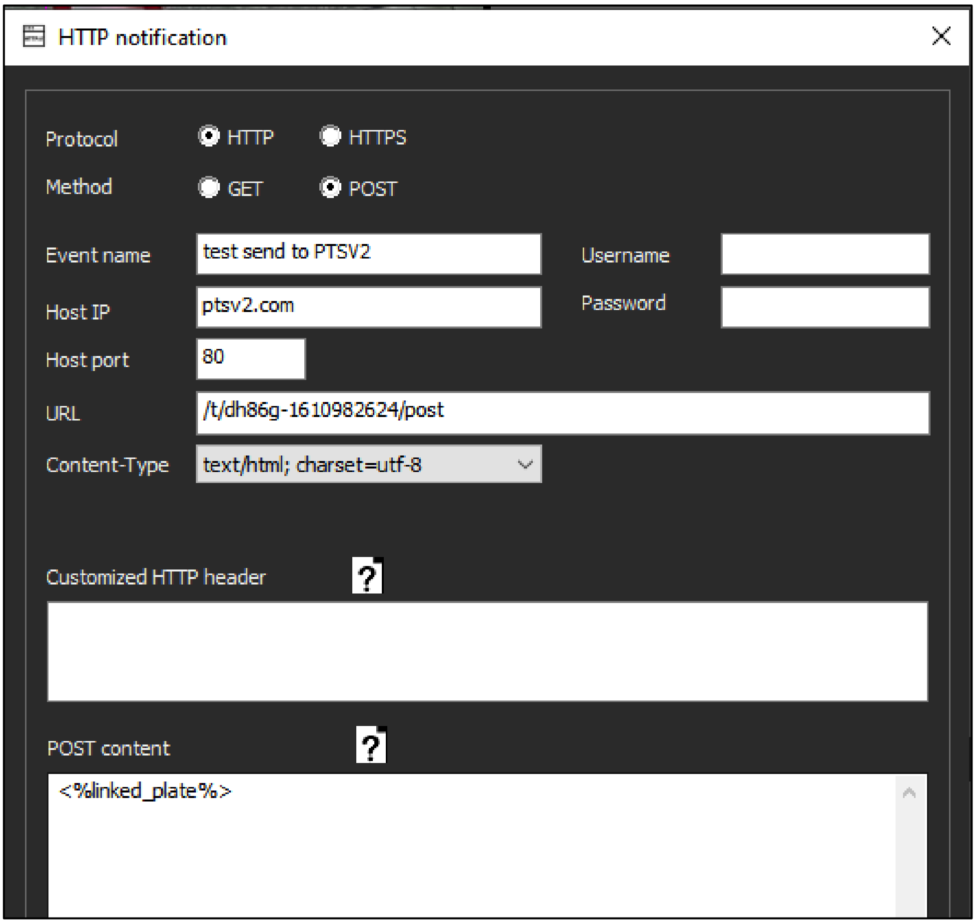


If I want to receive a plate number, I need to verify with this command on the internet explorer browser what value to look

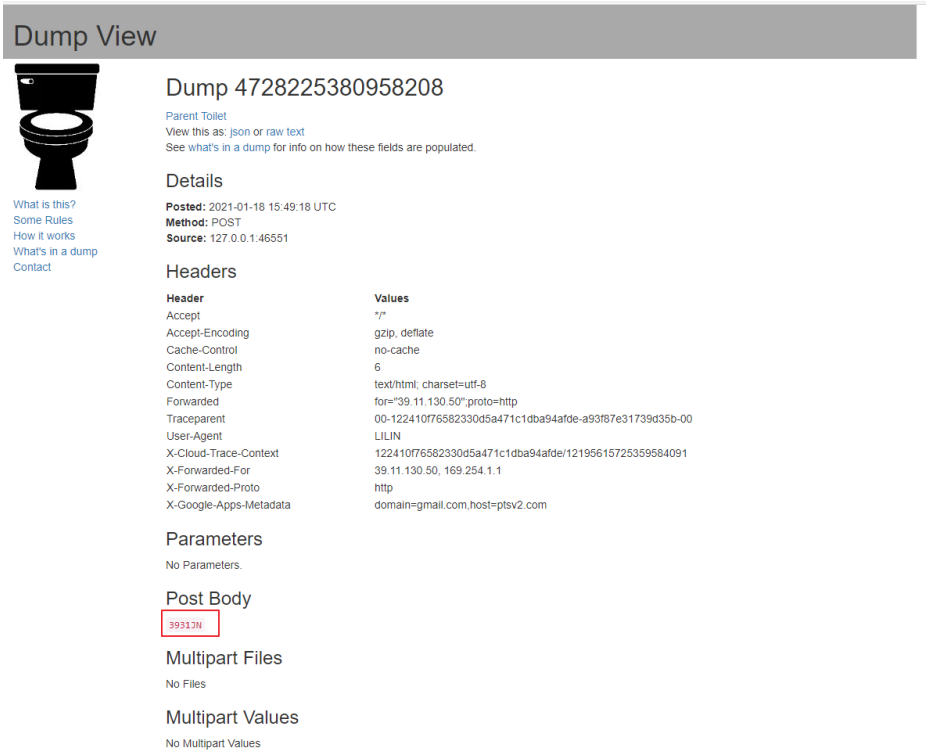
http://127.0.0.1:8592/getalarmmotion

CamTime: 2021-01-18 23:44:40 ms:338
{"AiEngine":[{"id":0,"channel_id":1,"camera_name":"","res_height":540,"res_width":960,"confidence":99,"engine_type":1,"label_name":"motorbike","class_id":3,"obj_type":0,"obj_tracking_id":383,"obj_dwell_time":3,"color_id":8,"color":"Black","behavior_id":0,"linked_plate":"PRV251","x":485,"y":163,"w":111,"h":121,"parent_idx":-1},{"id":1,"channel_id":1,"camera_name":"","res_height":540,"res_width":960,"confidence":82,"engine_type":1,"label_name":"person","class_id":0,"obj_type":0,"obj_tracking_id":385,"obj_dwell_time":2,"color_id":8,"color":"Black","behavior_id":0,"linked_plate":"","x":500,"y":116,"w":81,"h":135,"parent_idx":-1},{"id":2,"channel_id":1,"camera_name":"","res_height":540,"res_width":960,"confidence":91,"engine_type":1,"label_name":"person","class_id":0,"obj_type":0,"obj_tracking_id":382,"obj_dwell_time":3,"color_id":1,"color":"Red","behavior_id":0,"linked_plate":"","x":756,"y":12,"w":45,"h":116,"parent_idx":-1},{"id":3,"channel_id":0,"camera_name":"","res_height":0,"res_width":0,"confidence":100,"engine_type":16777216,"label_name":"counter count","class_id":0,"obj_type":7,"obj_tracking_id":0,"obj_dwell_time":0,"color_id":0,"color":"","behavior_id":0,"linked_plate":"","x":0,"y":0,"w":0,"h":0,"parent_idx":-1,"properties":{"counter_count":[0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0]}}],"Count":4}
--myboundary
Content-Length: 1448
Content-Type: text/html; charset=utf-8

Modify the rule

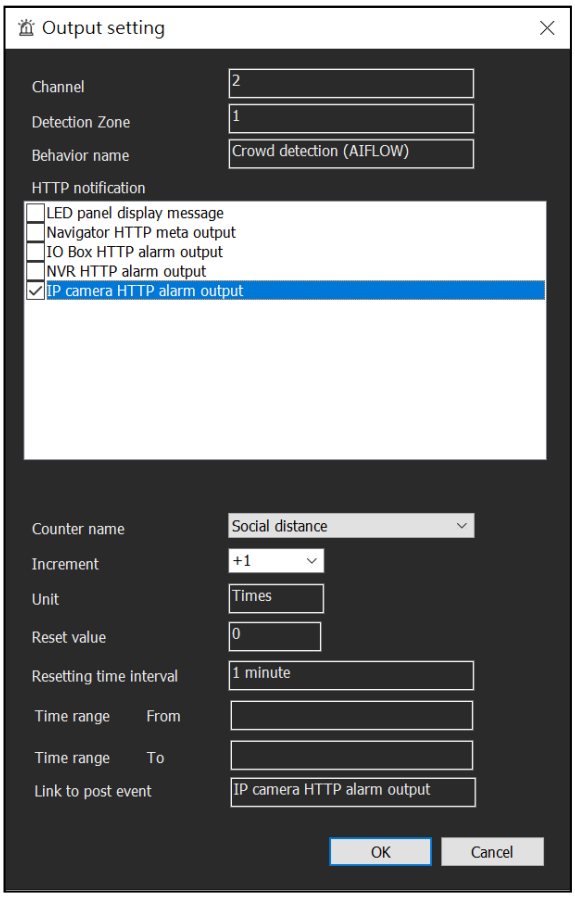


Then go back to PTSV2 toilet



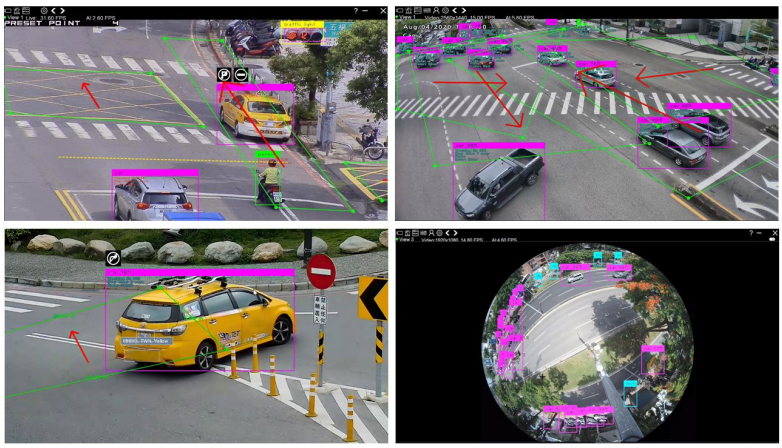
Chapter 4.8 The Outputs of Aida Software

The output settings of Aida software can be programmed for a behavior detected. For each behavior, click on the “Set Output” button for configuring the output, including (1) HTTP Post and (2) counter output.



Chapter 5.0 Aida Traffic Management

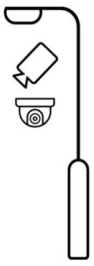
For Aida traffic management, follow the instruction below:

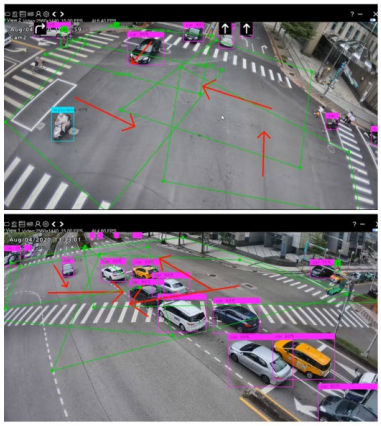


Chapter 5.0.1 The Camera Installation of Aida Traffic Management

The installation of the camera is important. For cost consideration, installing the camera on a single pole is preferred. For this reason, please make sure that the camera field of view can cover the entire intersection, and the resolution for object identification must be 100 pixels wide x 100 pixels high.

- *One pole installation is preferred.*





Chapter 5.0.2 The Infrared Illuminator

Generally speaking, traffic management cameras are installed in a street light environment. Please contact our company sales representative to suggest a suitable low-light camera for color mode AI recognition. If the camera image quality in low-light conditions is poor, an infrared illuminator can be installed, to perform black and white image recognition, but the recognition rate may decrease.

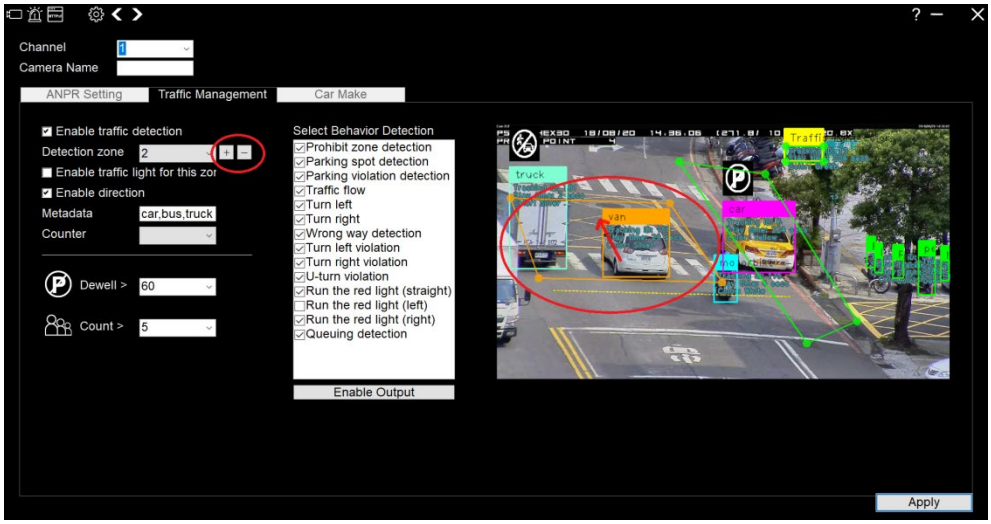
Chapter 5.1 The Settings of Aida Traffic Management

Click on Enable traffic detection for using AI traffic objects detections. For traffic behaviors, the behavior is defined in a traffic detection zone. There are four detection zones programmable for traffic objects. Follow the instructions below for setup.

Note: It is important to disable “Enable traffic detection”, if traffic detection is not used.

Chapter 5.1.1 Traffic Zones

Click on [+][−] buttons for inserting or deleting a traffic detection zone. Once a detection zone gets added, drag the Anchor of the zone to fit the environment. There are up to 4 traffic zones for detecting the behaviors of traffic objects.



Chapter 5.1.2 Adjust Traffic Zones

There are two methods to adjust the detection zone as follows:

1. Position the cursor on any detection zone’s corner and an icon will appear. Left mouse click on and drag the zone’s corner to the desired detection zone area.

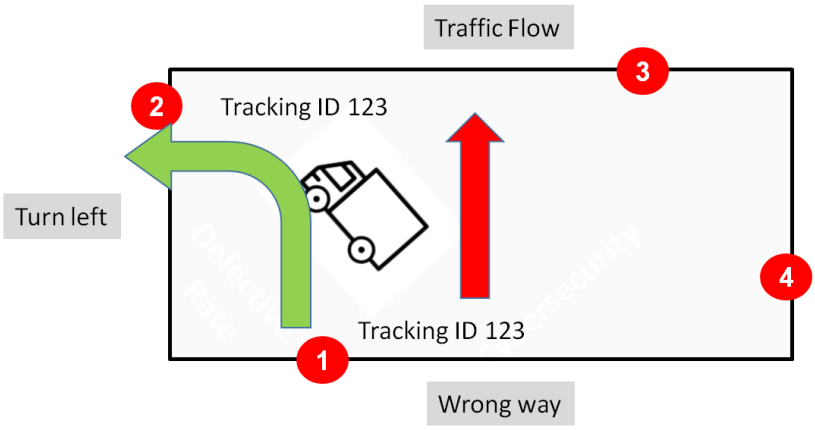
2. Position the cursor on any detection zone’s side and an icon will appear. Left mouse click on and drag the whole zone in desired detection zone area.

Chapter 5.1.3 Traffic Flow Behavior

There are several traffic flow behaviors that can be set up to trigger an alarm notification as follows:

- Traffic Flow: The object travelled according to designated direction.
- Turn Left: The object turned left.
- Turn Right: The object turned right.
- Wrong way detection: The object travelled opposite of designated direction.
- Turn left violation: The object turned left illegally.
- Turn right violation: The object turned right illegally.
- U Turn violation: The object made a U turn in the detection zone.

Before proceeding with the setting description, first explain the setting method of the detection area, the description is as follows:



1. Turn left: An object with same tracking ID crossing line #1 and line #2
2. Turn right: An object with same tracking ID crossing line #1 and line #4
3. Traffic flow: An object with same tracking ID crossing line #1 and line #3
4. Wrong way: An object with same tracking ID crossing line #3 and line #1

To set up an alarm notification for traffic flow behavior in the detection zone, please select the “channel” number for setting and key in the object names in “metadata”. Add a detection zone to desired area. Tick on “Enable direction”, a direction arrow will appear. Position your cursor to the middle of the arrow and a ↻ rotate icon will appear. Left mouse click on rotate icon and drag the mouse to the desired direction. Select behavior detection. Click “Apply” to save the settings.

Chapter 5.1.4 Setting Detection of Traffic Red Light

To set up an alarm notification for an object in the detection zone run the red light, the object travelling straight ahead, left turn or/and right turn through the red light.

Please select the “channel” number for setting and enter the object names in “metadata”. Add a detection zone and drag the zone to the traffic light. Adjust the zone area to fit the traffic light. Tick on “Enable traffic light for this zone” and select behavior detection. Click “Apply” to save the settings.

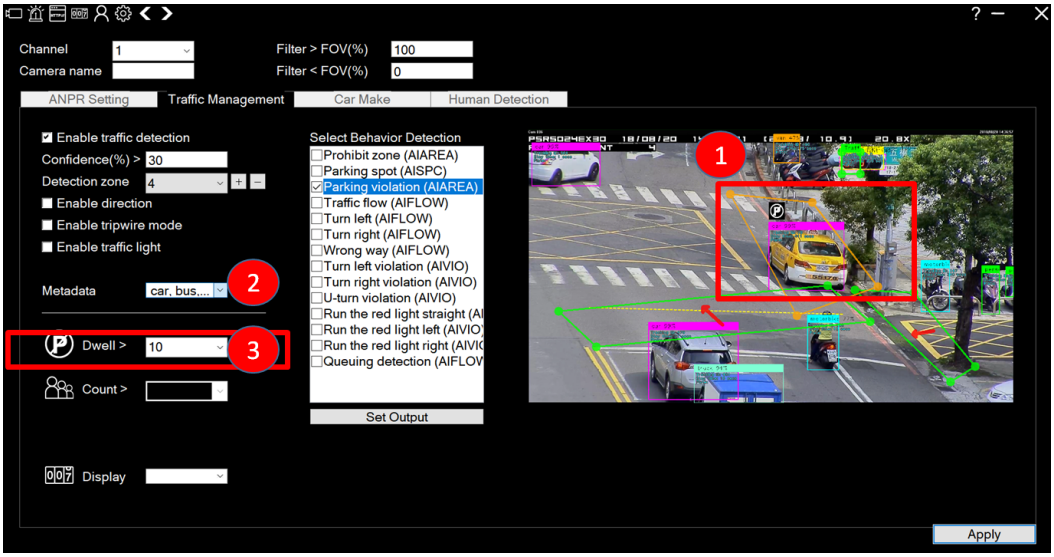
1. Set zone #1 on top of a traffic light (red) & enable traffic light
2. Set a zone #2 and enable the metadata
3. Set zone #2 for metadata, car, van, SUV, etc

Note: Each camera can setup for only one traffic light

Chapter 5.1.5 Prohibit Zone Detection (Parking Violation)

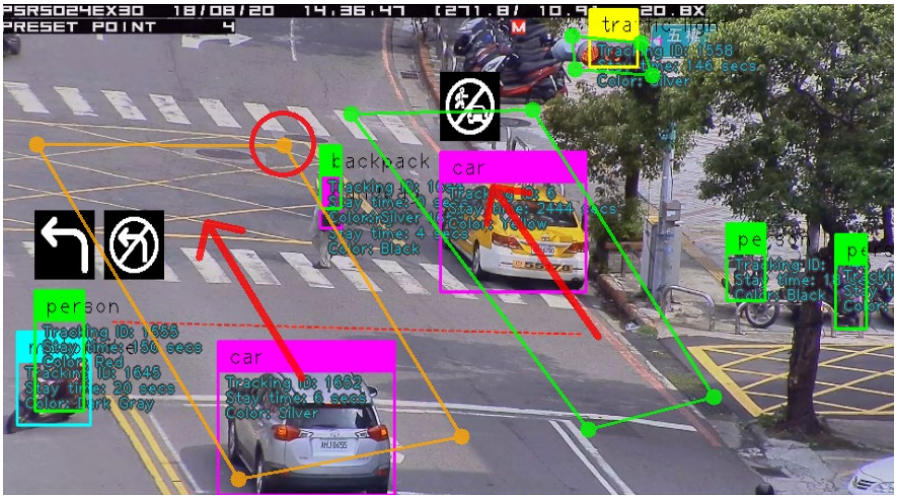
To set up an alarm notification for an object entered the prohibited detection zone, please select the “channel” number for setting and key in the object names in “metadata”. Add a detection zone to desired area. Tick on “Prohibit zone detection”. Click “Apply” to save the settings.

1. Enable the zone for parking area
2. Enable the metadata, car, truck, SUV, etc
3. Set the dwell



Chapter 5.1.6 Queuing Detection

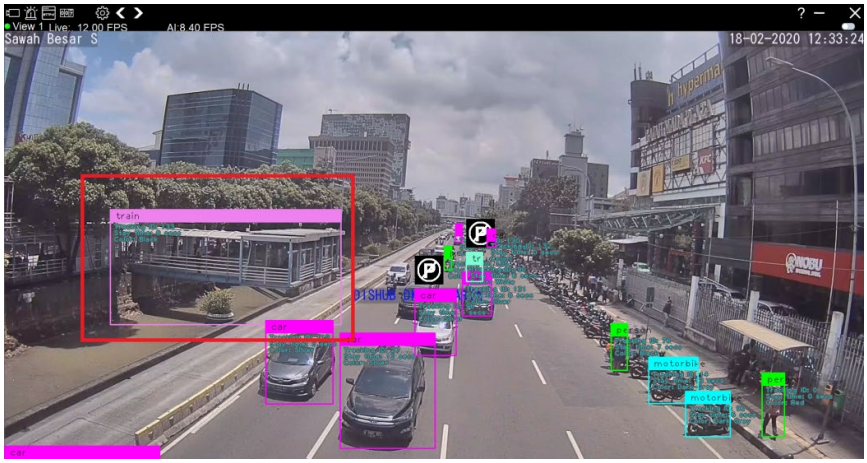
To set up an alarm notification for the number of objects entered the detection zone reached the maximum occupancy, please select the “channel” number for setting and select the object names in “metadata”. Add a detection zone to desired area. Tick on “Queuing detection” and key in the number of objects in **Count**. Click “Apply**”** to save the settings.



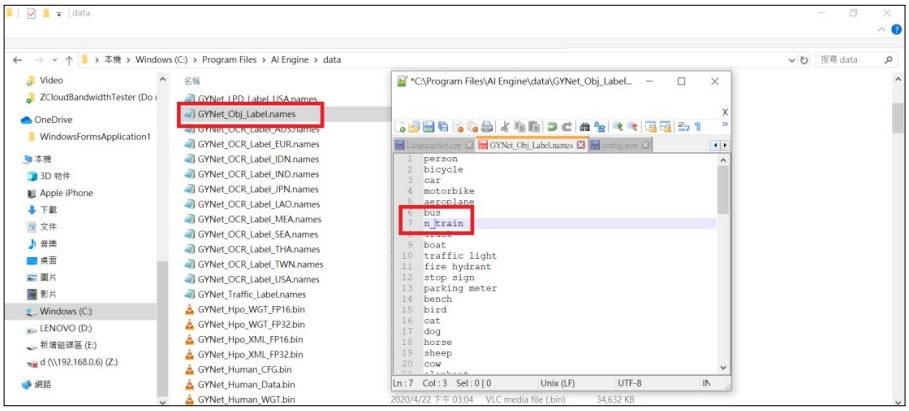
- Enable traffic detection: Enable Aida traffic engine. Disable other Aida engines for saving GPU load.
- Detection zone: Insert a zone for traffic behavior.
- Enable direction: Enable direction if traffic flows are needed such as turn left, turn right, and wrong way detections.
- Metadata: Select the object names for filtering the objects having a desired traffic behavior.
- Counter: A global counter for behavior event.
- Dwell: The time for parking violation.
- Count: The count of objects in a sense used by queuing detection.

Chapter 5.2 How to Improve Recognition Rate

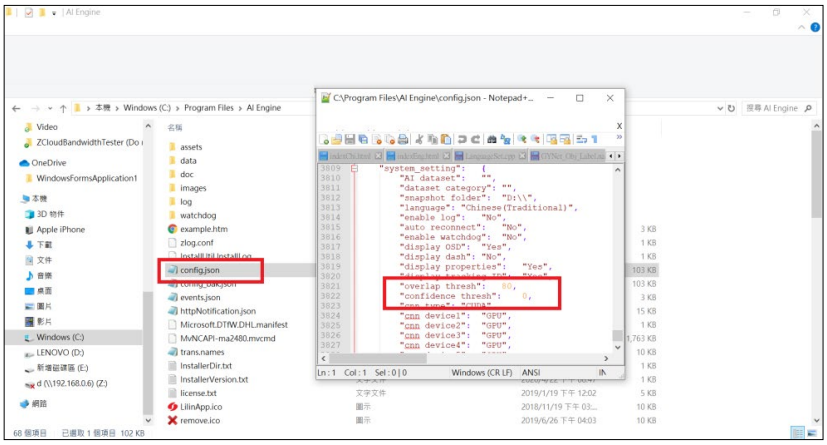
There might be a case that Aida recognizes wrong object. To improve the recognition rate, you can disable the recognition for the object.



For the example above, please disable “train” object by visiting C:\Program Files\AI Engine\data\GYNet_Traffic_Label.names. Modify the object name from “train” to “n_train” for disabling the recognition for the train object. Use Windows administrator’s right for editing the file, GYNet_Traffic_Label.names.



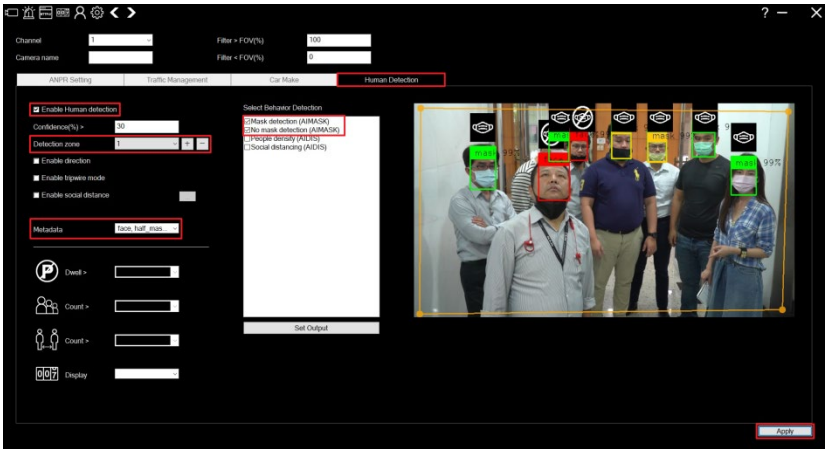
The second solution is to higher the “confidence thresh” value. Compare to the recognition rate on live video and “confidence thresh” value. Set “confidence thresh” value higher for filtering out the objects with lower recognition rate.



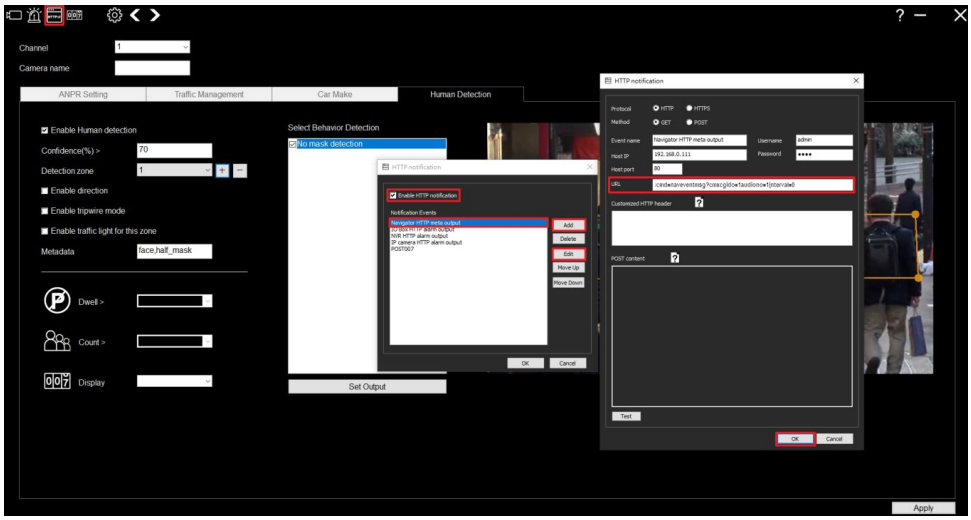
Chapter 6.0 Human Mask Detection Setting

To set up the mask detection and no mask detection of an object entered the detection zone, follow the instruction below:

1. Click on “Enable Human detection”. Please select the “channel” number for setting and specify “face, half_mask, mask” in “metadata”. Add a detection zone to desired area. Select “Mask detection” and/or “No mask detection” behavior. Click “Apply” to save the settings.

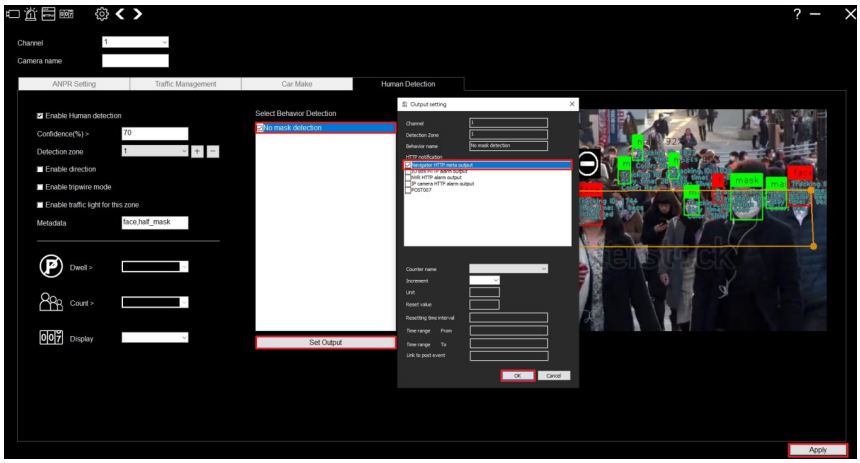


2. Configure the HTTP post by clicking on event icon. Then, click on “Enable HTTP notification”. Click on “Add” or select an event to “Edit” in “Notification events”. Then, type in URL field /cmd=naveventmsg?cmxcgido=1&audiono=1&interval=0. Click “OK” to save the settings. This is to notify LILIN Navigator for playing an audio.



Note: “Navigator HTTP meta output” is an event name used as an example to show how to configure HTTP post. User may create a name for an event.

3. Enable the HTTP Post Notification to No Mask Detection. To enable, click on “No mask detection”. Press “Set Output” and tick on “Navigator HTTP meta output”. Click “OK” and “Apply” to save the settings.



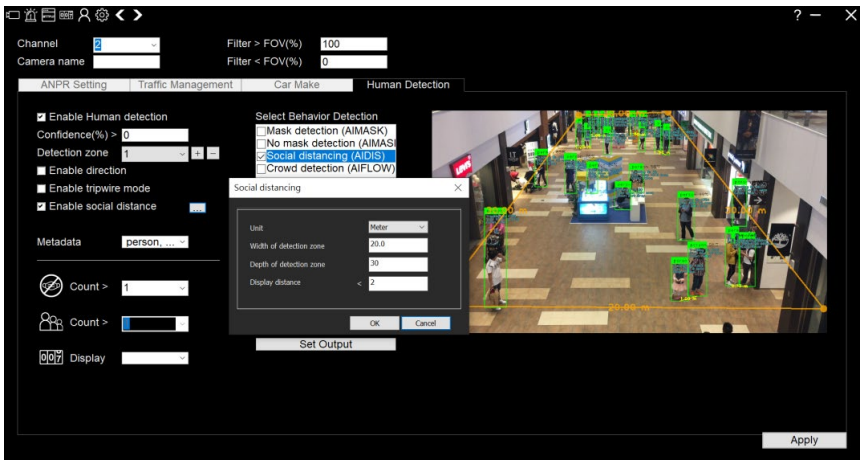
Chapter 6.1 Social Distancing

To set up social distancing, a rectangle area can be mapped to LILIN Aida software for calculating social distance. To do so, follow the setup steps below:

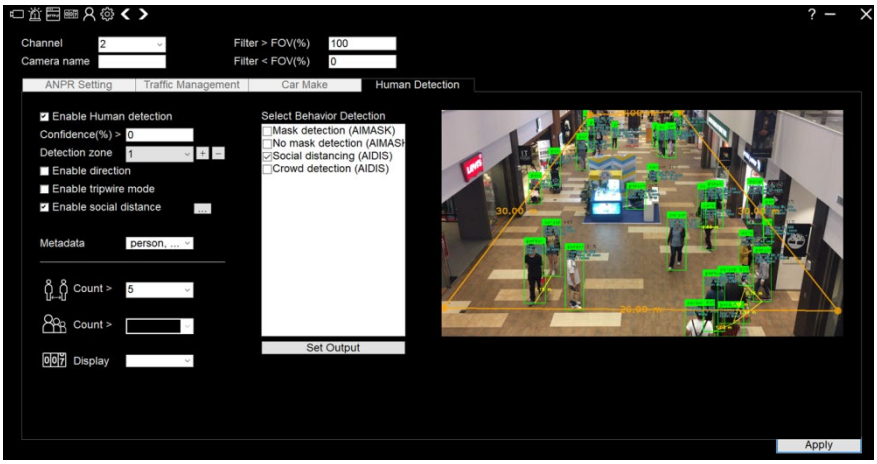
Chapter 6.1.1 Setup Social Distancing

To set up social distancing, enable “Social distance” feature. Select Social distancing behavior. Click on  button for setting social distancing. The social distancing feature works only in the rectangle area. The settings are described below:

- Unit: The rectangle area’s unit, meter or feet
- Width of detection zone: The X axis, width, of the rectangle area
- Depth of detection zone: The Y axis, height, of the rectangle area
- Display distance: If two people are in the social distance, show the detection lines.

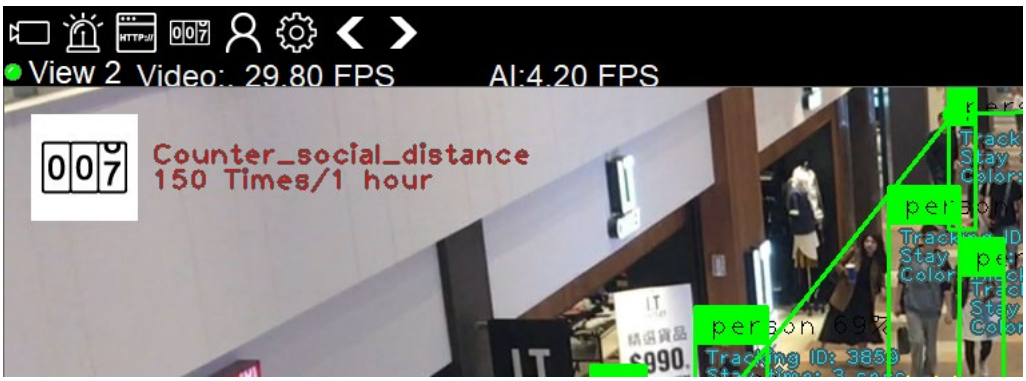


Once the social distance area gets set up, set the metadata to person. (Please select “Person” in the Metadata of the Traffic Management settings first. Then, select “Person” in Metadata of Human Detection settings.)



Note: There is only one detection zone that can support for social distancing feature.

The detection must be a rectangle area. Setup social distancing counter to, for example, 5 people distance. This can detect the social distance of these 5 people that are too close. You can also enable the display counter for verifying purpose. This can show how many times the area having violations of social distance.

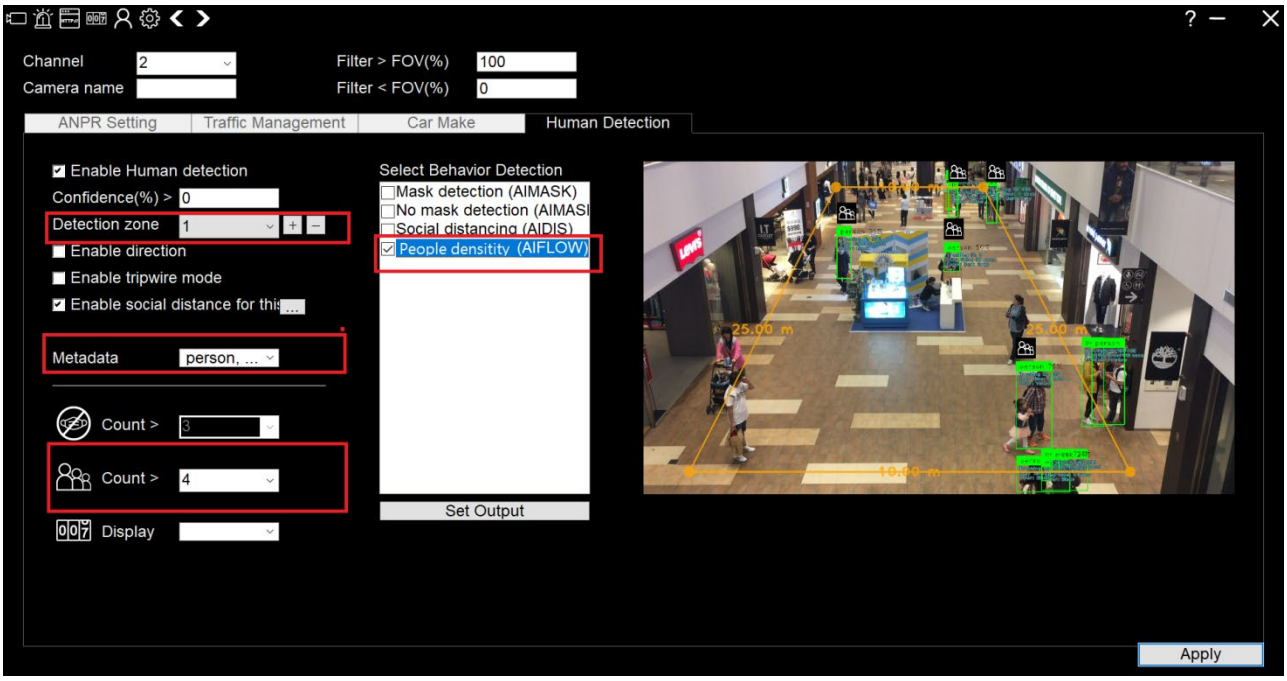


Chapter 6.2 People Density of Aida Software

To count the density of people in an area, follow the steps below:

1. Create a detection zone.
2. Enable people density.
3. Set metadata to “people”.
4. Add the people density count.

Once the people detected in the area is greater than density count, you can program HTTP post or event counter for outputs.



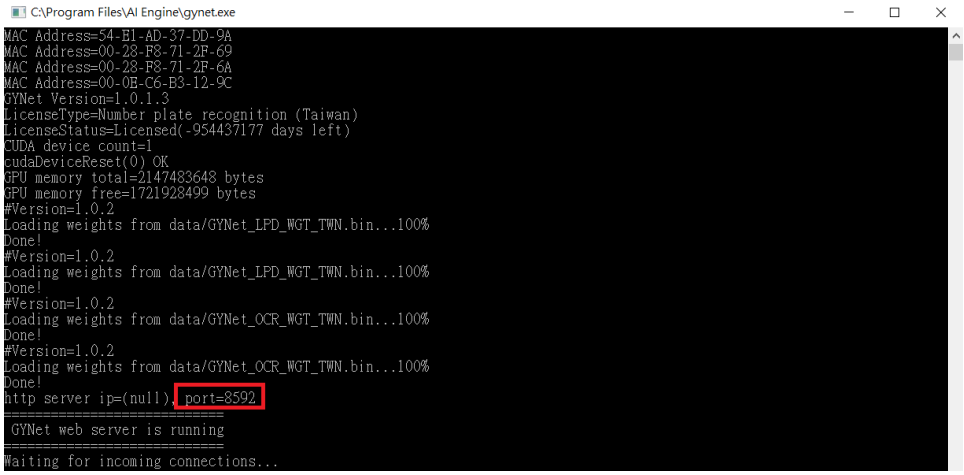
Chapter 7.0 LILIN Navigator & Aida Integration

Before installing software, please prepare the following software and hardware tools:

(1) LILIN Navigator software must be version 2.0.0.194 or above.
(2) LILIN Navigator software license key.
(3) LILIN license plate recognition software ANPR installation package.
(4) LILIN Aida license plate recognition license key.

After setting up Navigator AI number plate recognition, Navigator will launch GYNet.exe for recognition. If there is an issue, make sure that GYNet.exe gets launched and GYNet.exe is at HTTP 8592 port.

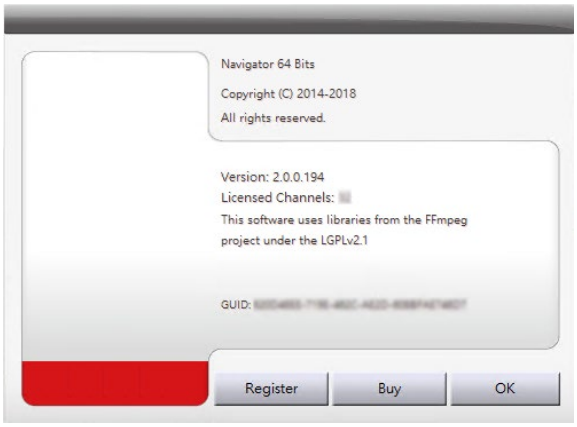
By launching AIEngine, the GYNet.exe is also launched for LILIN Navigator VMS via HTTP port 8592.

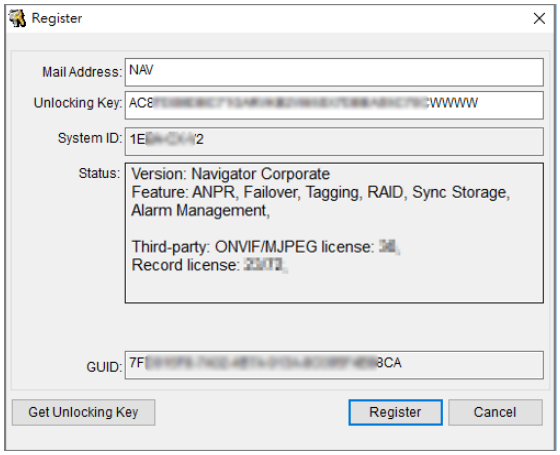


Click on Navigator software and click camera properties button. Click on ANPR Group setting. Type 8592 port for interfacing LILIN GYNet.exe.

Chapter 7.1 Installation of LILIN Navigator Software and License Activation

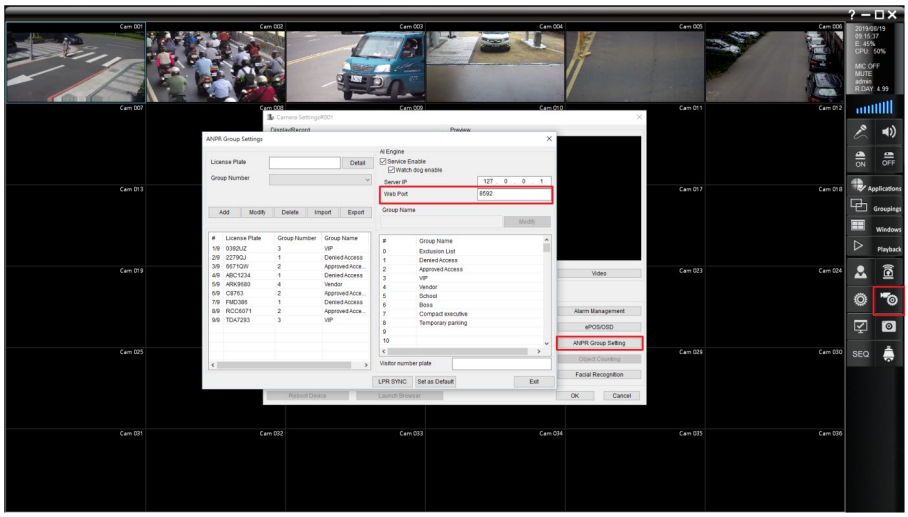
Please refer to the user manual of LILIN Navigator and follow the installations steps in sequence. After installation, click on the "?" icon in the upper right corner of Navigator to check the status of the license. Click on register icon to register the license plate recognition software license. Please provide your information including e-mail address, and system ID, and pass this information back to your dealer or sales person who will provide you the license key for full functionality.



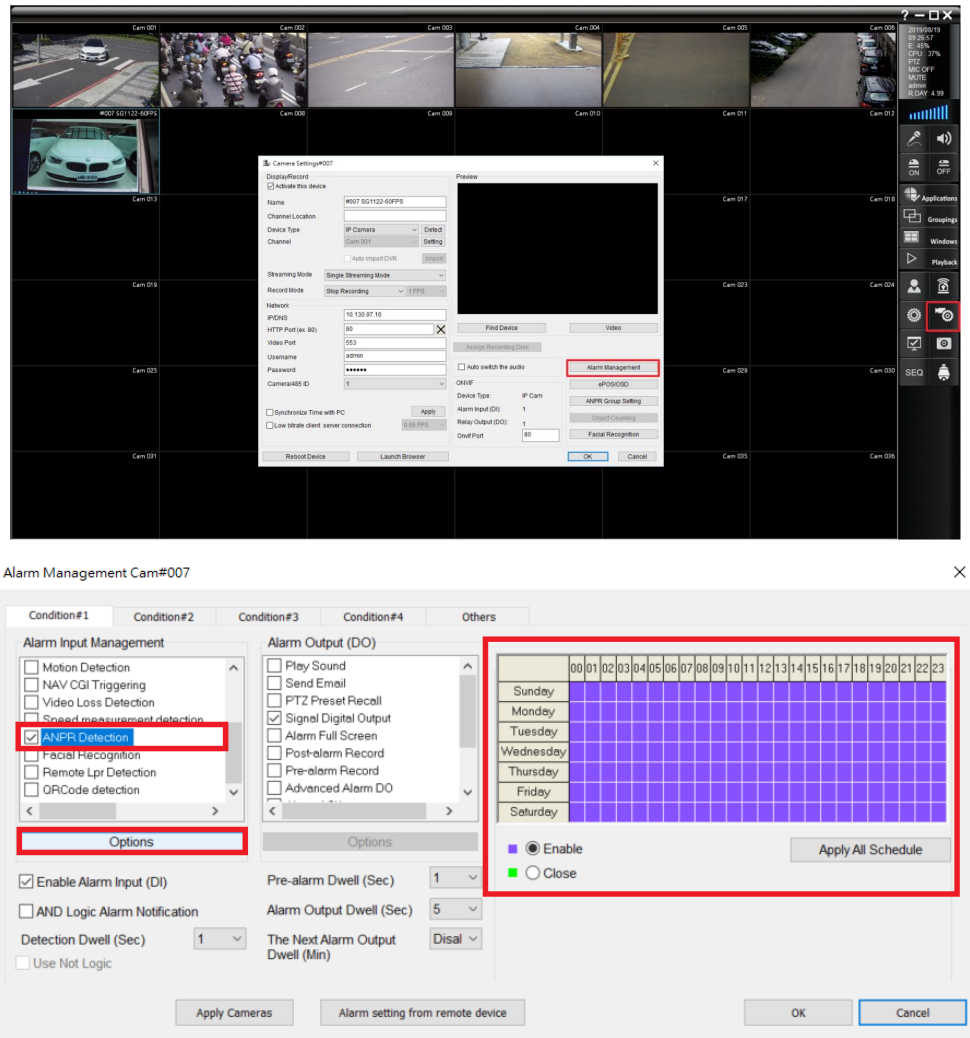


Chapter 7.2 LILIN Navigator Software Setting for Aida Number Plate Recognition

Click Navigator software and select camera properties. Click on ANPR Group Setting and make sure that the communication of Aida Number Plate Recognition is at 8592 port.

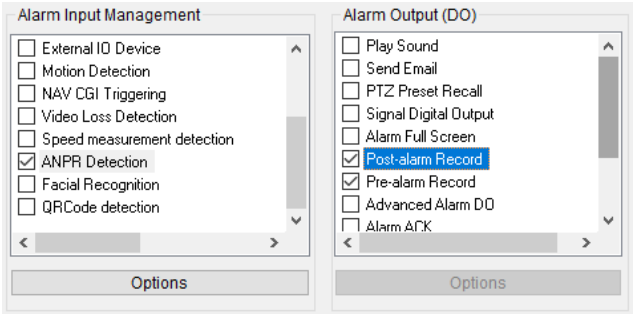


Click Navigator software and select camera properties. Click on Alarm Management and make sure that the schedule is set to Enable for alarm triggering.



Note: When using Navigator VMS and Aida Engine, there is no need for opening AIEngine.exe for saving CPU usage.

Please click the camera settings button or the right mouse button on the channel to enter the properties page. Please check “ANPR Detection” option in the "Alarm Input Management" item of the alarm management page. After checking this item, click "Options" to enter the settings.

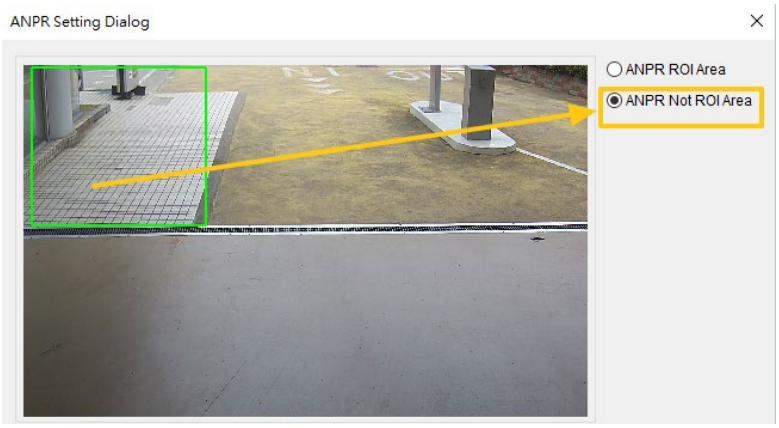


Chapter 7.2.1 Recognition Area of Navigator

The recognition area supports rectangle adjustment. This enables user to conveniently customize the selected recognition area.

Chapter 7.2.2 License Plate Exclusion Area

Some scenes in the recognition area will have tiles or grass obstacles, vehicle misidentification can be reduced through exclusion area.



Chapter 7.2.3 License Plate Character Height Adjustment

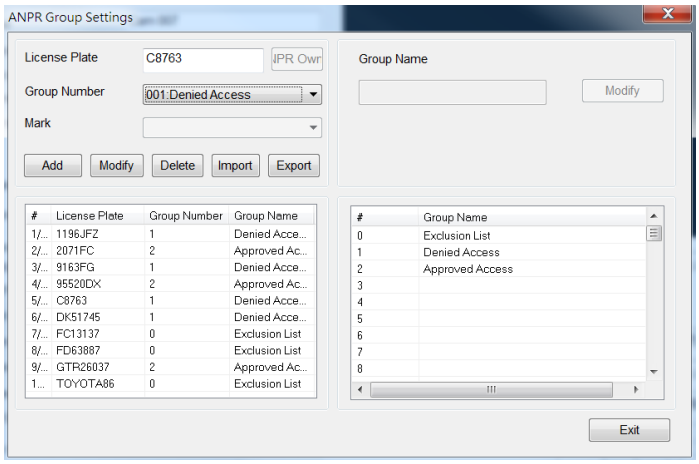
The height of the license plate character can be used to define the text height ratio according to the proportion of on-site license plates. The height of the text should be framed compared with the recommended ratio according to the site license plate number. The system automatically converts the height ratio directly into the dialog box. Maximum and minimum values can be set to identify the range of license plate characters width and height.

Chapter 7.2.4 LILIN Navigator ANPR System List Setting

Group list settings

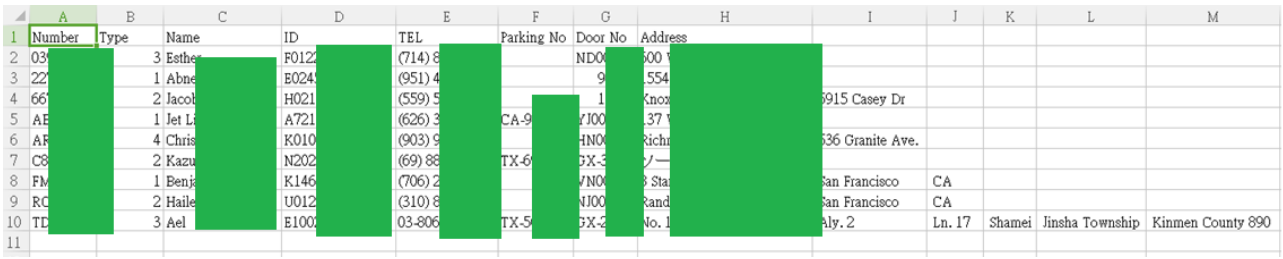
Each group of license plates can be set as a group, for example, preset groups such as "white list", "denial list" or "exclusion list". It is also possible to add a group and specify its function application group, and set the corresponding output after the license plate is detected.

ANPR Group Setting To set license plate group, click "License Plate Group Setting". After entering the license plate database, create a group from the list according to the ownership of the license plate, trigger the alarm with this group, and other settings:



Chapter 7.2.4.1 License Plate Import/Export List

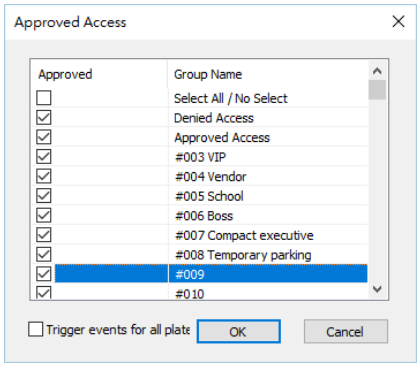
Support import/export list report. The function displays license plate and vehicle information in the Excel CSV file format.



	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Number	Type	Name	ID	TEL	Parking No	Door No	Address					
2	03	3	Esthe	F012	(714) 8		ND0	00					
3	22	1	Abne	E024	(951) 4		9	554					
4	66	2	Jacob	H021	(559) 5		1	Knox	5915 Casey Dr				
5	AE	1	Jet L	A721	(626) 3	CA-9	YJ00	37					
6	AF	4	Chris	K010	(903) 9		HN0	Richr	536 Granite Ave.				
7	C8	2	Kazu	N202	(69) 88	TX-6	GX-3	J—					
8	FM	1	Benj	K146	(706) 2		VN0	Sta	San Francisco	CA			
9	RC	2	Haile	U012	(310) 8		NJ00	Rand	San Francisco	CA			
10	TD	3	Ael	E100	03-806	TX-5	GX-2	No. 1	Aly. 2	Ln. 17	Shamei	Jinsha Township	Kinmen County 890
11													

Chapter 7.2.4.2 License Plate Group List Trigger of Navigator

Approved Groups You can select the license plate group setting, to set trigger events after detecting different license plates.



Chapter 7.2.4.3 Trigger Events for All Plates of LILIN Navigator

Check trigger events for all plates to trigger the alarm, whether or not the recognized license plates are on the list.

Chapter 7.2.4.4 Allowed List

The preset allowed list function setting mainly provides that the license plate in the license plate database is recognized, and the camera can send DO output triggering related device, such as the gate controller and the related alarm device. Edit the allowed list function can also customize for other alarm features.

Chapter 7.2.4.5 Denial List

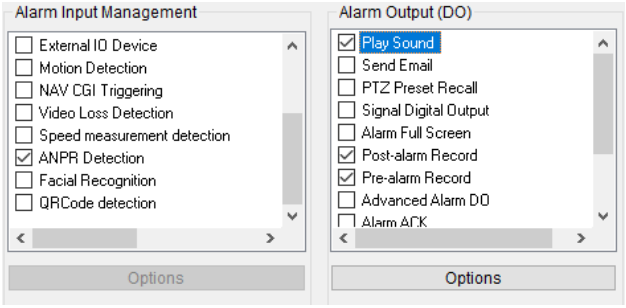
The denial list function setting mainly enables alarm notification when the license plate in the database is recognized. The preset is mainly to trigger the audio alarm notification. Also, other alarm functions can be customized.

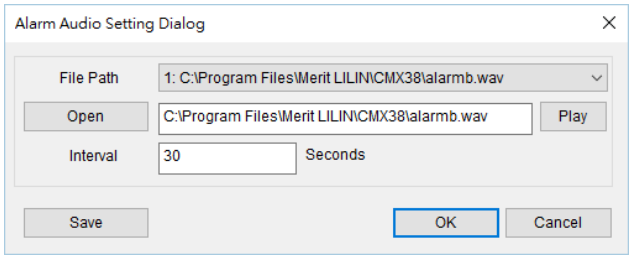
Chapter 7.2.4.6 Exclusion List

The preset exclusion list is mainly used to filter not license plate texts. It is mainly used to filter background text font mixed in license plate recognition images. If there are similar requirements, please input the text and filter the text.

Chapter 7.2.5 License Plate Recognition Group Output Settings

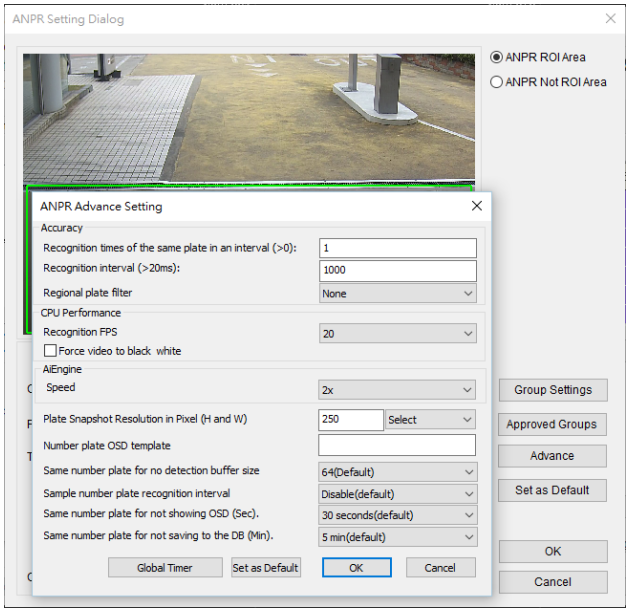
When the license plate recognition function recognizes the set license plate group, you can set the corresponding output response of the group, such as the single screen display, trigger DO output function, activate pre and post alarm recording function, or execute output setting.





Chapter 7.2.6 License Plate Advance Setting of Navigator

Click Camera Properties Settings -> Alarm Settings -> License Plate Recognition Settings -> Advanced, and start the settings in the following dialog window:



Chapter 7.2.6.1 Frame Number for Statistic (>0)

Vehicle identification system to analyze the same license plate number repeated several times that the successful identification (such as: advertising car or complex background, can reduce the chance of misidentification).

Chapter 7.2.6.2 Gap Time Between Cars

Driving speed due to different angles or turn misjudgment, you can increase the set value, the system will judge the longer the time.

Chapter 7.2.6.3 Apply Area Plate Filter

At present, Taiwan and Vietnam (two motorcycles or four special vehicles) are supported.

Chapter 7.2.6.4 Maximum Number of FPS Function

Use In multi-channel car detection, can limit the number of vehicles less channel identification number, the license plate identification resources to provide concentrated to the busy channel.

Chapter 7.2.6.5 Grey Level Processing Function

Uncheck the normal image for the RGB mode detection. Check the state of denial or white 256 gray-scale detection, the use of the processor when the pressure is too heavy or poor detection speed improvement.

Chapter 7.2.6.6 Show if not Enough Data for Statistic Function

More complex scenes to set the analysis of the required frame rate, but the recognition effect may not be as expected, if you check this setting, you can show in the case of insufficient frame rate.

Chapter 7.2.6.7 Aida Engine Speed

Up to 4x speed can be set. The higher Aida Engine speed is, the higher the recognition speed.

Note: Number of recognition channel will affect the CPU pressure, please adjust appropriately.

Chapter 7.2.6.8 Snapshot Around More Pixels

License Plate Screenshot Custom pixel size (JPEG)
default snapshot directory -> C: \Program Files\Merit LILIN\CMX38\Capture\ANPR

Note: To prevent system constantly writing to C driver (SSD drive), please change the directory other than "Disk C" for storing the screenshot directory.

Chapter 7.2.6.9 Snapshot Photo Text Template

License plate snapshot wording please follow examples of illustrations.

Chapter 7.2.6.10 Same Number Plate for no Detection Buffer Size

For identification of vehicle with long term parking in the parking lot, the same license plate does not keep detected while the maximum parking time limit has not exceeded.

Chapter 7.2.6.11 Same Number Plate Recognition Interval

For the same license plate recognized a number of times, setting the interval time can reduce the alarm trigger for the same license plate.

Chapter 7.2.6.12 Same Number Plate for not Showing OSD (Sec)

For the same license plate recognized a number of times, setting the interval time can reduce the POS display on the screen.

Chapter 7.2.6.13 Same Number Plate for not Saving to the Database (Min)

For the same license plate recognized a number of times, setting the interval time can reduce same license plate repeatedly enter the database.

Chapter 7.2.7 Global Timer

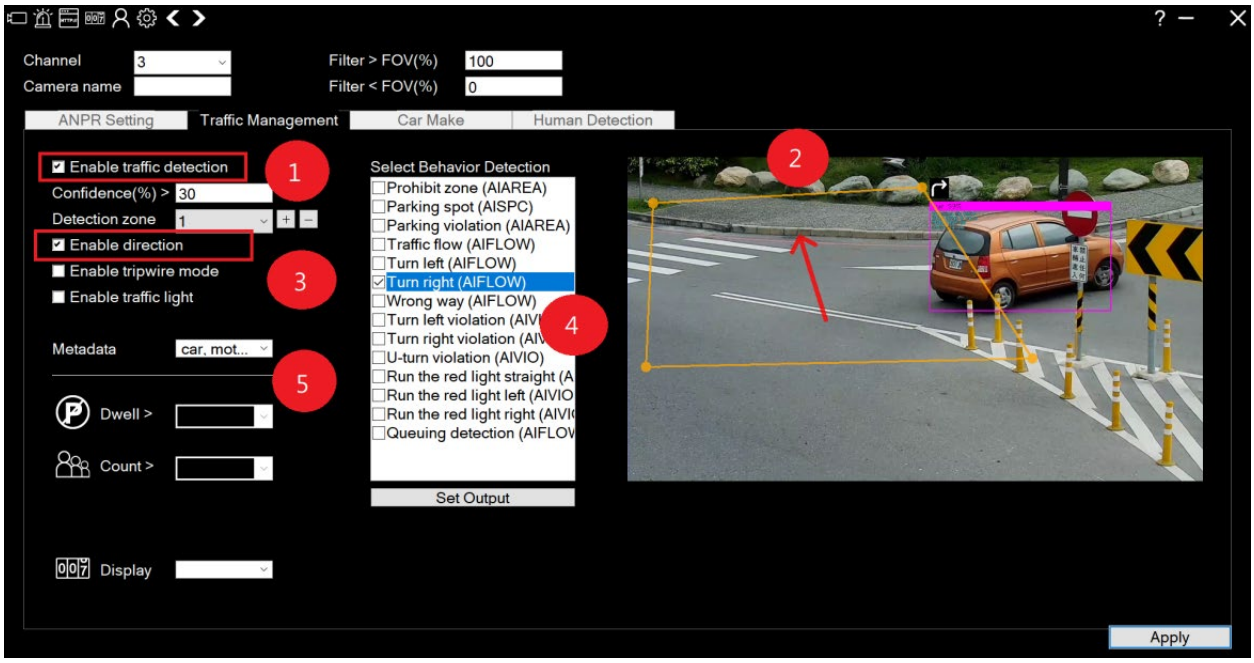
Support IP camera DO to trigger an automatic global timer, set the start time for starting up the countdown to trigger DO alarm.

Chapter 7.2.8 Set as Default

For restoring license plate advanced setting to default settings, set as default.

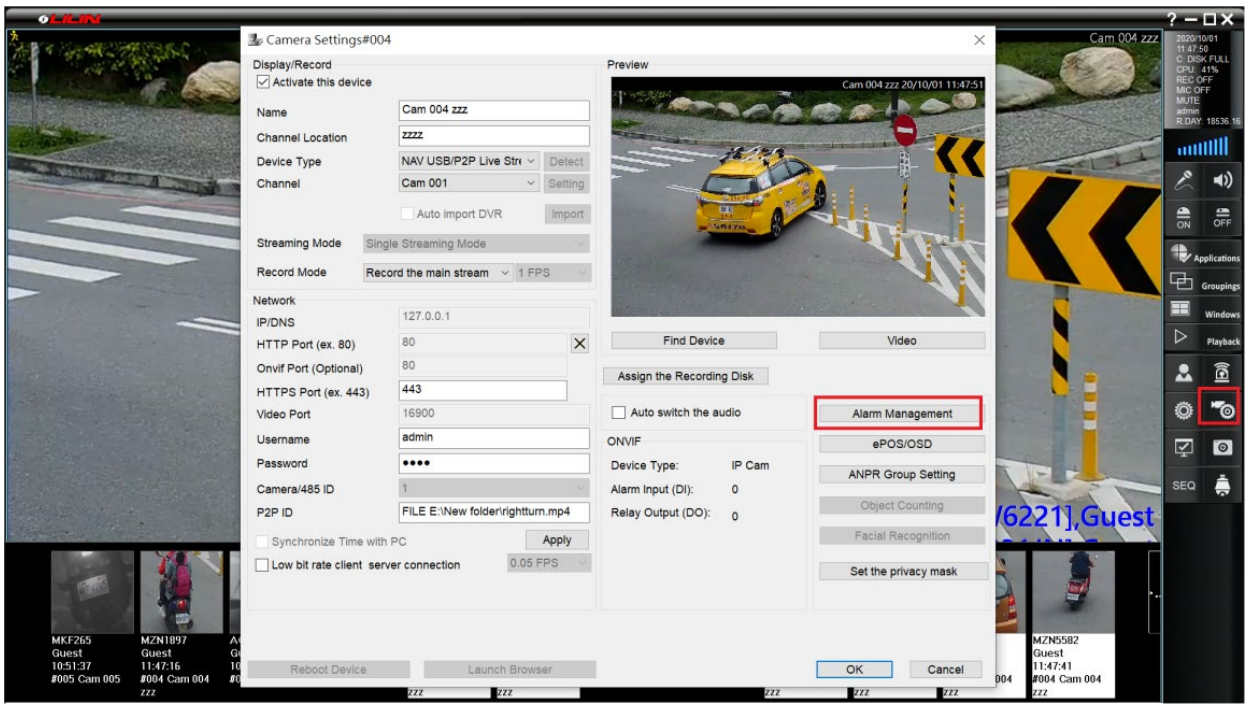
Chapter 7.3 Traffic Behavior Detection Setting of Aida Software

For Aida traffic behavior detection and Navigator settings, please set the relevant detection area in Aida Engine first, as follows:

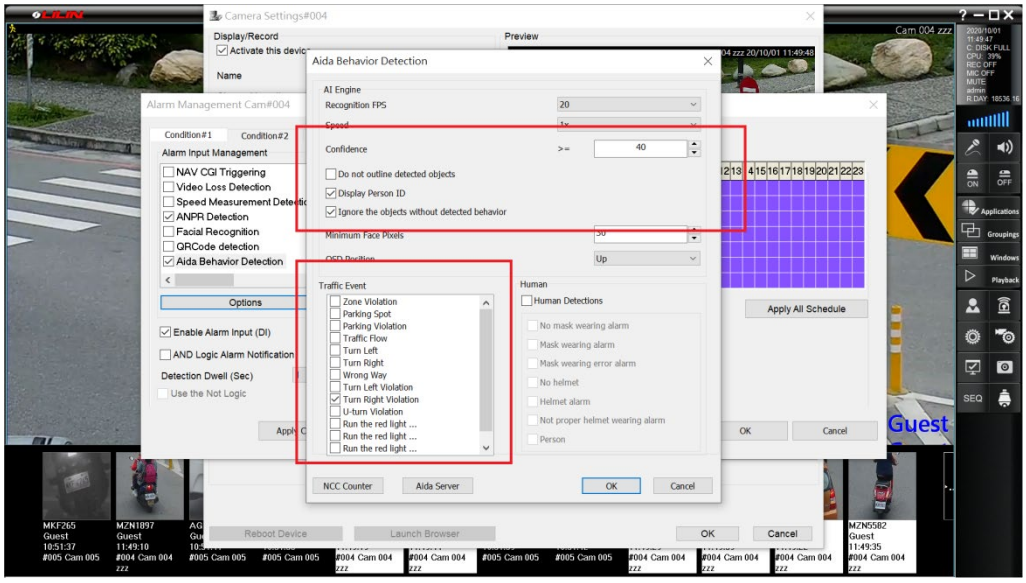


Chapter 7.3.1 Navigator and Aida Traffic Behavior Detection Settings

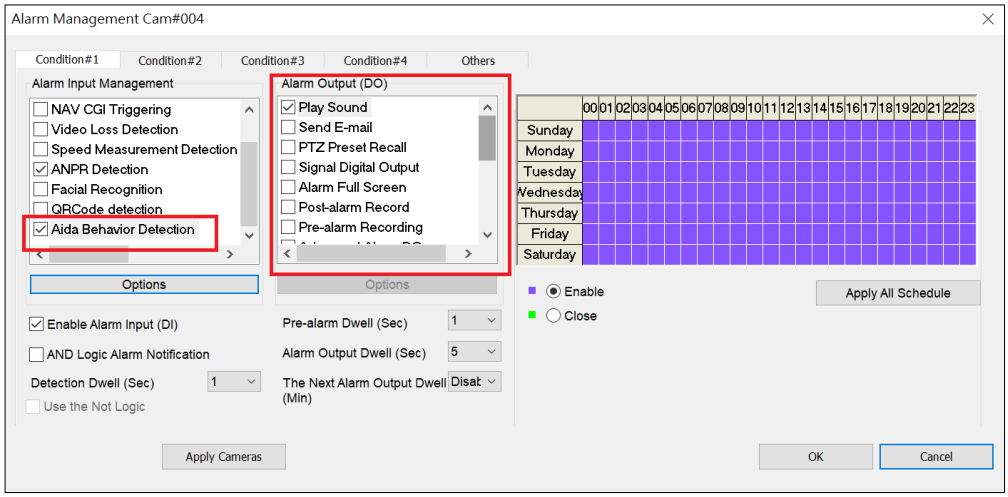
Click "Camera Properties" and click "Alarm Management" to configure Aida's behavior detection.



Click "Options" in "Alarm Input Management" to configure Aida's behavior detection.



Click "Options" in "Alarm Input Management" to set Aida's behavior detection.

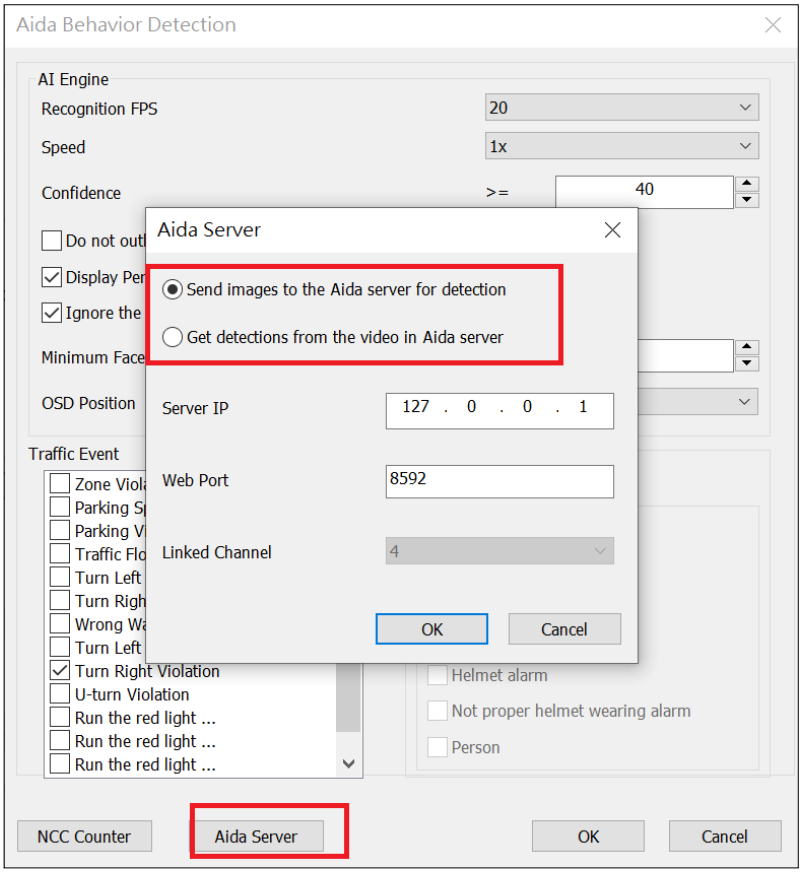


To set up the Aida host, please click on the "Aida Server" option to set up the communication between Navigator and Aida. The Aida server has two important options:

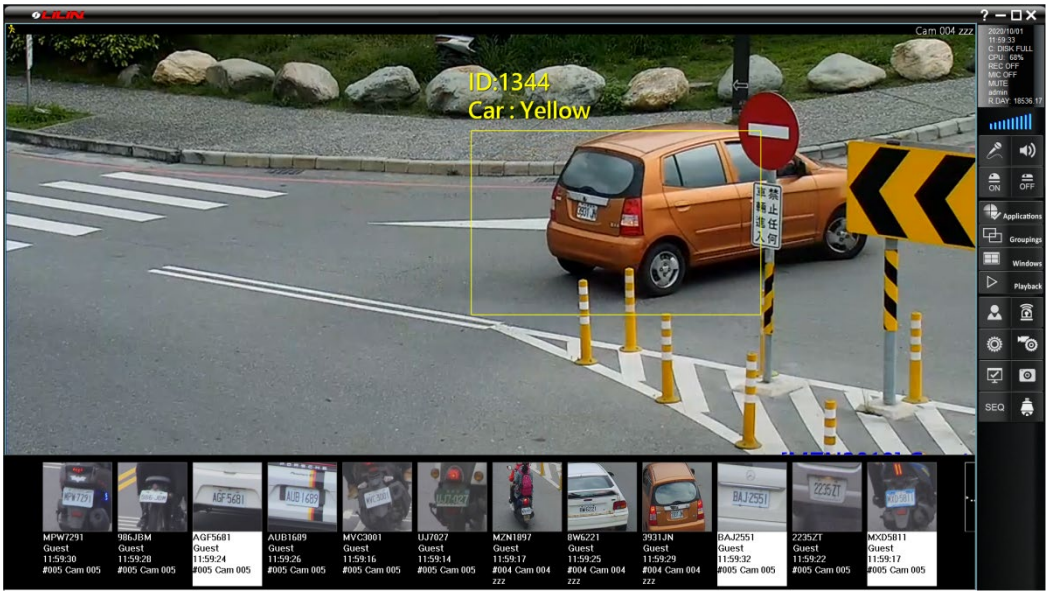
(1) Send the image to the Aida server for detection.
(2) Get recognition result from the video of the Aida server.

Send the image to the Aida server for identification—Navigator sends the video to the Aida server to display the recognition result

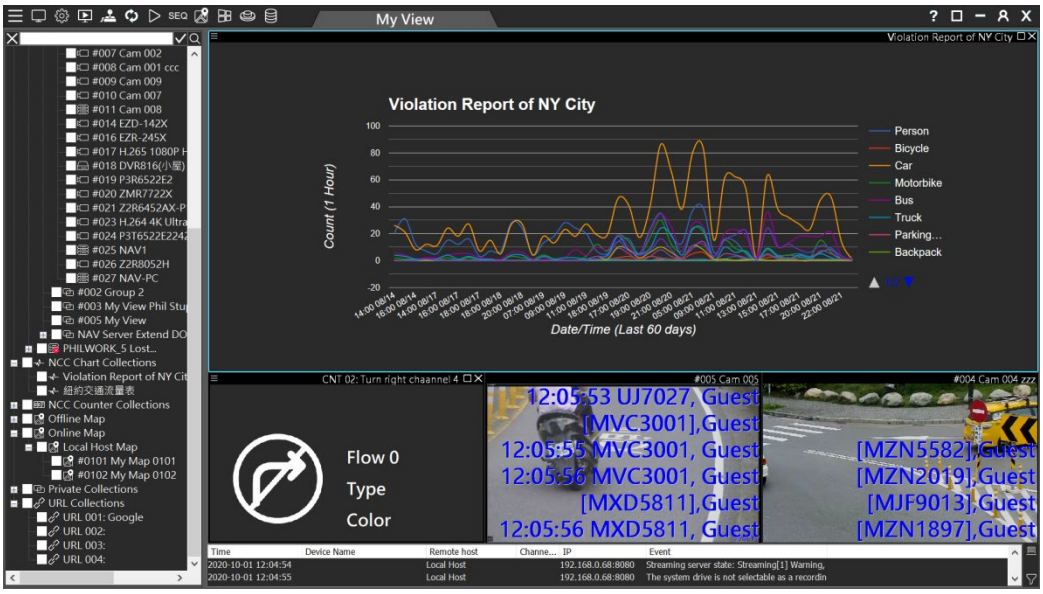
Get the recognition result from the video of the Aida server—Navigator will display the recognition after receiving from the Aida server, and the Aida server will actively connect to the IP camera.



After above settings, Navigator can receive the Aida traffic behavior detection and number plate recognition shown below:

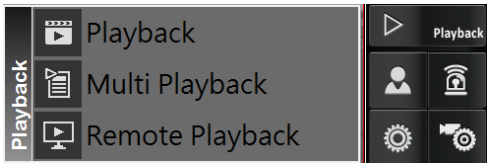


Navigator Control Center can also receive and display the behavior and number plate recognition via Aida engine.

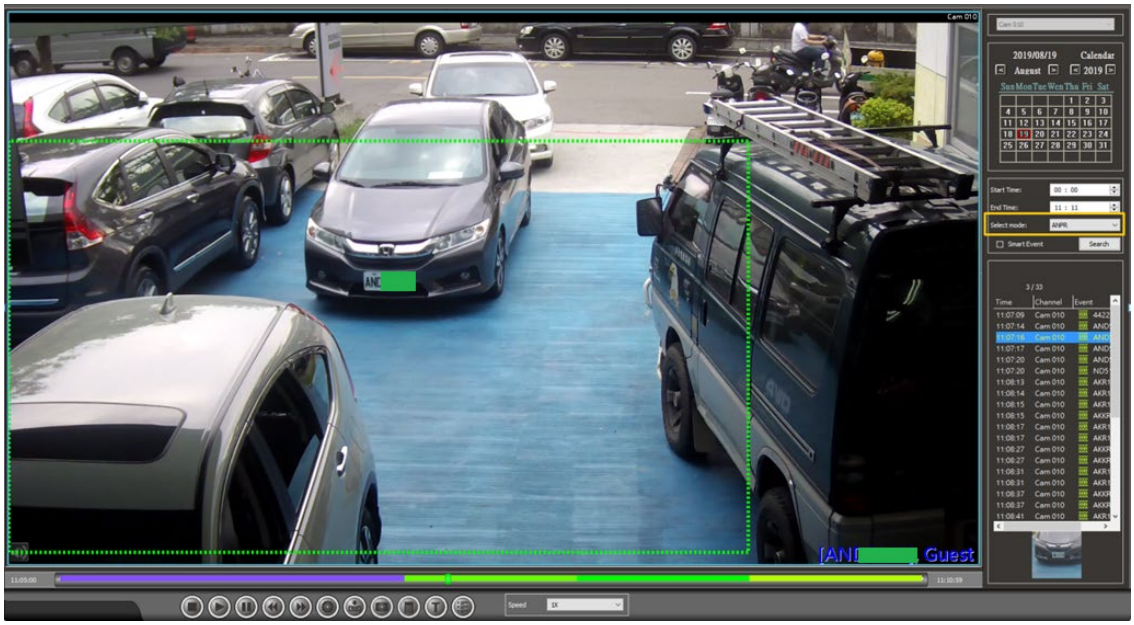


Chapter 8.0 License Plate Number Playback of LILIN Navigator

Please enter Playback mode in Navigator-> Playback

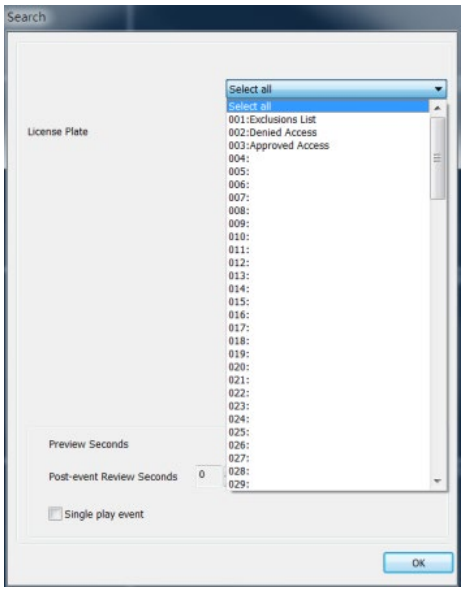


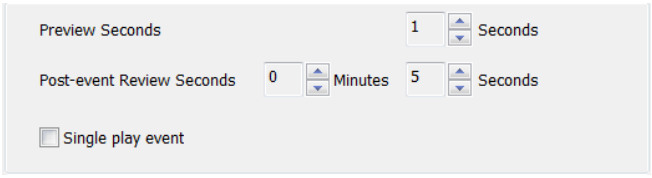
Please click the playback date, select "license plate recognition" mode. Check the playback time of the image.



Chapter 9.0 ANPR List Search of LILIN Navigator

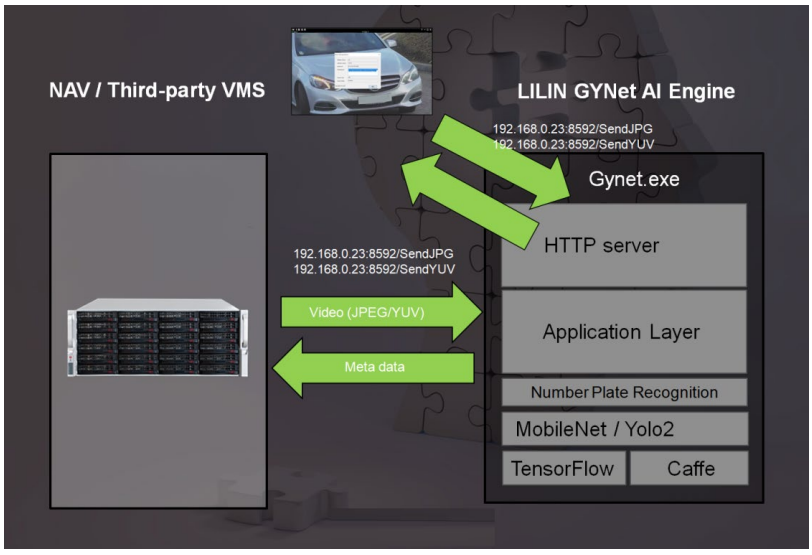
Support search for preset groups such as "Allowed List", "Denial List" or "Exclusion List."
And support for playback video features "event pre-broadcast" or "post-event playback."





Chapter 10.0 The Integration SDK of Aida Engine

There are SDK available for interfacing LILIN Aida engine via 8592 HTTP port. Visit LILIN AI SDK for details. Basically, third party software sends a JPEG picture to GYNet.exe. LILIN Aida Engine is able to reply JSON text result back to a VMS.



Chapter 10.1 SDK Example of Aida Engine

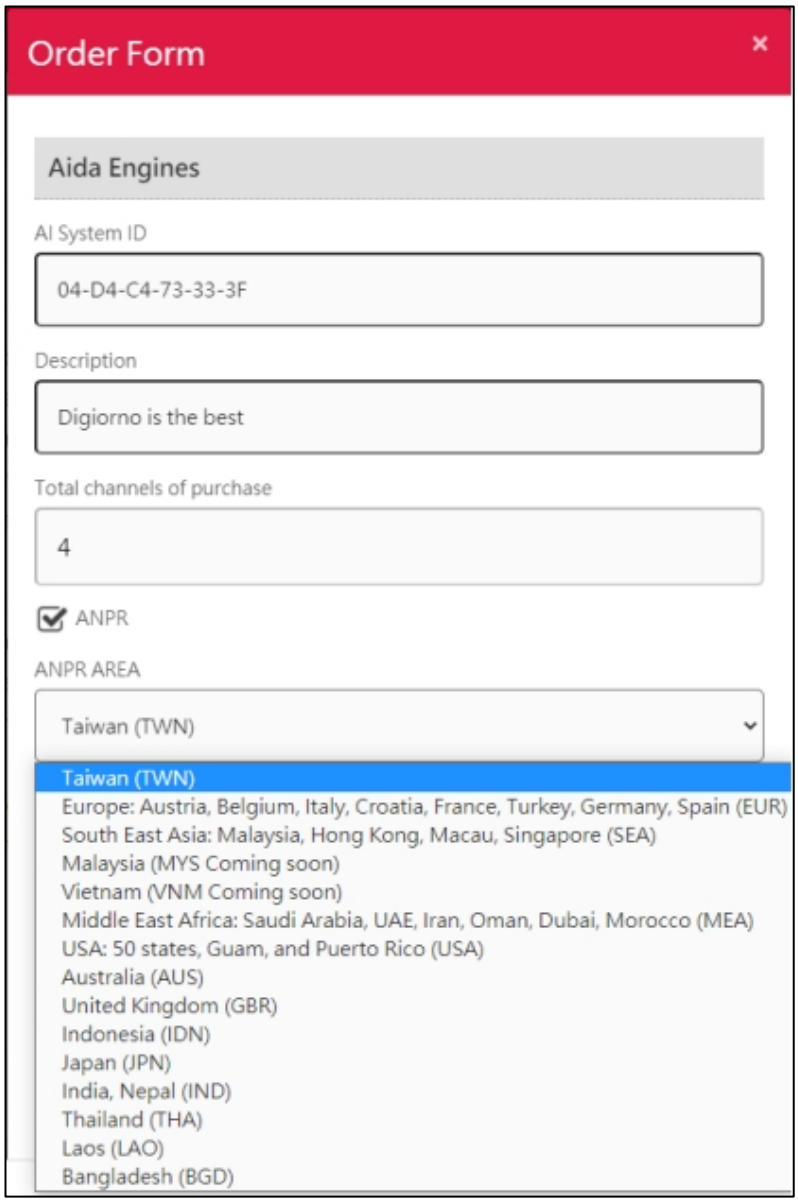
There is an HTML file, example.html, at C:\Program Files\AI Engine. A developer is able to open the file for verifying number plate recognition or object recognition.

First, you need to make sure you are running AIDA software on your computer with the correct key and function activated

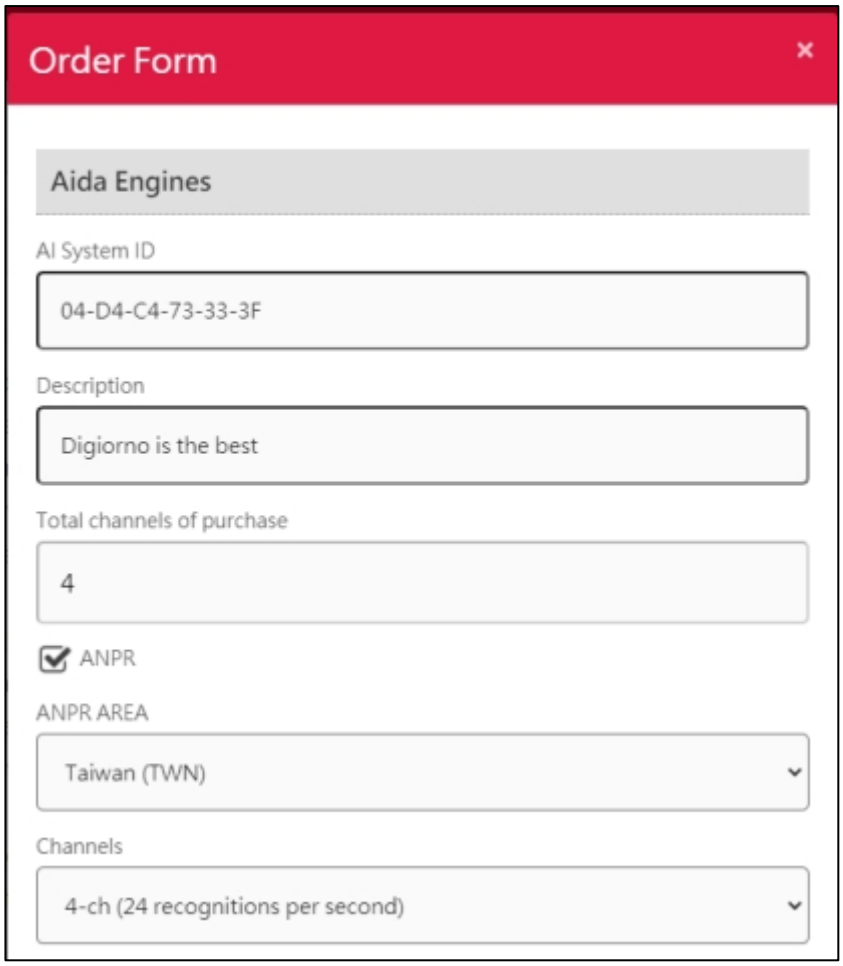
If I want to test ANPR and check if a picture can be recognized, I need to apply for ANPR AI with the correct ANPR country, to apply for the key please visit https://www.ddnsipcam.com/

Key your username and password, then go to Purchase AI tab.

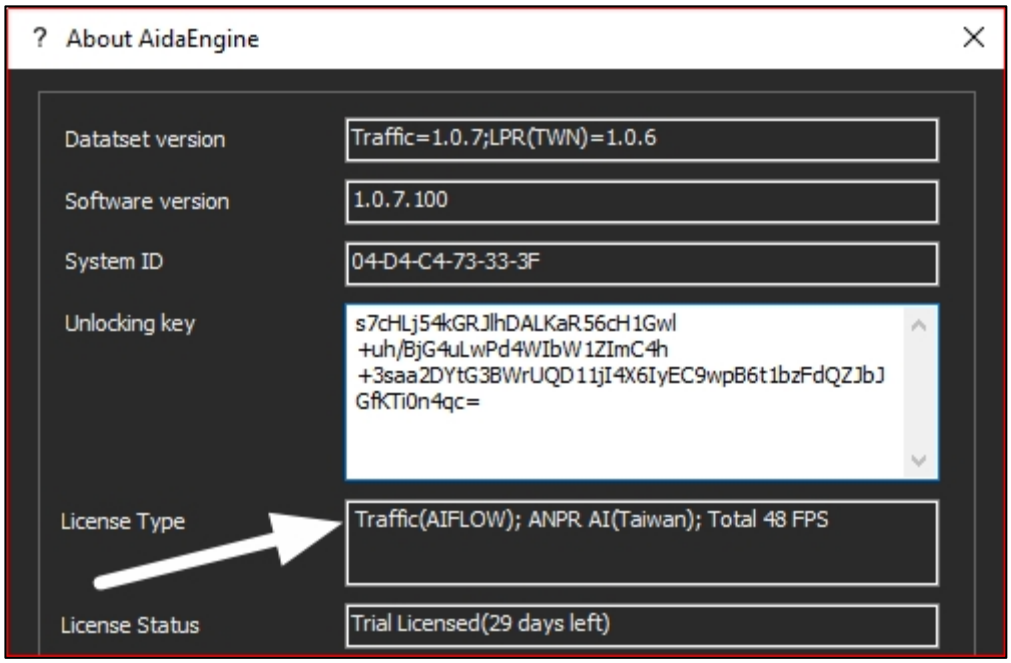
Copy your computer AI system ID and select the country you want



It should look like this



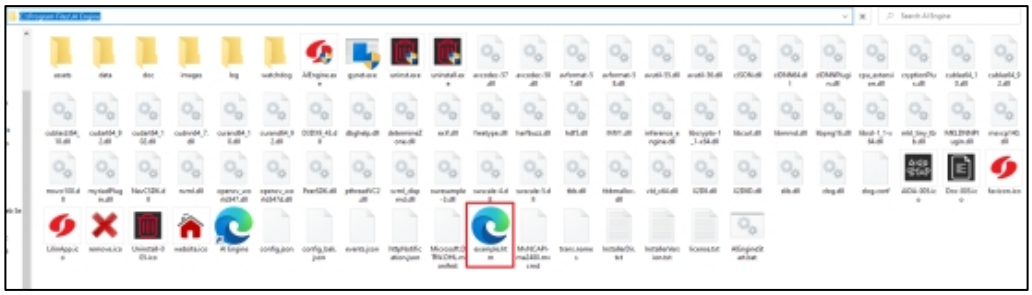
After you received your key, paste into your Unlocked key blank



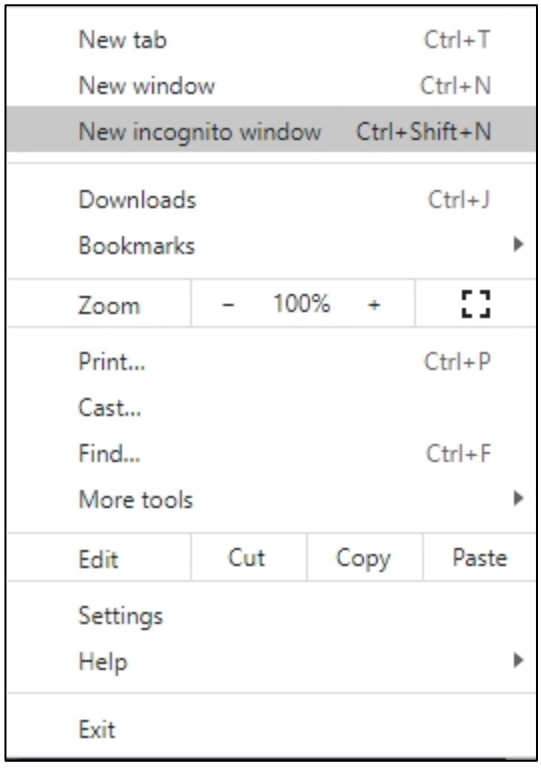
Go to your computer

C:\Program Files\AI Engine

Open the file example.htm with google chrome

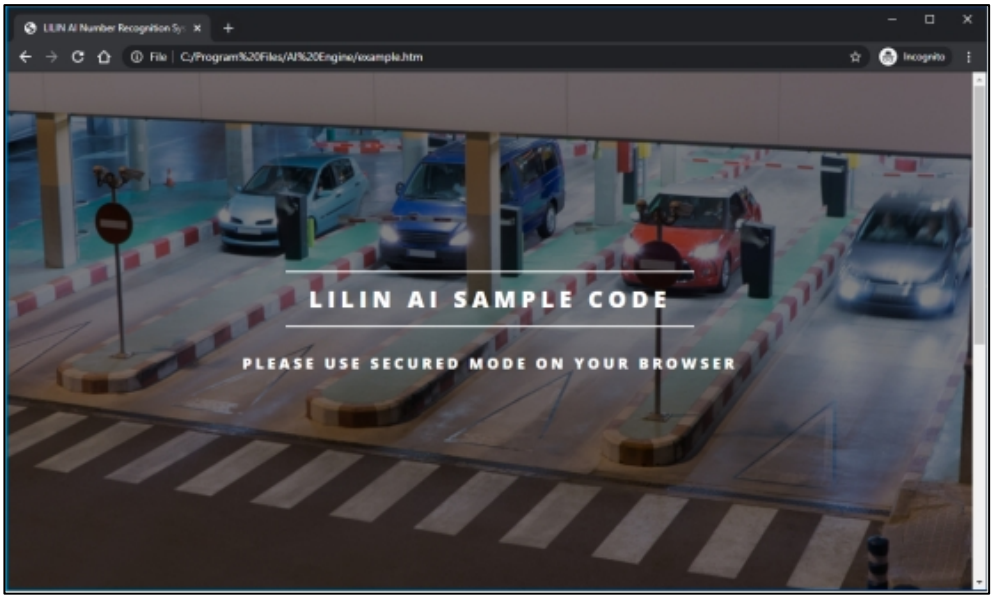


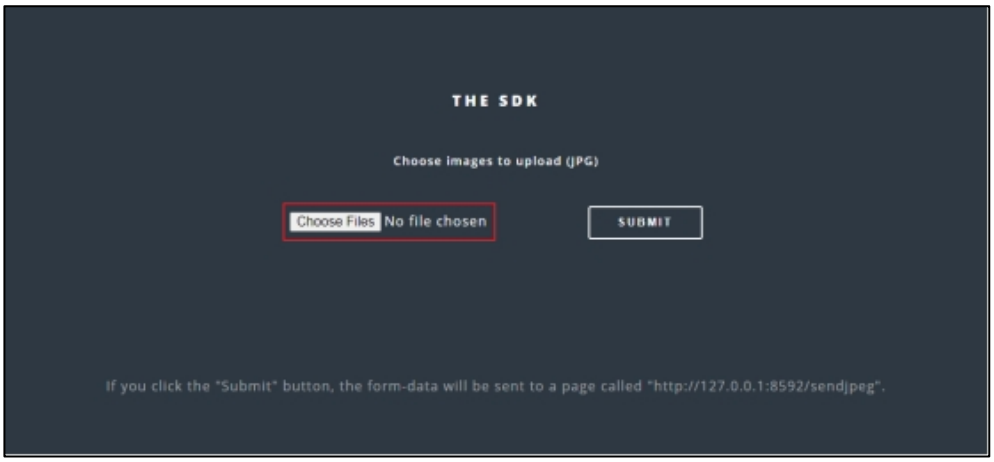
Then, open new incognito window



Paste this path link of the file

file:///C:/Program%20Files/AI%20Engine/example.htm

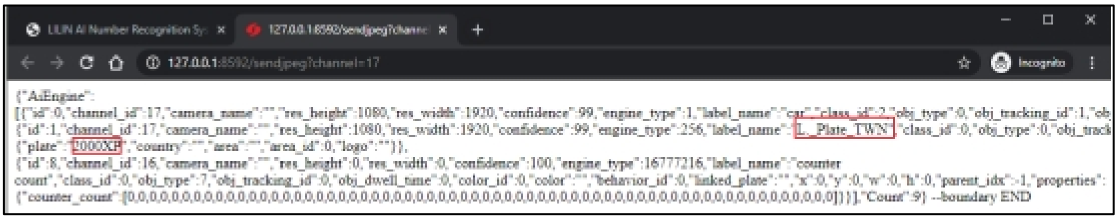




The picture I choose is this one

Then click on Submit

You should get a response from

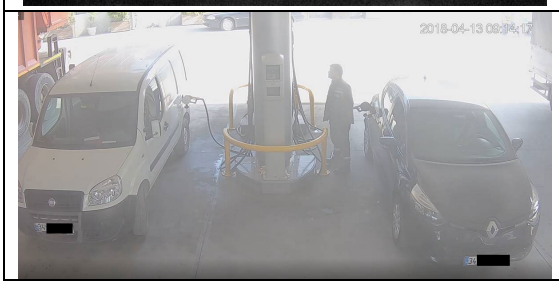


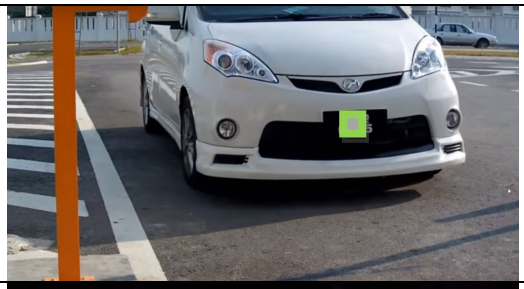
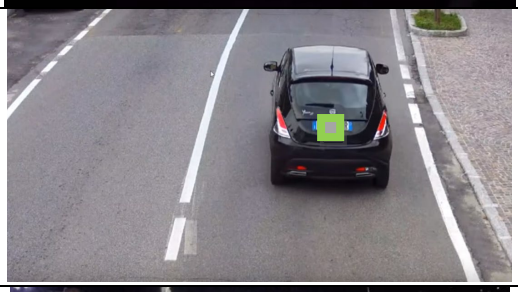
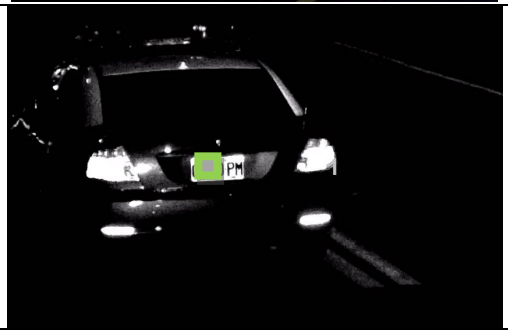
Scroll to see if the plate has been recognized with correct country origin

Or copy and paste into a word file you will see all info that AIDA recognized such as color, coordinate of the car plate very useful for system integrator that need to know the coordinates of the plate in the frame

{"AiEngine":[{"id":0,"channel_id":17,"camera_name":"","res_height":1080,"res_width":1920,"confidence":99,"engine_type":1,"label_name":"car","class_id":2,"obj_type":0,"obj_tracking_id":1,"obj_dwell_time":0,"color_id":9,"color":"White","behavior_id":0,"linked_plate":"2000XP","x":120,"y":0,"w":384,"h":337,"parent_idx":-1},{"id":1,"channel_id":17,"camera_name":"","res_height":1080,"res_width":1920,"confidence":99,"engine_type":256,"label_name":"L._Plate_TWN","class_id":0,"obj_type":0,"obj_tracking_id":1,"obj_dwell_time":0,"color_id":9,"color":"White","behavior_id":0,"linked_plate":"","x":208,"y":141,"w":91,"h":53,"parent_idx":-1,"properties":{"plate":"2000XP","country":"","area":"","area_id":0,"logo":""}},{"id":8,"channel_id":16,"camera_name":"","res_height":0,"res_width":0,"confidence":100,"engine_type":16777216,"label_name":"counter count","class_id":0,"obj_type":7,"obj_tracking_id":0,"obj_dwell_time":0,"color_id":0,"color":"","behavior_id":0,"linked_plate":"","x":0,"y":0,"w":0,"h":0,"parent_idx":-1,"properties":{"counter_count":[0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0]}}],"Count":9} --boundary END

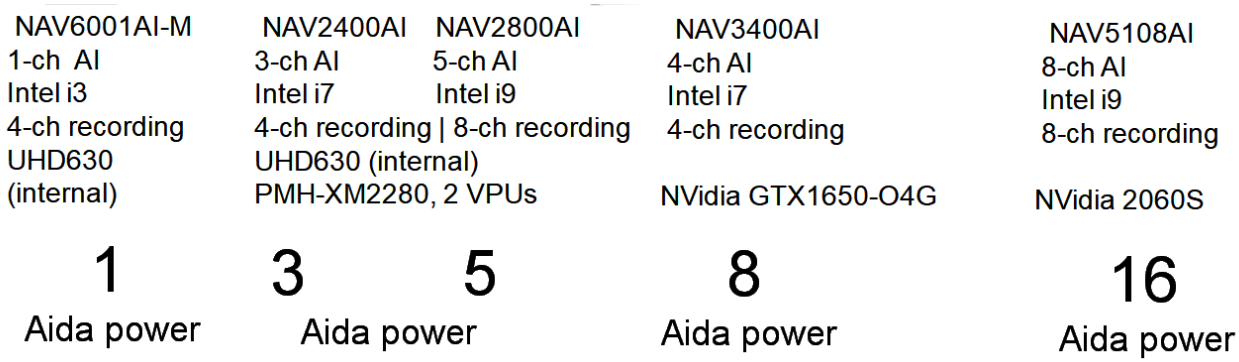
Appendix: Recommended Camera Installation

Bad camera installation	Defect	Suggestion
	1. Illumination is not enough. 2. Number plate is too small. 3. Field of view is too wide. 	1. Increase the illumination: Add infrared illuminators. 2. Number plate too small: Change position of the camera. 3. Zoom in the camera.
	1. Field of view is too wide. 2. Camera faces the headlight. 	1. Increase the illumination: Add infrared illuminators. 2. Zoom in the camera.
	1. Field of view is too wide. 2. Camera facing the headlight 3. Unfocused 	1. Zoom in the camera. 2. Move the camera closer to the gate. 3. Adjust focus.
	1. Shutter speed too slow 	1. Increase shutter speed at night mode.
	1. Camera over exposure	1. One lane per camera

Good camera installation	Application
	Parking lot camera installation
	One lane camera installation
	Two lanes camera installation
	White light lighting installation.
	Two lanes street light installation
	Enhancing light with IR.

Aida Power Performance Requirement

Engine	Recognition / Sec.	Aida power / channel
ANPR (for parking)	3 plates / channel / sec	1.0 Aida power
ANPR (for freeway)	6 plates / channel / sec	2.0 Aida power
Mask detection	6 FPS	1.0 Aida power
Helmet recognition (coming soon)	6 FPS	1.0 Aida power
Traffic obj. recognition	4 FPS	2.0 Aida power
Logo	6 FPS	1.0 Aida power



Benchmark of ANPR using OpenVINO (NAV2x00AI)

Win 10 Enterprise SAC, Navigator Software Version: 2.0.0.208, AI Engine Version: 1.0.4.60

UHD630+ PMH-XM2280		Res. & bitrate	1080P30FPS3M					
	# of Ch	# of Plates	Frame / Sec / Ch	Plates / Sec / Ch	Total Recognition / Sec	RAM Usage	GPU Usage	CPU Usage
	1	1	6	6	6	2.5	21%	9%
		2	6	12	12	2.5	31%	10%
NAV2200AI CPU/RAM: I7-8700/16G	2	1	6	6	9.2	3	34%	16%
		2	6	12	28	3	58%	20%
NAV2400AI CPU/RAM: I7-8700/16G	4	1	5.3	5.3	21.2	3.3	53%	31%
		2	4.9	9.8	39.2	3.2	86%	36%
NAV2600AI CPU/RAM: I9-9900K/16G	6	1	3.6	3.6	21.6	3.5	54%	25%
		2	3.2	6.4	38.4	3.4	87%	29%
NAV2800AI CPU/RAM: I9-9900K/16G	8	1	2.7	2.7	21.6	3.9	56%	29%
		2	2.3	4.6	36.8	4	88%	30%

Benchmark of ANPR using NVidia (NAV3x00AI)

Win 10 Enterprise SAC, Navigator Software Version: 2.0.0.208, AI Engine Version: 1.0.4.60

Nvidia 1650		Res. & bitrate	1080P30FPS3M					
	# of Ch	# of Plates	Frame / Sec / Ch	Plates / Sec / Ch	Total Recognition / Sec	RAM Usage	GPU Usage	CPU Usage
	1	1	6	6	6	3.2	19%	16%
		2	6	12	12	3.2	19%	15%
		4	6	24	24	3.2	22%	16%
NAV3400AI CPU/RAM: I7-8700/16G	4	1	6	6	24	3.7	44%	57%
		2	6	12	48	3.7	47%	56%
		4	4.5	18	72	3.7	49%	47%
NAV3800AI CPU/RAM: I9-9900K/16G	8	1	6	6	48	4.8	53%	57%
		2	4.2	8.3	66.4	4.8	52%	43%
		4	2.5	9.8	78.4	4.8	51%	36%

Note: Do not use 4K camera for AI recognition

Benchmark of Aida ANPR & Traffic Management Using Nvidia

Including number plate recognition + plate color detection + traffic object recognition + color detection + behavior detection + car make recognition

NVDIA Geforce GTX 1650-4G	PC: E3-1268L V5 CPU @2.4GHz 32G OS: Windows10 IoT Stream:1080P 15FPS AI : 1.0.5.73						
Engines	# of Ch	# of plates	# of object	Total Recognition / Sec	RAM Usage	GPU Usage	CPU Usage
	6						80%
ANPR	2	2		6.4 FPS per channel	4.9G	81%	
Traffic	4		4	3.4 FPs per channel			

Benchmark of Aida Mask Detection (NAV6001AI-M)

Recommend 1-ch recognition

UHD630	PC: Intel NCU (I3-8109U +8G RAM + GPU) OS: Windows10 IoT, x64 Stream:1080P 15FPS & 720P 15FPS AI : 1.0.5.77						
Camera(s)	CH1	CH2	CH3	CH4	GPU	RAM Usage	CPU Usage
1080P GPU	15	-			43%	2.3	26%
	15	15			68%	2.3	52%

Recommend 4-ch recognition

UHD630	PC: Intel (I5-8500 +8G RAM + GPU) OS: Windows10 IoT, x64 Stream:1080P 15FPS & 720P 15FPS AI : 1.0.5.77						
Camera(s)	CH1	CH2	CH3	CH4	GPU	RAM Usage	CPU Usage
1080P GPU	5.3	6.3	10.8	5.3	69%	2.3	67%

Benchmark of Aida ANPR, Mask, Traffic Management Using NVidia (NAV3400AI)

4-ch: Use Intel i7 CPU

Nvidia 2060S			1080P 15FPS 3M					
	# of Ch	# of AI Objects	Frame / Sec / Ch	(Plates or mask) / Sec / Ch	RAM Usage	CUDA	GPU Usage	CPU Usage
ANPR + Object	4	2 Plates + 3 Objects	4	8	4.9	78	25%	46%
Mask + Object	4	3 Objects	5.4	10	5.1	71	15%	46%

Benchmark of Aida ANPR and Traffic Management Using NVidia (NAV5108AI)

8-ch: Use Intel i9 CPU

Nvidia 2060S		1080P 15FPS 3M					
# of Channel	# of Plates | # of Objects	Traffic Obj	Plates / Sec / Ch	RAM Usage	CUDA	GPU Usage	CPU Usage
10 Ch ANPR	1	-	5.8	7.2	33%	18%	42%
	2	-	11.5	7.5	38%	24%	48%
	3	-	17.6	7.5	53%	33%	56%
	4	-	22.1	7.4	60%	36%	60%
9 Ch ANPR + 1 Ch Traffic Obj	1	6	6	7.5	34%	16%	45%
	2	6	12	7.5	47%	23%	48%
	3	7.1	17.6	7.5	58%	30%	56%
	4	14.1	18	7.5	70%	32%	58%
8 Ch ANPR + 2 Ch Traffic Obj	1	6	6	7.3	43%	16%	47%
	2	7.1	11.8	7.4	55%	23%	50%
	3	9.3	17.2	7.4	68%	29%	57%
	4	12.6	14.3	7.4	80%	29%	56%
7 Ch ANPR + 3 Ch Traffic Obj	1	6	6	7.4	51%	18%	47%
	2	6.4	11.7	7.4	63%	24%	50%
	3	7.2	16.4	7.4	74%	29%	58%
	4	9.8	13.8	7.4	82%	28%	54%
6 Ch ANPR + 4 Ch Traffic Obj	1	6	6	4.8	60%	18%	51%
	2	6.4	11.5	4.9	71%	22%	54%
	3	7.3	15	4.9	83%	27%	54%
	4	7.7	13.1	4.9	83%	27%	52%
5 Ch ANPR + 5 Ch Traffic Obj	1	6	6	4.9	67%	19%	48%
	2	6.3	11.4	4.9	76%	23%	50%
	3	6	17.8	4.9	83%	26%	52%
	4	6	17.5	4.9	82%	27%	51%
4 Ch ANPR + 6 Ch Traffic Obj	1	6	6	4.9	78%	21%	50%
	2	5.7	13.2	4.9	82%	23%	50%
	3	5.2	22	5	82%	27%	56%
	4	5.2	21.9	5	83%	26%	52%
3 Ch ANPR + 7 Ch Traffic Obj	1	5.3	7.9	7	78%	20%	48%
	2	4.8	16.8	7.2	80%	22%	49%
	3	4.8	22.5	7.2	83%	23%	48%

	4	4.5	25.9	7.4	81%	26%	57%
2 Ch ANPR + 8 Ch Traffic Obj	1	4.6	11.8	7.4	77%	20%	56%
	2	4.5	19.6	4.9	80%	22%	46%
	3	4.6	22.5	4.9	80%	22%	46%
	4	4.3	26.7	4.9	80%	22%	47%
1 Ch ANPR + 9 Ch Traffic Obj	1	4.3	14.4	4.9	78%	20%	42%
	2	4.2	21	4.9	77%	20%	42%
	3	4.4	20.3	4.9	80%	20%	42%
	4	4.2	30	4.9	78%	20%	40%
10 Ch Traffic Obj	1	4.5	-	4.9	82%	18%	40%
	2	4.4	-	4.7	79%	17%	38%
	3	4.3	-	4.7	78%	20%	40%
	4	4.3	-	4.8	77%	17%	37%

Note: Do not use 4K camera for AI recognition