TVT

Automatic Number Plate Recognition (ANPR)

Brought to you by **Arrowhead Alarm Products**

Contents

Overview

Background

With the popularity of automotive applications in daily life, smart car management has become critical in many industries.

ANPR technology can detect and identify a vehicle's unique license plate number and is an important part of a complex vehicle management system.

Key Technology

With the popularity of automotive applications in daily life, smart car management has become critical in many industries.

ANPR technology can detect and identify a vehicle's unique license plate number and is an important part of a complex vehicle management system.

Detection → **Recognition** → **Extract** → **Match Result**

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Application Scenarios

TVT

Gate Control

Vehicle Monitoring

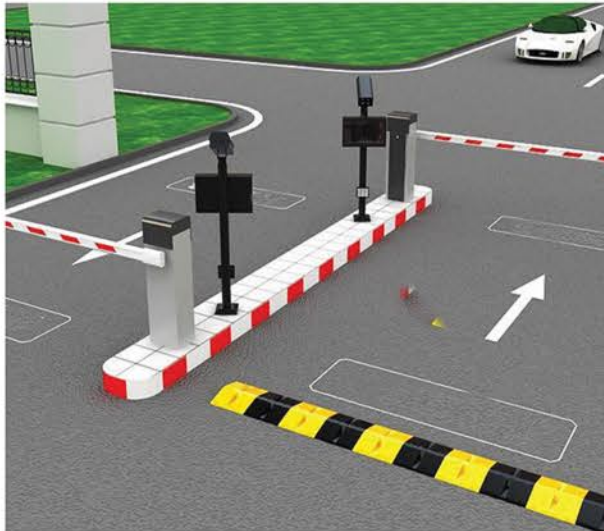**Not Supported**

Highways

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Application Scenarios

Gate Control

Access Control of Private Residence

Access Control of Community & Factory

Access Control of Parking Lot

TVT

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Application Scenarios

Vehicle Monitoring

Vehicle Monitoring in Public Areas

Vehicle Monitoring in Special Areas

Available Models

TVT

2MP

TVT-B722-2POE-LP
(Stock Item)

2.8-12mm (Non-stock item)
Gate Control

7-22mm (Stock item *TVT-B722-2POE-LP*)
Vehicle Monitoring

5-50mm (Non-stock item)
Vehicle Monitoring

70Km/h

10,000

2.8-12:6m
7-22:25m
5-50:120m

30 + International Plates

Built-in SD Card

Artificial Intelligence and Deep Learning Algorithems

4MP

TD-9443A3BH-LR

TD-9843A3BH-LR

2.8-12mm (Non-stock item)
(Gate Control)

8-32mm (Non-stock item)
(Vehicle Monitoring)

2.8-12:70Km/h
8-32:120Km/h

10,000

2.8-12:8m
8-32:30m

30 + International Plates

Built-in SD Card

Artificial Intelligence and Deep Learning Algorithems

Supports Wiegand input and output

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Installation Requirements

ANPR relies on the quality of the image it captures. Therefore, the installation is a critical part and should be done properly.

Target Height:

- More than 10% of the scene
- Less than 50% of the scene

Overall Target Size:
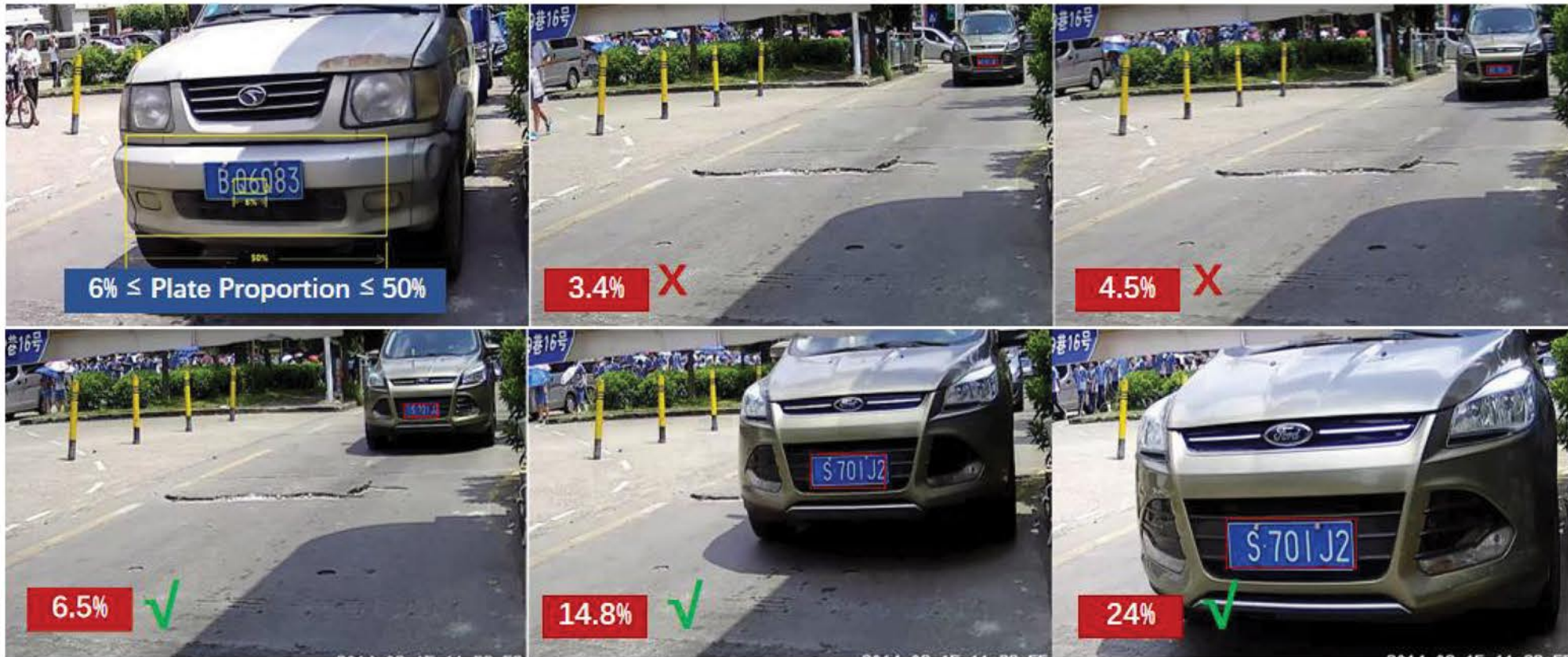
- More than 6% of the scene
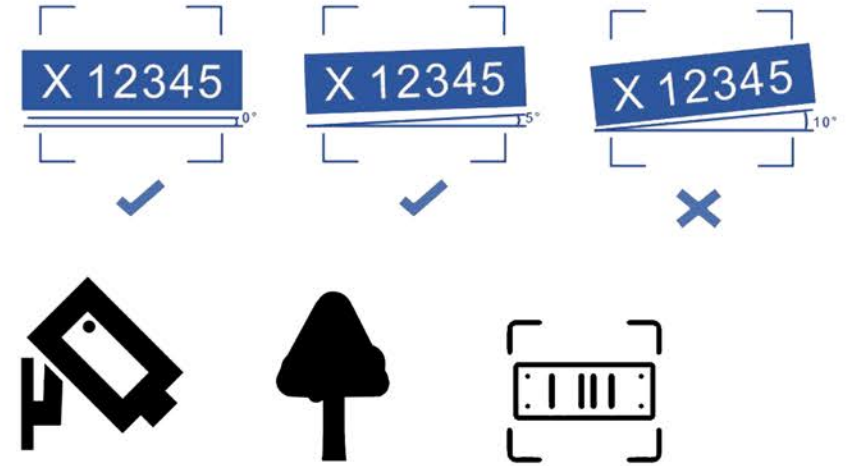- Less than 50% of the scene

Installation Requirements

Target size with reference to the scene

The size of the license plate must be within the specified range

Installation Requirements

- License plate camera tilt angle: no more than -5° ~ 5°

- No obstruction between the camera and license plate

- Clear focus on the detection area

Installation Requirements

Gate entrance / exit

The height of installed camera is around 1.2m -1.5m(like in most parking lots)

License plates propotions

The width of the license plate should be between 6% to 50% of the screen width

Tilt Angle 15° ~ 25°

Pan Angle 15° ~ 25°

Installation Requirements

Gate entrance / exit
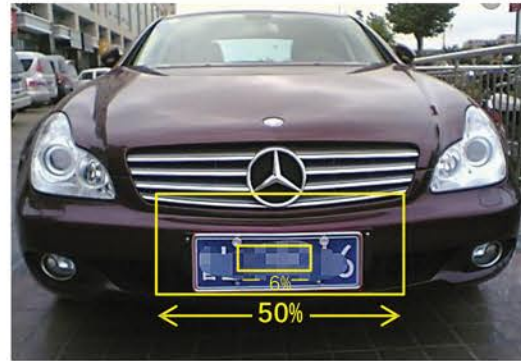
Percentage of license plate
The width of the license plate accounts for 6%-50% of the whole image width.

Full Light
Keep a certain distance from IPC, to avoid plate overexposure.

Installation Angel
Depression Angel ≥15 ° Note: avoid the influence of car lights.

Installation
1. Entrance Control

Percentage of license plates:
The width of the license plate accounts for 6%-50% of the screen width

Fill Lights

1.3-1.5 m

> 15°

Recognition Distance=2.5m-3m

Deceleration zone

Height: 1.3~1.5m

2.5m-3m
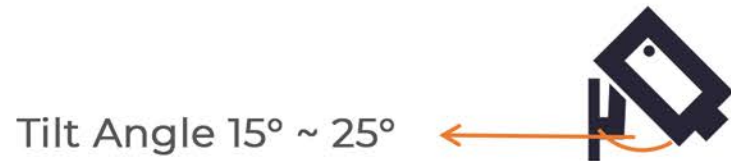
Arrowhead Alarm Products
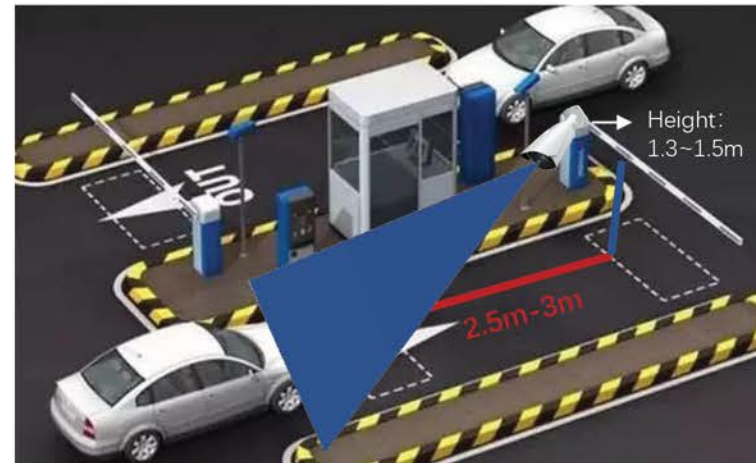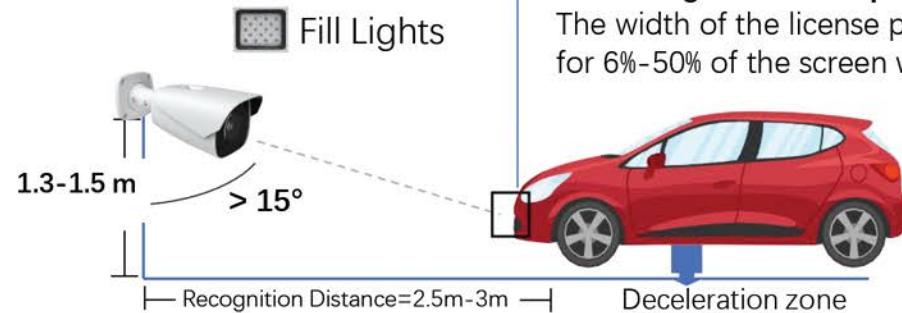
Installation Requirements

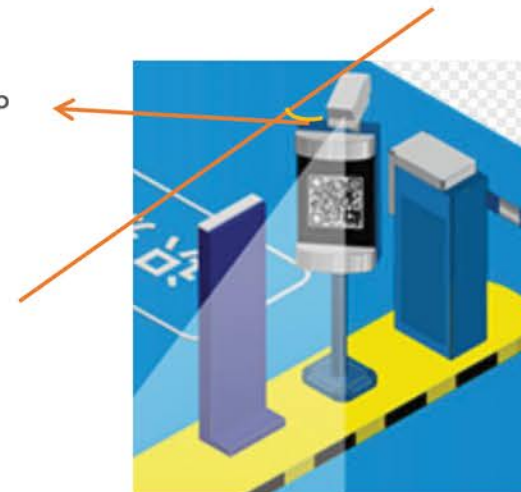## Street monitoring

The height of installed camera is around 4m - 6m (like in junctions or roads) License plates propotions. The width of the license plate should be between 6% to 50% of the screen width.
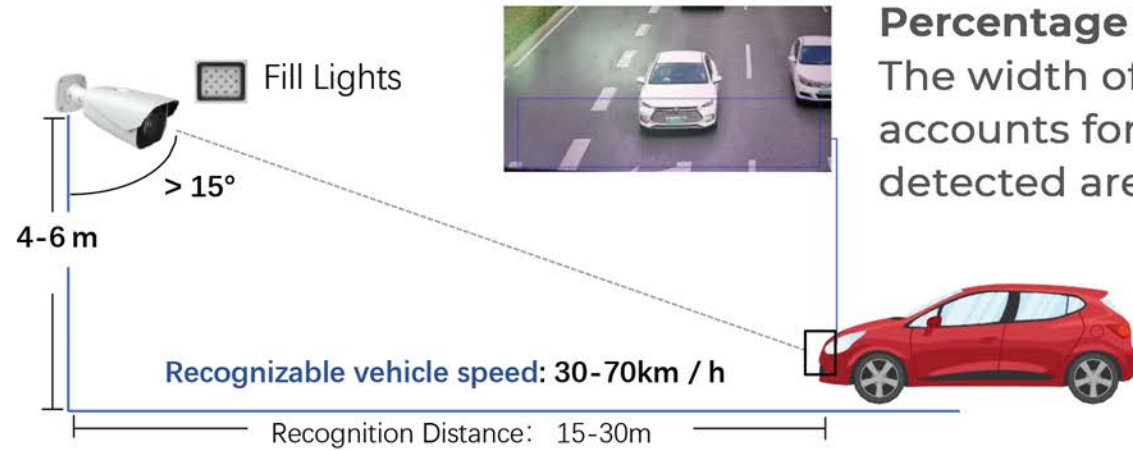

Pan Angle 0° ~ 25°

Tilt Angle 15° ~ 25°

Installation Requirements

TVT

Street monitoring

Fill Lights

> 15°

4-6 m

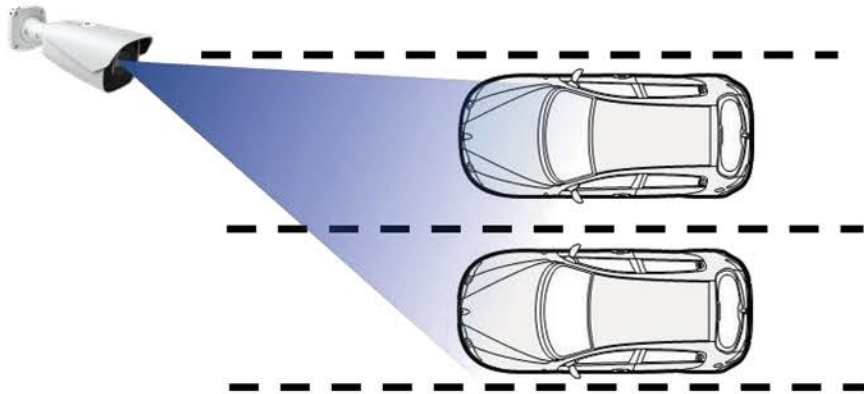**Recognizable vehicle speed: 30-70km / h**
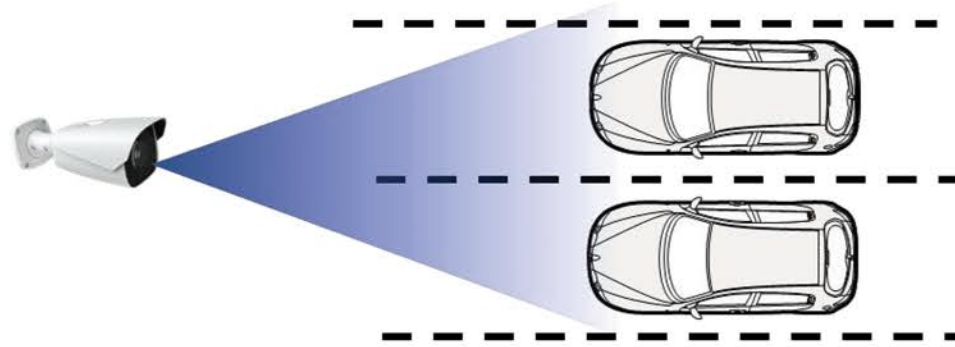
Recognition Distance: 15-30m

Percentage of license plates
The width of the license plate accounts for 6% - 50% of the detected area width.

Note
1. Not applicable for Highways
2. The highest recognizable speed is 70km/h
3. It can be used to cover two lanes

Camera on the roadside

Camera in the middle road

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Installation Requirements

Detection Area

Gate Control

We would draw the detection area where the car slows down. For example near a speed bump, gate entrance, shop sign, as per the below example.
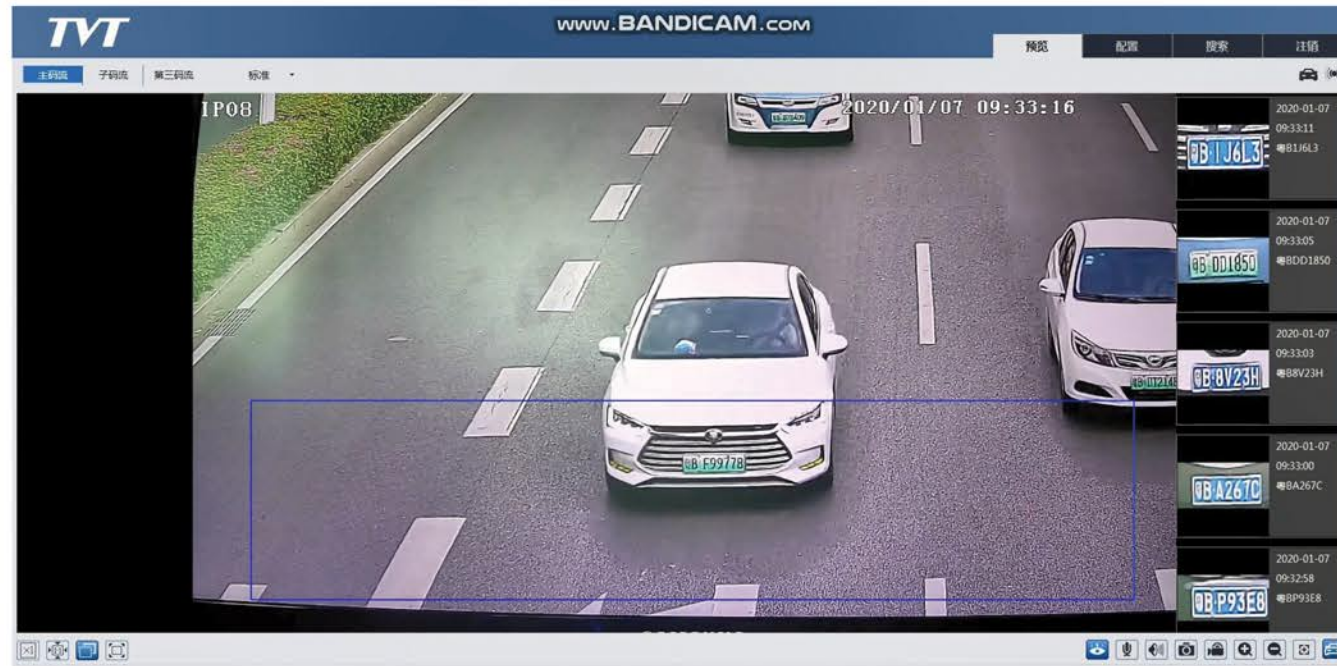
Installation Requirements

Detection Area

Street Monitoring - Front

Draw the detection area only in the closer lane, and at the bottom of the screen in order to capture a clear picture and give the camera enough time to recognize the plate. We recommend the detection area covers about one third of the whole area.

Installation Requirements

Detection Area

Street Monitoring - Back

Draw the detection area only in the closer lane and in the middle of the screen in order to capture a clear picture and give the camera enough time to recognize the plate. We recommend the detection area covers about one third of the whole area.

Plate Size

Every Country has it's own plates and the plate's width is not always the same. Therefore it is important to choose a lens that will fit your plate's size. A rule of thumb will be, if you can read the plate so to can the camera. Use the table below to ensure you select the correct lens for your install.

License Plate Width (cm)	Lens	H.FoV	Max. Detected Width(cm)	Min. Detected Width(cm)	Max. Recognition Distance(cm)	Min. Recognition Distance(cm)
30.48	50mm	5.5	488	61	5076	635
30.48	22mm	17.6	488	61	1575	197
30.48	12mm	32.4	488	61	839	105
52	50mm	5.5	832	104	8661	1083
52	22mm	17.6	832	104	2687	336
52	12mm	32.4	832	104	1432	179
44	50mm	5.5	704	88	7328	916
44	22mm	17.6	704	88	2274	284
44	12mm	32.4	704	88	1212	151

Street Monitoring

Draw the detection area only in the closer lane, and at the bottom of the screen, covering about one third of the area.

Detection

The key points that affect the snapping effect

- **Definition**
  Recognisable by the human eye

- **Size**
  Meet the set size range

- **Duration**
  License plate appears on the screen for more than 1 second

- **Area**
 Snapshot area is drawn at the position with the best license plate quality

Recommended Settings

1. Adjust the camera angle and height to ensure that the license plate stays in the picture for more than 1 second.

2. Adjust the maximum and minimum settings.

3. Draw snapshot area, the position depends on the actual scene

Application capture suggestions

- **Entrance Control**
  Draw the snapshot area in a slower area, such as near the speed bump. Makes the license plate more positive in the area.

- **Road Surveillance**
  Draw the snapshot area only in the closer lane, and at the bottom of the screen, occupying one third of the area.

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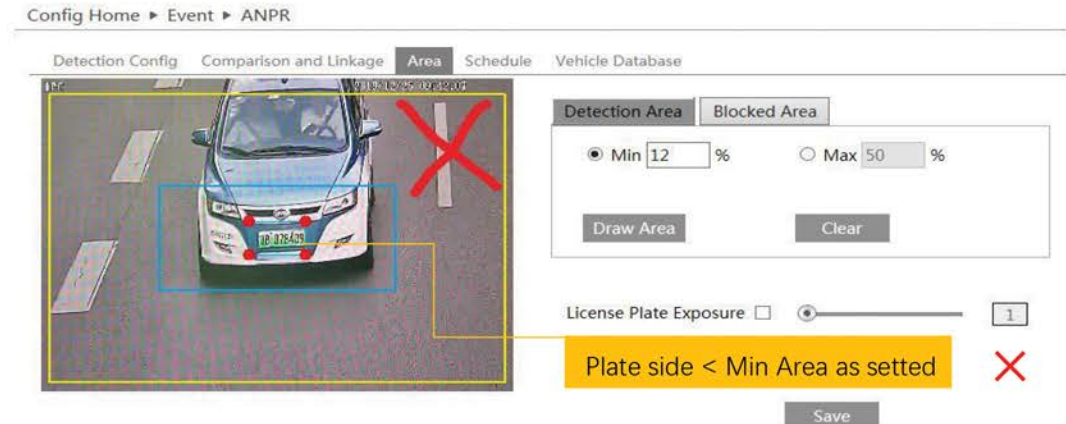
Recognition

Vehicle Database

Detection Config　Comparison and Linkage　Area　Schedule　**Vehicle Database**

add multiple vehicles

Add	Bulk Entry

Add

License plate number	AB123	List Type	Unknown vehicle ▾
Start Time	2019-10-08 00:00:00	End Time	2019-10-08 23:59:59
Owner	xxx	License plate type		Save

| License plate number | | List Type | All Types ▾ | Search |

Index	License plate	Owner	License plate	List Type	Start Time	End Time	Operate
1	AB123	xxx		Unknown ve...	2019-10-08...	2019-10-08...	Delete　Mo

1. License plate number is compulsory, a maximum of 12 characters supported.

2. Owner name is optional, a maximum of 12 characters supported.

3. The effective start time is optional; format: YYY/MM/dd hh:mm:ss; time range is from 1970 to 2037.

4. The effective end time is optional; format: YYY/MM/dd hh:mm:ss; time range is from 1970 to 2037.

5. Vehicle type is optional, a maximum of 12 characters supported.

6. List Type is compulsory. 1 stands for block list; 2 stands for allow list; 3 stands for unknown vehicle

Example　Download

Comparison & Linkage

Detection Config　**Comparison and Linkage**　Area　Schedule　Vehicle Database

| Allow fault character(s) of the plate number | 0 ▾ |
| Alarm List | Allow list ▾ |

Trigger Alarm Out

☐ Alarm Out

If the camera recognizes the detected vehicle, it will trigger Alarm.

⇨

2019-08-01
07:28:15
B72FB9

2019-08-01
07:28:13
B72FB9

⇨

Comparison Result

Time: 07:28:15

Plate No.: B72FB9

Alarm List

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Summary

TVT

- **General Logic:**
  License plate can be read by the human eye.

- **Size:**
  Meets the size configuration range.

- **Detection Area:**
  Draw the area where can capture the best quality image of license plate.

- **Duration:**
  Visible for at least 1 second in detection area.

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Image Settings

Image Setting Points

Brightness

25

5

☞ Setting the brightness in the daytime profile to a smaller value will cause the overall screen to be darker, but it will be more effective for reflective license plates

Gain

☞ Insufficient brightness will affect image brightness

Gain 1

Gain 2

Shutter Speed

1/25

1/100

1/750

☞ Simulate the brightness of the evening scene: the shorter the shutter upper limit time setting, the larger the image noise

Image Settings

Effect by brightness settings

Reflective license plate

Non-reflective license plate

Image Settings

Set schedule (Day/Night mode switching)

The best night results will be achieved when the camera in the night mode with IR on.

- Headlights directly from the Vehicle will cause the image to switch from B/W mode to color mode

- Under a scene around nightfall, the image quality is poor, with infrared light enabled, can get much better performance

- It may cause camera keep color mode all night when with street lights

It is recommended to adopt the schedule setting for day/night mode.

Note: 4 and 180 mean brightness value unit is Lux

Image Settings

Image Settings under Day/Night Mode

After the tests, we have the recommended values for Day/Night mode:

For Day Mode
- Brightness = 25;
- Shutter Max= 1/500
- Shutter Min = 1/100000
- Gain = 10

For Night Mode
- Brightness = 5;
- Shutter Max= 1/500
- Shutter Min = 1/100000
- Gain = 10

Image Settings

Backlighting scene configuration

License plate exposure settings

1. Set Detection Area

2. Enable Plate Exposure, set value

Caution on using the license plate exposure function

If after following the above steps you find the license plate is still very black, it means that the scene has a large dynamic range, and the license plate exposure cannot be used to improve the license plate capture. You will nNeed to set up license plate detection area reasonably.

Image Settings

Summary

Back-light scene
Turn on license plate exposure

Different Speed
Set different shutter upper limit values according to different vehicle speeds

Reflective scene
Adjust the brightness and gain according to the actual scene

Contents

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Applications (Villa)

This is one of the more common scenario's and can be done with only one camera. This can be implemented to control which vehicles are allowed to enter the villa and also those that are not.

ANPR Camera-Detection Config

TVT

Config Home ▸ Event ▸ ANPR

Detection Config   Comparison and Linkage   Area   Advanced   Schedule   Vehicle Database

☑ Enable

☑ Save Panoramic Picture To SD Card

☑ Save Target Cutout To SD Card

License Plate Detection Area   [Asia ▾]   [中国大陆 ▾]

☑ Capture Plate Absence Vehicle

Alarm Holding Time   [3 Seconds ▾]

☑ Trigger SD Snap

☑ Trigger SD Recording

☑ Trigger Email

Email Recipient(s)   ☐ Attach Picture

☐ 111   ☐ Attach Picture
☐ ni**@***.***.cn   ☐ Attach Picture

Email Subject [Car snapshot]

Email Content [this is test email]

☑ Trigger FTP

Server Address

☐ 192.168.54.23   ☐ Attach Picture

[Save]

---

(1) 中国大陆 China

(2) 美国 USA
California, Colorado, Florida, Georgia, Iowa, Illinois, Kentucky, Louisiana, Massachusetts, Michigan, Minnesota, North Carolina, New Jersey, New Mexico, Nevada, New York, Ohio, Oregon, Pennsylvania, Texas, Virginia, Washington, Wisconsin, Arizona, Connecticut, Indiana, Maryland, Tennessee, Mississippi, Montana

(3) 欧洲 Europe
Belgium, Bulgaria, Croatia, Germany, Great Britain, Greece, Hungary, Italy, Poland, Romania, Russia, Ukraine, Spain, Serbia, French

(4) 其他 Others
Israel, Hong Kong, Taiwan, Indonesia, Australia, South Africa, Turkey, India, UAE, Vietnam, Canada, Uzbekistan, Brazil, Thailand, Iran, Iraq, Egypt, South Korea, Mongolia, Palestinian National Authority

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ANPR Camera-Detection Config

ANPR Camera - Comparison and linkage

Config Home ▶ Event ▶ ANPR

Detection Config | **Comparison and Linkage** | Area | Advanced | Schedule | Vehicle Database

Allow fault character(s) of the plate number: `0 ▼`

☐ Deduplication Period `5 Seconds ▼`

Alarm Trigger Mode: `License Plate ▼`

Allow list | Block list | Temporary vehicle | Unknown vehicle

☑ Alarm Out

Save

ANPR Camera - Area

- Click "Draw Area" and drag the border lines of the rectangle to modify its size.

- Click "Stop Draw" to stop drawing the area.

- Click "Clear" to clear the area.

- Then set the detectable size by defining the maximum value and the minimum value (the default size range of a single number plate image occupies from 1% to 50% of the entire image).

Select the number of the undetected area. Then click "Draw Area" to draw a closed area. Up to 4 areas can be set up. After you set the blocked area, this area will not be detected.

ANPR Camera - Advanced

Config Home ▶ Event ▶ ANPR

Detection Config   Comparison and Linkage   Area   **Advanced**   Schedule   Vehicle Database

Recognition
Mode

| Overall Recognition |
| Recognizing when approaching |
| Recognizing when driving away |

Tolerant Digits

☐ ↔ ☐

Add

Delete

Save

Please set the tolerant character pair as needed. For example: 1 and L, supposing that the plate number "ABCL" has been added to the vehicle database, when the plate number "ABC1" is detected by the camera, then these two plate numbers will be matched successfully, and vice versa. Multiple tolerant digital pairs can be set as needed.

ANPR Camera - Schedule

Config Home ▸ Event ▸ ANPR

| Detection Config | Comparison and Linkage | Area | Advanced | Schedule | Vehicle Database |

○ Erase ● Add

Week Schedule

Sun.
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
00:00-24:00   Manual Input

Mon.
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
00:00-24:00   Manual Input

Tue.
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
00:00-24:00   Manual Input

Wed.
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
00:00-24:00   Manual Input

Thu.
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
00:00-24:00   Manual Input

Fri.
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
00:00-24:00   Manual Input

Sat.
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
00:00-24:00   Manual Input

Holiday Schedule

Date 02-05   [+] [-]

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
00:00-24:00   Manual Input
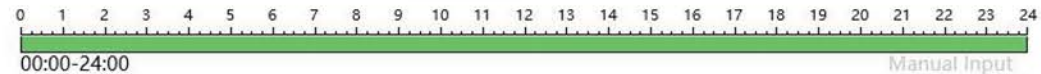
[Save]

ANPR Camera - Vehicle Database

Config Home ▸ Event ▸ ANPR

Detection Config   Comparison and Linkage   Area   Advanced   Schedule   Vehicle Database

Add   Task List

Task List

Path   [   ]   Browse   Upload

1. License plate number is compulsory, a maximum of 12 characters supported.

2. Phone Number is compulsory, a maximum of 14 characters supported.

3. Owner name is compulsory, a maximum of 12 characters supported.

4. The effective start time is optional; format: YYY/MM/dd hh:mm:ss; time range is from 1970 to 2037.

5. The effective end time is optional; format: YYY/MM/dd hh:mm:ss; time range is from 1970 to 2037.

6. License plate type is optional, a maximum of 12 characters supported.

7. List Type is optional. 1 stands for block list; 2 stands for allow list; 3 stands for temporary vehicle

8. Card Number is optional, a maximum of 9 numbers supported.

Example   Download

License plate number [   ]   List Type [All Types ▾]   Search   Export   Delete   Batch Delete

Index	☐	License plate number	Owner	Phone Number	Parking Card	List Type	Start Time	End Time	Operate

Supports manual add & batch imports

Application - Road Monitoring

ANPR Camera

Monitoring Camera

The license plate recognition camera is combined with the ordinary camera, with NVR, the license plate recognition camera is used to identify the license plate, the ordinary camera is used for panoramic video, and the video can be quickly viewed when disputes occur.

Application - Community & Factory

The license plate recognition camera and NVR are used together to easily realize the entrance and exit control of small factories.

NVR
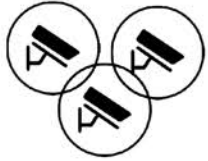
Manage multiple ANPR cameras and features

Supports Smart Query and Playback

Supports Smart View

Supports Event Likage

Supports Simple Parking Lot Management

NVR - Manage multiple ANPR cameras and features

TVT

Function Panel ▶ People/Vehicle Detection

Camera Name	IP Camera 01 ▾

People/Vehicle Detection	Face Recognition		LPR		More			
Line Crossing	Detection	Recognition	Detection	**Recognition**	Fire Detection	Video Metadata	Target Counting	Crowd Density
Intrusion	Face Database ➔		Plate Database ➔		Temperature Detection	Object Abandoned/Missing	Exception Detection	

Enable ☑ Successful Recognition ☑ Strange Plate

Successful Recognition   Strange Plate   **+ –**

Plate Group   [More] ☑ All   list;3;White list;
Schedule   [None ▾] [Manage]
Text Prompt   [hello]   Voice Prompt [<None> ▾]

☐ Enable alarm output pulse(Access Control)

☐ Trigger General	Record [Configure]	Alarm-out [Configure]	Snapshot [Configure]	Trigger Preset	
☑ Push	IPC			**Camera Name**	**Preset Name**
☐ Buzzer	Elite thermal came			Pre-sales9442C2-PA	None ▾
☐ Pop-up Video	IP Camera 01			IP Camera 01	None ▾
☐ E-mail				8843	None ▾
☐ Pop-up Message Box					

[Apply]

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NVR - Smart Query & Playback

NVR - Support Smart View

NVR - Supports Event Linkage

TVT

Text Prompt   hello

Voice Prompt   <None>

☐ Enable alarm output pulse(Access Control)

☐ Trigger General	Record Configure	Alarm-out Configure	Snapshot Configure	Trigger Preset	
☑ Push	IPC			**Camera Name**	**Preset Name**
☐ Buzzer	Elite thermal came			Pre-sales9442C2-PA	None ▼
☐ Pop-up Video	IP Camera 01			IP Camera 01	None ▼
☐ E-mail				8843	None ▼
☐ Pop-up Message Box					

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NVR-Supports Simple Parking Lot Management

NVR - Support Simple Parking Lot Management

Application - Parking Lot

TD-A510-MTSC-E
Note: Non-stock item

The combination of license plate recognition camera and NVMS can be used to manage a comprehensive large parking lot with multiple entrances or multiple sub-parking lots. Rich reports make parking management more efficient.

NVMS - System Settings

Supports multiple parking lots.

One parking lot can add multiple entrances and exits.

One entrance/exit can add multiple lanes.

One lane can bind multiple ANPR cameras.

NVMS - System Settings

Supports set barrier open duration, barrier will close automatically when the set time is reached.

Set up the number of parking spaces and whether temporary cars are allowed to enter when all spaces are full.

Supports the same license plate recognition interval, the same license plate will be identified once within the set waiting time.

Set alarm for overtime parking of temporary cars. Once the temporary vehicles that stay in the parking lot exceed the set timeout threshold, an email will be sent according to the set time.

NVMS - System Settings

Set the type of access: entrance or exit.

Set temporary car opening method: Automatic release or manual release.

Supports LED display for license plate information.

Bind vehicle group, after binding, all vehicles in the group will have access to this lane.

NVMS - Vehicle Group Management

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Supports vehicle white-list, block-list, detection of white-list or block-list vehicles can trigger linkage alarm.

Add license plates by manual or batch import, unbind and export number plates, and set number plate expiry date for each number plate.

Supports binding of vehicle groups to lanes, after binding all vehicles in the vehicle group you will be given all access to the corresponding lane, and the valid time for access can be set.

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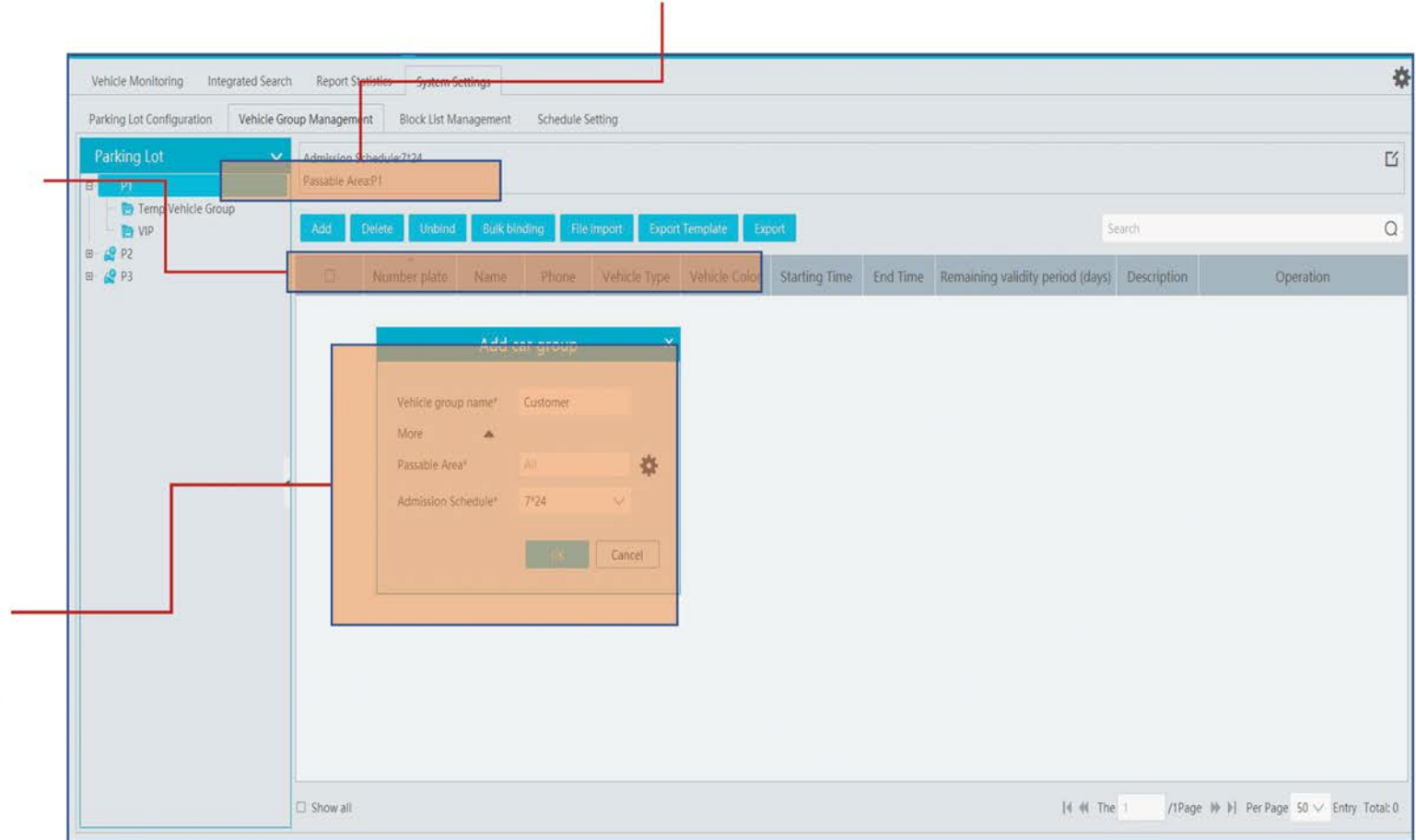
NVMS - Vehicle Monitoring

Display current vehicle information: license plate, parking type, vehicle type etc and captured photos.

Maximum 16-split preview.

Real-time display of comparison information and support for display based on filter conditions.

Display the remaining parking spaces.

NVMS - Integrated Search

Supports zoom in the captured license plate photos and download to local.

Supports search by setting filters such as start time, end time, license plate, vehicle type etc.

Supports playback when the license plate was captured.

NVMS - Report Statistics

Supports export report statistic in excel or image form.

Vehicle flow statistics of all parking lots can be searched and viewed via line chart, bar graph and pie chart.

Statistics can be generated on a daily, weekly, monthly or custom time basis.

NVMS - Search

NVMS - Alarm Linkage

TV WALL

Pop up liveview

Audio

Email

Boardcast

Record

Alarm out

PTZ