

License Plate Recognition Parking System (ETC, Electronic Toll Collection) Solution

Tags: LPR camera, ANPR camera, license plate recognition camera, automatic parking system, intelligent parking system



1. Parking System Requirement:

In the management of modern parking lots, the parking management involves various aspects, and the management of vehicles is an important aspect. Especially for government, enterprise buildings, industrial parks, and residential communities, it is required to strictly manage various vehicles in real time, strictly monitor the time of their entry and exit, and register various types of vehicles (including internal vehicles and external vehicles) and identification. For large-scale field areas, there are many kinds of vehicles entering and exiting. For example, each vehicle must be judged manually, which is time-consuming, unfavorable to management and inquiry, and is difficult to defend and inefficient. In order to improve this mode of management that is not commensurate with modern parking lots, government, corporate buildings, industrial parks, and residential quarters, it is necessary to realize the automation and intelligence of vehicle management as soon as possible and to manage them in the form of computer networks. Entrance and exit vehicles are effectively and accurately monitored and managed. The system is required to provide corresponding application software to achieve efficient and intelligent parking management.

2. Sysvideo Intelligent Parking System Description & Features

2.1 System Description

The system use high definition video stream license plate automatic recognition algorithm, the vehicle capture, number plate recognition, when the vehicle enters the entrance of the community, license plate automatic recognition algorithm automatically captures the vehicle photos and identify the license plate number, the license plate number, the color, license plate characteristic data, and entry time information are recorded and transmitted. The vehicles can enter and exit the parking lot without barriers, providing users with a brand-new service mode.

The system automatically recognizes the number and license plate characteristics of the vehicle entering the community, verifies the user's legal identity, automatically compares the blacklist database, and automatically alerts, and can monitor and manage the entire parking area, including entrance and exit management, internal management, acquisition, and storage. Data and system work status for administrators to monitor, maintain, count, query, and print reports. The vehicle access to the community is completely under the system monitoring, so that the community's access, charges, security, parking management fully intelligent, automated and has the advantages of convenience, safety and reliability.

2.2 System Features

- The recognition system's reliance on the environment is reduced to the minimum level, realizing normal work around the clock, and the recognition rate remains high.
- The LPR identification system improves the speed and accuracy of recognition.
- The recognizable minimum number plate is (60-120) pixels (wide)
- Adapt to the complex climate and lighting conditions, such as cloudy, rainy, and night, can still guarantee high recognition rate.
- Adapting to high-speed and high-speed traffic, the vehicle speed is 20 km/h, and the high recognition rate (>98%) can still be guaranteed when the single lane traffic is 30 vehicles/minute.
- Realizes frame-by-frame processing of video images. The video stream triggers without embedding the sense coils (dual channels) to avoid road damage.
- The installation of the project is easy and the operation is stable, without disturbing the user's existing system.

- With high processing power, it can recognize and process all images in the process of vehicle travel, and does not depend on single images, effectively improving the adaptability of the equipment to complex environments.

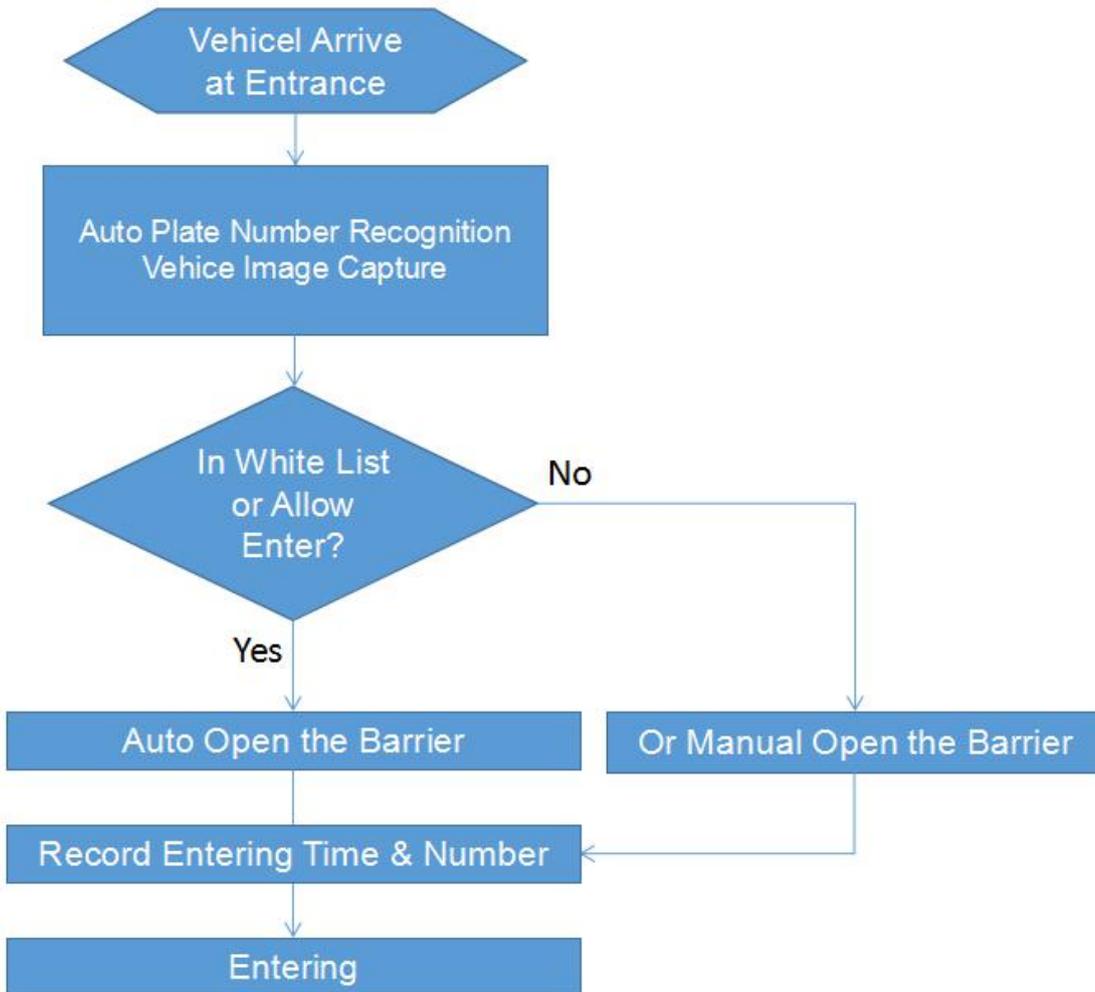
Adaptability to different lighting

The project site environment is more complex, such as: smoke, rain, snow, sunlight from different angles of illumination, lights and large billboards, etc. may cause interference to the identification system, especially the use of external trigger recognition equipment, its recognition rate is serious. Depending on the captured picture, the license plate of the vehicle is in the disturbed position at the instant of capture, which can cause misidentification. The license plate recognition algorithm of our company carries out frame-by-frame real-time processing of video images. During the movement of the vehicle, the angle and light are constantly changing. The license plate is always clear at certain moments, and certain license plate clear video frames will be collected. For analysis and identification, our company's license plate recognition equipment is highly resistant to light and climate.

Adaptability to vehicles and ultra-low speed vehicles

Due to the adoption of a high-speed algorithm platform that adapts to a speed of 20 km/h, the vehicle can accurately identify the number of the license plate number when it is traveling at ultra-high speed (Shaoguan rushed vehicles) or at extremely low speeds, avoiding the incapability of capture due to high-speed vehicle traffic intersections. The phenomenon occurs.

2.3 The System Working Process



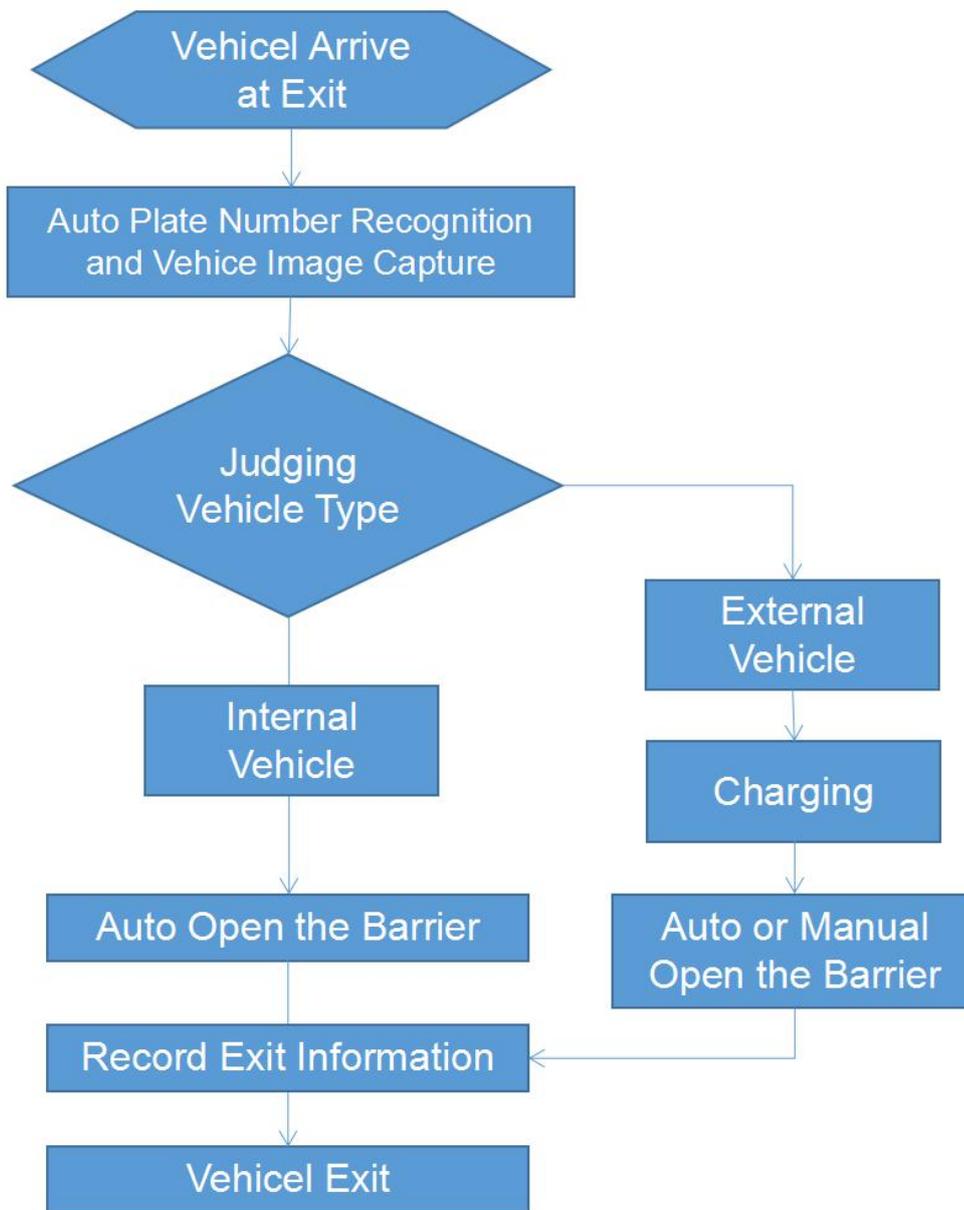
When the vehicle reaches the parking lot entrance camera identification area, the camera automatically recognizes the license plate number and makes a judgment on the vehicle type according to the system white list.

Internal car: automatic gate release / manual gate release optional, vehicle access information and pictures to save the database.

Temporary vehicles: automatic gate release / manual gate release optional, timing and save the entrance capture pictures to the database.

Unable to confirm the vehicle: Manually release, manual entry of license plate number, manual modification of license plate number, record database.

Vehicle Exit Process



Description:

The vehicle reaches the area entrance camera identification area, automatically recognizes the vehicle license plate number, and makes judgments on the vehicle type. Internal car: automatic gate release / manual gate release optional, vehicle access information and pictures to save the database.

The

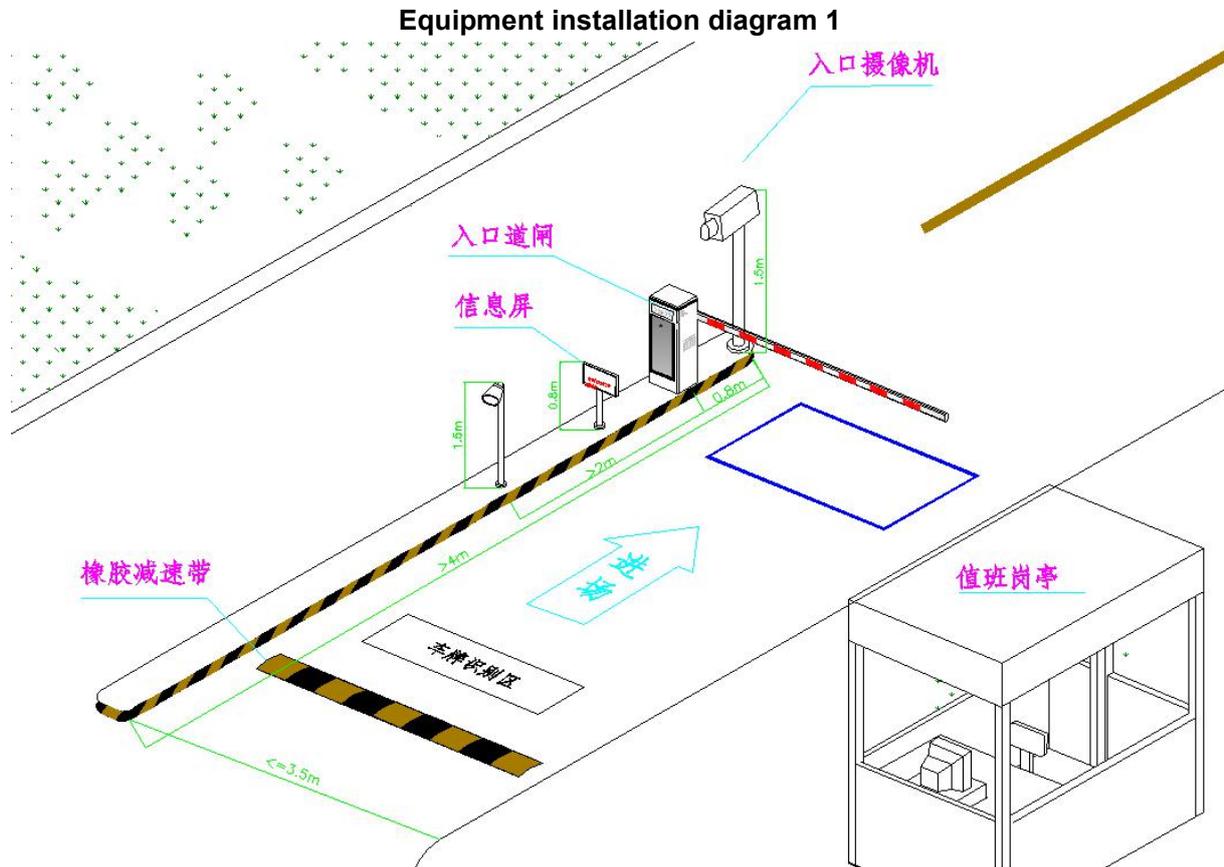
Temporary vehicles: automatic gate release / manual gate release optional, timing and save the entrance capture pictures to the database. If fees are charged, the fee will be charged according to the standard of the temporary vehicle charges. Manual release is generally preferred.

Unable to confirm the vehicle: manual release, manual entry of license plate number, record database, and correct cost.

3. license plate recognition system installation

The each entrance is erected with a camera column with a height of 2.0-2.8 meters. The column is equipped with a special camera for license plate recognition. The camera lens points to the ground where the sense of lane is about 4.0-4.5 meters to align the license plate.

The specific installation location is shown in the figure below.



Specific construction requirements, according to the site conditions to make additional details. Different construction sizes, choose different focal length lenses.

4. Sysvideo License Plate Recognition System Specifications

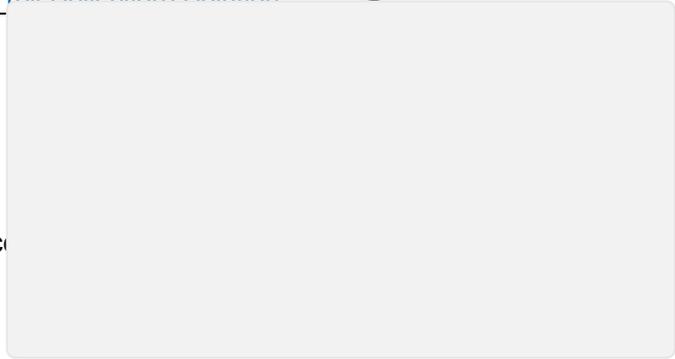
4.1 Sysvideo License Plate Recognition System Specifications

In the normal city license plate cleanliness situation, the license plates are unobstructed, and the average letter and digit recognition rate can reach over 99%. Through the application of regional enhanced templates, the entire card recognition rate (including license plate Chinese characters) can reach over 99%.

Single plate identification time: <math>< 0.2</math> seconds

The whole card recognition rate: >98% (full-card recognition rate = completely correct number of

cards/natural traffic volume)
 Number plate detection rate: >99.9%
 Allowed vehicle speed: 0~20 km/h
 Output image resolution: 1920x1080
 Output information: vehicle map, license plate number, ac
 The



4.2 Sysvideo License Plate Recognition Camera Introduction



Description

Sysvideo SC6121PZ is one professional Automatic Number Plate Recognition (ANPR), License Plate Recognition (LPR) IP Camera, it use Deep Learning AI(Artificial Intelligence) technology to continuously improve the recognition accuracy, support

Russia, Turkey, UAE, Qatar, Saudi Arabia, France, Indonesia, Singapore, Malaysia, Brazil, etc..countries (different software version) license plate capturing, recognition. Support white list control, license plate number OSD, provide SDK for software system integration, support RS485, I/O control. Support video auto trigger, coil trigger, and mixed mode to capture the plate number.

It use 1/2.8" Sony optical WDR Machine Vision CMOS sensor, up to multiple exposure wide dynamic range(WDR) >120db, starlight level super low light, highlight Compensation (HLC). It built-in 4 x LED white light, support H.265/H.264/MJPEG encoding.

It is one good solution for parking control system, traffic management, security system.,etc applications.

Features

AI (Artificial Intelligence) Technology

Sysvideo LPR camera built-in Deep Learning algorithm which are most popular on artificial intelligence industry, it has the ability to learn from itself, and the accuracy is high much than traditional recognition software, and it is easier to extend different countries plate number.

Wide Dynamic Range (WDR)

The camera achieves vivid images, even in the most intense contrast lighting conditions, using industry-leading wide dynamic range (WDR) technology. For applications with both bright and low lighting conditions that change quickly, True WDR (120 dB) optimizes both the bright and dark areas of a scene at the same time to provide usable video.

Highlight Compensation (HLC)

HLC can reduce the strong light from the vehicle lamp, it still can get clear plate number at night.

Camera Specifications:

Model	SC6121PZ
Hardware	
Processor	Hi3516A High performance SoC Image processor + FPGA Dual ISP
Sensor	1/2.8" Progressive Scan Sony Machine Vision CMOS Sensor
Effective Pixels	2 Megapixels, 1920×1080@25/30fps
Lens	Default: 2.8-12mm motorized zoom Optional: 4/6/8/12/16/25mm/2.8-12mm
License Plate Recognition	
Recognition Algorithm	Deep Learning artificial intelligence algorithm, the accuracy is high much than traditional recognition algorithm.
Recognition Rate	>98% (It depend on the field condition, the camera installation position, vehicle speed, etc, these factors will affect the recognition rate.)
Support Countries	Russia, Turkey, Indonesia, Singapore,UAE, Qatar, Saudi Arabia, France, India, Brazil, China,. etc (every country use different version, more countries are being supported)
Trigger Mode	Virtual coil, Video detection
License Plate Capture	Capture Mode:whole image or only license plate Storage: local SD card / FTP / HTTP / private protocol server
White List Control	Support white list import, search, support similar, same license plate match control
Recognition Time	≅ 200ms
Vehicle Speed	<40km/h
Control Parameters	exposure time , gain, trigger interval, output interval, single/double row,rotate
License Plate Enhance	Smart
Define recognition area	support
LED Light	4 x white light LED, support manual / auto control
The third-party software support	SDK(Software Development Kit) for integration, RS485
Camera	
Video Encoding	H.265 Main Profile,H.264,MJPEG

Resolution	Main stream	50Hz: 25fps (1920×1080,1280×720) 60Hz: 30fps (1920×1080,1280×720)
	Sub stream	720*576, 1-25(30)fps; 640*480, 1-25(30)fps 320*240, 1-25(30)fps
Video bit rate	30Kbps~16Mbps, support CBR/VBR	
Shutter	1/2~1/8000s	
Low Light	Color 0.01Lux @F1.2(ICR); B/W 0.001Lux @F1.2 (ICR)	
S/N Ratio	≥50db(AGC OFF)	
WDR	≥120db	
Audio Encoding	G.711A, G.711U, G.726	
Data storage	Video, picture file	
Storage System	Manual, auto(loop, schedule, alarm, motion detection)	
Alarm data transmission	FTP, E-mail, HTTP, CMS software	
Support Protocol	TCP/IP, UDP, RTP, RTSP, RTCP, HTTP, DNS, DDNS, DHCP, FTP, NTP, PPPOE, SMTP, UPNP, IPv4/IPv6	
Third Party Protocol	Support ONVIF/GB28181, HTTP API (CGI)	
IE Browser	Support IE6.0 and above, max support 16 users access	
Interfaces		
Audio Input/ Output	1 Audio Input/1 Audio Output	
Video output	1 analog video output	
Storage Interface	Support Micro SD(TF) card, support max 64G	
Network	1 RJ45 10M/100M Ethernet	
I/O Input/output	2x I/O input/2x I/O output(AC120V 1A/DC24V 1A), 1x RS485,1x RS232	
General		
Working Temperature/humidity	-40℃ - +55℃/0% - 90%	
Waterproof Protection	IP66	
Power Supply	DC12V/2A	
Power consumption	15W(MAX)	
Dimension	459mm ×150mm ×117mm	
Weight	2.2kg	

4. Sysvideo Intelligent Parking Management System Functions

The automatic license plate recognition algorithm can be flexibly mounted on various management systems that require license plate recognition functions. From the usual considerations, the management software has the following functions:

- Management System Interface
- Incoming and outgoing record query report
- Charge record report and inquiry
- Temporary vehicle charges

- License Plate Recognition: The license plate recognition adopts the license plate automatic recognition algorithm technology and can achieve all-weather work. Uses pure video algorithm recognition to work without feeling
- Vehicle access data storage archive
- License plate number automatic comparison function, through the database query, compare the license plate number, classification processing
- Supports temporary billing vehicles, monthly car rentals, stored value vehicles, and free car class IV vehicles.
- License plate inquiries: can include: A: query by access time; B: query by location; C: query by vehicle license plate number and other query conditions
- Fuzzy query
- Traffic statistics function: statistics on vehicles entering and exiting in any direction at any time, generating statistical reports
- Print data list or list of query results
- External output voice and LED information display (this option)
- The license plate automatic recognition algorithm is used as the front end of the application system, and the back end needs a vehicle management system and database support to effectively utilize and reflect the license plate recognition function and play a significant role in the vehicle management system.

5.2 Central Management Software

The parking lots management - including the definition of yard name, number of parking spaces, yard number. Can increase, modify.

User Management - contains operator rights management, user ID. Can increase, modify

System password modification, database connection settings, etc.

Vehicle Management contains three pieces

1) Internal vehicle authorization 2) Delay in recharging the internal vehicle 3) Internal vehicle deregistration.

Report query contains

- 1) Authorization report
- 2) owner report
- 3) Recharge report
- 4) Amount report
- 5) Billing report
- 6) In and out of the report
- 7) Entry and exit details report
- 8) parking lot status