

PlateDSPTM

Vehicle License Plate Recognition System

Version 6 User Manual

- [PlateDSPTM Vehicle License Plate Recognition System V1] Issued officially in June, 2003, Software Copyright Registered Number: 2006SR00107
- [PlateDSPTM Vehicle License Plate Recognition System V2] Issued officially in June, 2005, Software Copyright Registered Number: 2006SR00108
- [PlateDSPTM Vehicle License Plate Recognition System V3] Issued officially in September, 2006, Software Copyright Registered Number: 2007SR03393
- [PlateDSPTM Vehicle License Plate Recognition System 2008] Issued officially in October, 2007
- [PlateDSPTM Vehicle License Plate Recognition System v5.0] Issued officially in October, 2008 Software Copyright Registered Number: 2008SR36708
- [PlateDSPTM Vehicle License Plate Recognition System v6.0] Issued officially in January, 2011
- [PlateDSPTM Vehicle License Plate Recognition System v6.1] Issued officially in February, 2012 SCRN: 2012SR061552

Standard: GA/T 833-2009

[PlateDSPTM Vehicle License Plate Recognition System]-It adopts the newest Digital Signal Processing (DSP) and dynamic object automatic follow technology, it can auto-identify image quickly and real-time including Vehicle License Plate auto-orientation, character division and character recognition. That's to say, the system is the fastest and most effective Commercial recognition software. The vehicles in the legend of this manual are not the vehicles which have offended against the traffic, they are only examples of the software interface.

The manual doesn't contain all the contents of PlateDSPTM Vehicle License Plate Recognition System. As for the modification about contents in the future; we will not inform the users of them separately. Please read the manual carefully and use it according to the explanation.

The final revision date is in 9/23 2014

中华人民共和国国家版权局
计算机软件著作权登记证书

证书号： 软著登字第0429588号

软件名称： 普利得PlateDSP车牌识别系统软件
[简称： PlateDSP]
V6.1

著作权人： 深圳市普利得软件开发有限公司

开发完成日期： 2012年02月01日

首次发表日期： 2012年02月01日

权利取得方式： 原始取得

权利范围： 全部权利

登记号： 2012SR061552

根据《计算机软件保护条例》和《计算机软件著作权登记办法》的规定，经中国版权保护中心审核，对以上事项予以登记。



No. 00142094



SHENZHEN PLATEDSP SOFTWARE DEVELOPMENT CO., LTD.

Website: www.PlateDSP.com

Tel: (+86) 0755-86219206, 96219209

Add: Room 1801, East Building, Nanshan Software Park, NO. 10128, Shennan Road, Nanshan District, Shenzhen City

SHENZHEN PLATEDSP SOFTWARE DEVELOPMENT CO., LTD.

www.PlateDSP.com

Catalog

Preface.....	1
Newly-added Items	2
Compatibility	3
Software Maintenance of the old editon	4
Introduction.....	4
Development Platform	4
Copyright Declaration.....	5
Authorization Permission.....	5
Android Runtime Environment.....	6
Linux Runtime Environment	6
Windows Runtime Environment	6
Installment Steps	7
Function Table.....	8
Recommended Hardware	9
Important Items About The High Definition Camera	10
Recommended Computer Configuration	11
Newly- applied Plan.....	12
Operation Explanation	14
Video Configuration.....	15
Recognition Parameters configuration	17
Character Training.....	18
Appendix A: Common Questions and Answers.....	19
Appendix B: The technic analysis of intelligent transportation product	21
Appendix C: Index	42
Appendix D: Construction Items	43
Camera Requirement.....	43
Capture Card	43
Block Entrance System	44
Charging system.....	44
Mobile Checking Vehicles System.....	44

Preface

Our company's first edition recognition software *PlateDSP™ Vehicle License Plate Recognition System* has entered the market officially in June, 2003. After several years, it has made great progress, especially in the market of the mobile electronic police system and so on, which requires the product is highly real-time, our software surpasses its similar products obviously and owns the public praise. According to users' feedback, as well as the requirement of the technological innovation, our company has developed *PlateDSP™ Vehicle License Plate Recognition System V6*.

At present, in the aspect of the vehicle license plate recognition, other products mostly use the Triggering or the Mobility Detect to capture a picture and carry on the recognition, which belongs to the single frame pattern recognition. As for a project, it has only one opportunity to recognise the object. Obviously, this method has many disadvantages.

The effect on the picture from the Trigger: In the multi-tasking system of the Windows, the delay of task switching is not very steady, from the practical measuring, we find that the time ranges from zero to hundreds of milliseconds. When the CPU is made better of, the delay of task switching will be longer. But the rate of CPU utilization of video device is often very high. Actually, the trigger examines I/O by task query, when the condition given before is satisfied, the system can timely catch the image. Because of the delay from the change of I/O to the device detection, the picture may not be the clearest one, when the vehicle is very fast, this situation will be especially obvious.

Triggering is not suitable for the vehicles inspection: Generally, the vehicles inspection should not limit the speed of the moving vehicle; otherwise, it must have an effect on the traffic. In the situation of the high-speed vehicle, the camera will take only one clear picture, others will be blurry. Because of the indefinite delay of task switching and the different types of the vehicle and so on, the picture taken by trigger will often not be the clearest, which must inevitably affect the accuracy of the vehicle license plate recognition.

Limitations in Mobility Detect technology: When the change about the image gets to a certain, the control system will complete capturing and recognising the image, this kind of Mobility Detect technology will bring many serious limitations in the speed of the vehicles. For example, vehicles must not be too fast or too slow, otherwise, the undetected rate is very high. The shadow of something, the twittering of the branches and the automotive engine system as a result of running will lead to a wrong detection. Even if it can detect the vehicles correctly, its location is not the clearest one. When the traffic is very heavy, the missed detection is very obvious. In practice, there are too much garbage records, the workload of proofreading is very heavy, and so the recognition is not ideal. It does not have any practical value at all. It is not reliable that the system can be used in the running police wagon. Because the image is twittering, that is always equal to a moving object.

If the recognition system identifies each image and finds the best one automatically, it is better than to put all our stakes on one picture, by this way, we can improve the efficiency of the capturing and recognizing. Besides, it can simplify our project. *PlateDSP Vehicle License Plate Recognition System V6* is just based on this mind and adopts high-speed recognition algorithm core to recognise the video by frame and frame, that is to say, it identifies one vehicle for many times, and then we come over many flaws in other available technologies. Using many continuous frames, at the point of

the project, its successful opportunities are more than by depending on one frame. It is because that the consecutive captured images conclude those images about different angles and different light conditions, all the effects are not the same. In theory, as long as there is one clear picture, we can get a good result of recognising. The edition V6 introduces an advanced technology of target tracking and the way of adopting the best result and so on, so as to make sure of recognising a series of plates in the vehicles stream.

If we need recognise ever frame of video, we must introduce the high-speed and efficient recognition algorithm, otherwise, it will not be practical at all. As for a common image (768 by 288), our system can finish recognizing it in from 3 to 10 milliseconds and adopt the real-time recognising plan by one computer with 16 groups.

Newly-added Items

[PlateDSP™ Vehicle License Plate Recognition System V6.0] added and modified functions:

- Improve the fast localication plates,can adapt several goal plates in the high definition pictures.
- Provide OCX on the windows platform and DLL auto-database API transfer connection.
- Provide SO shall-database API transfer connection on Linux platform.
- Add the effective user's picture buffer connection.
- Support the memory recognition in BMP/JPG/BAYER/YUV.
- Support 4.0 the latest TIANMIN VC series capture card.
- Support ADLINK series vedio capture card.
- Support ALLIED VISION (PROSILICA) 5-million high definition camera the real-time recognition.(15 frame/s) (15frame/s) .
- Support BASLER Vision Tenchnologies AG.5-million high definition camera the real-time recognition.(17.5frame/s).
- Support beijing vision tailor technology CO.,Ltd 200/500-million high definition camera the real-time recognition(25frameJPG/s).

[PlateDSP™ Vehicle License Plate Recognition System V6.1] added and modified functions:

- Vehicle outline trajectory vedio tracking,convenient to capture the unlicensed vehicles or disorderly change line vehicles.
- Tractic light signal vedio auto-detection.

[PlateDSP™ Vehicle License Plate Recognition System V6.2] added and modified functions:

- Using ffmpeg library supports most video files and RTSP standard network video streams.

[PlateDSP™ Vehicle License Plate Recognition System V5.0] added and modified functions:

- Improve the fast artificial intelligence algorithm, enhance largely the veracity of one-frame recognition of picture and multi-frame recognition of successive video flow

[PlateDSP™ Vehicle License Plate Recognition System 2008] added and modified functions:

- Support recognising high definition pictures

- Directly support Beijing Daheng/Beijing Microview real-time high definition CCD digital camera recognition (15-30 frame/s).
- Support auto-tracking the maximum 4 goals (plates) in one picture
- Directly support BEIJING JOINHOPE IMAGE OK series capture card and 10Moons VC series capture card
- Real-time multichannel recognising is faster and more accurate

[PlateDSP™ Vehicle License Plate Recognition System V3] added and modified functions:

- Use the newest fast algorithm and enhance the rate of recognition and capturing largely
- Provide notices with running vehicles and characters to us, which can be better in weak light to capture the image
- Provide us with the notices which can show there are some vehicles out-of-bounds, so that applications can process the current records faster
- Practical plate statistics built-in filtering functions and events.
- Provide the video with the function of checking the speed for some specific applications.
- Save multi-thread image file and make better use of CPU.
- Provide the functions of capturing picture which can be traced again to facilitate the development and application of the running red light system

[PlateDSP™ Vehicle License Plate Recognition System V2] added and modified functions:

- Additional intelligent vehicle license automatic tracking ,can recognise the direction of running vehicles ,which can help the applications in one –roadway and two- car stream
- Combined well with the video so as to help the user develop the advanced hard disk video record system(DVR)with the function of auto-retrieving vehicle license plate.
- The perfect function of video replaying may replay by frame and frame and capture pictures so as to get the picture evidence in record
- The additional function of character overlapping can lowlap the characters in the captured pictures and the video records
- Besides auto-supporting the DirectShow video device, it can also support Haheng and Microview Imavision Video Series. For the Daheng video card, the system can optimize specially its function. When it is continuous, the rate of CPU utilization is extremely low.
- It contains built-in GDI+ and also supports the system to recognise and save *.BMP/*.JPEG
- More convenient and more reliable for application encryption.
- The width of the vehicle plate can be displayed real-timely so as to help put the project into practice

Compatibility

Compatible with [PlateDSP™ Vehicle License Plate Recognition System V2/V3/V3.5/V5.0]:

- Provide the programmes of the PlateDSP.V6.ocx outer -calling V6 and needn't compile, but binary system supports all the programmes of the old edition
- Add some useful functions so that it can help improve the source codes of old programme

- Not support the recogniyon and saving files in GIF/PNG/TIFF.
- Compatible with [PlateDSP™ Vehicle License Plate Recognition System V1]:
- Not compat with V1.

Software Maintenance of the old editon

In order to be responsible to our users, we will continue to maintain the old edition software. For new customers, we specially suggest that you should develop the application software based on the newest edition-[*PlateDSP™ Vehicle License Plate Recognition System V6*]

Introduction

[*PlateDSP™ Vehicle License Plate Recognition System V6*] is developed based on the component technology of Microsoft ActiveX (OCX), it is an open middle component and all its interfaces are open. It supports most of the popular development platforms nowadays, which will help developers integrate applications. The main characteristics of *PlateDSP™ Vehicle License Plate Recognition System* are fast and real-time to recognise each frame effectively. Because it can fast recognise the image. It is possible to realize the applications which can't be achieved before, what's more, some unideal instances have been improved.

[*PlateDSP™ Vehicle License Plate Recognition System V6*] supports the vedio device based on the technology of Microsoft and DirectShow as well as some Video capture cards and cameras, and run on Windows 2000 or their higher platforms and Linux 2.6 platforms. *PlateDSP™ Vehicle License Plate Recognition System* supports for the majority of WDM Driver programme capturing cards in the current market, 1394 and DV device connected with USB and so on, supports for a multi-card machines, supports recognizing the memory bitmap, supports recognising and saving *.BMP and *.JPG and so something, supports for repalying and recognising the video file such as *.AVI, *.MPG, *.WMV and supports saving the pieces of the *.AVI compressed strongly from MPEG4

Development Platform

[*PlateDSP™ Vehicle License Plate Recognition System V6*] is developed based on the component technology of Microsoft ActiveX (OCX) and supports the development platforms of current popular x86 of Windows, for example:

Microsoft Visual C++ 6
Microsoft Visual Basic 6
Microsoft Visual C++.NET 2003 / 2005/2008
Microsoft Visual C#.NET 2003 / 2005/2008
Microsoft Visual VB.NET 2003 / 2005/2008
Borland C++ Builder 6

Borland Delphi 7
Java (JDK1.6)
PowerBuilder, Foxbase, ASP and so on

The latest platform and database run on x86 linux:
GCC / GTK / QT

ARMV7A Android 4.0+ / SDK14+ / NDK8+

Copyright Declaration

[PlateDSP™ Vehicle License Plate Recognition System V6] is protected by copyright law and prohibits any illegal copying and reverse engineering. The softdog protection and authorization of the Recognition software are provided by SHENZHEN PLATEDSP SOFTWARE DEVELOPMENT CO., LTD, it forbids any non-authorized recognition software in the commerce

If your softdog is lost, our company will not make up it for you.



Schematic drawings of using the softdog of the [PlateDSP™ Vehicle License Plate Recognition System V6.0]

Authorization Permission

It is necessary to get the product permission that you must agree with all the items in the agreement and here any supplement or the special permission. If you do not agree all the items in the agreement, please return the product to my company in three days. If you have used the software, it would indicate that you had agreed with all the constraints in the agreement.

Award you the authority of using permission. You can copy the software in disk for backuping for important files and can embed the software, which is provided by our compay according to this manual, into your programme in order to integrate your software.

Except the authorities awarded above, you can not duplicate, modify, do any reverse engineering, decompose, recompose all or some parts of this product and can not sell, lease, approbate, attorn dispense all or some parts of our product and authorities in the agreement.

There is not any assurance which is clear or suggestive or some other forms, it includes but not only restricted in the sale and specific use.

In any case, in despite of any responsibility *according to any* theory, our company will not be charged with the loss that you use or can not use the product. It concludes: data loss, the loss of your profit or other special, accidental, followed, sequential or indirect loss.

All the products (software, manual and other materials followed with the product) , the ownership of doing backups and copyright belong to SHENZHEN PLATEDSP SOFTWARE DEVELOPMENT CO., LTD.

If you violate any item above, the agreement will be invalid automatically.

Other products and company's names involved in the manual may be the trademarks of the respective owner

Android Runtime Environment

ARMV7a (Cortex A8 +)

Android 4.0 +

Linux Runtime Environment

Intel P4 CPU 1.5GHz + 256MB + 1GB-HD

Ubuntu 10.04 / 12.04

Fedora 14/15

CentOS 6

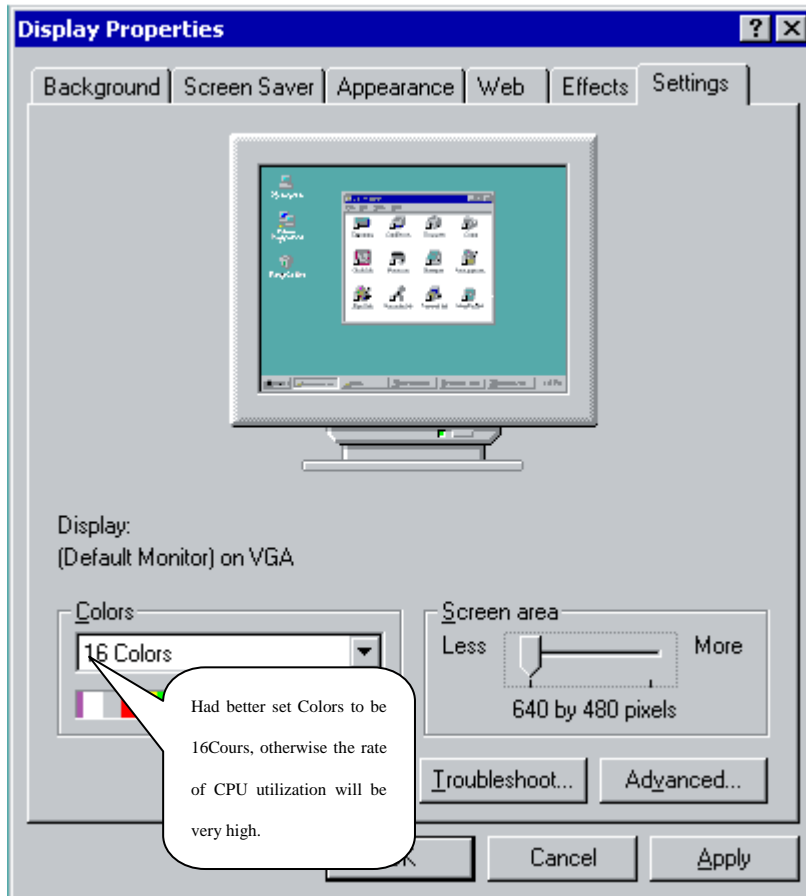
Windows Runtime Environment

Intel P4 CPU 1.5GHz + 256MB + 1GB-HD

Microsoft Windows 2000 / Windows XP + DirectX 9.0

GDI+ interface programme (GdiPlus.dll)

Graphics card had better be independent and you had better set Colors to be 16Colors so that the rate of CPU utilization will not be too high.



Graphics Card Colors configuration

Installment Steps

- First: setup software softdog driver (Demonstration Edition needn't)
- Second: insert USB software softdog into your computer (Demonstration Edition needn't)
- Third: setup [PlateDSP™ Vehicle License Plate Recognition System 6]
- Fourth: setup DirectX 9.0

Function Table

Recognition software concludes the demonstration edition and official edition, their running files are different. Codes of the former are not integrated. When the software is running, the characters *demonstration edition* will be showed in the message text.

Main functions	Official Edition	Demonstration Edition
Use OCX component technology and support redevelopment of multiple platforms	√	√
Including video device compatible with DirectShow technology	√	√
Including video device compatible with Video for linux 4	√	√
Including video capture card of Daheng, Microview and JOINHOPE	√	√
Support identifying High Definition Images	√	√
Identify every frame fast and real-timly (the time is less than 10 ms)	√	√
Support identifying the directions of moving vehicle	√	X
Support measuring the speed of moving vehicle	√	X
Support vehicle mobility detection	√	X
Including the notices of vehicle outside	√	X
With built-in the practical plate auto-counting filter	√	X
Plate auto-orientation	√	√
Identify the plate with Chinese character and the color of the plate	√	√
Identify the color of the vehicle	√	X
Identify *.BMP/*.JPG/*.	√	√
Save *.BMP/*.JPG/*	√	X
Replay and identify the *.AVI/*.WMV/*.MPG/*.ASF	√	√
Save the *.AVI compressed by MPEG4	√	X
Identify memory *. BMP/JPG/YUV/BAYER	√	√
Character training	X	X
Application encryption	√	X
Support applying multiple components at one time	√	√
Vehicle outline trajectory video tracking	√	√
Tractive light signal video detection	√	√
The recognition rate of all the characters of video stream	97%	97%
Restrictions about the date and times of identifying	no	more restrictions
Video source at most managed by one computer	1--16 pieces of source	4 pieces of source
Identify the marker of operation vehicle	customization	no

Note1: Intel P4 1.5GHz CPU + 256MB memory + 20GB-HD + NVIDIA RIVA TNT2 Graphics Card, IBM compatible computer; Windows XP operating system; VT210 (bt878) video capture card, PAL_D Mode, 720x288x16 bit. It recognises every frame.
 SHENZHEN PLATEDSP SOFTWARE DEVELOPMENT CO., LTD. Page 8 www.PlateDSP.com

Note2:The characters which can be identified include numbers (0 to 9), letters (A to Z), Chinese characters

Note3:The Android version didn't support AVI play and DVR functions.

Recommended Hardware

Capture card:

- ✓ Daheng Imavision Video series CG300(one-source video capture card);QP300 、VT142(four-source video capture card)and so on
- Beijing Microview V110(one-source video capture card);V400、 V411、 V410E(four-sdource video capture card)and so on
- AverMedia EZ-capture878 Video Capture card (the driver of 2.7 edition supports multiple cards on one computer
- VSTAR、 VT-210 and so on bt878 video capture card
- Fishview PHILIPS 7130 TV Receiving Card
- BEIJING JOINHOPE OK Series Capture card
- 10Moons VC Series capture card (you must copy the relevant *.DLL into the system or the directory of applications, otherwise you can not open the device)
- ADLINK series capture card

Camera / DV:

- SANYO:VCC-6572P/6574P Camera, the electronic shutter can be adjusted
- panasonic:WV-CP430 Camera,the electronic shutter can be adjusted
- ✓ BAXALL:CDX9714 Camera,the electronic shutter can be adjusted,strong light auto-reversing(better at night).
- ✓ SONY:SONY480AP integration Camera
- Panasonic NV-DS88 Digital Video Camera (the electronic shutter can be adjusted and followed by 1394 interface and simulation video interface)

High Definition Camera:

- Beijing Daheng CCD high definition DH-SV1310FC(weak light),1394 interface, 1280 by 1024,15 frames/s
- Beijing Daheng CCD high definition DH-SV1410GC, kilomega network interface, 1280 by 1024,15 frames/s
- Beijing Microview CCD high definition MVC900DAC-GE30,kilomega network interface, 1392 by 1036,30frames/s
- Beijing Microview CCD high definition MVC900DAC-GE15,kilomega network interface , 1392 by 1036,15frames/s
- (you must copy the related *.DLL into the system or the directory of applications, otherwise you can not open the device. If your Network Interface Card is not Intel series, please set IP to be 192.168.1.xxx or192.168.0.xxx)

ALLIED VISION TECHNOLOGIES (PROSILICA) high definition GC2450C,kilomega network interface,2448 by 2050,15 frame/s(you must copy the related *.DLL into the system or the directory of applications, otherwise you can not open the device.)

BASLER VISION TECHNOLOGIES AG. High definition piA2400-17gc, kilomega network interface,2448 by 2050,17.5 frame/s

Beijing vision tailor technology Co.,Ltd. High definition W5000M,hundredmega network,2592*1920,10 frames/s.

Beijing vision tailor technology Co.,Ltd. High definition W2000D,hunderdmega network ,1600*1216,25frames/s.

(you must copy the related *.DLL into the system or the directory of applications, otherwise you can not open the device).

Important Items About The High Definition Camera

The high definition camera needs strong CPU and large memory space when it is recognising something real-timely, so we suggest using double -core CPU, momory should be 1G or larger.

In order to improve the speed of processing, you should limit the area of recognising (you can use the dialogbox to realize recognition configuration and also can call the setRecogCfgRange).

If the plate is very large, you can update the default values in your system, for example:

```
setRecogCfgPlateMaxWidth (255); //default:220
setRecogCfgPlateMinWidth ( 100); // default:80
setRecogCfgPlateMaxHeight (80); // default:60
setRecogCfgPlateMinHeight (30); // default:20
```

Recommended Computer Configuration

■ Recommended Configuration about notebook computer

source	computer	Capture card
1	Celeron CPU 1.4GHz 256MB Memory	AverMedia Cardbus notebook computer special capture card or IEEE1394 Interface DV or USB2.0 video capturing box
2	P4 CPU 1.7G 256MB Memory	AverMedia Cardbus notebook computer special capturing and USB2.0 video capturing box

■ Recommended Configuration about desktop computer

source	computer	Capture card
1- source	Celeron CPU 1.7GHz 256MB Memory	AverMedia EZ-capture878, Beijing Microview V110 or DH-CG300
2- source	P4 CPU 2.0G 256MB Memory Independent Graphics card	2 pieces AverMedia EZ-capture878 (2.7edition Dvier) or 2 pieces Beijing Microview V110 or 2 pieces DH-CG300
3- source	P4 CPU 2.0G 512MB Memory Independent Graphics card	3 pieces Beijing Microview V110 or 3 pieces DH-CG300
4- source	P4 CPU 2.0G 512MB Memory Independent Graphics card	Beijing Microview V400、V411 or DH-QP300
8- source	P4H CPU 3.0G 1GB Memory PCI-E Bus Independent Graphics card	2 pieces DH-VT142 or 2 pieces Beijing Microview V410E
12- source	P4H CPU 3.0G 1GB Memory PCI + PCI- E Bus Independent Graphics card	1 pieces DH-QP300 + 2 pieces DH-VT142 or Beijing Microview 1 pieces V400/V411 + 2 pieces V410E

If your signals of video are more than 4 pieces, you had better use super-thread or double-core CPU.

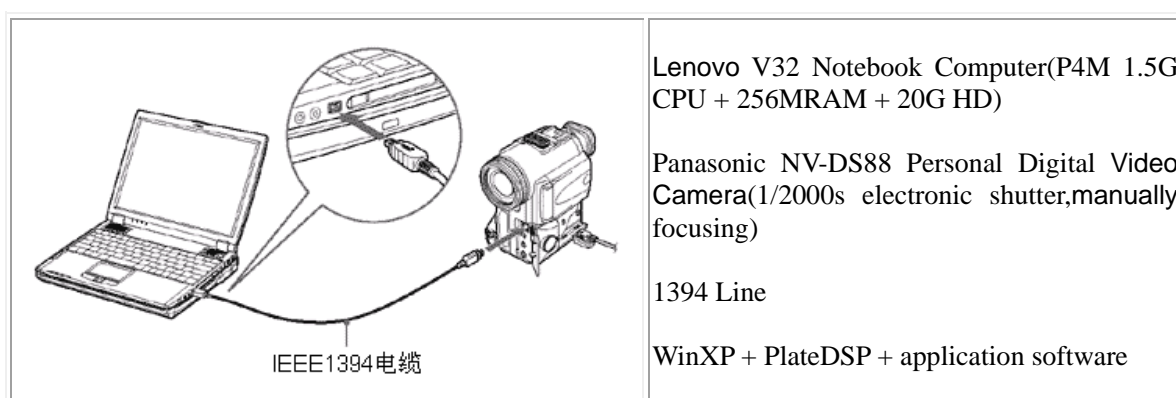
Newly- applied Plan

The plate recognition is a crucial step in the Intelligent Transportation System (ITS). Seen from the development for some decades and the present situation, every algorithm has its advantages and disadvantages and can not solve every problem in the actual operation. But, in any case, our final purpose is to satisfy the practical demand in the market

Looking from the feedback of customers, nowadays, many users wouldn't like to use any trigger device (For example, earth-sense- car- check --the device is hard to construct and maintain, what's more, the capability of this kind of device to be covered up is very weak). Customers can not believe in the technology of video mobile detection (wrong detection and the high rate of missed detection and un integrity of plate capturing). Taking this into consideration, we have introduced the *PlateDSP™ Vehicle License Plate Recognition System* which is the first design in the market and needs only 10 milliseconds to recognise the images real-timely by frame and frame. Owing to its high rate and high speed of recognition, we have got the support of many integrators of mobile electron police system in no time. Now we have introduced a higher efficiency system *PlateDSP™ Vehicle License Plate Recognition System V6*, it can finish recognising the video of multi-source 768x288 on one computer real-timely by frame and frame in order to meet the users' higher demand.

We all know, in the practice, we have more successful opportunities in recognising a number of pictures than in recognising one picture. It is because that we can get different angles, different intensities of light and different recognition results from the continuous captured pictures. If the recognition system can find automatically the best picture, it is better than only depending on one picture. However, the application needs the support of very fast recognition products; otherwise, it is only one bushwa that we must achieve the real-time recognition. For the application development engineer, the logic of the programmes is more complex than before, but if you want better performance, it is worthwhile to pay a little for it.

The simplest system configuration:



Seen from the changes in the market, a few types of products below which do not use the trigger devices will develop faster than others, as follows:

Blacklist alarm video record system: This product can be integrated into a computer on 2 to 4 channels to complete the real-time recognition, 1 to 2 channels digital video record. Its main function is to complete blacklist network alarm, panoramic images for continuous video record and so on. It is suitable for the public security system to inspect the black car.

Overspeed automatic recognition capture video record system: Because nowadays the mobile electronic police system, bayonet system and DVR hard disk video record system are mutual harmonious, such integrative products, by a computer, can complete real-time recognition with 1 to 4 channels, digital video record with 1 to 2 channels and check the speed by selecting the laser or radar. Its main function is to complete blacklist network alarm, overspeedily capturing pictures automatically, panoramic images for continuous video recording and so on. It is suitable for the traffic police department to get the evidence of overspeed vehicles and inspect the black car.

Run the red light automatic recognition bayonet system: By one computer, it can complete multi-source real-time recognition. If there are some results, the pictures will be saved. If the blacklist exits, it will give an alarm. Under the circumstances of the valid red light, if there are recognition results, the vehicles will be considered to have offended the traffic

Run the red light automatic recognition system: By one computer, it can complete multi-source real-time recognition (due to alternating red light, the system can switch the images of adjacent lanes, so our system can actually recognise the double lanes). Once the red light is effective, the recognition system is activated and all the running vehicles will be automatically identified, and then the system will capture images of vehicles illegally.

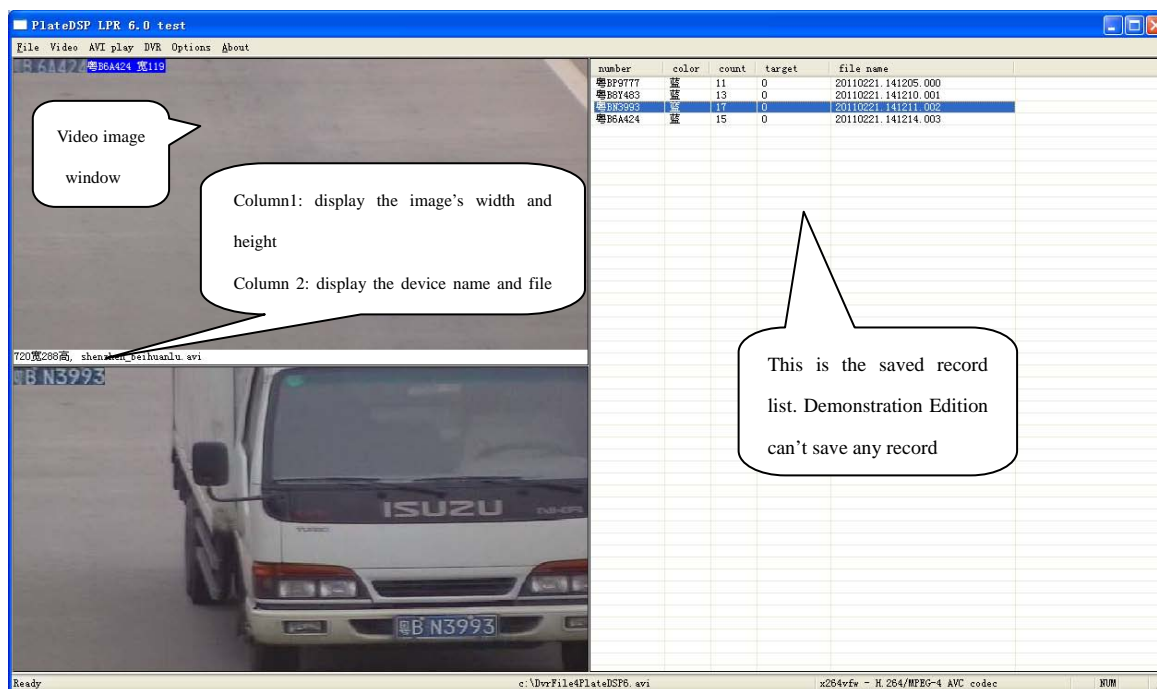
Escaping from being charged for the toll automatic recognition video record evidence system: By one computer, it can complete two-way real-time recognition and the four-way digital video record. Once the incident happens, video record will be immediately activated. Its main function is to complete blacklist alarm, video record about escaping from being charged for the toll. It is suitable for open toll stations.

Recognition Server: By one computer, it can complete multi-source real-time recognition, all pictures are sent by fiber or network to centre computer room, a large enough network Server is composed of all the recognition computers to inspect all vehicles passing. If there is a blacklist, immediately, the system will give an alarm.

Operation Explanation

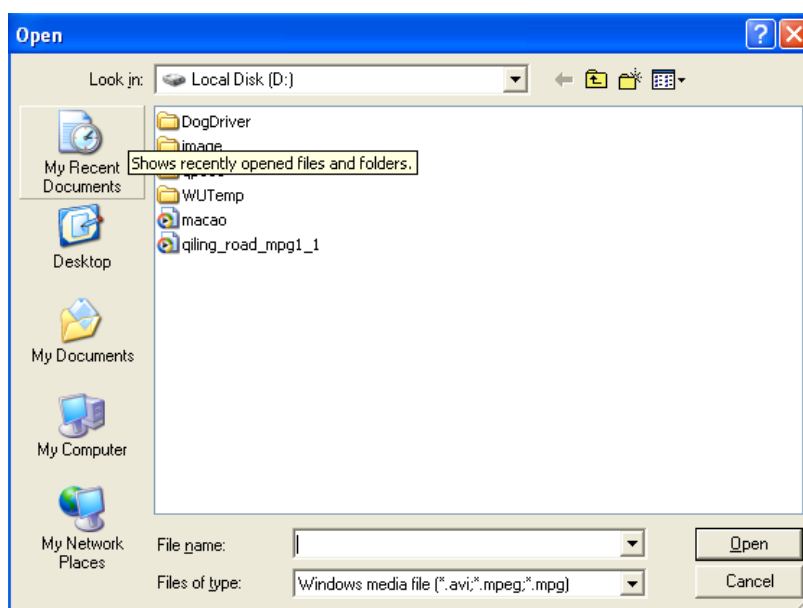
The chart below is the test programme's interface of the *PlateDSP™ recognition System V6*, and now we will make elaborate introduction in order to make the users to master its essentials as soon as possible.

The programmes are mainly used for the user of official edition to test the software .

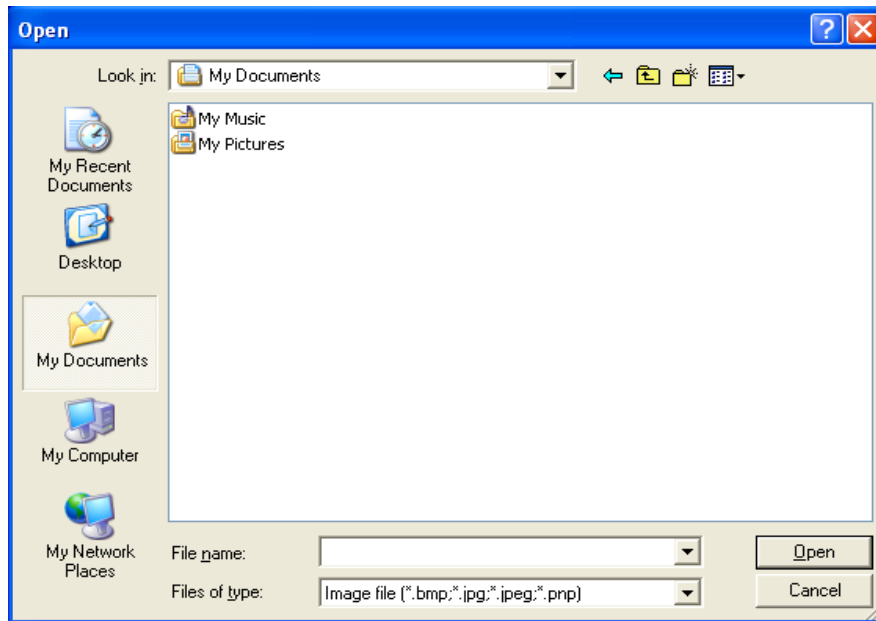


TestAll.exe

Select the menu item *File/ AVI/MPG File*, you can open a video file and recognise it



Select the menu item *File /BMP/JPG File*, you can open a picture and recognise it.

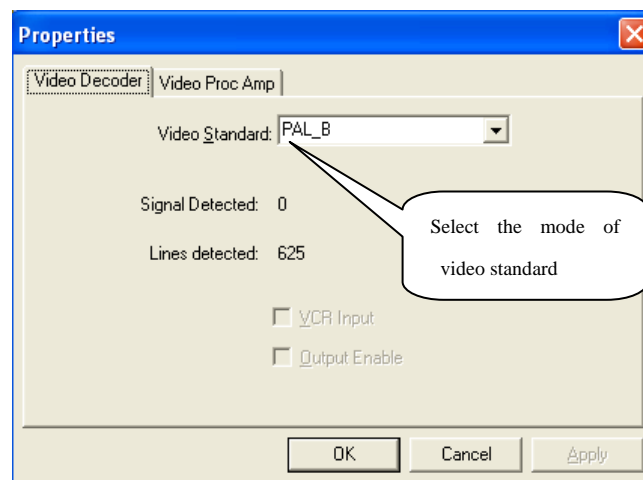


Select the menu item *File /Clear all records*, you can clear all records saved before.

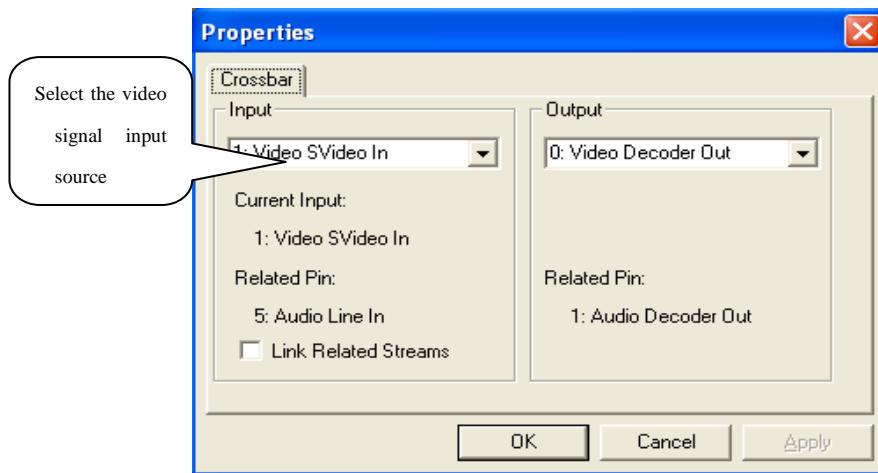
Video Configuration

If you open a video device successfully, the real-time video signal will be showed in the image window of PlateDSP controls and the device can be set up. Three buttons –Display setting, Source setting and Format setting –can call three different dialogs of video device(some devices dialog' functions can be overlapped).

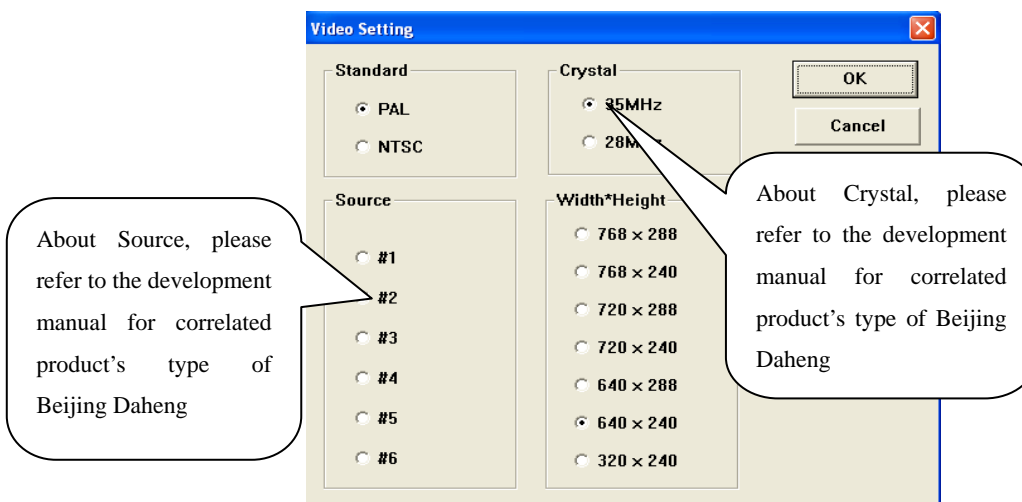
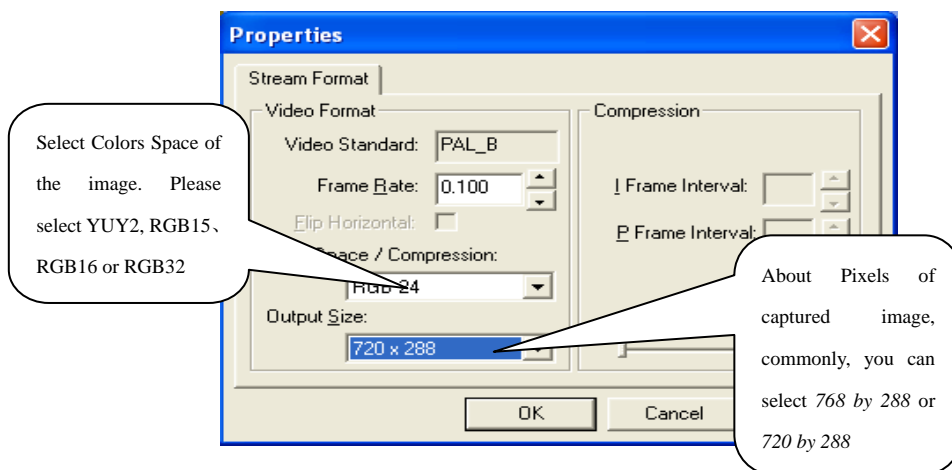
Select the menu item *Video / Display setting*, you can open a dialog which shows display setting video device.



Select the menu item *Video / Source setting* can open a dialog by which you can select source setting of video device.



Select the menu item *Video / Format setting*, you can open a dialog by which you can select the format setting of video device.



Recognition Parameters configuration

Select the menu item *Recogniton/Recog Setting* and you can open the following dialog. This dialog can help mainly set up some parameters related to the recognition.

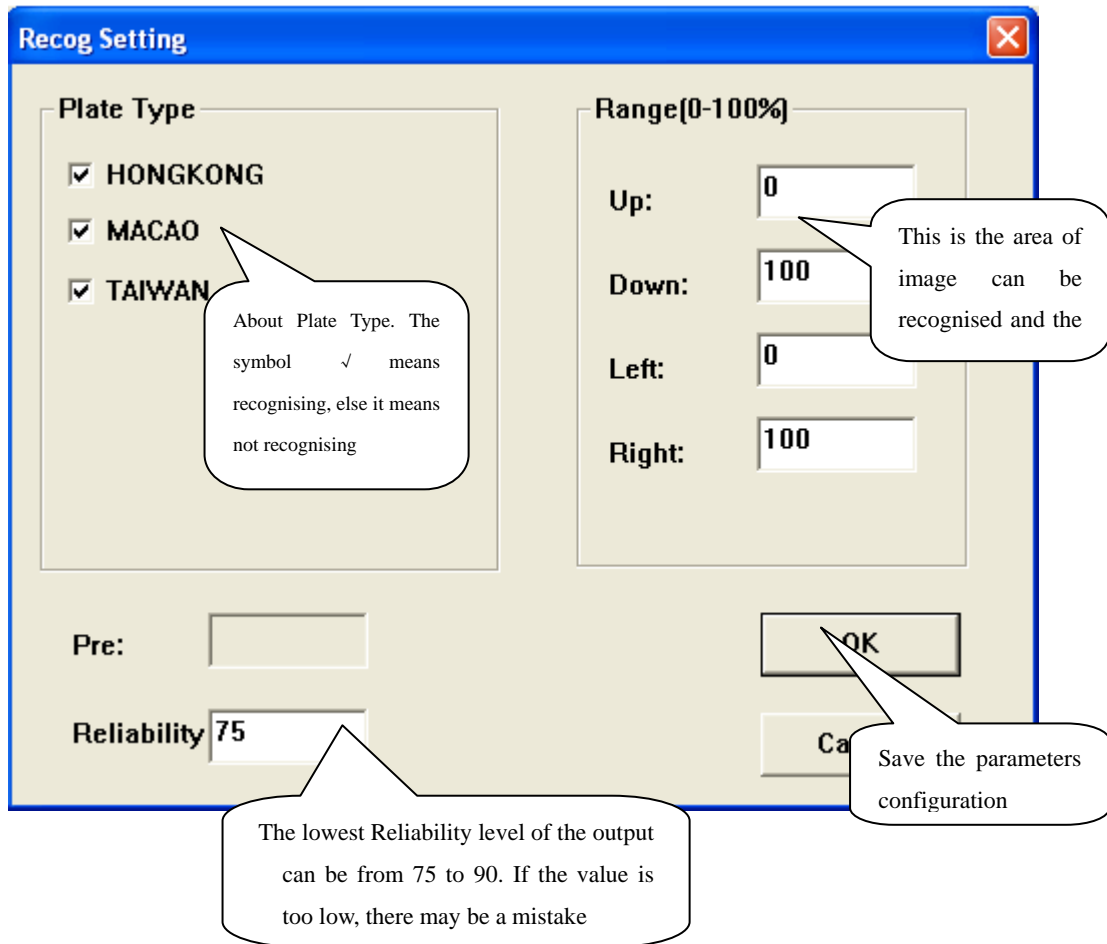











Plate templates in Mainland of China	The relevant picture
Civil License Plate (92 edition)	
Civil Freight Vehicle Rear License Plate(single row)	
Civil License Plate(2002 individuation)	

Police Cars License Plate(*police)	
Armed Police License Plate(WJ*, 2007edition)	
Military License Plate(2004 edition)	

Others License plate templates	The relevant picture
Hongkong	
Macao	
Taiwan	
Brazil	
Nigeria	
Equatorial Guinea	

Relevant plate template

Character Training

Because the version V5/V6 introduces a new fast artificial intelligence algorithm, but the algorithm of character training is very slow and the training may take dozens of hours for a time, and its process is very complicated and difficult for the users. So beginning from the version V5, our company will not provide the interface of character training. But if you need it indeed, please send us the pictures or videos with the vehicle license plate characters and we will be glad to offer you our services.

Appendix A: Common Questions and Answers

The effect on the recognition from the image

Only when the image focus is clear, can the recognition be satisfying. When the plate in the image is 150 x 40, characters are not easy to be conglomerated and helpful for division. After being divided their characteristic will be more obvious and this will help recognise the image.

The effect on the image from the speed

In China, the PAL video standard system provides 25 frames/s (for each frame, the interval between frames is 40 milliseconds). The depth of field of camera lens (the image is clear) is 1.0m. for the speed of 90 km/h ($0.001 * 3600 / 0.04 = 90$), the camera can only capture one clear frame. In order to get clearer images, we should increase the depth of field. The specific method is that the camera lens must be larger and the size of CCD camera must be smaller.

The effect on the image from the trigger

In the multi-tasking system of Windows, the delay of task switching is extremely steady. After our practical measuring, we find the delay ranges from 0 to hundreds of milliseconds and when the rate of CPU utilization is high, the time of switching is very long. However, the rate of CPU utilization in the video application system is very high. Trigger, in fact, is a device which uses task query to inspect the status of I/O, when it reaches the given condition, the system will capture the image. Owing to some delays from changing of I/O to inspecting, the image may be not the clearest. When the speed is higher, the situation will be more prominent.

The effect on the image from the vehicle model

Whether to use the earth induction coils or infrared trigger, the impact is obvious. For carts and trolleys even all in the low speed, their trigger location may be more than 0.5 meters. If more than 1m, the image which we get at last may not be the clearest

Why the trigger is not applied to vehicle detection?

Generally, vehicle detection should not limit the speed of moving vehicle, otherwise, it will affect the traffic and its imperceptibility is not very good. From the above analysis, for the speed of 72-90 km/h, our camera can only get one clear image. Because of the uncertain delay of task switching and different vehicle models, the image captured by the trigger is often not the clearest, which is bound to affect the accuracy of plate recognition.

Why not use Mobility Detect technology?

When the change in the image gets to a certain, the control system will finish capturing and recognising the image, the Mobility Detect technology confines the speed greatly, the vehicle can be not too fast or too slow. In general, it is only suitable for 5 to 20 km/h, otherwise, the rate of missing detection will be very high. The shadow of light, the twittering of the branches and automotive engine system all lead to wrong detection. Even if it can detect correctly the number, their positions may not be

the best clear ones. When the traffic is busy, the missing detection even is more obvious.

In practice, the effect is not ideal and there is no practical value at all. Such a system can not be used in the moving police wagon, because the image is always twittering, that is to say, there is always a moving object. Some systems, a certain extent, may deal with the phenomenon, but it is only an improvement, the fact can not be avoided at all.

Why we need the high-speed recognition?

On urban road and national highway, the speed of vehicles is commonly from 0 to 80 km/h. The practical vehicle detection application system should reach the level and can not be confined. At the speed of 80 km/h, the camera only gets one clear frame. In order to capture accurately the image, the only way is to capture and recognise every frame, which calls for the delay of capturing and recognising is over 40 milliseconds. In order to make sure of normal operation of Windows, we have to cut down the delay to less than 20ms

Detection method used by PlateDSP

PlateDSP recognition system can recognise the real-time image video stream (PAL 25 frames/s), the delay of recognising a frame is less than 10 milliseconds.

Recognition speed of PlateDSP

Test Platform:

Intel P4 1.5GHz CPU + 256MB memory +20GB-HD + NVIDIA RIVA TNT2 Graphics card+IBM compatible

Windows XP operating system;

For the video stream of 768 x288x16 bit color, PlateDSP introduces fast recognition algorithm, its recognition speed is higher than 10 milliseconds/frame and the system uses Daheng CG300 video capture card to test it. When it is continuous, the rate of CPU utilization will be less than 5%.

For *.JPG recognition, PlateDSP introduces different accurate recognition algorithms, the average delay is about 40 milliseconds for a time

The number of videos supported by the PlateDSP on the one-computer

According to the test results:

P4 CPU 2.4 / PCI bus, no more than 4 channels 768 by 288 real-time recognition.

P4 CPU 3.0H / PCI-E bus, more than 8 channels 768 by 288 real-time recognition.

P4 CPU 2.2 double-core/PCI-E bus,16channels 768 by 288 real-time recognition.

Storage time of Picture

For a *.JPG (720 by 288), a picture of 100% quality takes about 60 mS, 90% quality about 40 mS, a *.BMP about 20 mS (Intel P4 1.5GHz CPU + 256MB memory). When you save the file, there may be a video standstill, so you had better use the thread to keep it

The recognition rate of PlateDSP

Briefly, it is not very significant, because the relation of recognition rate and the quality of image is most important. When the plate is about 150 by 40, the image focusing is clear, the obliquity is less than 10 degrees and when the characters are far from being conglutinated, the recognition rate of video stream is better than 97%.

Appendix B: The technic analysis of intelligent transportation product

This text selection from Beijing Song Keran “Intelligent Transportation Product Present situation And technical Analysis”,agreed after the author,has made the part deletion,the revision and the arrangement.

■ Foreword

Intelligent transportation system is to persue safe,comfortable and unimpeded transportation enviornment ,through the most advanced message communication technology,the transportstion system which make the human,the path and the autocar into a whole one.In the process of this system development,it’s a essential important ink for improving.

On May 1st,2004,our country has promulgated “Transportation Law”,cause the transportation government to have legal support,regarding the establishment and maintenance good traffic order,,safeguarded the path has played the positive promoter action.Chinese road transportation system is so board,the police forces fall behind its so far.,the law enforcement needs the reliable evidence.Therefore,the technical strong police,wants the police forces to the science and technology to be imperative.Under such demand, the product applies the high tech method should be potential to live.The using of the product decrease the rate of accident and the mortality ,meanwhile,the traffic orer is improved different level.Because the intelligent transportation is a new industry in our world,the product is also the collection of many technology,such as computer,communication,human intelligence, vidicon,character identify,sensor and so on.Some developed countries have developed in this area for years,so they can provide experience for some products.Although,because of the differences of the situation of countries,the laws and regulations ,the execute factors are different.Thus it needs us to made high-tech products meet ourself.Though the domestic product research and development application's time is not long, after earnest comparison, analysis discovered that overseas certain products in many aspect aren’t as well as domestic excellent product.Outstanding product occupies after all the proportion is very small, the domestic numerous product has many questions.

■ Radar

At present, the user requests to the use Doppler velocity radar's function basically for the following several spots:

- 1) speed determination
- 2) the same/different direction speed discrimination
- 3) Dynamic,static measuring
- 4) The detect distance can be moved

However, many radars only then measured that the fast function does not have other basic functions. Through draws the conclusion to the User departments feedback opinion's analysis: Cocurrent, different to speed discrimination function energy, the tendency, the static state measured that the fast function is essential to the user. If the radar only has measured that the fast basic function will cause the radar related product application to receive the enormous limit, or will have

the grave mistake data. Below in view of the migration measured that the fast equipment (popular name “mobile electron police”) and measured fixedly the fast equipment (“fixed point radar measured fast system”) explained..

1. The dynamic, the static state measured that the fast function can increase the migration to measure the fast equipment's use flexibility:

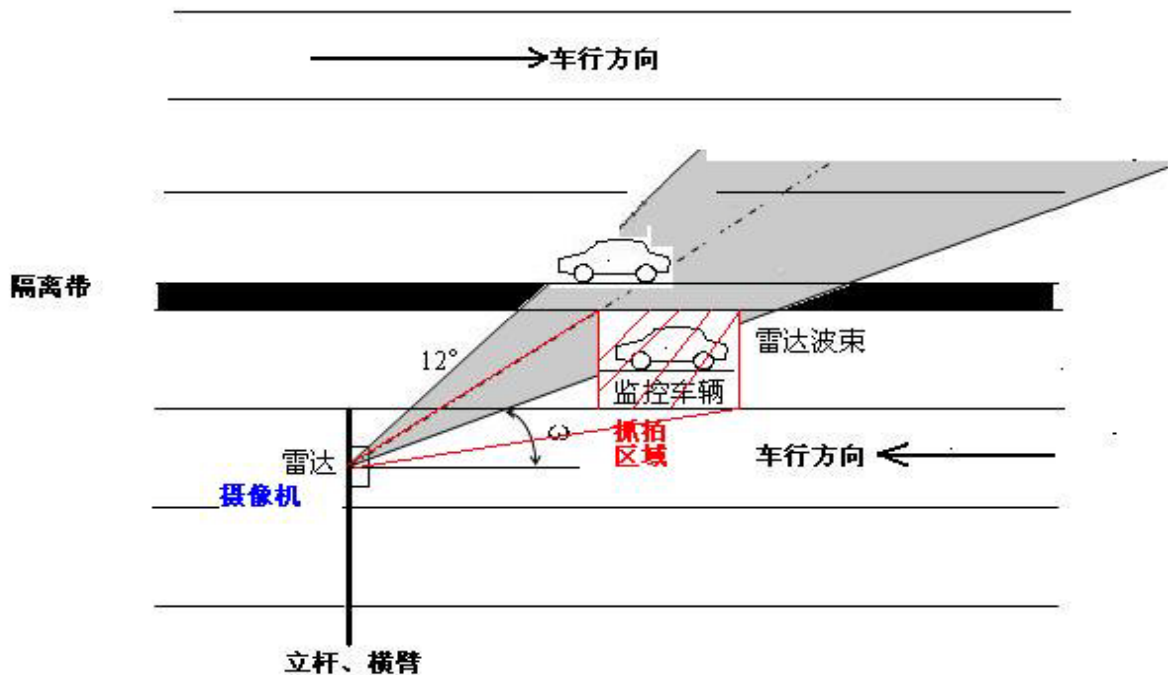
The migration measured that the fast equipment by its erection joint's convenient, the use way's flexibility, high mobile and so on many merits is widely applied in the traffic police department grasps ultra, governs the ultra aspect, simultaneously also to realize Ministry of Public Security to propose “the smooth traffic project” and cuts the accident rate, the mortality rate and so on to play not the minor role..

However, the traffic police uses in the product, some products already may dynamic measure that fast may also the static state measure fast, some products can only the static state measure fast, only then discovered through the dissect: Some products choose the radar itself does not have dynamic measures the fast function; Also some products are the radar itself have dynamic measure the fast function, but the Manufacturer has not developed this function. Or develops this function, but actual used has the question, for example: Causes the software to collapse, the computer halts and so on questions, but has shielded this function. This will cause the product only to be able to place in the ground or the placement uses in the static vehicle, the use way will be unitary.

2. Cocurrent, different to the speed discrimination is the equipment accurate capture, the widespread application powerful guarantee

The migration measures the fast equipment when the static state measures fast, usually puts in the roadside not to hinder the vehicles normal speed the position, such radar ray and the road longitudinal forms certain angle. Under this kind of condition, cocurrent and different can catch completely to the travel vehicles' speed by the radar, the system when processes such speed, will have the data disturbance, will be unable to guarantee the survey the accuracy. If the radar has cocurrent, different to the speed discrimination function, establishes the good gathering direction after the software, will not gather the direction the speed automatically to shield by the radar, increased the gathering speed accuracy..

This regarding the fixed point radar measured that the fast equipment applies in the actual environment, avoids the serious data error having the prominent significance. In the actual use environment, in guaranteed that under the safe condition, the erecting pole is highly generally 6.5 meters, the cross arm 6.5 meters, domestic passage width generally about 3.8 meters, single direction 3 road's width probably 11.4 meters, when the reality the erection unit, the radar is impossible to be located at is taken a snapshot the path place above, but takes a snapshot the path to form a big included angle, such radar's ray will cover isolation strip another one side inevitably the cocurrent travel stream of vehicles, the snapshot illegal vehicles' feature article camera and the panoram camera video frequency picture is covering the path which will take a snapshot, at the same time the camera also will be will catch according to the radar to the speedInformation as snapshot basis. This will have such result inevitably, is taken a snapshot the path to drive not illegal vehicles' at the same time, isolation strip another one side cocurrent has gone exactly overspeed illegal vehicles, because the radar cannot differentiate cocurrent and different to the speed, such radar can catch naturally to the cocurrent travel vehicles' speed, after distinguishing, actually has triggered the camera snapshot, produced has taken a snapshot by mistake. If the radar can differentiate cocurrent, different to the speed, this kind of situation will occur. The following chart shows:

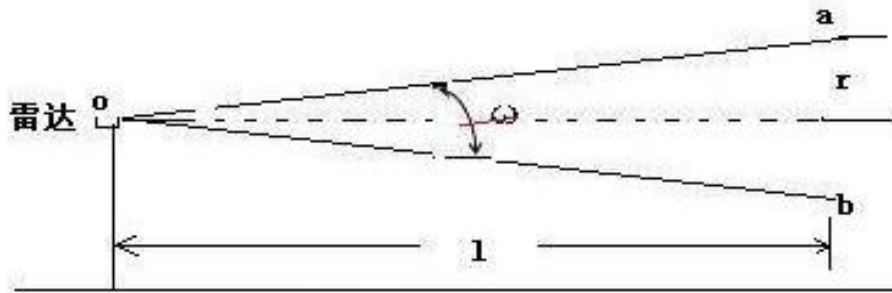


3. ignore the radar's feature and camera character,can't guarantee the identity of the monitor data

The radar's ray has certain flare angel,the different radar flare also differ.At present in the products of widely uses,the flare angle isn't same from 4 degrees to 20 degrees,12degrees is common.Radar's detecting distant may achieve 1200 meters.With such parameter,we can compare the datas in the graphical.

If account by the radar's fareset range:the $I=1200$ meter, $r=1200*0.105=126$ meter,radar's detecting sectional diameter is 252 meters;Because with the electric appliance working,after the part gives off heat,the operating point somewhat drifts,the sensitivity will drop,the conservativeconsideration radar range $I=800$ rice, $r=800*0.105=84$ meters,then radar's detecting sectional diameter is 168 meters.

regarding the mobil measures equipment,radar is apart from the groud lever is between 0.8 meter and 2.0 meters,then when the radar aparts from the land 0.8 meter, $I=7.61$ rice,the below edge of the radar will be project on the groud;when 2.0 meter, $I=19.0$ rice,the up-edge can detect achieve 1200 meters or 800 meters.With such result,the detecting range of radar's ray is clear.In the scope,how many high-speed cars and overspeed cars can cover?These speeds can be caught certainly.But camera's snapshot is limited.



∠: 雷达射波张角12度，半角为6度

$$r/l = \tan 6^\circ, \tan 6^\circ = 0.105$$

Therefore, when radar and road are laid parallelly, only if there is one car running in the detecting range, otherwise, the identity of the cars caught by camera and the speed detected by radar is unable to be guaranteed effectively.

4. Radar's surveying cycle is big, in the same effective coverage, the data can be obtained is few

Radar's survey cycle is a key factor to measure the overall performance target. Different radars, different survey cycle, such as 20ms, 50ms, 120ms, 300ms, 500ms and so on. Many radar nominal survey cycle and actual obtains are differ so much.

The concept of survey cycle is difficult to understand like this, and is also not good to know the influence of the product's survey cycle, now let's analysis with some data computation:

Precondition: Select the same flare angle of the radar's ray, detecting range same several kind of radars; Different survey cycle; Place in the same place, the same distance from the ground, the same angle of the radar's antenna radial and the angle of pitching with the land.

From system's angle, radar's survey cycle is shorter is better, but from the radar principle, it must have the sampling and the computation processes, these two process's sum of time is the cycle. The below multianalysis surveys the cycle the concrete influence which produces to the system.

Chart 1 Test several kinds of radars and the path have the identical angle to erect, the launch radar ray is the continue wave beam with the same flare angle. Each model of radar launch flare angle is fixed.

The testing radars carry out again and again continually when testing the speed, the time of this testing is fixed, that the cycle of the testing, every testing cycle composed with two process, the sampling and the computation. Chart 2 is the sketch map between the sampling and processing by the enlargement wave beam internal radars.

Each kind of radar's survey cycle is different, the testing cycle that the radar lobbing covers in the region influence the measuring accuracy immediately, because the wave beam flare angle is fixed, the testing cycle in the region is determined by the goal speed, the faster, the fewer; the lower, the more of the

testing cycle. In chart 2, supposed there are two testing cycles: T1 and T2, the white is the sampling, the black is the processing, what needs to pay attention: the relative relations between the sampling and the position of the road is unfixed, just stochastic. Only in the sampling position, the car would be discovered, but radar can only notify the analysis result in the end of the cycle.

If the vehicles enter T0, the black area, and radar is being at the computation analysis stage, therefore in T0 cycle, there will never exist any car, only in the T1 cycle's sampling stage, the radar can discover the vehicles, and it will report the speed of the vehicles when the T1 cycle is over. Because the vehicles' speed is different, the lobe width internal energy accommodation's cyclical integer will be different, the testing cycle cycling again and again, it's impossible to hold the whole cycle within the lobe width, the position the vehicles are discovered is changing. Moreover, the vehicles' size, style are different, the radars' reflect wave strength are different, and it will also influence the position of the vehicles.

As stated above, the vehicles enter the radar lobe to cover the region first time the position which discovered are not fixed. Stochastic region size = radar surveying cycle * vehicle speed. The supposition first kind of radar's survey cycle is 1 second, the vehicle speed is 150km/h, namely 41.6m/s, the stochastic region is 41.6m, the radar first report speed position in the entire 41.6m scope the stochastic appearance. The second kind of radar response cycle is 0.2 second, the vehicle speed similarly is also 150km/s, stochastic region = 41.6m * 0.2 = 8.3m; When the vehicle speed is 60km/s, to the first kind of radar: Stochastic region = 16.7m; To the second kind of radar: Stochastic region = 3.3m

After the stochastic region's radar effective detection range, the radar can defer to the sampling period to survey the speed stably continuously.

Based on above calculates us to draw the conclusion: Under the seeing coverage fixed condition, radar's survey cycle is smaller, may obtain more valid data. In can catch under the many data premises, carries on when the statistics, the analysis, processing to the data can obtain a more accurate data, thus enhances measures the fast system's data precision.

5. The product's structure is unreasonable, it's unable to guarantee the identity of the monitor data and it's inconvenient to operate.

At present, the majority of the migration measured equipment's radar and camera is lay on the plane. Like the chart shows:



Only like this purely fixes the radar and the camera in this kind of simple service platform, but between the two also does not have strictly, the science connection structure. The camera and the radar will defer to leaving the plant when the vertical direction the fixed angle also pitch; About in the direction, the radar and the camera have 2 degrees-of-freedom respectively, according to arrangement combination computation, then between the complete equipment radar and the camera has 4 degrees-of-freedom. This i.e., originally should the factory strict definition, between the design the two's linkage structure abbreviate, was a set of strict science high precision equipment originally. Actually

turned has adjusted the two angle by the traffic police according to the experience set of things. Rich experience traffic police possibly thing use relative many, is insufficiently experienced comrade will use will be very troublesome. Moreover through the above analysis, we had already known, radar sounding's distance, the radar ray can cover the scope as well as the camera snapshot were away from. Therefore such structure will create the radar and the camera respectively in the independent working, actually will use scientifically, the correct trigger pip the two to relate not necessarily not necessarily in together, certainly could also not guarantee the two's data identity and the accuracy.

With the science, the strict linkage structure equipment to consider fully radar's characteristic and the application camera's characteristic, considers fully from the software design and the hardware design aspect to the monitor data identical question, not because of the different person use, but will obtain the different result.

■ **Analysis the principle of the system realization**

The mobile speed-test equipment and the fixed speed-test equipment have developing and being applied for 4 years,the product are breaking through one and another tech-link uncreasingly.Looks over these annual product condition, realizes the principle as well as the technological development the product makes the thorough analysis:

1. Radar signal Springing

The system compares the radar capture's speed value time and the hypothesis road section regulating value, catches is bigger than to some speed value the limitation value, triggers the camera snapshot immediately, establishes the value decision snapshot picture quantity according to the user, snapshot all pictures stores assigns the table of contents, after end of job, again by the staff from the numerous pictures selects one to satisfy the request the picture.

The realize flowing



Therefore taking a snapshot like the result is unable to locate vehicles' in video frequency picture position accurately, even more is unable to be clear about the localization car license, but the car license is also the law enforcement essential essential factor.

- Disadvantage:**
1. the screening picture's work load is huge,increased the police's woking strength.
 - 2.waste the system storage enormously.
 - 3.the snapshot effct is different by different person.,even that we can't see the license clearly.
 - 4.the effective pictures occupy the snapsot pictures 1/6 or 1/9,affects the transmission,even cannot transmit.

In order to reduce the snapshot picture quantity, the only radar signal triggering snapshot's system has the promotion. After radar discovery overspeed signal, controls the camera after 200 milliseconds or 500 milliseconds takes a snapshot several pictures continuously. The effect has the improvement, but

fundamentally has not solved the problem. Instead has brought other question. For example: The speed is lower than when some value or the speed are higher than some value, takes a snapshot that moment, the vehicles or has not entered the video frequency picture or already drove out of the video frequency picture, takes a snapshot the spatial chart.

Now analyzing certain products' realize principle:

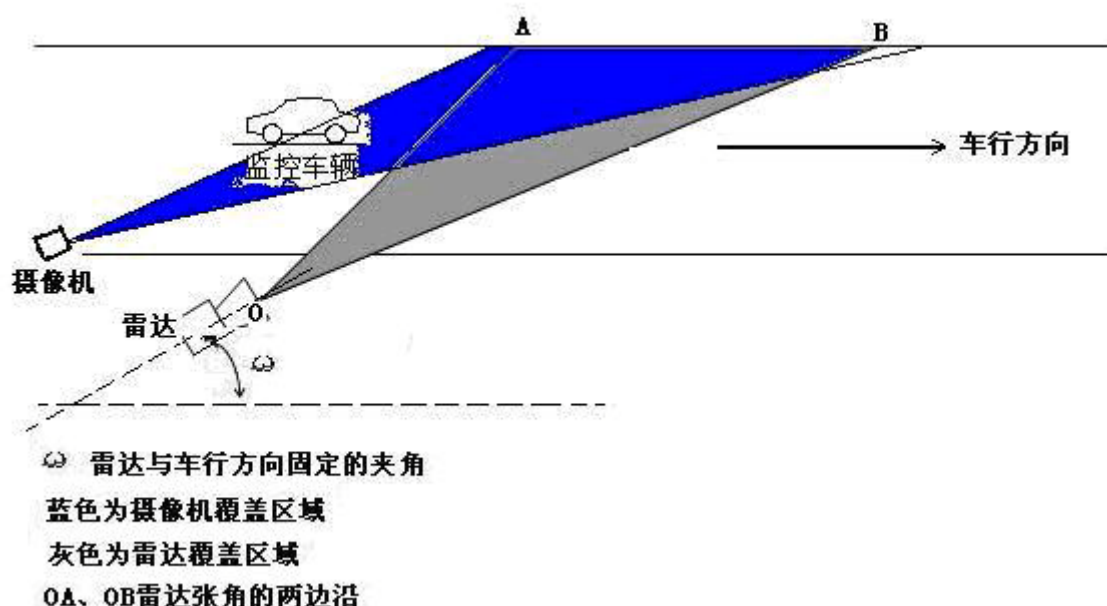
When the radar and the car dealership direction's included angle is a fixture, because radar's flare angle is a definite value, like this, radar's two border OA, OB on and the car dealership direction are definite values. If radar's central axis and the car dealership direction have 45 degrees angles, flare angle 10 degrees, then OA and the car dealership direction is 50 degrees, OB and the car dealership direction is 40 degrees, the road width basic is 3.8 meters. When the radar is fixed in the roadside position, AB (unit for rice) the length has fixed, radar's search coverage fixed.

After snapshotting several times,fix the angle of the camera.

The radar radial direction and the path maintain the fixed angle the goal, the radar radial direction and the path maintain the fixed angle the goal, is must guarantee that radar's search coverage size is fixed, realizes in the radar sounding region, in certain scope's speed can obtain the limited speed quantity, will otherwise cause the snapshot quantity to be excessively many.

Snapshot vehicle rear license plate's time, the vehicle rear license plate before the radar and camera's survey, takes a snapshot the region presence the time the sign presence time to be by far longer than the vehicle, will therefore request the user to take a snapshot the tailstock, but do not take a snapshot the front, if will take a snapshot the front, many times, when the radar will obtain the overspeed value triggering camera will take a snapshot, Che Qianpai will surpass camera's video frequency region, the snapshot picture mostly for automobile body such invalid picture.

The overspeed vehicles enter the video frequency region, the camera do not take a snapshot, only then the overspeed vehicles enter the radar sounding region, and in the stochastic region, the computer cannot catch the vehicles speed continuously, distinguished after overspeed signal, starts to take a snapshot continuously until the vehicles leave the radar's testing area.



Supposed the radar's testing cycle is t second, the overspeed vehicle's speed is v miles every second ($1000/3600v$ m/s), first spring radar wave's edge OA, but this time perhaps isn't the sampling time, thus there are three possibilities:

1. If it's just the time of sampling, radar can report the speed within t . In the detecting area, radar can detect the speed is: $N1 = 18 * AB / 5vt$.

2. If radar has just finished the sampling, thus radar must sampling after $2t$. Radar can detect the speed is: $N2 = (AB - 2t * 5v / 18) * 18 / 5vt + 1$.

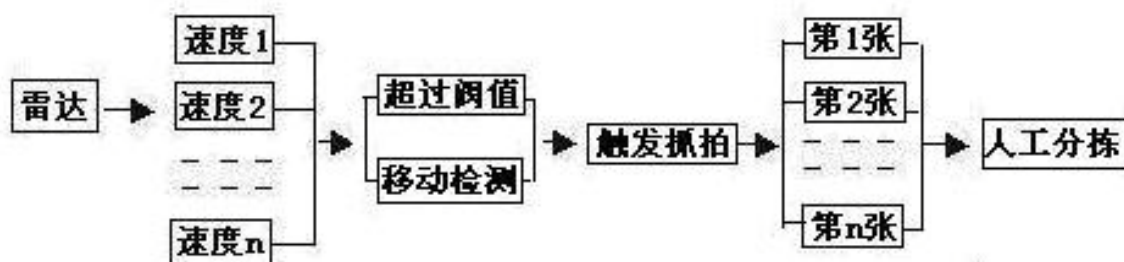
3. If this time just in the cycle, thus radar must wait until the last process over. Radar can detect the speed is: $N2 < N3 < N1$.

May draw the following conclusion by the above formula: When equipment and a car dealership direction Cheng fixed angle, the equipment can catch effective velocity quantity and radar's survey cycle, flare angle, vehicles' velocity correlation. The survey cycle is bigger, the vehicles speed is higher, in the search coverage, the speed quantity which can catch are few, even does not catch. Because the vehicles are the object which the system must catch, therefore radar's survey cycle has become the decision capture effective velocity quantity key aspect.

2. Radar signal Springing + Motion examination

After the pure dependence radar speed distinguishes realizes the principle understanding, based on this increases the motion examination the goal is must the more accurate localization car license in the video frequency picture the position and reduces the spatial chart.

The realize flowing:

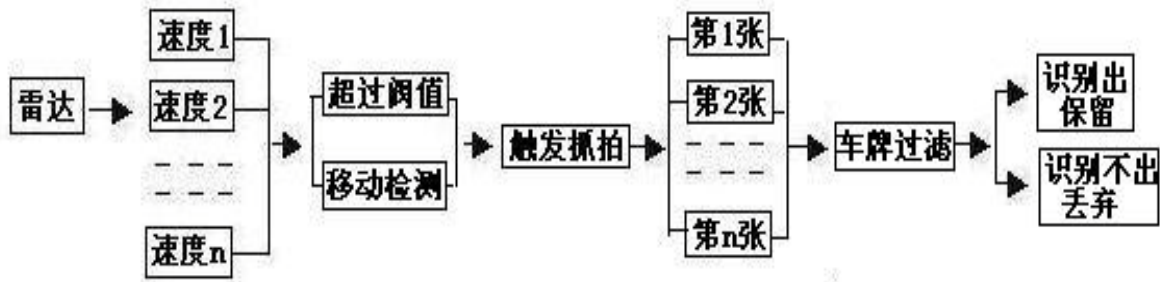


The motion examination has the entire screen examination and the region examination and so on several kinds realizes the method, moreover realizes the examination algorithm has the gradation comparison test, the background method of difference, the frame difference law, the marginal check law and so on .

But through the practical application, the test, the comparison, these algorithms regarding realizes the high speed mobile accurate localization effect not too to be ideal. Moreover in the actual environment, vehicles own color, own shadow, building's shadow, the peripheral trees rock unceasingly the shadow, the weather sudden light and shade fast change, the road surface pedestrian migration and so on many factors are big to these algorithm's disturbance. If considers the ideal environment, in the technical aspect, the radar signal triggering + migration examination's way compared to depends upon the radar to distinguish that purely truly the snapshot progressed many. But, the product use when the actual environment, the radar and the camera cannot achieve maintains the data the identity, these disturbance factor definitely will produce the picture which the massive spatial charts and take a snapshot by mistake.

3. Radar signal Springing + Single frame licesen identify/ Radar signal Springing + Motion examination + Single frame licesen identify

The realize flowing:

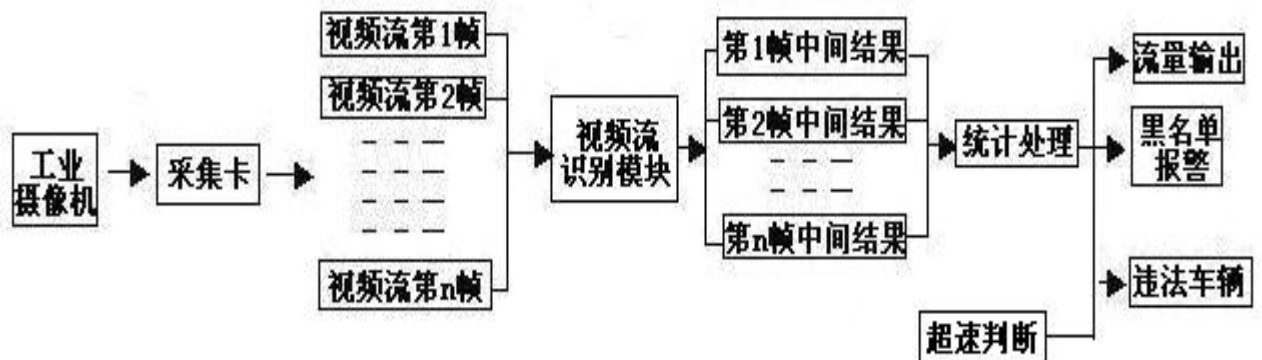


Along with the product function demand's change, the car license recognition function already became the product necessary part. But, in the market the majority of products are at present: Radar signal triggering + single frame car license recognition or radar signal triggering + migration examination + single frame car license recognition, was also increased the car license single frame recognition module in the original system's foundation, used the original triggering way, carried on the recognition with the car license recognition module to the snapshot picture. Through front to the car license recognition way, realizes the principle analysis. Already explained front end the trigger to the single frame recognition's influence, whether such system snapshot's picture automatic diagnosis car license also does have the uncertainty. Some factories for the enhancement recognition rate, to the picture which takes a snapshot through the car license recognition module filtration, regarding can distinguish the car license the picture retention, regarding cannot distinguish the car license the picture deletion. As a result of the filtration work in the backstage execution, is only distinguishes the result the picture demonstration and the retention, therefore, the user is not understood completely the system principle of work, can only feel the capture ratio to be low, leaks grasps seriously.

4. Radar signal and video licesen identify distinguish in-phase

In the applied science reasonable structure, simultaneously unifies radar's characteristic and camera's characteristic, had guaranteed the radar and under the camera monitor data identical premise, the selection survey cycle is short, the flare angle is appropriate, the stable property reliable radar, the union algorithm outstanding, the highly effective video frequency class car license recognition module's system becomes the profession gradually the mainstream and the direction.

The realize flowing:



Through the flow comparison which realizes to the system may know, such system realizes principle the system which narrated with front is completely different. Increased many processing

modules in the software aspect, more has applied statistics principle and the logic principle. , the speed accuracy, law enforcement evidence's reliability aspects and so on car license recognition rate had the guarantee.

Because uses the video frequency class real-time recognition, regarding examines the robber to snatch the vehicles, to owe the taxes and fees vehicles, to cause trouble the escape vehicles, the wrap sign vehicles (general designation “blacklist”), both may the real-time warning, and raised the capture ratio; Can the real-time distinction vehicles characteristic, be possible to act according to the special path to the different type vehicles different stipulation, realizes to different type vehicles' multiplex processing, for example: The highway is different to the large-scale vehicle and the small vehicle's regulating; The oversize vehicle takes the ultra traffic lane for a long time; In the scheduled time section, some kind of vehicles cannot drive into certain paths and so on.

5.foreign product’s actuality

The foreign product basic is: The radar capture rate signal, distinguishes for overspeed on the triggering camera photograph way, also some systems increased the motion examination. In each kind of system X frequency band and so on frequency band, K frequency band, Ka radars have the use, the camera already have the use film also to have the numerical code, digital camera's picture element is also from 1,300,000 to 6,100,000 different.

Using the Doppler radar certainly to have the stochastic region the question also to have the Cosine factor the question. Front had already analyzed the stochastic region and the triggering way to the snapshot the influence, these influences definitely will exist in these overseas products. The overseas product does not have to the Chinese car license recognition function, the function is unitary. Therefore the overseas import's product can only calculate in the domestic intelligent transportation product development process, the early product.

At present, domestic outstanding product, regardless of from realizes the principle, the function, the efficiency, the performance-to-price ratio and so on each aspect to go far beyond the overseas imported product.

6.Sevral kinds of vehicles’ speed misinformation

At present, when the police officer in uses mobile electron police who and the fixed point radar some factory production measures the fast system, has some misinformation data even to have between the police people's lawsuit, has made many not good impressions to the user. These question's production did not mean that the radar measured fast invalid or the radar measures fast inaccurate, the reason lies in the exploiter not to have radar's specialized knowledge, has not analyzed the radar earnestly the question which appears in the actual use, discovers the concrete solution, actually the reason which has the question sums up as the radar.

In fact, the specialized people understand that the speed which gives under some special conditions is inaccurate.Specially in allusion to several kind if vehicles:

- a) the container car and the bus with long bodywork.
- b)the big car or the bus with fan on the head
- c)the big truck or mini-freight train with trailer.
- d) The compartment opens, and is loaded with the shape anomalous object vehicles.

The radar when aims at these kind of Che Cesu, obtains the speed data most is real accurate, occasionally will have the inaccurate data. Produces the reason is the identical radar ray has the diffuse reflection on these kind of chasses, the reflected wave in the identical frequency oscillation amplitude superimposition. The reason has been clear, uses some are corresponding the measure, will guarantee the

data the accuracy.

7. Selecting and using the camera should be considered synthetically

The camera are of great variety, the performance, the target and the parameter are also infinite varieties. But, in the project implementation, camera's effect is unsatisfactory frequently. The essential reason lies in a model of camera has not been aims at the intelligent transportation this profession development the specialized camera, the user can only with every effort create satisfies the camera exploitation conditions the environment. Regardless of being measured that the fast system, the public security bayonet socket system, run a red light the snapshot system and so on, the snapshot main body vehicles are the movement, like this must guarantee that the picture clear, the camera must reduce shutter's closing time, moreover vehicles' speed is quicker, the shutter corresponds must be higher. Only then can guarantee the snapshot clearly like the picture, no trailing.

However, camera's certain performance index parameter is relative to the standard shutter. For example: The lowest light intensity, wide trends and so on. Once it is separated from standard shutter parameter, would not have any practical significance to the user. Therefore, when choosing the camera and the lens, pertinency should be eager to excel. Also must consider camera's performance index parameter and aim at the specific items and the actual using condition. In it is not suited this profession under the specialized camera premise completely, the applications can only consider the supplementary means that enables the camera to achieve the best snapshot effect.

■ Elporating some information of the camera

Camera's development speed is very quick, from the camera tube to the CCD part, the camera which take the CCD chip as the main body constitution ,have the small volume, the weight light, no influence by magnetic field,and it is also can resist the trembling and striking , simultaneously it is used widely with the advancing of the definition ,light intensity and reliability. CCD is the charge-coupled device (the Charge Coupled Device abbreviation), one kind of semiconductor image formation component, thus has high sensitivity, the anti-glare, the distortion to be small, the small volume, the long life, the anti-vibration and so on.

1. The imaging principle of CCD vidicon

The image of the obsorbed object focus to the CCD chip, the CCD chip accumulates the corresponding proportion charge according to the strength of the light, the charge accumulated by each picture element is under the video time-order's control, moving outside point by point, after the filter, the enlargement, processing,and forming, the video signal output. After the monitor device or television input video signal, we may see the same video image as the primitive image.

2. The classify of the CCD vidicon

(一)Ploting by the imaging color

CCD the camera divides according to the image formation color into the color camera and the black and white camera two kinds. Besides chromaticity processing aspect different, other principles basic consistent. Mainly has the optical system, the electro-optic transition system, the signal processing system composition. And the electro-optic transition system is camera's core.

The natural image through the optical lens image formation in camera's light target surface, in color camera's optical system uses the coherent color separation prism or the special strip ray filter divides into red the light signal, green, the blue tricolor light signal, the electro-optic transition system through the CCD part use television scanning method the light image signal conversion along with the time variation video frequency electrical signal, passes through the enlargement, processing, the code to

become the entire television signal again.

(二)Ploting by the distinguish ratio

According to the distinguish ratio, CCD's distinguish is about 380,000 image element, corresponding the multicolor 330 line and the black and white 400 line style; 470,000 image element or so, corresponding the multicolor 470 line and the black and white 570 line style.

(三)Ploting by the sensitivity of the camera

According to the sensitivity, CCD's lowest light is from 1 to 3 lux common style; the moonlight style about 0.11 lux: the starlight style below 0.11 lux, the red-ray illuminance style imaged by the red-ray light.

(四)Ploting by the size of the side of the CCD's target

CCD's size include 1 inch, 1/2 inch, 1/3 inch, 1/4 inch and so on. In these size, 1/3 inch and 1/2 inch is common. The CCD camera with 1/5, 1/6 inch have been exploited maturely and it will occupy certain proportion market in future.

Generally speaking, the target surface big CCD chip, its correspondence's picture element area is also big, receives absorbs the light the area to increase, makes the picture element output electric charge to increase inevitably, the sensitivity rise, has the good photography ability under the weak light condition, easy to make the camera overall quality to enhance, image detail obvious exquisite nature. But time the optical system focusing phantom's focal-plane is smaller, then in the imaging process loses the detail are more, the image enlargement which, after obtaining the detail transition possibly has the phenomenon which changes suddenly, does not appear the nature. Moreover light-sized CCD will have more picture elements and a higher resolution will also cause the single picture element the photosensitive reduction of area, will have to make public insufficient possibility. The single picture element's area is smaller, its photosensitive performance is lower, the signal-to-noise ratio is lower, the dynamirange is narrower. In each picture element's information tends with (is called chroma luminance disturbance in it nearby picture element information mix in electronics).

3.CCD camera's common performance and the main performance index

The camera's functions are so many now. such as the automatic white balance, automatic gain control, electronic shutter, reversed light compensation, many kinds of synchronous mode, Y/C separation output and so on. But the main targets are the definition on plane, the lowest light intensity (sensitivity) and the signal-to-noise when inspecting the camera scale.

(一)Definition

The clarity clear number of degree is an important parameter weighs the camera fit and unfit quality, it refers is when camera ingestion equal-space arrangement black and white interaction stripe, in the monitoring device (should most line numbers which compared to camera resolution high) on can see. When surpasses this line number, but on the screen only can watch dusky one piece not to be able again to distinguish the black and white interaction the line.

The industry surveillance with camera's resolution usually between 380~460, the broadcast level camera's resolution may achieve about 700. The clarity is by photograph component picture element how many decisions, obviously photographs component's picture element to be more, the image which obtains is clearer, otherwise also however. The clarity is higher, showed that the camera scale is higher, otherwise is lower.

(二)The lowest light intensity

The lowest light intensity is the most low light intensity is when is absorbed the scenery the radiance to lower to the certain extent causes the camera output the video signal level to lower to some rating the scenery object light luminance value. Generally color camera's most low light intensity is 2~3 LUX, the

degree of illumination determination is take in certain lens aperture coefficient as a premise, therefore, cannot only look at the most low light intensity which in the camera instruction booklet marks, should according to the camera under the identical aperture coefficient its intensity of illumination size. The most low light intensity is smaller, the camera scale is higher. Is opposite says in the color camera, the black and white camera as a result of does not have chromaticity processing, but (brightness) the signal is only sensitive to the optical fiber strong and the weak, therefore the black and white camera's degree of illumination must be lower than the color camera degree of illumination, generally may achieve 0.0001LUX when F1.4, is lower as for the glimmer camera.

Video signal's nominal value is 1Vp-p, the normal value is 0.7Vp-p, time the most low light intensity's video signal value is 1/3 to 1/2 standard plants. Therefore camera's in most low light intensity time image, the meeting “is similar to no way the daytime is the same”. Moreover, camera when most low light intensity produces the image clarity, is carries on with the television signal test card measures the type, its black and white interaction's stripe, the request black index of reflection nearly in 0%, the white index of reflection is bigger than 89.9%. But we in spot inspection time sometimes does not meet such requirement, for instance: Leaf and the lawn index of reflection is very low, the contrast is very small, is not easy to obtain the brilliant image. Therefore middle the actual use cannot weigh the scene environment degree of illumination by the camera nominal most low light intensity achievement the standard.

(三).Signal-to-Noise

The signal-to-noise ratio is also a camera's important performance index. When camera ingestion bright scene, the monitoring device demonstrated the picture is quite usually sprightly, the viewer is not easy to see in the picture the disturbance noise spot; But when camera ingestion dark scene, the monitoring device demonstrated the picture is quite dim, the viewer is very this time easy to see the picture moderate snowfall efflorescent disturbance noise spot. The disturbance noise spot's strong and the weak (is also disturbance noise spot to picture influence) has the direct relation with the camera signal-to-noise ratio target quality, namely camera's signal-to-noise ratio is higher, the disturbance noise spot the influence is smaller to the picture.

What so-called “the signal-to-noise ratio” refers to is the signal voltage regarding noise voltage ratio, usually expressed with mark S/N. As a result of generally, the signal voltage far is higher than the noise voltage, ratio is big, therefore, the actual computation camera signal-to-noise ratio's size usually is takes to the mean square signal voltage and mean square noise voltage ratio take 10 is multiplied by the coefficient again as the bottom logarithm 20, the unit indicated with dB.

Generally the camera gives the signal-to-noise ratio value is when AGC (automatic gain control) closes value, when because AGC connection, to the small signal will carry on the promotion, causes the noise level also correspondingly to enhance. The CCD camera signal-to-noise ratio's typical value is 45dB~55dB generally. When survey signal-to-noise ratio parameter, should use the video frequency clutter measuring instrument direct connection on camera's video output post.

(四)AGC

AGC--Automatic Gain Control abbreviation. All cameras will have one to come from CCD the signal to enlarge to may use the standard the video amplifier, its enlargement quantity will be the gain, equivalent Yu Youjiao the high sensitivity, may cause it under the glimmer keen, however the amplifier will overload in the environment which the bright will illuminate, causes the video signal distortion. Therefore, must (AGC) the electric circuit survey the video signal using camera's automatic gain control the level, at the right moment switch AGC, thus enables the camera to work in the big illumination scope,

this namely dynamirange, namely when low light intensity increases camera's sensitivity automatically, thus enhances the image signal the intensity to obtain the sharp image. Has the AGC function camera, will improve in the low light intensity time sensitivity, but this time's noise spot will be quite also obvious. This is because the signal and the noise are simultaneously enlarged reason.

(五) BLC

BLC--BackLight Compesation abbreviation, is also called as the reversed light compensation or the reversed light supplements and corrects, it may compensate the camera effectively photographs when the reversed light environment the picture main body dark flaw. Usually, camera's AGC operating point is through makes the average to the entire field of view content to determine that but if in the field of view contains a very bright background region and a very dark prospect goal, then this time definite AGC operating point has the possibility regarding the prospect goal is insufficiently appropriate, the background light compensation has the possibility to improve the prospect target indication condition

When introduction back light compensatory function, the camera only (for example from 80th line of ~ 200 line of center regions) carries on the examination to an entire field of view's sub-region, through asks this region the average signal level to determine the AGC electric circuit's operating point. Is very low as a result of the subdomain average level, the AGC amplifier can have the high gain, causes the output video signal the peak-to-peak value enhancement, thus causes on monitoring device's main body picture to be bright. This time's background picture will be brighter, but it will reduce greatly with the main body picture's subjective luminance difference, the entire field of view's viewability will be improved.

When backlight compensation on, the camera only asks the average to an entire field of view's sub-region to determine its AGC operating point, if this time the prospect goal located at this subdomain in time, then the prospect goal viewability hopeful improvement.

(六)ES

The full-name of ES is Electronic Shutter,is a terminology from the contrast of the camera's engine shutter,it correspond to control the sensitization time of the CCD image sensor.Because the essence of the CCD's sensity is the signal electronical accumulate,so the longer of the sensity,the longer of the ignal electronical accumulate,the larger of the output signal elctronical .Through adjusting the accumative time of the signal electric(sdjusting the width of clock impulse),then realize the fuction ofcontroning the sensitizational time.

(七)WB

WB (White Balance) can only used by multicolor pickup camera,it's useness is realizing the camera image to ce able to reflect the scenery condition precisely,with the manual white balanced and automatic white balanced two ways.

Automatic white balanced (AWB, Automatic White Balance) influentials for continuously white balanced and the automatic control white balanced. White balanced is also called the automatic tracking continuously white balanced (Automatic Tracking White balance, ATW), is along with the scenery color temperature change, but adjusts continuously, the scope is 2800~6000K. This way regarding scenery color temperature in photography period changes unceasingly the situation is suitable, causes the color performance nature, when even are very few regarding the scenery in does not have the white, if the scene majority is the blue sky white clouds or the setting sun contour color temperature object and under the scene quite dim situation, continual white balanced cannot produce the best colored results.

Automatic control white balanced (Automatic White balance Control, AWC), needs first camera white referring objects and so on alignment such as Bai Qiang, white paper, then through the menu or

the switch establishment from the manual change will be the automatic way, retains, in this position several seconds or present up to the white to the image, after white is carried out balanced, dials the automatic mode switch reaches behind the back to move the position to lock this white balanced establishment, this time the white balanced establishment will maintain in camera's memory, up to until carries out once more is changed, its scope is 2300~10000K, even if the camera power failure will not lose this establishment. Establishes by the button way white balanced is most precise and is reliable, is suitable for the majority of application situation.

Manual white balanced closure automatic white balanced, through manual regulation red or blue color adjuster, changes red or the blue color condition, generally the adjustable rank reaches 107 much, like increases either the reduced red each rank, increases or reduced blue color each rank. Except the time outside, some cameras will also have in vain will be balanced fix in 3200K (incandescent lamp level) and 5500K (sunlight level) and so on scale orders.

(八) Synchronous Mode

The synchronous mode always include INT、LL and EXT

INT is produces the synchronized signal using the camera internal crystal oscillating circuit to complete the operation. Mains locking (LL, Line Locked), also called that it linear locking or a line of locking, is completes the vertical impetus synchronization using camera's alternating current supply, namely camera and power source zero curve synchronization.

EXT uses the synchronized signal which an outside synchronized signal generator produces to deliver camera's outside synchronization input end to realize the synchronization. The synchronized signal may be the colored compound video frequency either the black suddenly method signal (VBS), the black and white compound video frequency or the composite synchronizing signal (VS), may also be like the matrix and so on external instrumentation's multiplying vertical driving signal (VD2) and the compound video output signal.

■Some related knowledge of the camera lens:

一、 Choosing the lens

How to choose the camera lens rightly is important for the economic target and the technic performance.

Clarify of the camera lens:

According to the constructions' appling occasion,lens include:

- (1) Wide-angle-lens: the visusl angle is above 90 degree,always used in the lift, the hall that small distance and big visual angle occasion.
- (2) Standard lens: the visual angle is about 30 degree,always used in the walkway and the plot perimeter that occasion.
- (3) Telephoto lens: the vision angle is within 20 degree,the focus range is from several tens to hundred millimeter,always used in monitoring with distance.
- (4) Zoom lens: the lens' focus is Invariable,can change from wide-angle to telephoto,used in the big depth of field,the extensive vision range area:
- (5) Pinhole lens: used in monitoring conceally.

二、 Confirm the lens focus

Choosing the lens,there are five factors to confirm the lens standard:

- (1) the size of the monitoring spot;
- (2) the size of the absorbed object;

- (3) the distance of the objects;
- (4) the focus;
- (5) the size of the CCD target surface.

The front 4 points can be measured in spot and confirm the lens focus standard by computing, the compute method is below:

$$u \text{ 1/3" CCD } \quad F=4.8*L/W \text{ or } F=3.6*L/H$$

$$u \text{ 1/2" CCD } \quad F=6.4*L/W \text{ or } F=4.8*L/H$$

And, W is the width of the absorbed object, H is the height of the absorbed object, L is the distance from the lens to the object, F is the lens focus.

So why do we should consider the size of the target surface when choosing the lens?

In order to obtain the same angle from the 1/3 and 1/2 camera, the 1/3 CCD camera lens must be shorter: In the opposition, if we adopt the same focus lens in 1/3" CCD and 1/2" CCD camera, then how about that? 1/3" CCD camera vision angle will be smaller evidently than the 1/2" CCD camera, at the same time, the 1/3" CCD camera's picture on the monitor will be magnify contrasting to the 1/2" CCD camera's picture, then produced the long focus lens' effect.

In addition, we must notice this principle when choosing the lens, that is, the small target surface can use the big target surface CCD camera's lens, otherwise is not good. The reason is: if 1/2" CCD camera use 1/3" lens, the input light will be small, the color will be bad, even that the picture will be damaged. Otherwise, the input light will be more, the color will be better and the picture effect will be better. Certainly, colligate these factors, we'd better choose the right lens suited the camera.

Choosing the manual aperture and the automatic aperture.

The lens aperture has the manual and the automatic two kinds. Because formerly camera's use in outdoor or reasons and so on other special occasion, therefore selects the automatic diaphragm lens. In the present monitoring project, because the intelligent building uses the CCTV system massively, the indoor monitoring point accounts for the high proportion. But many project business when does the engineering facilities quote price, also similarly likes using the automatic diaphragm lens. Although the automatic diaphragm lens are strong to the monitoring point optical fiber change compatibility, but its price also obviously is higher than the same focal distance manual to decide the burnt lens. But the present majority cameras have the electronic shutter, the indoor photo source is also stabler, therefore, in the intelligence building program uses the automatic diaphragm lens not too big necessity massively; On the other hand, in the market uses now the automatic diaphragm lens divide into two broad headings: a. the power source actuates the automatic diaphragm lens; b. video frequency actuation automatic diaphragm lens. The power source actuates the automatic diaphragm lens is through four line control lens, two are DC12V or the DC24V power source actuates in lens' motor, another two pilot wire's induces the exterior photo source through lens in light induction spot the degree of illumination to control the aperture the size; The video frequency actuation automatic diaphragm lens are control the lens through three lines, starts the aperture for the video frequency trigger pip, and controls the aperture size, another two are DC12V or the DC24V power line actuates the electrical machinery motor. At present in market mostly black and white or color camera, although has the automatic diaphragm lens connection, but besides minority may the compatible two kind of lens, the majority cameras cannot be compatible, can only use the power source to actuate the automatic diaphragm lens or the video frequency actuation automatic diaphragm lens. If in use, when some cameras damage, buys newly whether does the camera have with the original automatic diaphragm lens compatible question. But works as in the project the monitoring point when outside, uses the belt automatic diaphragm the lens is

necessary, is big because of the outdoor optical fiber's dynamirange change, under the summer day sunlight the environment degree of illumination reaches 50000Lx-100000Lx; At night when street light is only 10Lx, the change scope is quite big. Whether in this case regardless of the camera does have the automatic control sensitivity function namely not to be impossible through camera's electronic shutter to adapt the such wide degree of illumination scope, is also unable to achieve the control image effect the function.

In the TV monitor system,how to choose the camera lens rightly according to the spot monitor conditions is very important,because it effects that whether the monitor picture can meet the ssystem's design request after the system formed(about the menu range and the picture detail),then choose the camera lens rightly can obtain the best design and the best monitor effect.

According to the aperture,camera lens include manual aperture lens and automatic aperture lens;According to the focus ,that include fixed focus lens and the varies focus lens.

Then below,talk about how to choose the camera lens rightly in different using conditions.

Choose manual or automatic aperture

Choosing manual or automatic aperture lies on whether the light intensity of the using consition is invariable

If in the light intensity is invariable,we can choose the manual aperture lens in lift,in occlude porch or in the room without light.Thus we can fix the size of the aperture during the system's testing to obtain the satisfactive light intensity picture according to the actual light intensity of the condition.

If the light intensity is variable,we must choose the automatic aperture lens(with the camera has automatic aperture lens jack) in the hall vary with the sunlight time,on the window and in the hall.Thus we can realize the picture's self-regulation and obtain the best invariabale light monitor picture.

As the control signal of the automatic aperture lens,including DC and VIDEO,that is,the volts d.c controlling and video signal controlling.In the automatic diaphragm lens' type selecting, in the mode of camera automatic diaphragm lens plug's connection, as well as on choosing automatic diaphragm lens' drive type switch, these three shoule be attentioned sychromeshes.

Selecting the fixed focus or the variable focus lens

Selecting the fixed focus or the variable focus lens mainly relies on the range of the monitor ,as well as whether the monitor picture is clear or not.

The lens specification (lens specification divides into 1/3 " , 1/2 " and 2/3 " and so on generally) in certain situation, the lens focal distance and the lens angle of view's relations are: The lens focal distance is longer, its lens' angle of view is smaller; In lens focal distance certain situation, the lens specification and the lens angle of view's relations are: The lens specification is bigger, its lens' angle of view is also bigger. Therefore may know by above relations: In lens distance certain situation, along with the lens focal distance's fill-out, saw on the system terminal monitoring device is monitored the scene the picture scope to be smaller, but the picture detail is getting more and more clear; But along with lens specification's enlargement, saw on the system terminal monitoring device is monitored the scene the picture scope to increase, but its picture detail is getting more and more fuzzy. Under the lens specification and lens focal distance certain premise, the CS connection lens' angle of view will be bigger than the C connection lens' angle of view.

The lens angle of view may divide into the image horizontal angle of view as well as the image vertical angle of view, and the image horizontal angle of view is bigger than the image vertical angle of view, usually we say the angle of view generally refers to lens' image horizontal angle of view.

In the small moniton condition ,for example in the lift,in the small room.We should adopt the short

focus angle or the extension angle fixed-focus lens. For instance, choosing the 1/2" lens, CS connection, lens' focus is 3.6mm or 2.6mm, these lens angle of view aren't less than 99 degree or 127 degree, when the camera's common highth in the small room is 2.5m or so, its lens angle of view range can cover the whole monitor room enoughly, according to the actual need, we can monitor the scene's "point" or "surface" conveniently and nimbly.

As the common variable lens, the smallest focus is about 6.0mm, so the variable lens' biggest angle of view is 45 degree or so, if we use this lens in the small monitor condition, its monitor angle will be bigger. Although it can be controlled by the front to decrease the monitor dead angle, that will increase the cost of the system project (the system must add the front decode equipment, rapping and shield), and the system operating complexity, thus in this condition, it's not good to use the variable focus lens.

In the wide monitor condition, first should act according to is monitored the environment the open degree, the user request saw on the system terminal monitoring device is monitored the scene picture the readability, as well as is monitored the scene the central point to camera lens between straight distance for the reference. In straight distance and certainly satisfies the cover entire to monitor the scene picture under the premise, should consider as far as possible selects the long focus lens, like this may obtain one on the system terminal monitoring device to have the clear detail to monitor the scene picture. In the condition we can consider selecting the variable focus lens, it can be determined by the system design and the performance-to-price ratio, we should also consider this two points: (1) When adjustment to the shortest focal distance (looked that panoram) ought to be able to satisfy the cover mainly to monitor the scene picture the request. (2) When the adjustment to is most long focus (looked that detail) ought to be able to satisfy the observation to monitor the scene picture detail the request. Usually, in the storage, wokshop and the plant, we choose 6 times or 10 times lens can meet need, but in the outside storeroom, port, plaza, station, we can choose 10 times, 16 times or 20 times lens by actual need (usually, the bigger of the lens times, the higer of the price, we can select the higher times variable focus lens under the permission of the cost).

The theoretical computation of selecting lens focus rightly

Ingest the scenery lens angle of view id o important reference. The lens angle of view changes along with the lens focus and the camera specification size (the change relationship is as mentioned above), the covered scenery lens focus can be computed with below formula:

$$(1) f = u * D / U$$

$$(2) f = h * D / H$$

f: lens focus、 U: the actual highth of the scenery、 H: the actual width of the scenery、 D: the actual distance from the lens to the scenery、 u: the highth of the image、 h: the width of the image

Examples:

When selects 1/2" lens, the picture size is $u=4.8\text{mm}$, $h=6.4\text{mm}$. The distance from the lens to the scenery is $D=3500\text{mm}$, the scenery's actual highth is $U=2500$ (the scenery's actual width can be figure out by the equation below $H=1.333*U$, this relation is decided by the camera viewfinder CCD piece).

Substitute the above reference into (1), we can get $f=4.8*3500/2500=6.72\text{mm}$, so 6mm fixed focus is OK.

What is the meaning of F2.0, f3.4 ? How can I select lens by these figures?

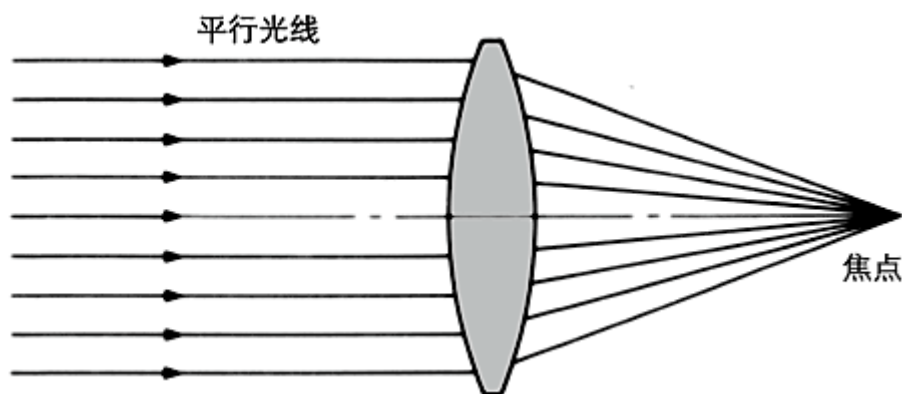
ANSWER: F is the lens aperture, f3.4 means the lens focus is 3.4mm. Lens F2.0 and f3.4 adopt the economic format, so the price is low, and applied in the veneer camera, F2.0 lens's aperture can gather light half of the human eyes, f3.4mm lens has 60 degree angles of view on 1/4 inch CCD, has 90 degree angle of view on 1/3 inch CCD, and it is close to the human eyes angle of view. Human's eyes can cover

bigger angle of view,just as the god's smart design,it is 150 to 180 degree angle between human,but remind,F and f focus are just the references,they can't delegate the quality. ().F1.4 means 1.4:1,this is the lens opening ratio,a F1.4 lens can gather twice light than F2.0 lens,the basic principle is square,2 squares is equal to 4.1.4 squares is 2. 4 is twice of 2, ($2^2/1.4^2=4/2=2$),in other words,F1:1 lens is 100 times than F10:1 lens,considering the cost,the close up monitoring camera always uses the range from F1.4 to F4,the smaller,the better of the lens,certainly the higher of the price. F3.4mm means the focus is 3.4mm, independent lens focusing lens will focus lens' optical center 3.4 millimeters place phantoms, f8 millimeter lens can produce focus lens' optical center 8 millimeter place kept phantoms, the bigger, the better of the lens. With f8 to 80 millimeter lens usual achievement telescope use, with the f2~4 lens usually to have 40 to 90 degrees angles of view, is close to the human eye, with f1~2 millimeter or smaller lens may consider that serves as the wide-angle lens.

三、 The depth of field's principle and application on the spot

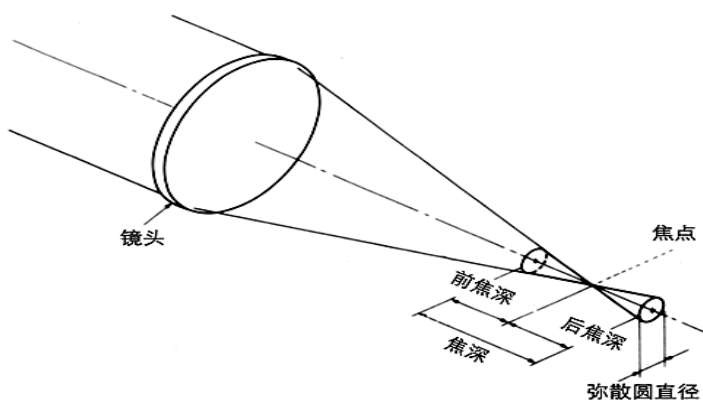
1、 focus

When the parallel light rip into theconvex,the perfect lens is gathering the all light on a point,then proliferate with cone-shape,the gathering point is focus.



2、 circle of confusion

Around the focus,light begin to gather and proliferate,the point's image is faint,form a expansile circle,and it is the circle of confusion.

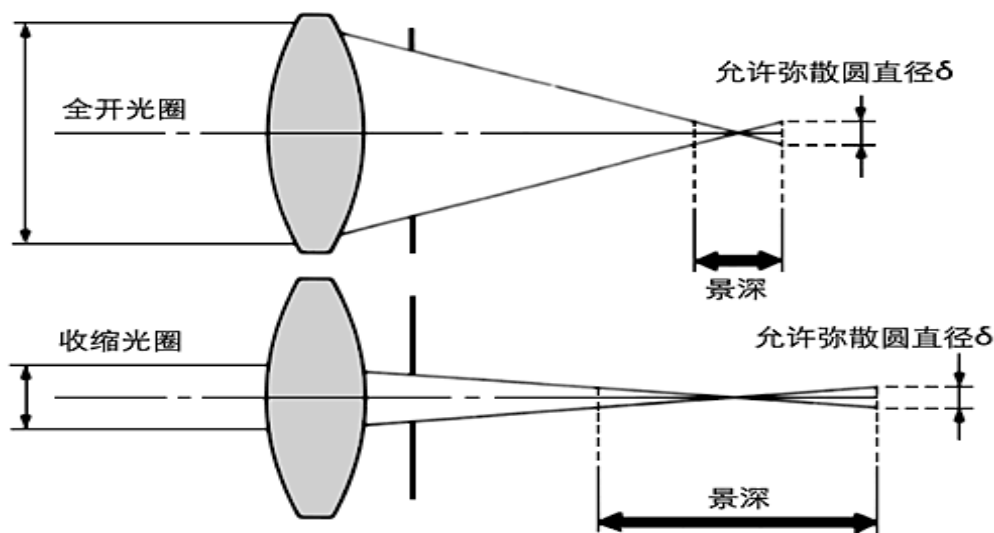


If the circle of confusion's diameter is shorter than human eyes' distinguish ability,in certain range,theactual image can't be identified,in fact,human eyes see it clearly.This circle of confusion which is unable to identify is permissible circle of confusion.

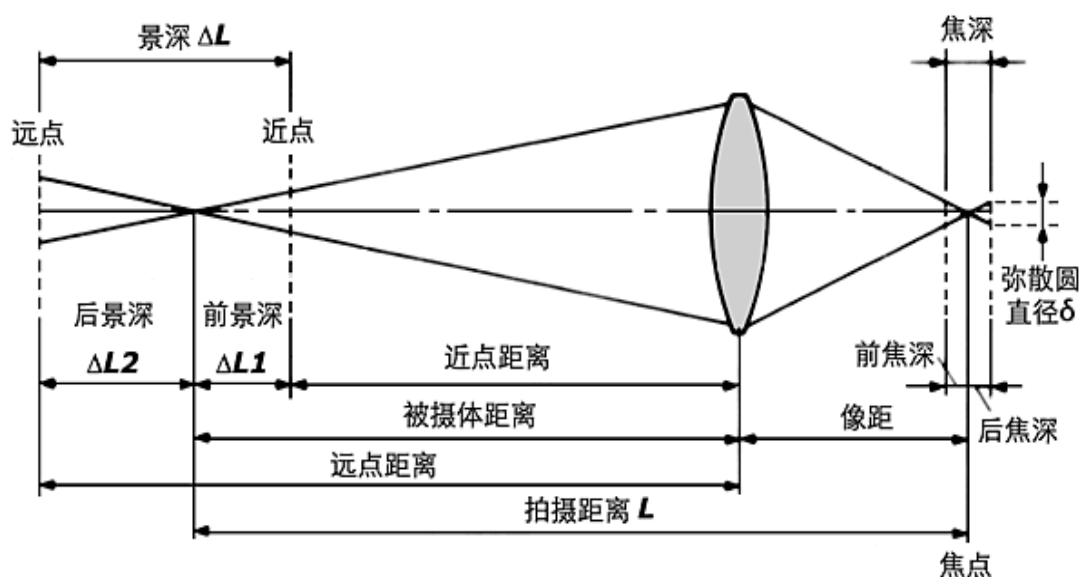
3、 depth of field

Around the focus,there is a permissible circle of confusion, the distance between these two circles of confusion is depth of field,that is:around the absorbed object,its image still has a clear area,and this is

depth of field. In other words, in the depth of the absorbed object, the faintness of the image can be identified by eyes (human consider the image is clear), is in the restrict area of the permissible circle of confusion.



The depth of field vary along with the lens focus, the value of aperture and the screen distance changing, as the fix focus and screen distance, the smaller of the aperture, the bigger of the depth of field.



The smaller of the aperture (the bigger of f), the bigger of depth of field; the bigger of the aperture (the smaller of f), the smaller of depth of field; the farther of the focus, the bigger of depth of field.

Regarding the random aperture, after its focal point's depth of field probably is in front of the focal point depth of field 2 times. Lens' focal distance is shorter, the depth of field is bigger; Lens the focal distance is longer, the depth of field is smaller. “+ reduces as far as possible using the biggest aperture absorbs is apart from + the long focus lens” to be able to gain the smallest depth of field effect. Can gain the maximum depth of field effect using “the smallest aperture + most short-focus mirror + hyperfocal distance focusing”.

4、computation of depth of field

f: lens focus

F:the screen value of lens

δ :the diameter of permissible circle of confusion

L: focusing distance

ΔL_1 : the front depth of field

ΔL_2 :the back depth of field

ΔL :depth of field

The front depth of field $\Delta L_1 = F\delta L^2 / (f^2 + F\delta L)$

The back depth of field $\Delta L_2 = F\delta L^2 / (f^2 - F\delta L)$

Depth of field $\Delta L = \Delta L_1 + \Delta L_2 = 2f^2 F\delta L^2 / (f^4 - F^2\delta^2 L^2)$

From (1) and (2),we can obtain,the back depth of field > the front depth of field.

Seeing from the depth of field formula, the depth of field and the lens use aperture, the lens focal distance, the photography are away from as well as the object archery target request (performance for to allow dissemination circle size) related.These main factors' influence to depth of field as follows(supposed other conditions is not change)

(1) lens aperture

The bigger of the lens aperture,the smaller of depth of field; The smaller of lens aperture,the bigger of depth of field.

(2) lens focus

The longer of the focus,the smaller of depth of field;The shorter of the focus,the bigger of depth of field;

(3) screen distance

The farther,the bigger of depth of field;The nearer,the smaller of depth of field.

Appendix C: Index

automatic tracking.....	3	GDI+	3
DVR.....	3	recognise the direction.....	3

Appendix D: Construction Items

Camera Requirement

Camera shutter can be manually set to 1/1000 above. Too low speed of the shutter will result in that the camera can not clearly screen a moving object. When the brightness is not too low and the noise is not too loud, your speed should be as quick as possible, which can make sure of good quality.

The lens should be set to be manual focus and be adjusted well. The method: hold an object (ID is similar to the plate) and stand in the location of triggering and then adjust it to the clearest position.

Adjust the location of the camera to make sure that the plate in the picture is horizontal to the best of your abilities.

The aperture should be set to be automatic, the image can not be too bright, slightly dark is good for recognition.

The longer the focal length is, the better the effect is. In general, the lens should be longer than 16 mm. If it is 50mm or longer, the effect of recognition will be better.

If you need to recognise the plate in the evening, your camera should have the function of auto-reversing (the part which is too bright will auto-reverse to black to improve the brightness of the plate effectively).

Capture Card

The standards of capture card had better be 768 points in width and 288 points in height or whereas. For the captured recognition picture, you can refer to the following picture, please make sure that the plate is about 150 points in width, 40 points in height and horizontal as much as you can.



This is a picture captured by the system on the scene. Its size is 768by288 and the image of the plate is about 1/5 of the whole picture in width

Block Entrance System

The camera is about 5.5m above the ground, the lens is of 50mm and the distance of screening is about 21m, its quality is better. The auxiliary light source had better be placed alone; it can not be far from the location of the vehicle detection.

For the recognition picture, you can refer to the following picture, please make sure that the plate is about 150 points in width, 40 points in height and horizontal as much as you can.

Camera shutter should be set to 1/1000 at least, when the speed is over 100 km/h, the shutter should be set to 1 / 2000.

Charging system

The auxiliary light source is 0.5 to 1.0m in height and 1-2 m away from the vehicle and it must be installed with the camera in the same side.

Shortest distance to install: the camera is about 1.2 to 1.5m above the ground. The lens is 16mm in length and it is 5m away from the location of vehicle detection. Camera shutter should be set to 1/1000 at least and be automatic aperture.

Best distance to install: the camera is about 5.5m above the ground. The lens is 50mm in length and it is 21m away from the location of vehicle detection. Camera shutter should be set to 1/1000 at least and be automatic aperture.

Mobile Checking Vehicles System

The camera is 2m above the ground and the lens is 50mm in length. The camera is about 21m away from the front of the vehicle.

For the recognition picture, you can refer to the following picture, please make sure that the plate is about 150 points in width, 40 points in height and horizontal as much as you can.

Camera shutter should be set to 1/1000 at least. When the speed is over 100 km/h, the shutter should be set to 1 / 2000.