

Smart Parking (V-Park Solutions)



Company Profile

Founded in 2004, NEXPA Systems Co., Ltd. has been developing and implementing revolutionary technologies that drive the world of smart parking and public surveillance to the next level.

At NEXPA, we constantly test and challenge our technology; we strive to offer smarter and convenient solutions to businesses. With over 50 patents in video analytics and surveillance systems, we have the expertise and experience to provide solutions tailored to maximise the potential of smart parking solutions, transforming it to a pivotal asset for the business growth.

Together with global partners like Cisco System, Inc., NEXPA looks to continuously develop advanced parking solutions as one of the key pillars of IoT (Internet of Things) domains. And as part of CIM (City Infrastructure Management) of Cisco Systems, Inc., we work towards the vision of a world with smart cities and communities in the future.



NEXPA Milestones

- Established: NEXPA Systems Co., Ltd, Korea
- Designated as excellent procurement product by Public Procurement Service 2006
- Contract with Public Procurement Service as excellent supplier



2004 •

- Achieved CE certificate for following: – Illegal Parking Crackdown System - Road Security Surveillance system
- Intelligent Security Surveillance system
- Achieved Excellent Product Procurement certificate for the following:
- Static/Mobile Illegal Parking Crackdown System
- Multi-functional Surveillance System
- Installed Smart Parking Guidance System - domestic line, Gimpo International Airport
- Obtained SMBA Performance Certificate for bi-directional License Plate Recognition (LPR)
- Designated as member of CPTED, Korea
- Certified Excellent Product Procurement for Static Intelligent Illegal Parking Crackdown System
- Carried out Smart Parking System development project - Incheon International Airport
- Solution Demo installation and exhibition in CISCO GCoE
- Incheon International Airport Ticketless Parking Management System
- Changi International Airport Videobased Parking Guidance System
- Sengkang hospital Video-based Parking Guidance System



V-Park Solutions

The V-Park Solutions is one of the most innovative evolutions in car parking and security industries. It provides a comprehensive video based car park management system and parking guidance system via utilizing IP Cameras equipped with License Plate Recognition(LPR) technology to identify, track, and guide cars based on their unique license plate numbers.

This innovative system also provides impeccable security and safety features with total video surveillance that covers the entire car park without a single dead-zone. This technology creates a holistic parking experience for drivers along with the assurance of total security for their cars.

Benefits of Smart Parking Solutions to businesses

Creates New Revenue Opportunities

Build brand loyalty with customers satisfied with the holistic parking experience, inciting repeated usage of the parking facilities.

Enhanced Safety and Security

Equipped with IP Cameras that also function as CCTVs, there are no dead-zones in the car park and the cameras are able to monitor the car park 24/7 while archiving video data up to 30 days. Videos can be retrieved by identifying the car's number plates and parking lot numbers to mitigate disputes arising from minor collisions.

Maximize Performance and Profitability

An integrated parking solution that includes remote car park management, car access control, security, visual parking guidance, and automated payment systems. A comprehensive range of services which eliminates additional expenses for maintaining a car park.

Enhanced Parking Experience

The V-Park Solutions guides drivers with an automated and simple guidance system, providing a convenient and hassle-free parking experience.

Comparisons

Differences between Ultrasonic Sensor-based Parking Solutions and **V-Park Solutions**.

Function Comparison

Identification Method	Ultrasonic Sensor-b Parking Solutions
Car Detection Method	Only detects car pres through Ultrasonic S Vulnerable to misde
Installation Location	Ceiling – needs sepa and data cables, and sensor per lot.
CCTV/Surveillance	Requires separate ir of CCTV cameras, wi not integrate much v sensor system.
LPR/Car Detection	No video analytics fo object detection and
Recognition Coverage	Car Recognition: 1 lo
Video Data Transmission Method	N/A

ased	V-Park Solutions
sence iensors. tection.	Detects car presence and reads license plate numbers through video analytic technology.
rate power requires one	Ceiling – only needs data cable for both power supply and data transmission. Only requires one camera per 3 – 12 lots.
istallation nich does vith the	The same IP cameras for LPR can also function as CCTV surveillance – no need for separate CCTV system and, virtually, it covers the entire car park without dead-zones.
r advanced LPR.	Variety of video analytics, including LPR, can be applied to the objects and cars at the back-end systems.
ot per sensor.	Car Recognition: 3 – 12 lots per camera depending on the type of camera and functions.
	One Ethernet cable (PoE) for data and power.

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System Overview

Parking Management System



02 Auto Pay Station

05



Parking Guidance System



Parking Management System



Specifications

Single/Dual Camera LPR System

LPR System is an automated control/ management system that minimises car congestion at the entrance and exit of the car park. The system identifies cars' license plate number within a single second, with more than 98% accuracy. The system uses the plate number as an identification for billing and security purposes. The computerized system reduces the need for consumables such as tickets.



Parking Control/ Management System Demonstration

Product	Dual Camera LPR System	Single Camera LPR System
Method	Visually analyses front/ back plates of cars	Visually analyses front plates of cars
Input voltage	AC 220V	AC 220V
IP Camera Unit	Digital CCD, 1.3-megapixel x 2EA	Digital CCD, 1.3-megapixel
Shutter speed	Auto	Auto
Recognising speed	Within 0.85seconds	Within 0.85seconds
Lens	5~50mm	5~50mm
Light	High brightness infrared LED	High brightness infrared LED
Recognition rate	Above 99%	Above 98%



Bi-Directional LPR Technology

The Dual Camera LPR System, with the bi-directional LPR technology, detects the rear license plate in the event of damaged or bent front license plate. It significantly reduces error rates with recognition rate of more than 99%.

Parking Management System



Auto Pay Station

The Kiosk embedded Auto Pay Station allows drivers to pay their parking fees with the prominent goal of providing convenient parking experience. The product also provides navigation function, which allows drivers to easily locate and reach their cars in the quickest way possible. In case of emergencies or general enquiries, drivers can communicate with operating personnel through the video call function. The exterior design of the machine can be customised to incorporate the company's logo.

System Architecture



Other Products:

• Car Exterior Identification System







Parking Guidance System

IP Camera System

IP Camera System is installed on the ceiling of indoor car parks to guide and monitor cars throughout the car park. Running with the back-end LPR technology, the IP Cameras detect the availability of cars and the cars' license plate numbers, and transmit the information to the command centre for 24-hour surveillance. The information is also used to locate the cars based on their plate numbers at different kiosks. The cameras also indicate the availability of parking lots via illuminating green for available, and red for unavailable parking lots.

Uni-directional IP camera

IP66 model (Individual LED light for parking lot)



Each uni-directional IP camera covers up to 3 lots, detecting cars in those 3 lots and recognising plate numbers. Built-in LED Light indicates the status of parking lot, which designed for individual parking lot with additional LED Light.

IP54 model



Each uni-directional IP camera covers up to 3 lots, detecting cars in those 3 lots and recognising plate numbers. Built-in LED Light indicates the status of three parking lots.

Omni-directional IP camera

360° IP CAMERA



The 360° IP Camera monitors and detects up to 6 lots in 360° radius concurrently. The 360° video will then be uploaded to the Command Centre where the Video Partitioning/ Distortion Correction module divides the visual into 4 separate screens for accurate recognition of plate numbers and easy monitoring of the cars.

Parking Guidance System Demonstration

Parking Guidance Operations









Specification

Product	Uni-directional IP Camera
Input voltage	PoE 36~56V DC
Photographic device	1/2.5" COLOR 5M CMOS (5-megapixel)
Communication method	100M Ethernet
Minimum illumination	1.2~1Lux @ F1,2
Sync method	Internet trigger
S/N Ratio	38dB
Shutter speed	Auto
Frame	1.3-megapixel 5FPS(15FPS max), 5-megapixel 1pic/2sec (1FPS max)
Туре	Raceway attached
Video	H.264
Video file extension	JPEG
Detection range	3 lots per camera

Product	360° IP Camera
Input voltage	PoE 36~56V DC
Photographic device	1/2.5" COLOR 12M CMOS (12-megapixel)
Communication method	100M Ethernet
Minimum illumination	1.2~1Lux @ F1,2
Sync method	Internet trigger
S/N Ratio	38dB
Shutter speed	Auto
Frame	1.3-megapixel 5FPS(15FPS max), 12-megapixel 1pic/2sec (1FPS max)
Туре	Raceway attached
Video	H.264
Video file extension	JPEG
Detection range	6 lots per camera

Parking Guidance System



"Find-My-Car"

"Find-My-Car" provides car-locating solution through a simple procedure of drivers just keying in their cars' plate numbers into the kiosk. Once located, the kiosk calculates the shortest path between the user and car, and displays the information on its infrared touch screen, guiding the user to the car.

System Architecture





Emergency Support System

With PoE technology, emergency alarms are connected to the operating computer at the command centre for operating personnel to assist parkers in case of emergencies. Once the emergency button is pressed, the IP Camera located nearest to the alarm displays the status of the driver and the car in order for the operating personnel to provide assistance in the most effective manner. Two-way voice communication using VoIP/SOP is also provided for immediate voice communication between the driver and operating personnel.





NEXPA Mobile Applications

With the advancements in technology, NEXPA has harnessed the information in its database for the convenience of drivers. Drivers are now able to use mobile applications to retrieve data of their parking history in car parks, get directions to the nearest empty parking lots, locate their cars and make payment for parking.

Other Components

• LED Guidance Signage

PoE Switch

The components for the Parking Guidance System, such as the IP Cameras and the Emergency Support System, are supported with PoE technology that supplies power and transmits network data simultaneously. The PoE technology eliminates the need for power cables and saves the installation costs. The system is also backed up by UPS for safety measures from power overload or power outage.



Multi-stream Support

The network data from the IP Cameras are simultaneously streamed into the operating computer for live monitoring, and into the NVR server for archiving.

This enables total surveillance solution: provision of real time network data for user support system, and retrieval of visual evidences to mitigate disputes from collisions that occur at the car park.

Outdoor Parking Solutions

NEXPA's comprehensive range of Smart Parking products also include Outdoor Parking Solutions for parking spaces that does not come with an overhead roof or ceiling. The cameras can be mounted onto a pole or lamppost, enabling the system to detect the vehicle's presence in the parking lot.

Once the vehicle is detected, number plate is saved into the database for identification and this data can be subsequently used for the tracking of number of vehicles in the carpark and for the "Find My Car" function which allows the user to find the location of his/her vehicle by entering the plate number from a Kiosk. Other functions include, PGS operations and parking fee calculations.



Smart Parking Guidance System Using Video Analytics (Parking Guidance + CCTV)

Outdoor Parking Solution uses stereo cameras installed on the pole in outdoor car parks to guide and monitor cars in parking lots. The stereo cameras detect cars in parking lots then transmit the information of real-time available spaces to the command centre with 24-hour surveillance video. Each camera monitors parking lots as overlapped which significantly enhance detection rates with minimizing blind spots.

Features

- Dual 360" IP Camera System for Parking Areas
- Car Detection by Backend Video Analytics Servers
- Surveillance Monitoring of the Parking Areas and Archiving of the Video Streams

Benefits

- 1 Set of Dual 360" IP Camera System Can Cover 12 Parking Lots • 1 Video Analytic Server To Handle 32 Dual 360" IP Camera Systems and Archiving of Video Streams
- for Up to 1 Month
- Car Detection Rate of 98% or Above
- Highly Sophisticated Algorithm Crafted to Detect Cars Only
- Default Surveillance Monitors, No Other CCTVs Required
- No Hidden Spots for Surveillance Coverage, Excellent Evidence Against Accident Claims
- Overall Customer Experience and Enhanced Security

System Architecture



Stereo Camera

Stereo camera consists of two 360° IP cameras which cover 12 parking lots to detect presence of cars in those parking lots. Stereo Camera also support multi-streaming, which enables Outdoor Smart Parking Solution to expand its function to Surveillance Solution.

Smart Parking Guidance and LPR (License Plate Recognition) System Using Video Analytics (Parking Guidance + CCTV + LPR)

Outdoor Parking Solution with LPR uses stereo cameras and PTZ camera installed on the pole in outdoor car parks to guide and monitor cars in parking lots. Running with the back-end LPR technology the PTZ cameras recognize license plate numbers of parked cars which detected by stereo cameras then transmit information which includes availabilities, license plate number, location and 24-hours surveillance video to the command centre. By using the information, outdoor parking solution with LPR provides 'Find My Car' service through Kiosk, Auto Pay Station and Apps.

Features

- Dual 360" IP Camera System + PTZ for Parking Areas
- Car Detection by Backend Video Analytics Servers
- License Plate Number Recognition by PTZ Camera and Video Analytics
- Surveillance Monitoring of the Parking Areas and Archiving of the Video Streams

Benefits

- 1 Set of Dual 360" IP Camera System Can Cover 12 Parking Lots for Accurate Parking Lot Availability
- 1 PTZ Camera Can Cover 6 Lots for LPR Works Criss-Cross with Dual 360" IP Camera System
- License Plate # Recognition by PTZ Camera and Image/DB Update
- "Find My Car" by License Plate Number
- Highly Sophisticated Algorithm Crafted to Detect Cars and LPR
- Default Surveillance Monitors, No Other CCTVs Required
- No Hidden Spots for Surveillance Coverage, Excellent Evidence Against Accident Claims and Crime Prevention
- Overall Customer Experience and Enhanced Security



System Architecture



Stereo Camera + Pan-Tilt Zoom Camera

Through High-tech combination of stereo camera and pan-tilt zoom camera, Outdoor Smart Parking Solution provides 'Find My Car' service by LPR technology, which also provides excellent security function with holistic experience for customers.

PoE Plus Switch

PTZ camera required relatively higher power than general IP camera. NEXPA's Outdoor Smart Parking Solution use PoE plus switch to supply sufficient power for PTZ camera, which eliminates the need for power cables and saves the installation costs.





Certificates & Patents

	Serial number	Certificate/ Patent	Issued By	
Credibility accreditations	R7011-3198	Certification of Innovative Small and Medium Business (INNO-BIZ)	Small and Medium Administration	
	20052330	Recognition for company-affiliated R&D center	Korea Industrial Technology Association	
	05329/0	ISO Certified (ISO 9001:2008 CERTIFICATE)	Qualityaustria	
	2014112	Excellent Procurement Product - Static Intelligent Illegal Parking Crackdown System		
	2014162	Excellent Procurement Product - Mobile License Plate Recognition System	Public Procurement Service	
	2014224	Excellent Procurement Product - Road Security CCTV System		
	11-282	SMBA Performance Certificate - Bi-directional License Plate Recognition Equipment		
	11-321	SMBA Performance Certificate - Parking Surface Management System with Multi-functional Video Editing Functions	Small and Medium Administration	
Major patents	10-0991106	Car Plate Number Recognition System by Front & Rear camera module		
	10-1373854	Car Parking Guidance System by Sensor Base Video Improvement Method		
	10-0956400	Multi-functional Image Processing Module embedded with Intelligent Car Space Camera Device	Korean Intellectual Property Office	
	10-0976441	Car Space Management Systems by Fish Eye Camera		
	10-0865510	Car Park Security Management & Method by Car Detection & Record Function		
	10-0844478	Car Space Management System & Related Method		
GS Accreditation	14-0051	Vehicle Location System v1.0	Telecommunication Technology Association	
K mark	PC12011-137	Parking Location System		
	PC12011-138	License Plate Recognition System for Parking Control	Korea lesting Laboratory	
Q mark	L151-2013-001	Parking Location System for Parking Control	Korea Testing Certification	
CE certificate	EMC: F690501/SP- EMG000648			
	LVD: F690501/SP- SAF000909	Number Plate Recognition System (NPS-2200)		
	EMC: F690501/SP- EMG000649	Automatic Illegal Parking Enforcement Systems (NPP-1000)	SGS Testing Korea	
	LVD: F690505/SP- SAF000908	Intelligent Surveillance Systems (NPS-1000)		
Performance accreditation	N00001-2015-01- 0005	Bi-directional Parking Guidance System (Unburied)		
	N00001-2013-01- 0009	Parking Location System for Parking Guidance (Unburied)	KoROAD	
	N00001-2011-01- 0038	License Plate Recognition Equipment (Buried)		
	Reg. 2013-3185	Intelligent Parking Location System for Parking Control	Korea Testing Certification	



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