



LILIN CMX ANPR Software Manual

Chapter 1. CMX ANPR Setup	8
Chapter 1-1. ANPR ROI Area	8
Chapter 1-2. Characters' Min and Max Heights	9
Chapter 1-3. Min and Max Characters' Length of a Plate	9
Chapter 1-4. Country.....	9
Chapter 2. CMX ANPR System Setting	10
Chapter 2-1. ANPR Category List.....	10
Chapter 2-2. License Detection Output	11
Chapter 2-3. White List	11
Chapter 2-4. Black List.....	11
Chapter 2-5. Exclusion List	11
Chapter 3. ANPR Camera Requirements.....	13
Chapter 3-1. Recommended Camera Position.....	13
Chapter 3-2. Image Requirements	14
Chapter 3-3. Recommended LILIN Cameras	15
Chapter 3-5. General Camera Setup Techniques	17
Chapter 3-6. CMX ANPR Alarm Output and Gate Control	18
Chapter 4. CMX ANPR Engines' Samples	18



Package Contents

The package contents include:

1. CMX ANPR Installation pack
2. FXMC USB dongle



System Requirements

The following is the suggested minimum system configuration to run CMX ANPR:

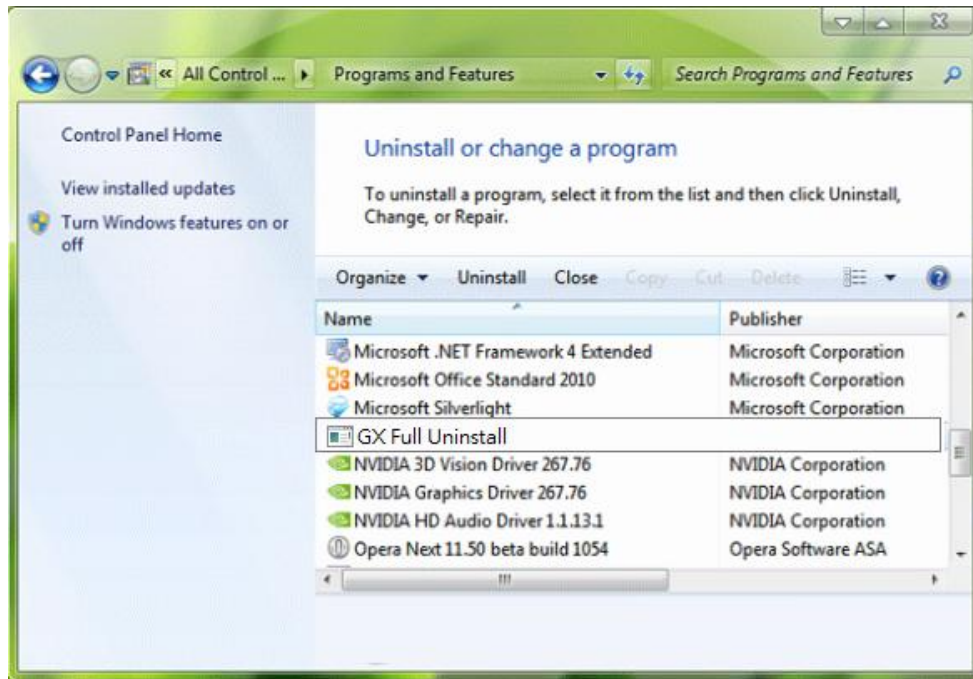
- Intel i3 CPU or higher
- 256 Mbytes of RAM or more
- USB 2.0 port
- Windows XP, Windows Vista (64 bit), Windows 7
- This is a HW protection of the software, the dongle includes the license.

Installation on Windows Platform

1. Before installing a new CMX ANPR Installation Software Pack, uninstall any previous version of CMX ANPR Installation Software from your system (if applicable) and reboot your computer.
2. After your operating system has started, insert the CMX ANPR product CD.
3. If CMX ANPR setup does not start automatically, locate D:\setup.exe (assuming D:\ is your CD-ROM drive), and double-click on it.
4. Follow the instructions on the screen, which will guide you through the installation process.

Uninstall on Windows Platform

Always uninstall the software from control panel and remove it from GX Full Uninstall from the list.



Before Installation

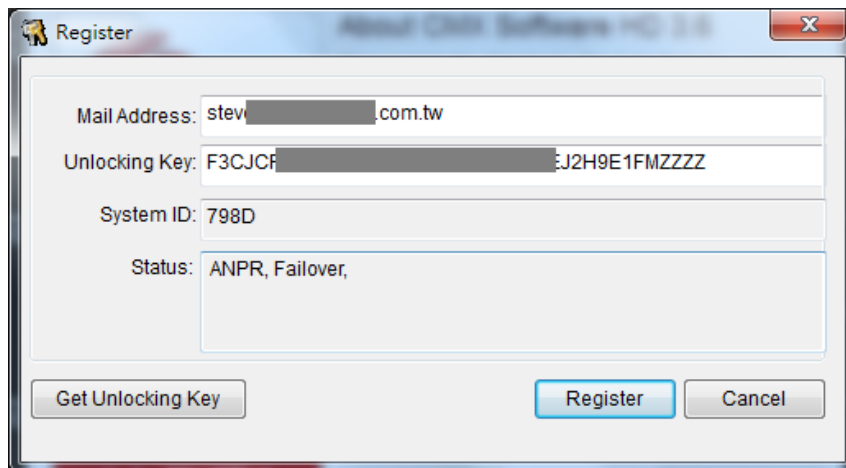
Before installation, please have the following software and hardware ready:

- (1) CMX Software HD 3.6.1.102 or above product CD or download it from LILIN web site at www.meritlilin.com.
- (2) Purchase CMX ANPR dongle from LILIN sales.
- (3) Install CMX Software with software license keys.
- (4) Install CMX ANPR Driver Installation Pack
- (5) ARH USB dongle.

CMX Installation



After CMX gets installed, please click on “?” (help) button and click on Register button. Please send an email to your LILIN sales representative with “Mail address” and “Unlocking Key”. We will provide CMX-LK software license key, a new “Mail address”, “Unlocking Key”, and “System ID”. Please enter the newly assigned “Unlocking Key” to get ANPR feature.



CMX ANPR Driver Installation

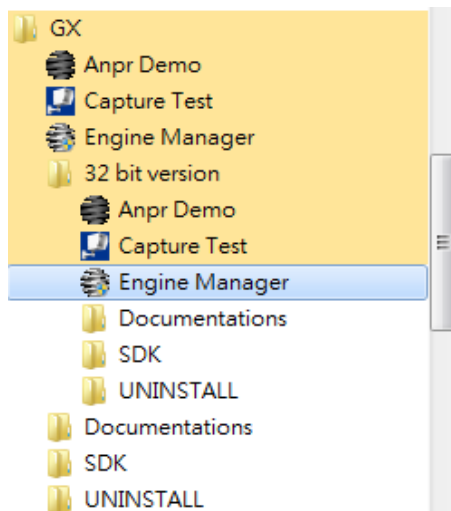
CMX ANPR Driver is packed inside "CMX ANPR Installation Pack". Install CMX ANPR Installation pack from the product CD. You can also download "CMX ANPR Installation Pack" from LILIN web site.



During the installation, click “Install 64 bit version” first and click “Install 32 bit version”. Both 64 bit and 32 bit drivers are needed. If your PC is a 32 bit PC, please just install 32 bit driver.

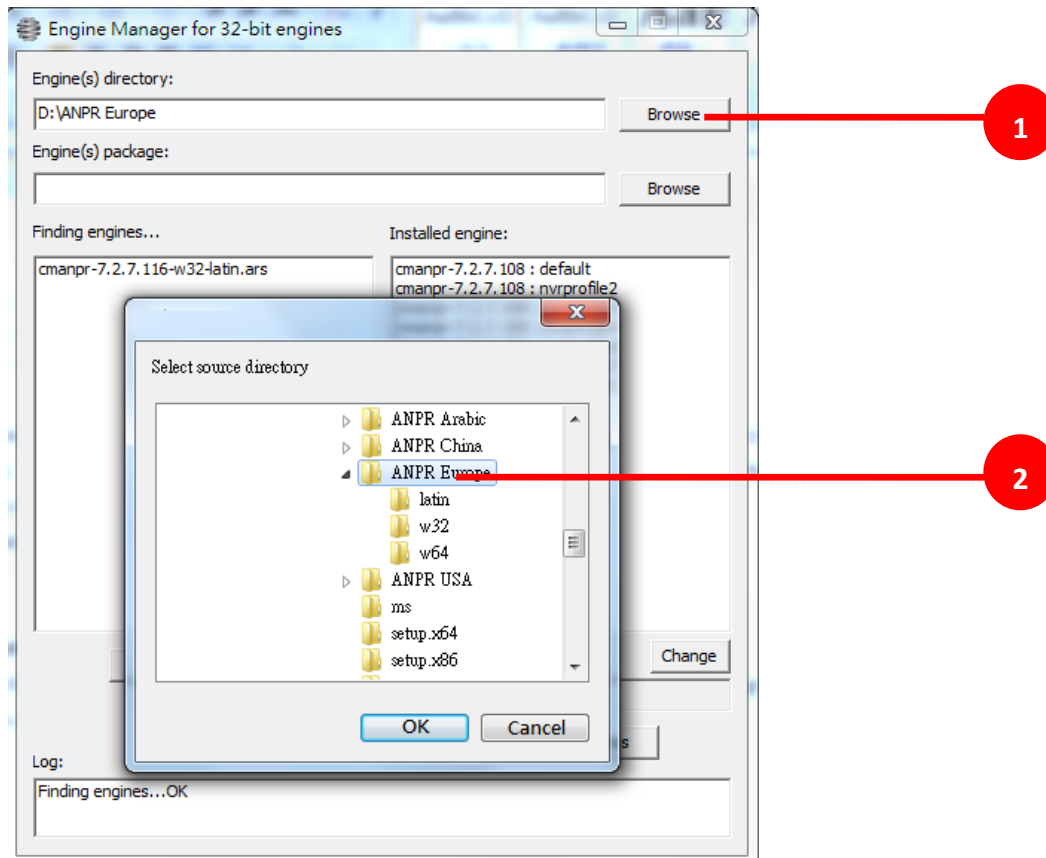
Select Country Engine for CMX ANPR

For installation CMX ANPR pack for the country of Arabic, China, Europe, or USA licenses, please click on “Start->Programs->GX->32 bit version->Engine Manager (32 bit version) for Engine Manager. For other regions, skip this step. You can use the default CMX ANPR driver.

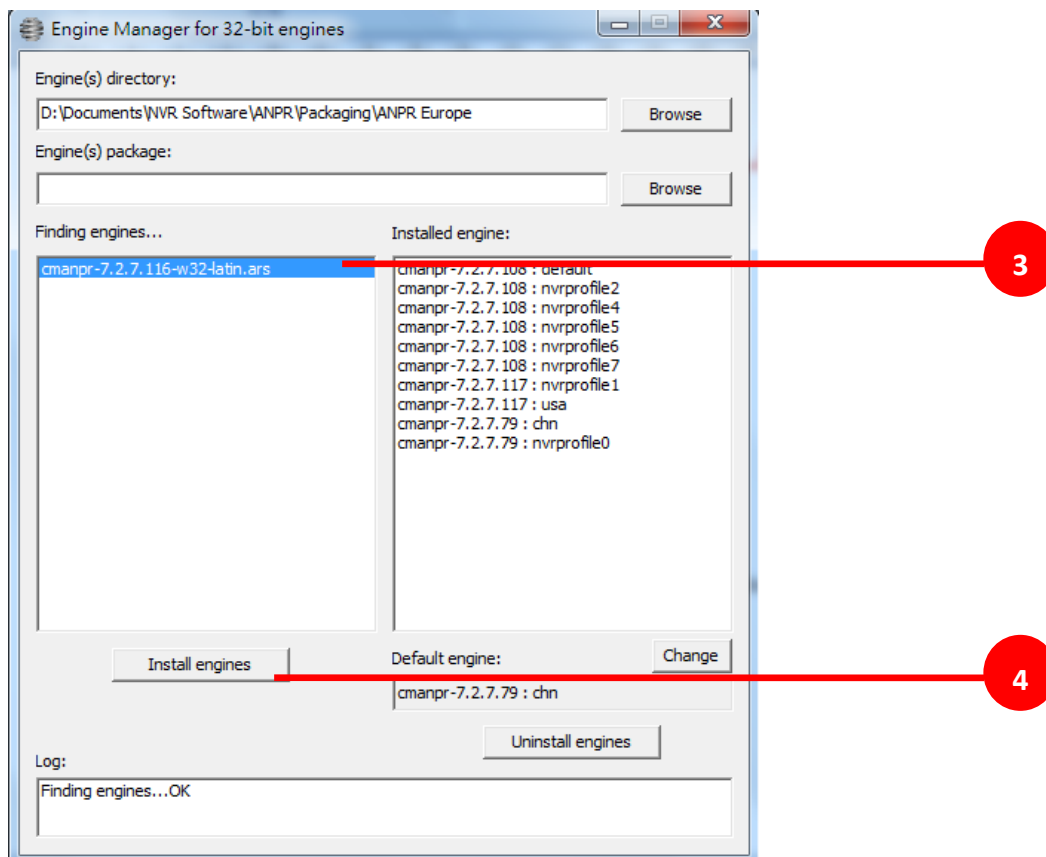


Please use “Engine (s) directory” browse button at Engine Manager to locate “ars” file. Once a directory with “ars” drivers detected, “Finding engines...” list box shows the detected driver package. Select the local CMX ANPR package and click on “Install engines” button to install the engine.

Step 1: Browse the driver path.



Step 2: Select the “Finding Engines” and click on “Install Engines” button.





Verify the CMX ANPR engine is installed properly



Click on camera Property button, and the ANPR Detection list shows up.

Click on Options button. ANPR Setting Dialog box shows up. If the USB dongle and software are properly setup and configure, the “USB Key Device Detected” shows up.

☐ Audio Auto Switch

Pre-alarm Dwell: 1

Alarm Output Dwell: 5

Alarm Input Management

☒ Enable Alarm Input (DI)

- ☐ Remote Alarm In
- ☐ Remote Motion Detection
- ☐ Remote Face Detection
- ☐ Remote Tampering detection
- ☐ Remote Voice Detection
- ☐ External IO Device
- ☐ Motion Detection
- ☐ Video Loss Detection
- ☒ ANPR Detection

Options

Alarm Output (DO)

- ☐ Play Sound
- ☐ Send Email
- ☐ PTZ Preset Go
- ☐ Signal Digital Output
- ☐ Alarm Full Screen
- ☐ Post-alarm Record
- ☐ Pre-alarm Record

Options

ANPR Setting Dialog

IP: 192.168.1.100 19/02/04 20:20:24

ANPR ROI Area

Char Max Height

Char Min Height

USB Key Device Detected.

Country: USA

Plate Range: 738,433,1859,1021

The length of the number plate characters: Min 3 Max 12

The height of the each character (pixel): Min 2 Max 80

ANPR Setting

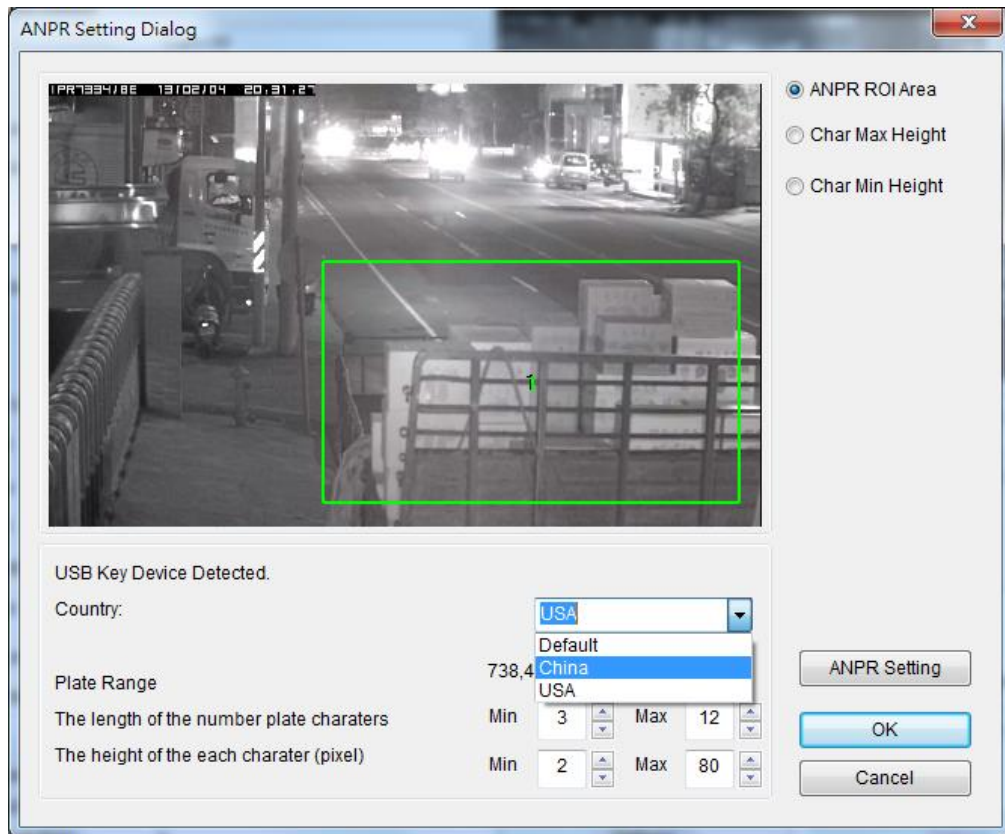
OK

Cancel

Chapter 1. CMX ANPR Setup



Click on camera Property button for ANPR Setting Dialog box. The detail settings of the dialog box are described below:



Chapter 1-1. ANPR ROI Area

It is highly recommended to enable ANPR region of interest (ROI). This can further lower the CPU processing rate. Only the ROI area is detected for ANPR. To enable, simply draw the rectangle on the video. To disable, right mouse click on the video and select Clear menu item. There is only one ROI area that can be set.



Chapter 1-2. Characters' Min and Max Heights

The character minimum and maximum heights can be specified. This can further avoid the logo on a truck or advertisement on a bus to be recognized. The recognition rate can be increased.

Chapter 1-3. Min and Max Characters' Length of a Plate

To increase the recognition rate, the minimum and maximum characters' length can be specified.

Chapter 1-4. Country

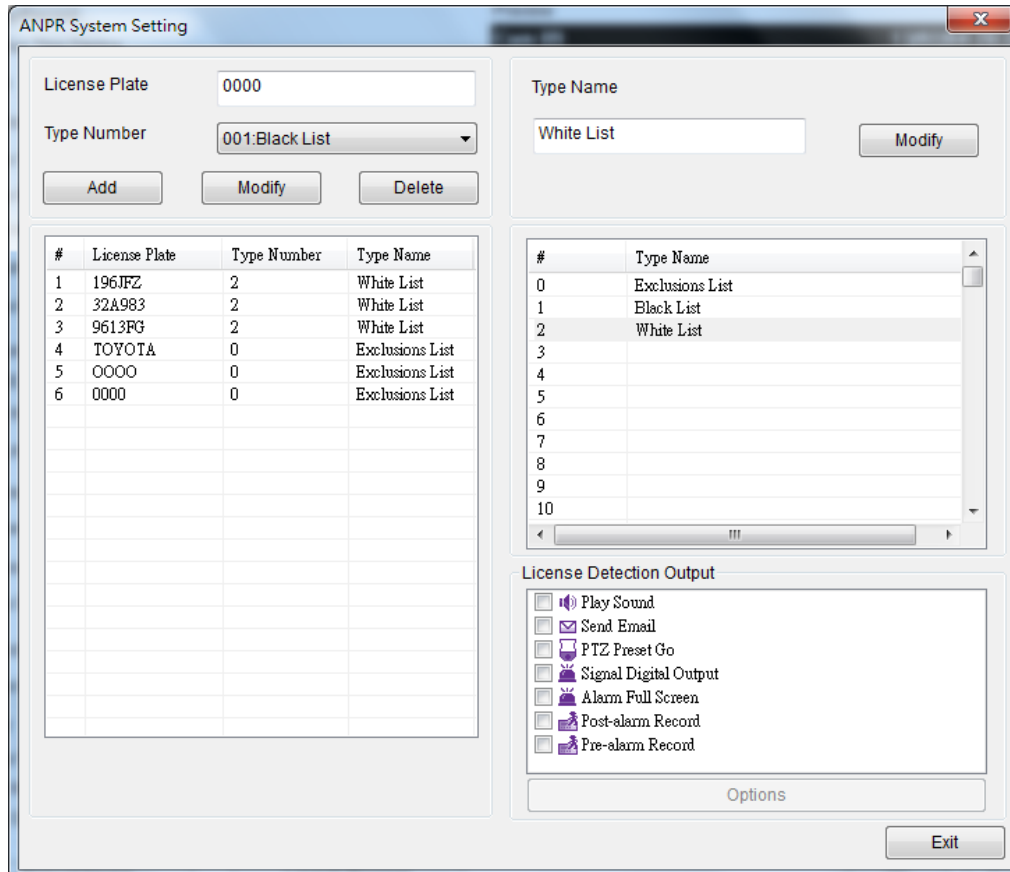
After CMX ANPR engines are installed for a country, the Country codes are shown in the Country drop box. Please select a proper engine for your country.



Chapter 2. CMX ANPR System Setting

ANPR Setting

To enable ANPR system setting, click ANPR Setting button. The dialog box is shown below:



The ANPR System Setting dialog box contains the following sections:

- License Plate:** A text input field with the value "0000".
- Type Number:** A dropdown menu showing "001:Black List".
- Buttons:** "Add", "Modify", and "Delete".
- Type Name:** A text input field with the value "White List" and a "Modify" button.
- Table 1:** A table with 4 columns: #, License Plate, Type Number, and Type Name.

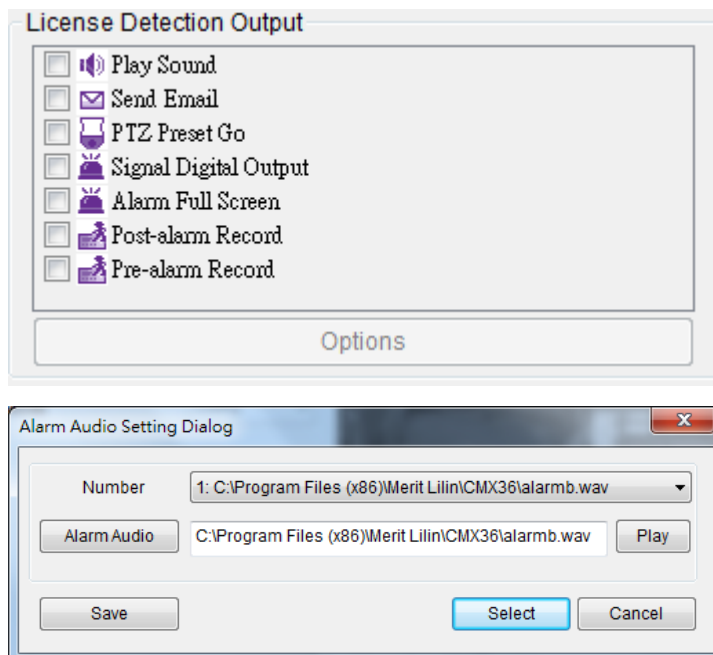
#	License Plate	Type Number	Type Name
1	196JFZ	2	White List
2	32A983	2	White List
3	9613FG	2	White List
4	TOYOTA	0	Exclusions List
5	0000	0	Exclusions List
6	0000	0	Exclusions List
- Table 2:** A table with 2 columns: # and Type Name.

#	Type Name
0	Exclusions List
1	Black List
2	White List
3	
4	
5	
6	
7	
8	
9	
10	
- License Detection Output:** A list of checkboxes for various actions:
 - ☐ Play Sound
 - ☐ Send Email
 - ☐ PTZ Preset Go
 - ☐ Signal Digital Output
 - ☐ Alarm Full Screen
 - ☐ Post-alarm Record
 - ☐ Pre-alarm Record
- Buttons:** "Options" and "Exit".

Chapter 2-1. ANPR Category List

A user is able to create his or her own ANPR categories. Each ANPR type can trigger various outputs such as redirecting alarm output or firing prerecorded audio. The predefined type lists are (1) exclusion list, (2) black list, and (3) white list which are described below:

Chapter 2-2. License Detection Output



Chapter 2-3. White List

White list can be used to allow a vehicle to enter a facility. Once a plate is detected as in the white list, it can trigger a digital output of an IP camera for gate control.

Chapter 2-4. Black List

Black list can be used to ban a vehicle to enter a facility. Once a plate is detected as in black list, it can fire pre-recorded audio for warning purpose.

Chapter 2-5. Exclusion List

The logo of a vehicle might contain characters can might be recognized as a number plate. You can add the logo into Exclusion List to eliminate the plate. In the following example, the CANTER brand might be recognized as a plate. Please add CANTER into the exclusion list to avoid the recognition and increase the recognition rate.

Image

Cam 09 13/02/04 10:35:46

2.3 X

[3065 G]

00:00:00 10:35:00 21:26:00

Stop

Play

Pause

<

>

Snapshot

Screen Shot

Playback Speed 8 X

011702

04 / 02 / 2013

Calendar

Start: 00:00

End: 21:26

☐ Record
 ☐ Alarm
 ☐ POS
 ☒ ANPR

Search

Condition

Event

Playing Time:

4708QE	2013/02/04 15:47:41
7081IE	2013/02/04 15:47:59
708QE	2013/02/04 15:48:05
114	2013/02/04 15:48:05
141	2013/02/04 15:48:08
12E	2013/02/04 15:48:09
74708QE	2013/02/04 15:48:13
RN1	2013/02/04 15:48:13
A1N4	2013/02/04 15:48:18
081Q	2013/02/04 15:48:27
7081OE	2013/02/04 15:48:34

Play From File

D:\Video\2A275E3A-41EC-46e1-8CC8-EA\

Save As AVI

C:\ch09.avi

Save now

Convert

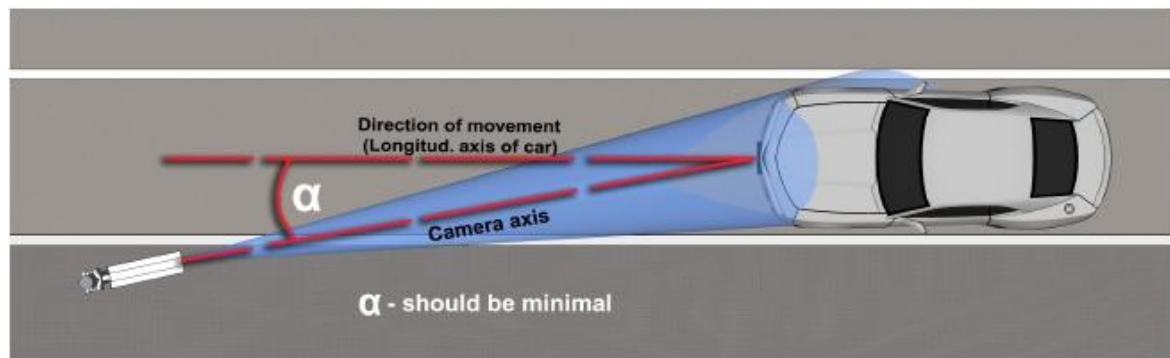
Quality 80%

Close

Chapter 3. ANPR Camera Requirements

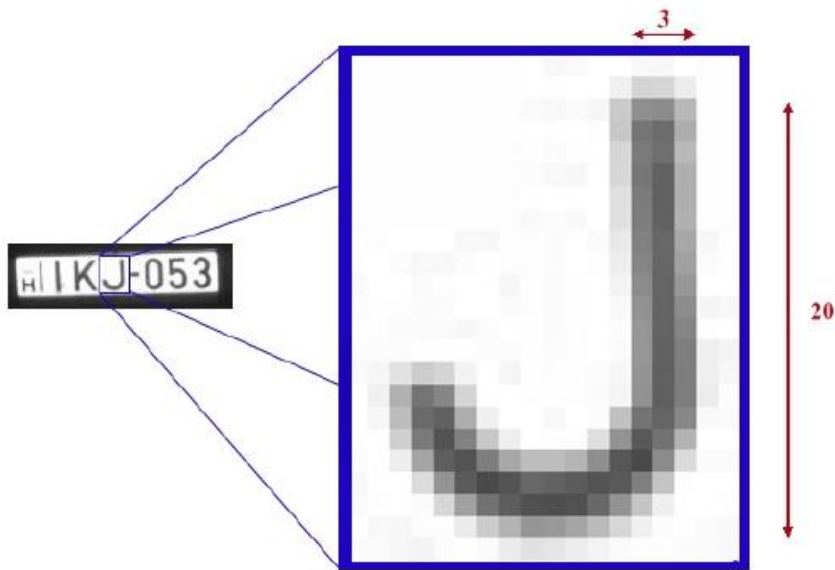
Chapter 3-1. Recommended Camera Position

A good ANPR engine can read the plates from images taken in various conditions. However if you want to achieve over 95% recognition rate with short recognition times, you have to calculate the position of the camera accurately. The best position is if the angle between the camera axis and the direction of the vehicle movement is minimal (see below).



The distance between the camera and plate is also important. If the camera is too far from the plate, the characters may not be large enough for recognizing them. In this case zoom-in until you reach the proper size. If the distance is too short it may happen that a part of the plate is over the camera's field of view (when the vehicle is near to the side of the lane or the plate is not at the middle of the vehicle).

From the point of ANPR/LPR the most important is the size of the characters on the image. For English characters it is recommended to have at least 16 pixel average character height, for Arabic or other special characters it is recommended to have 20 pixel height (because they are more calligraphic than the Latin characters). Too large characters are also not suitable for ANPR, therefore try to avoid settings where the character size is greater than 50 pixels in height. A line width of a character on the image should be at least 2 pixels.



Proper character sizes (in pixels) on the sample image

Chapter 3-2. Image Requirements

In order to expect the most accurate result from the CMX ANPR software, the processed images should contain a plate:

- with reasonable good spatial resolution (on the license plate the minimum character height is 16 pixels for Latin and 20 pixels for Arabic characters, 2 pixels line-width on the image),
- with reasonable good sharpness,
- with reasonable high contrast,
- under reasonable good lighting conditions, and
- in a reasonable good position and angle of view.

Although, 'reasonable' is not an exact definition, still it has a well understandable meaning. Here are some problematic images:

Problematic ANPR images	Good ANPR plate images
 Low contrast Minimum 20 grayscale difference is	● with good sharpness ● with good spatial resolution ● with high contrast ● under good lighting conditions ● in a good position and angle of view

required between the background and the characters of the plate.

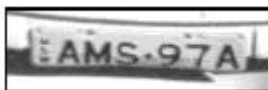


Overexposure



Low spatial resolution

(too small characters on the plate) The required minimum character size is 16 (20 for Arabic characters) pixels height and 2 pixels line-width on the image.



High distortion



Blurred image



Interlaced



Chapter 3-3. Recommended LILIN Cameras

LILIN's 700TVL cameras with LILIN video encoder VS212 can be used for ANPR purpose. LILIN's iMEGAPRO range full HD IP cameras can be used for full HD ANPR purpose. The following models are recommended for ANPR application.

Analogue 700TVL CCD Cameras

Box camera: CMG108

IR outdoor: CMR728X, CMR738



Full HD iMEGAPRO IP Cameras

Box camera: IPG1022 and IPG1032 with ADL 10~50mm lens

IR outdoor: IPR7334, IPR7338, IPR434, IPR438



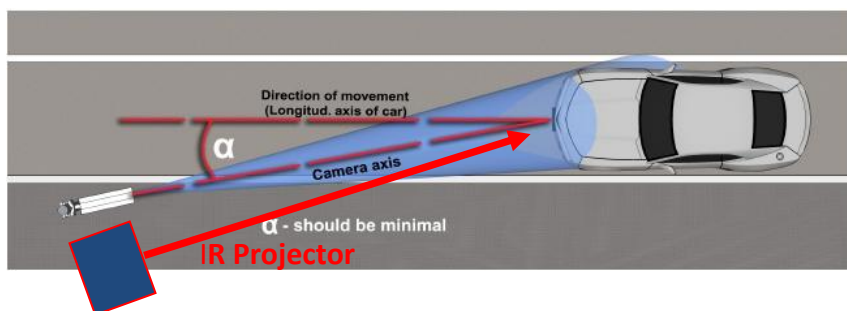
LILIN IPR7334 / IPR7338



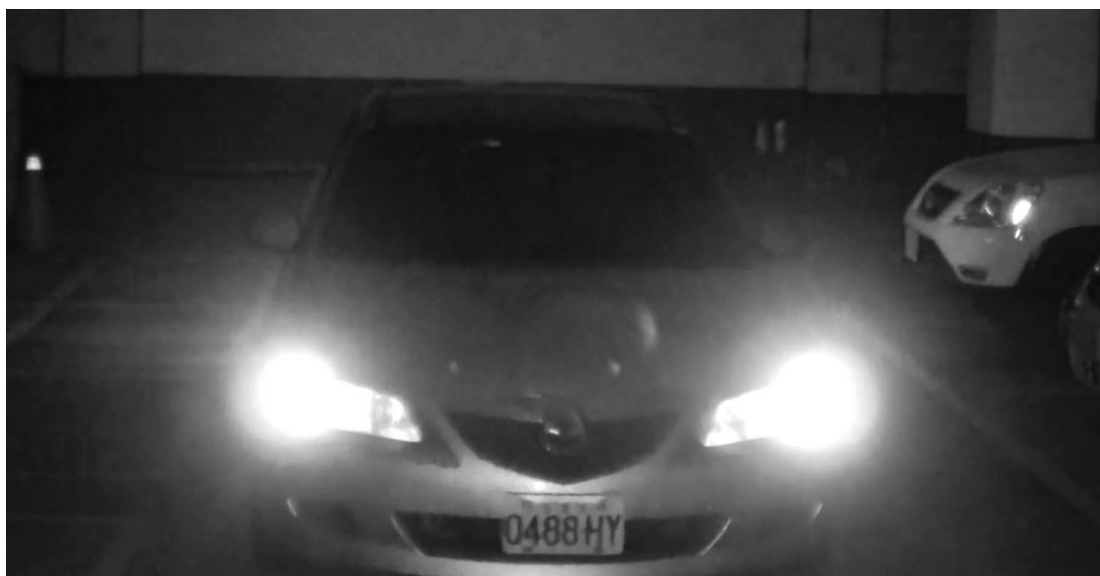
LILIN IPG1022 / IPR1032

IR Illuminator

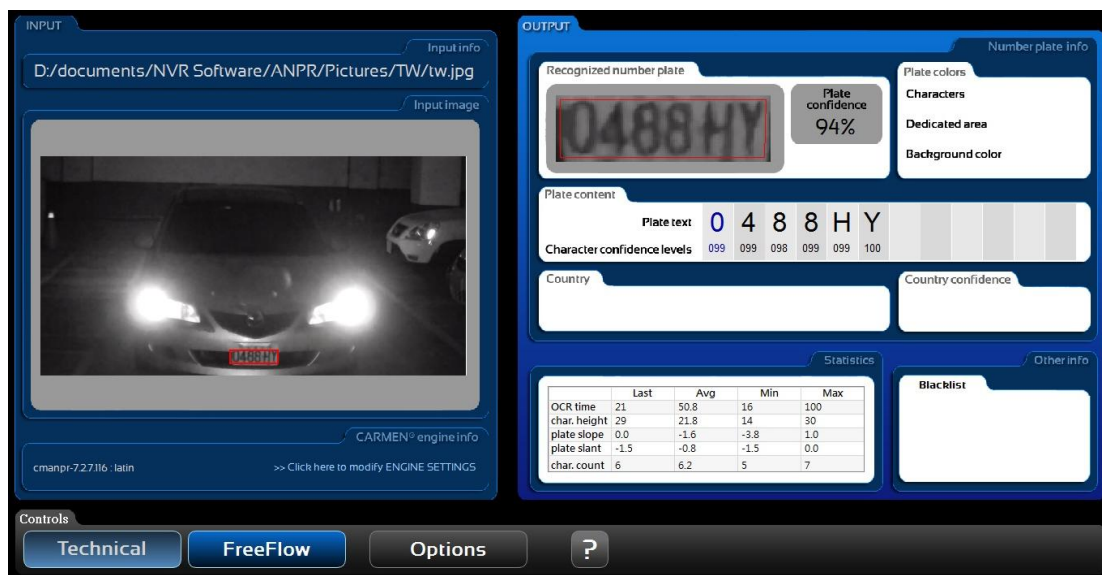
If IR mode (black/white) is required for the ANPR application, LILIN's IR projector can provide supplement light source for suppressing the head lights at night.



IM05108/05308/05608



IPR7338ESX at no Light Environment with IR on



IPR7338ESX Recognition Statistics

Chapter 3-5. General Camera Setup Techniques

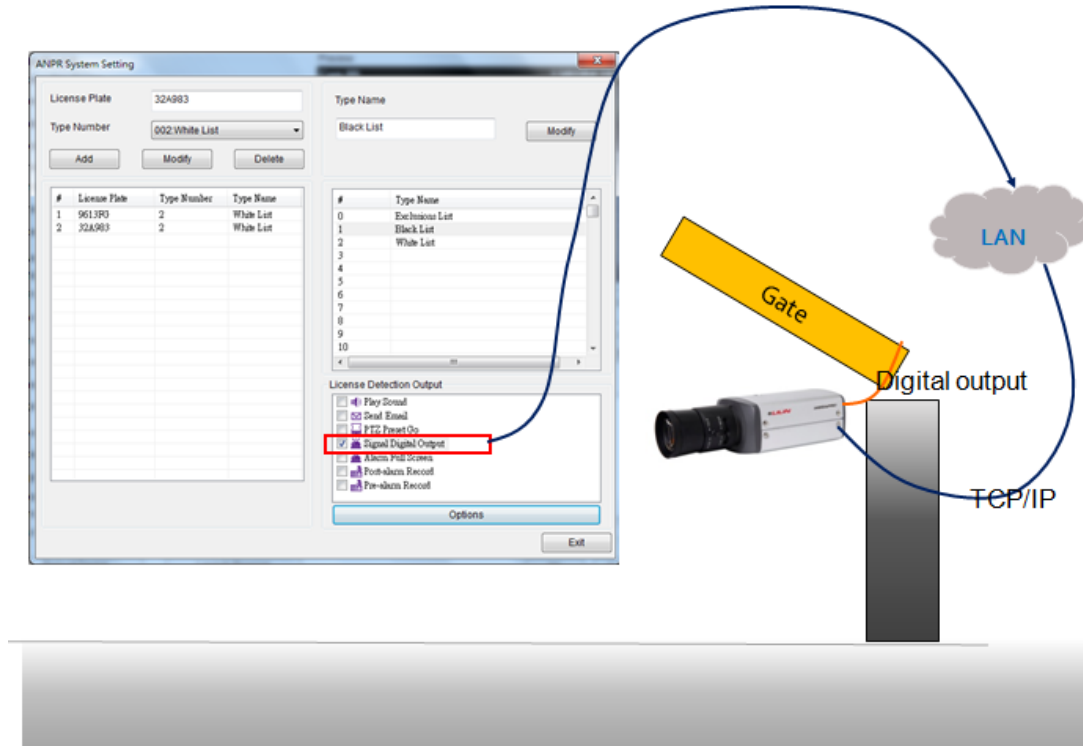
LILIN IMEGAPRO range cameras have two sets of digital signal processor (DSP) settings. The settings can be fine turned for handling head lights at night.

	Daytime	Nighttime
WDR	Recommend to be On	Must be Off
Back Light Compensation	Recommend to be On	Must be Off
Shutter Min & Max	1/8000~1/50	Speed 60Km/h: 1/240~120
Auto Gain Control	Set it to default	Set it to default
3DNR	Recommend to be 2	Keep it minimal
Sense Up	Do not care	Must be Off

Sensor Advanced I	Sensor Advanced II
☐ IR Cut Removable : Auto / Night	
☐ Type: Sensor Advanced II	
☐ QualityMode: Night	
☐ Exposure Settings	
Exposure Value: 5	☐ White Balance Control: Auto
WDR: Off	☐ Mirror: Off
Back-light Compensation: Off	☐ Flip: Off
Shutter Limit(sec): Min: 1/8000	
Shutter Limit(sec): Max: 1/50	
☐ Low-light Gain Technique(Sense-Up Plus)	
Auto Gain Control: 64x(36dB)	
3D Noise Reduction: 2	
Sense Up: Off	
☐ Load Default	
☐ Load Default: Default	Apply

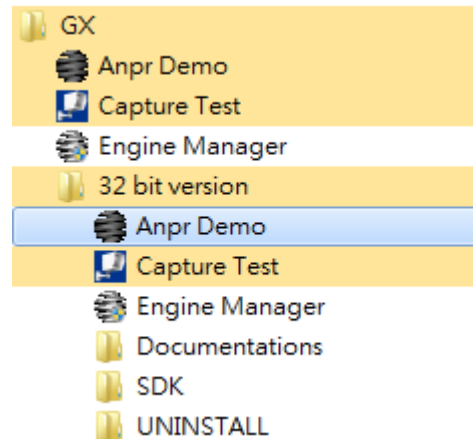
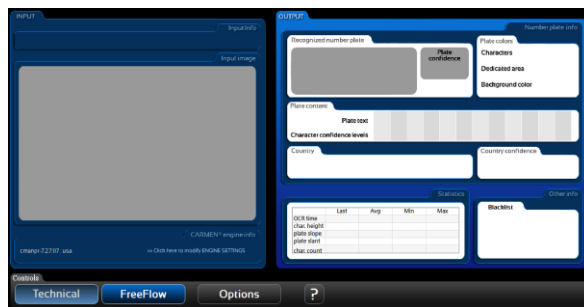
Chapter 3-6. CMX ANPR Alarm Output and Gate Control

Each license category can be assigned for its License Detection Output. Digital output of an IP camera can be triggered for opening the gate control via the dry contact of the IP camera. The system diagram is shown below:



Chapter 4. CMX ANPR Engines' Samples

Sample of different country plates are shown below: A user can use Anpr Demo program to test the license plate.



To use Anpr Demo program, select GX->32 bit version->Anpr Demo program. The software can be used for (1) testing JPEG image taken by a camera for night, (2) testing the country/state/province codes for a region, (3) testing recognition for a JPEG image in terms of resolution and performance.



Options

Step1: Click on Options button to enable or disable Options dialog box.

Controls

Step 2: Click on Controls button to enable or disable Controls panel.

Browse

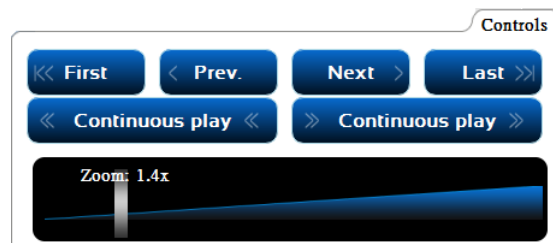
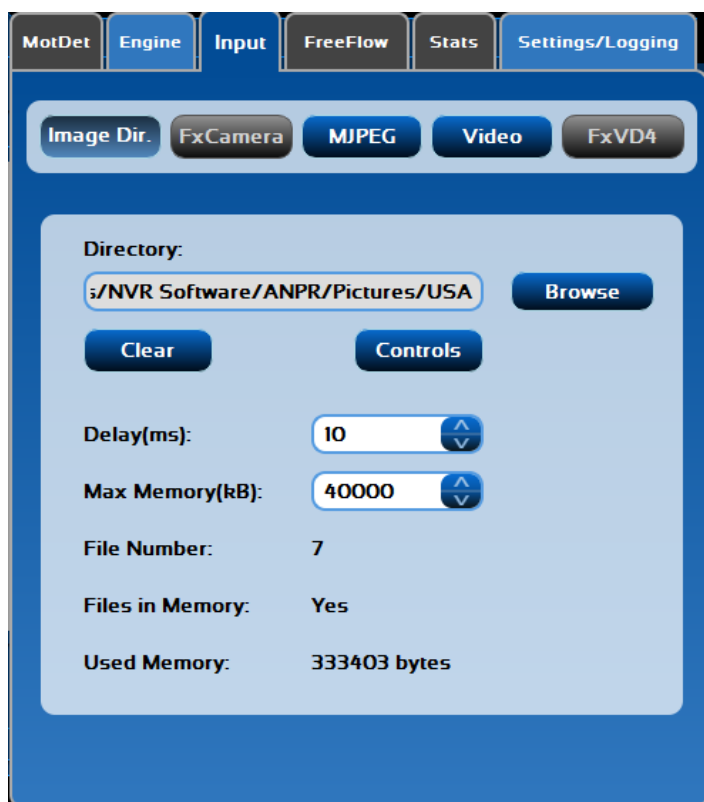
Step 3: Click on Browse button to the directory of the license plate directory.

< Prev. Next >

Step 4: Click on Prev and Next buttons to perform recognition.



Step 5: Disable Controls and Options button. Double-click on X button to exit the program.



CMX ANPR engine: China

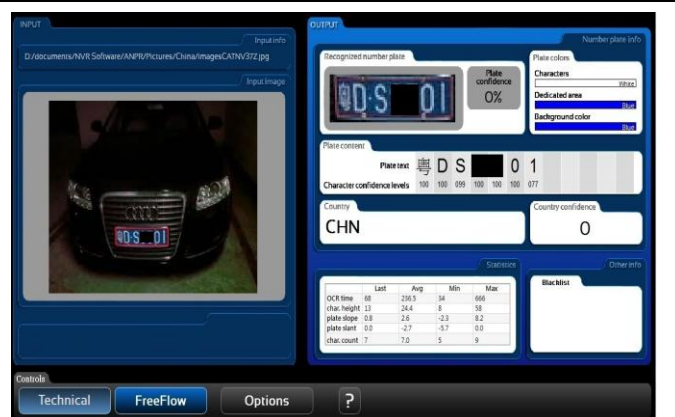
Country Detected: China
Province Detected: Yes



Country Detected: China
Province Detected: Yes



Country Detected: China
Province Detected: Yes



Country Detected: China
Province Detected: Yes



Country Detected: China
Province Detected: Yes



CMX ANPR engine: Europe

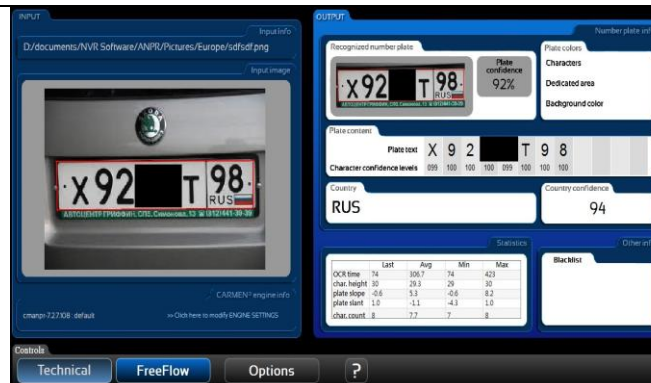
Country Detected: Germany



Country Detected: UK



Country Detected: Russia



Country Detected: Russia

INPUT: D:/documents/NVR Software/ANPR/Pictures/Europe/dfsdf.jpg

OUTPUT: Recognized number plate: K50 O 61, Plate confidence: 79%, Country: RUS, Country confidence: 86.

	Last	Avg	Min	Max
OCR time	423	421.6	423	423
char. height	29	29.0	29	29
plate slope	1.2	8.2	8.2	8.2
plate slant	0.0	-2.2	-4.3	0.0
char. count	7	7.5	7	8

CMX ANPR engine: Default

Country Detected: None

Country: Malaysia

INPUT: D:/documents/NVR Software/ANPR/Pictures/TW/my.jpg

OUTPUT: Recognized number plate: JN 6015, Plate confidence: 56%, Country: (empty), Country confidence: (empty).

	Last	Avg	Min	Max
OCR time	180	180.0	180	180
char. height	14	14.0	14	14
plate slope	-1.8	-3.8	-3.8	-1.8
plate slant	0.0	0.0	0.0	0.0
char. count	7	7.0	7	7

Country Detected: None

Country: Taiwan

INPUT: D:/documents/NVR Software/ANPR/Pictures/TW/tw.jpg

OUTPUT: Recognized number plate: 0488HY, Plate confidence: 94%, Country: (empty), Country confidence: (empty).

	Last	Avg	Min	Max
OCR time	25	50.8	18	100
char. height	29	21.8	14	30
plate slope	-0.0	-1.8	-3.8	1.0
plate slant	-1.5	-0.8	-1.5	0.0
char. count	6	6.2	5	7

CMX ANPR engine: USA & Canada

Country Detected: USA

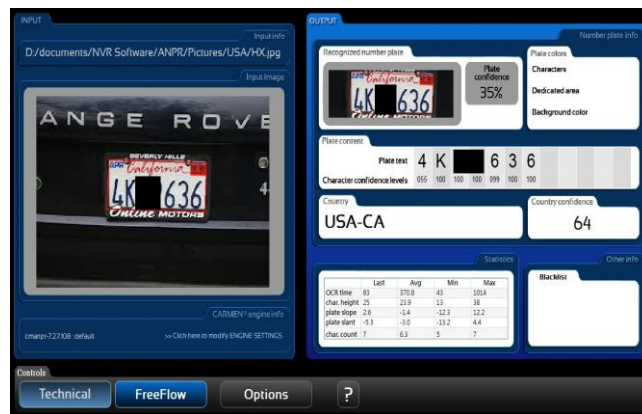
State Detected: Illinois

INPUT: D:/documents/NVR Software/ANPR/Pictures/USA/cfb.jpg

OUTPUT: Recognized number plate: 918 14, Plate confidence: 77%, Country: USA-IL, Country confidence: 77.

	Last	Avg	Min	Max
OCR time	45	870.3	43	1034
char. height	20	20.2	13	38
plate slope	1.7	-0.0	-12.3	12.2
plate slant	-2.7	-1.9	-12.2	4.4
char. count	7	6.3	5	7

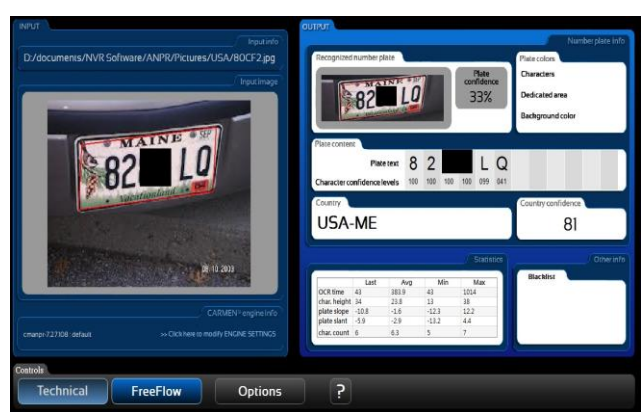
Country Detected: USA
State Detected: California



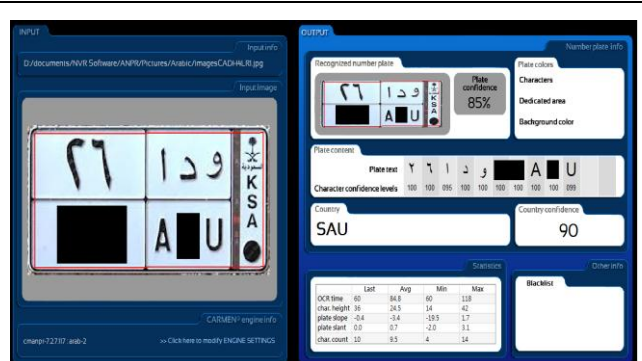
Country Detected: USA
State Detected: California



Country Detected: USA
State Detected: Maine



Country Detected: Saudi





CMX ANPR Specification

	ANPR-FL	ANPR-PK
	FreeFlow	Parking solutions
CMX License Key	Included	Included
Support channels	Up to 8 channels at D1/1080P **	1
Detection speed	0.2 Second / recognition	6 seconds / recognition
Support resolutions	Full HD: 1920 * 1080 / HD: 1280 * 768 / D1: 720 * 480 / VGA: 640 * 384 / CIF 320 * 240	
Multiple lane recognition	Up to 4 plates per image	4 plates per image
Character size	Minimum and maximum pixel heights configurable	
License plate character length	Configurable	
Detection area	User configurable	
Black list	Alarm triggering and plate text recording	
White list	Alarm triggering and plate text recording	
Character length	Configurable	
Exclusion list	Configurable	
Character size	Configurable	
Countries supported	USA and Canada: state detectable Australia: state detectable China: province detectable Europe: Europe country detectable Australia: Province detectable Arabic: Arabic country detectable Taiwan and other countries	
Playback		
Quick search	Yes	
License capture	PIP and OSD text overlay	
Video input		
Camera source	IP cameras / IP video encoder	
Alarm		
Alarm management	Alarm popup for full screen, PC sound, redirect IP camera DO, eMail snapshots, redirect a PTZ preset recall	
Event	Various alarm log, video loss, stop recording, schedule, logon, operation log	
Digital output	Controllable via IP cameras	
Alarm recording	Pre-alarm:1~5 seconds and post-alarm: 5~50 seconds	
Database		
Vehicle information	Name, state/province, color, and memo	
Backup		
	AVI conversion with number plate OSD and JPEG snapshots	
System Requirement		
Access log	Complete access log in database manager	
CPU requirement	Minimum Intel i3 CPU 2.0 GHz or above	
RAM requirement	4GB memory	
HDD requirement	20GB free size	

** Supporting 1080P resolution image is highly dependent on CPU processing power.