AI Powered Traffic Management

Datasheet v4.3

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AllGoVision
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Contents

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INTRODUCTION

Automatic Number Plate Recognition –The Automatic Number Plate Recognition feature monitors the entry/exit of vehicles by automatically detecting the vehicle number plates in a virtual field of view. It supports automatic matching for one or more user-specified vehicle watchlists and generates instant, real-time alerts against the same. The ANPR feature can detect and recognize license plates on both moving and stationary vehicles and users can further configure it for accurately tracking vehicles across multiple locations and cameras. Since it also supports the recording and logging of number plates at a specific scene, this feature is especially useful for forensic investigations. Common applications include, checking the license/registration status of vehicles, cataloging traffic movements in expressways or highways, preventing unauthorized vehicle movement in protected areas, supporting automated parking management with regulations for entry and exit in tollgates, and generating auto-E challans with 95% accuracy.

Deep Learning: A subset of Artificial Intelligence, Deep Learning technology exposes machines to high volumes of tagged data. The machine is then tasked to 'learn', 'analyse', and 'detect' the same information in new datasets which ensures more proficient detection and identification of objects. Since Deep Learning technology is also powered by robust hardware infrastructure, the analytic output is better and faster.

Use of Deep Learning in License Plate Recognition: The use of Deep Learning for ANPR brings it much closer to human perception. Advanced Deep Learning methods can assess large datasets of vehicle number plates and the layered filters can take the minutest details into account. This increases the number of parameters considered for matching the vehicle number, thereby increasing the degree of accuracy in Number Plate Recognition. Thanks to the technology's improved processing performance and superior object classification capabilities, it can efficiently detect and identify multiple vehicle types with low visual biasing and false alarms.

LPR APPLICATIONS

- **Parking Management:** For vehicles which has ingress into the parking area but even after timeout there is no egress, alarms are generated for detection of such vehicles.

- **Traffic Monitoring:** red light violation or any other traffic rule violation can be detected and associated rule-breaching vehicle's license number can be recognized.

- **Law Enforcement:** Stolen cars can be detected from IP cameras deployed in traffic surveillance system in the city / highway. Even the place of registration can be tracked for the detected and recognized license plates.

- **Task Automation*:** Based on a matched entry of recognized license plate associated systems can be triggered such as access control / boom barriers etc. to open for a white listed vehicle at Entry and Exits of restricted zones, parking lots etc.

- **Automatic Toll Management*:** Recognized vehicles being charged the toll fees by associated payment systems for car owners with the specific license number.

*Integration required with the associated systems.

SYSTEM REQUIREMENTS

AllGoVision analytics has the following system hardware & software requirements for LPR.

CATEGORY	REQUIREMENT
Operating System	Ubuntu server 18.4, Windows Server 2016, Windows Server 2019
Network	Ethernet, 1GB or higher recommended
Hardware Requirements	x86_64 Platform, AVX 2 Support 6th Gen and above + Nvidia GPU
Frame Rate	Frame Rate > 10 fps
Database	Maria DB (X64) 10.3.13.0
Stand Alone version camera support	Camera Models from Axis, Pelco, Bosch, Hikvision, Honeywell, IQinvision, Sony, Dahua, Panasonic, Brickcom, Indigovision, Cisco, Samsung, Acti, Digital Watchdog, and others (ONVIF Cameras).
VMS Support	Honeywell DVM, Honeywell Maxpro, Milestone, Genetec, IndigoVision, ExacqVision, Cognyte (Verint), Bosch, Network Optix Note: With VMS all cameras supported by VMS will be supported
Reporting & Analysis Software	AllGoVision Alarm Center

DESCRIPTION OF THE FEATURES

AllGoVision provides following features for traffic and parking management. AllGoVision also has License Plate Detection and Recognition features - currently supported in specific countries.

| AGV-VA-IPDT	Illegal Parking Detection (with ANPR)
	Detects parking or stopping by any vehicle in a specified virtual area (no parking zone or restricted zone) beyond a specified period. Example: Illegal parking on road sides, in no parking areas or restricted zones, Illegal parking of the vehicle in front of the entry/exit gates.

AGV-VA-SPDT	Speeding Detection (with ANPR)
	Detects speeding of any vehicle above specified speed limit observed in camera installed parallel to the road. Example: Over speeding vehicles on highways, city roads and campus pathways.
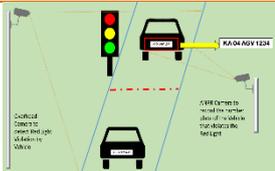
AGV-VA-RLVD	Red Light Violation Detection (with ANPR)
	Detects the Violation of Red Light by a Vehicle and gives an alarm. Can also be integrated with LPR to get the License plate details of the vehicle. Example: At traffic junctions, Red Light Violations can be detected, and the license plate of the violating vehicle can be recognised.

AGV-VA-LPDT	License Plate Detection
	Detects the presence of vehicle license plate (or number plate) and captures the image of the license plate along with the vehicle. Example: Records keeping of vehicles entering or exiting a specific zone. Used for evidence and monitoring purpose.

AGV-VA-LPRC	License Plate Recognition/ Automatic Number Plate Recognition (ANPR)
	Extracts / recognizes the license number (registration number) from detected vehicle plates and can verify against a user defined black / white list. Example: Used for traffic monitoring & law enforcement (detection of traffic rule violation and identification of the associated vehicle, detection of stolen cars etc.); vehicle access control & task automation; automated parking & toll management.

AGV-VA-WWDT	Wrong Way Detection (with ANPR)
	Detects vehicle movement in a direction opposite to user specified direction. Example: Wrong movement of vehicles on highways, one-ways, illegal U-turns, etc.

| AGV-VA-YBV	Yellow box violation
	Vehicles that stop for a minimum period in the Yellow boxes can be detected by using the "dwell time" feature of AllGoVision. When such violation is detected, the "ANPR" feature can be used to identify and fine the violator.

AGV-VA-LCV	Lane change violation
	Lane change violation can be detected by drawing a virtual "Tripwire" on the lane boundary which should not be violated. After a vehicle crosses the Tripwire, the Automatic Number Plate Recognition or "ANPR" feature can be used to identify the vehicle which commits the violation.

LPR- HOW IT WORKS

The video feed coming from IP camera is processed frame by frame for detection and recognition of license plate which has 3 steps involved in the process. The solution is based on deep learning and provides best in class accuracy

- In the step 1, the clear image captured by the camera is processed for presence of any vehicle license plate. On successful detection of license plate the detected license plate is captured. This step is known as License Plate Detection (& Capture).

- In the step 2, the captured license plate image is segmented into an optically recognized character string and alpha numeric values corresponding to the string are extracted.

- In the step 3, the license plate identity (the alpha-numeric code) is stored in the database. The user has options to manually examine the code and modify if required. There is option for the matching the extracted code with the existing entries in a list of registered license plates. Depending upon match or mismatch the license plate is recognized or unrecognized with respect to registered database.
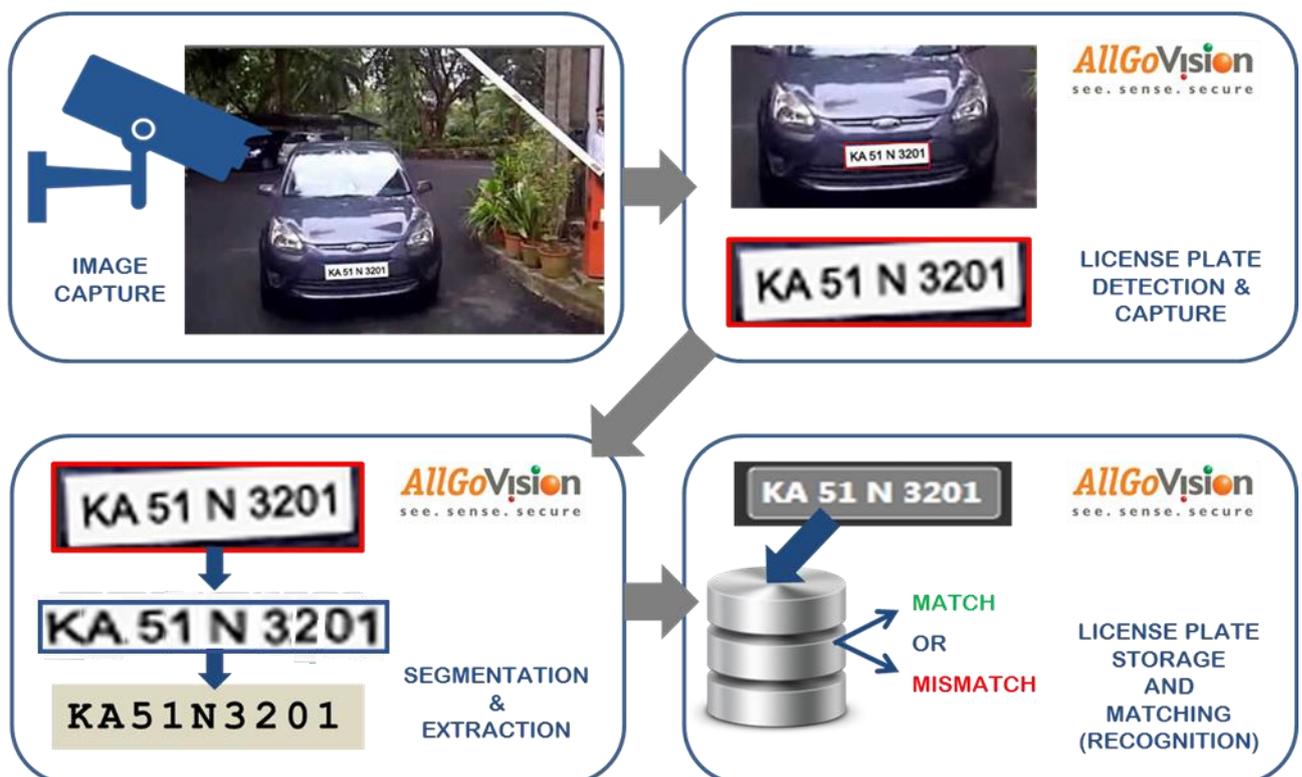
INSTALLATION

The software is easy to install and simple to use with intuitive GUI.

- Camera should be of good quality with high shutter speed. Full HD, 120 DB WDR, 30 fps Frame rate is required.

- Illumination should be Min 200 Lux. IR illuminator is required.

- **For Entry/ Exit:** For driver image along with captured license plate image, another angular camera should be installed at a height of 5-6 feet, focussing on the position where driver face would typically appear. Illumination should be Min. 200 lux for the face detection.
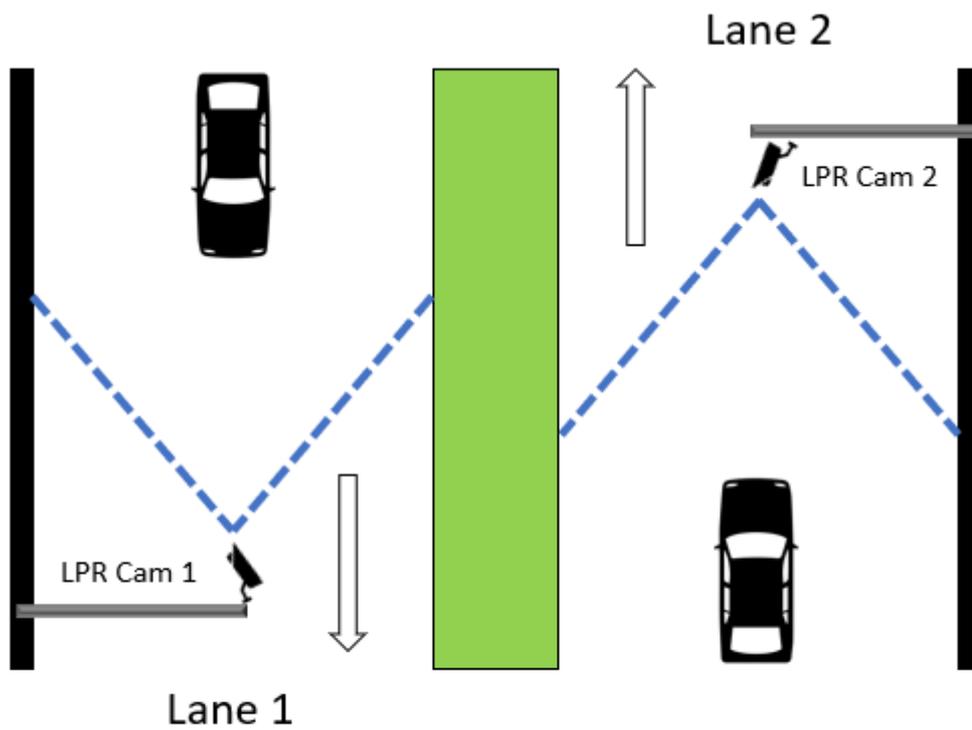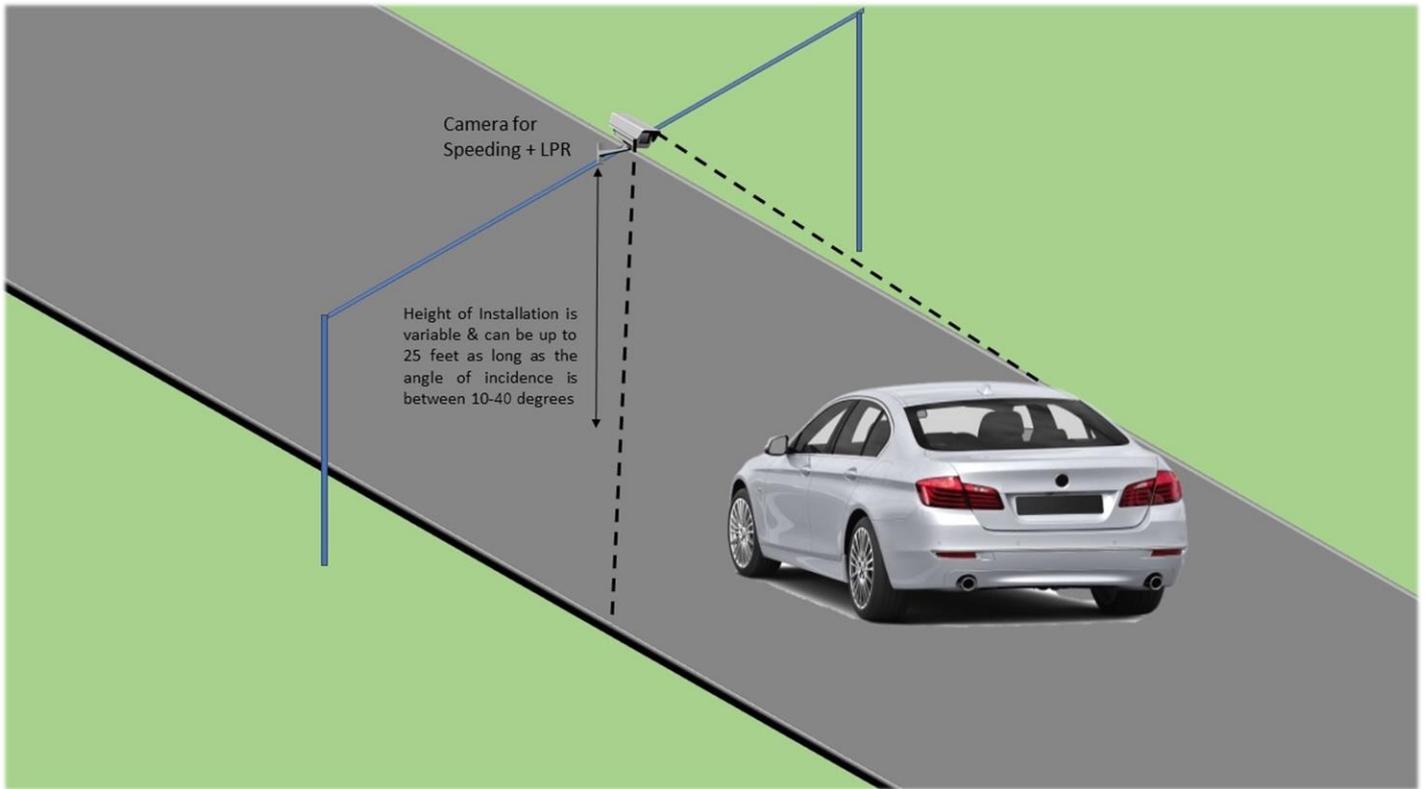
Cam (1)
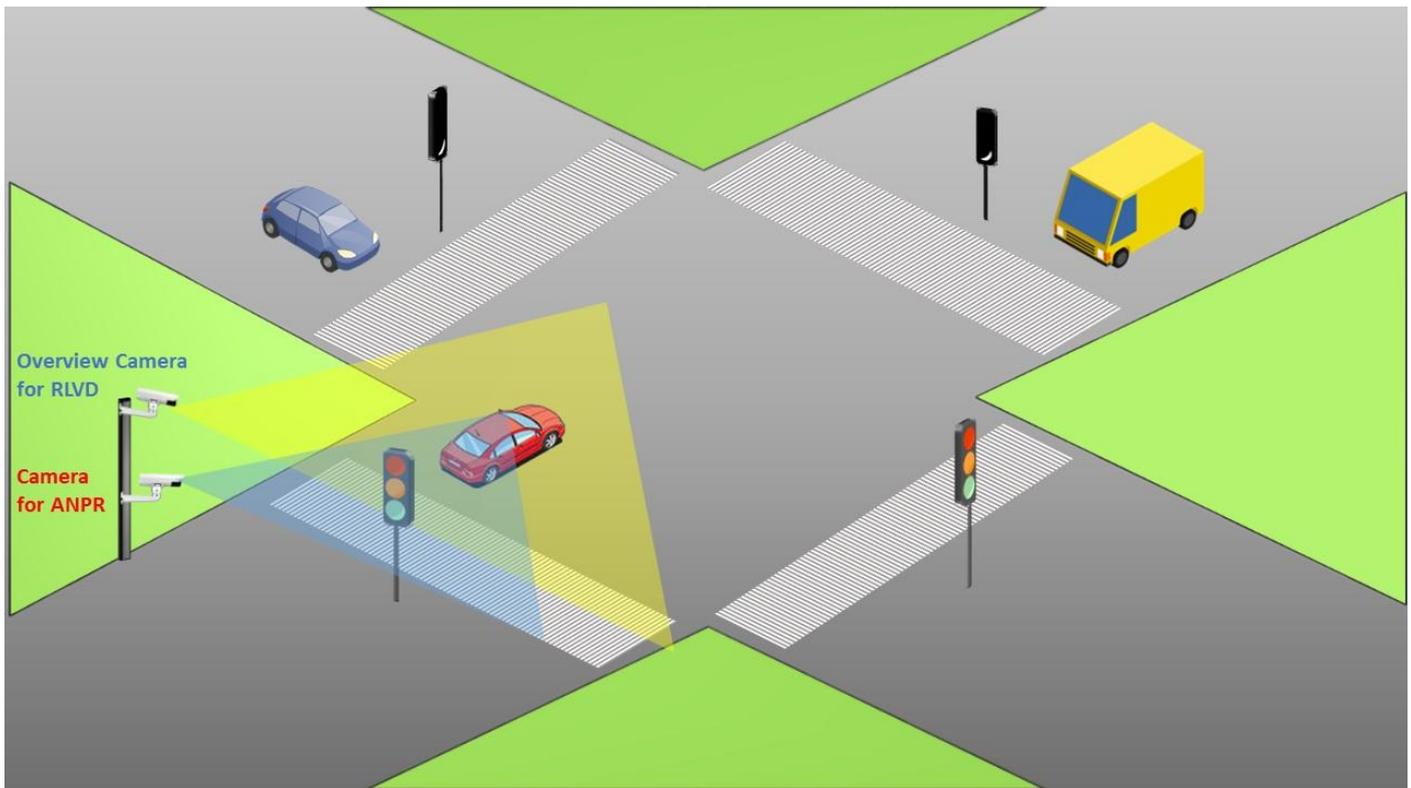For License Plate Detection & Recognition

Cam (2)
For Face Detection & Capture (Optional)
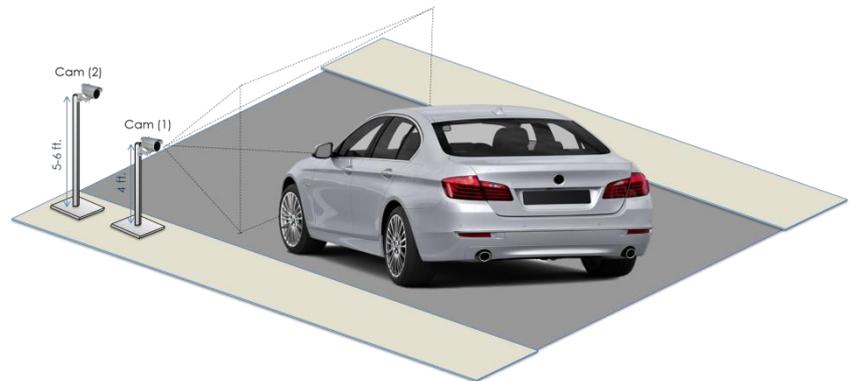
- **For Highway:** Height of Installation of the Camera is variable and can go up to 25 feet. The angle of Incidence should be between 10 to 40 degrees.

Camera for Speeding + LPR

Height of Installation is variable & can be up to 25 feet as long as the angle of incidence is between 10-40 degrees

Lane 2

LPR Cam 2

LPR Cam 1

Lane 1

Lane Based LPR

Red Light Violation Detection

TECHNICAL HIGHLIGHTS

- ✓ High accuracy coupled with low complexity
- ✓ Works under difficult conditions like uneven lighting, partial shadows, dirt and glare as long as the numbers are readable by humans without ambiguity
- ✓ License plate can be located at any visible place on the vehicle
- ✓ Wide range of camera angles – up to 45 degrees vertical (elevation: θ), 45 degrees horizontal (azimuth: ϕ); can be extended even further for uniform traffic flow direction
- ✓ Detection works both day and night, even when vehicle is not clearly visible or occluded, but number plate is visible and readable
- ✓ Accuracy: 99+%, Recognition: 95+% (This accuracy is for unambiguously readable license plates. Some variations in accuracy is expected due to environmental conditions (lighting, blurring, noise), lack of sufficient computational resources, non-standard nature of plates or fonts, damaged/dirty plates, and country)
- ✓ Countries supported: GCC countries (Abu Dhabi, Ajman, Bahrain, Dubai, Fujairah, Kuwait, Oman, Qatar, Ras Al Khaimah, Saudi Arabia, Sharjah, UAE, Umm-Al-Quwain); Algeria, Brazil, Dominican Republic, Egypt, Finland, Hong Kong, India, Indonesia, Jamaica, Malaysia, Mexico, Philippines, Singapore, South Africa
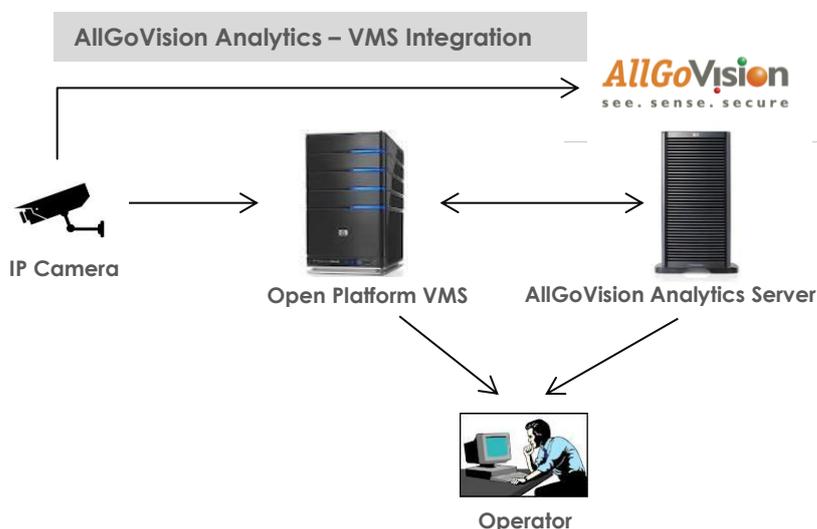
Operating parameters

Parameter	Value
Min Plate width	75 pixels (1 row) 45 pixels (2 rows)
Max Plate width (1 row)	400 pixels (1 row) 250 pixels (2 rows)
Max Plate Size dynamic range	4X (ratio of max to min plate size in the same frame)
Min Character height	10 pixels
Resolutions supported (entry/exit)	Upto 4K
Resolutions supported (Road/highway)	Upto 1080p
IR Illumination	30-60 W
Camera angle	maximum 45 degrees elevation (θ), 45 degrees Azimuth (φ).

INTEGRATION FLEXIBILITY

AllGoVision License Plate Recognition application is available in 2 flavours:

With VMS:
AllGoVision application is based on Open Platform Standards.
It is integrated with many open platform VMS.

AllGoVision Analytics – VMS Integration

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IP Camera

Open Platform VMS   AllGoVision Analytics Server

Operator

Without VMS:

- It is a standalone application.
- Directly takes the video feed from camera.
- The alarms and reports are seen in AllGoVision Alarm Center.
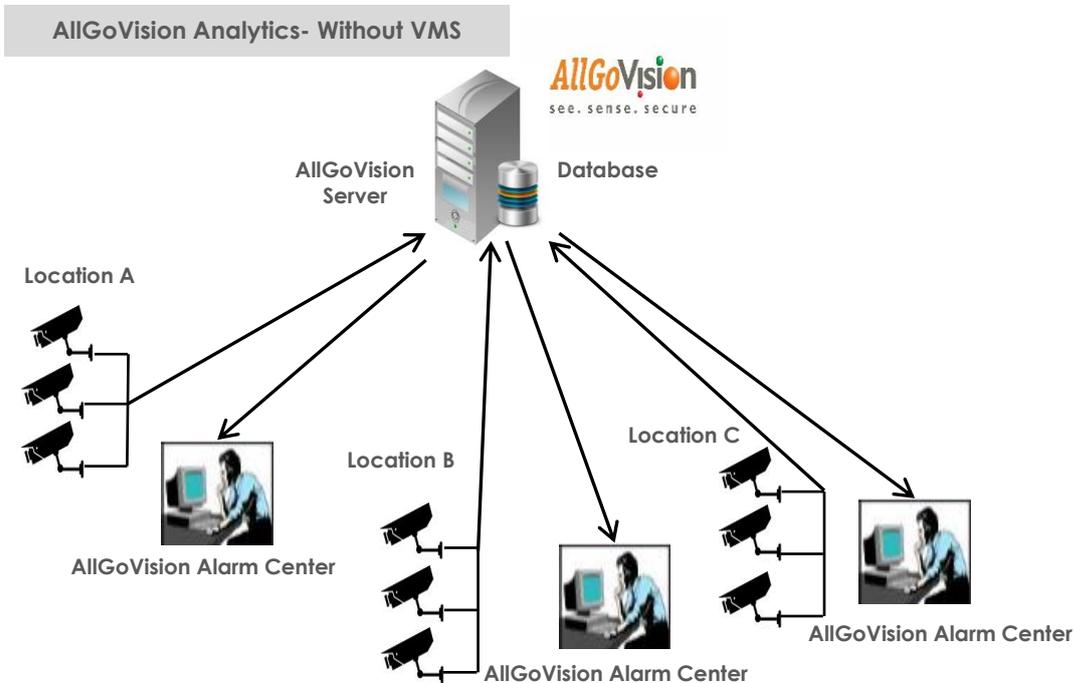
Federated Architecture

- With Federated Architecture, analytics can be done at local servers and viewed by local operators.

- A central server with a central operator can view all the alarms in the system generated by all the local servers.

- Alarms from different clients can be seen at the central Alarm Center and alarms are differentiated through Client IDs.
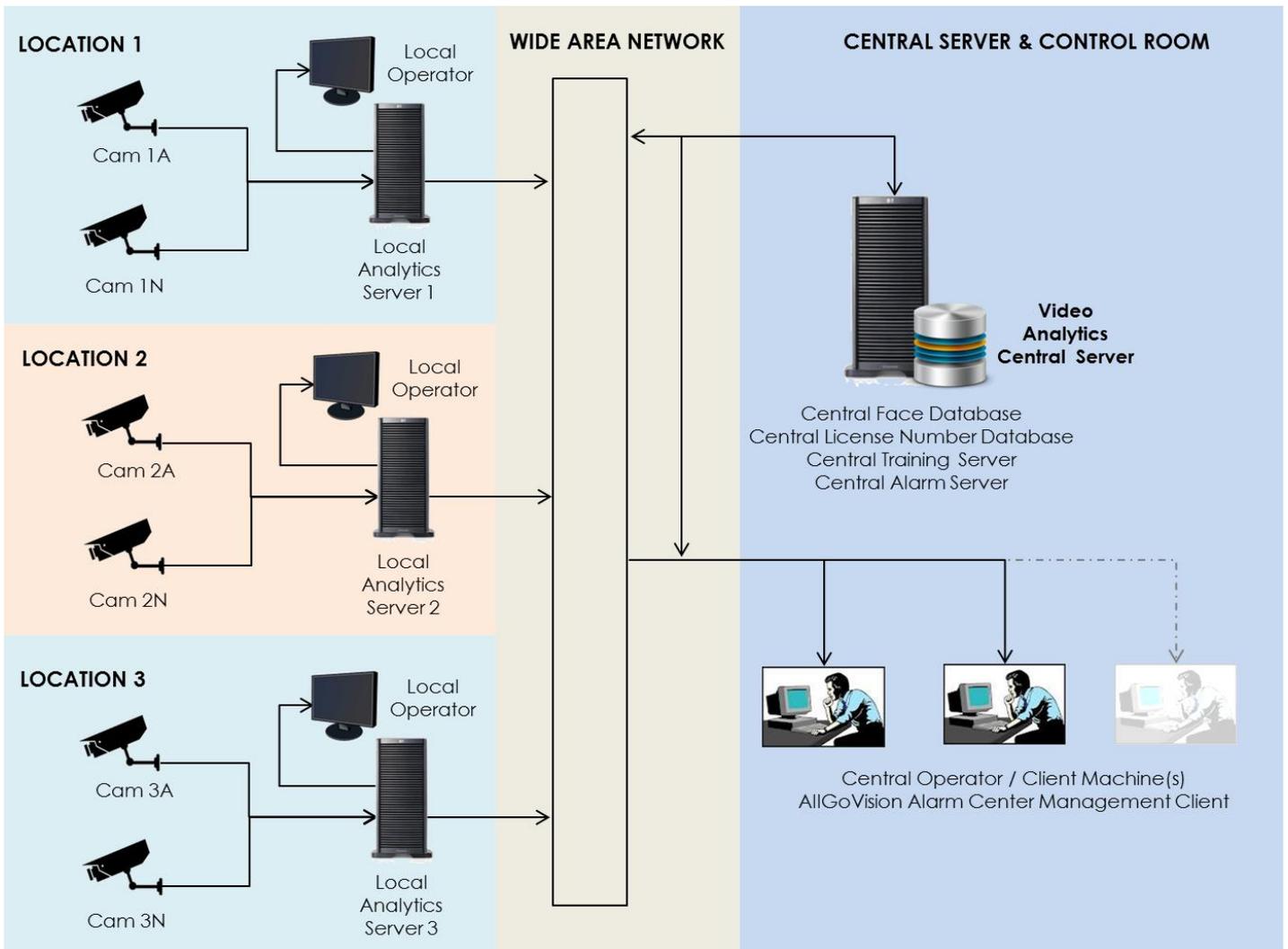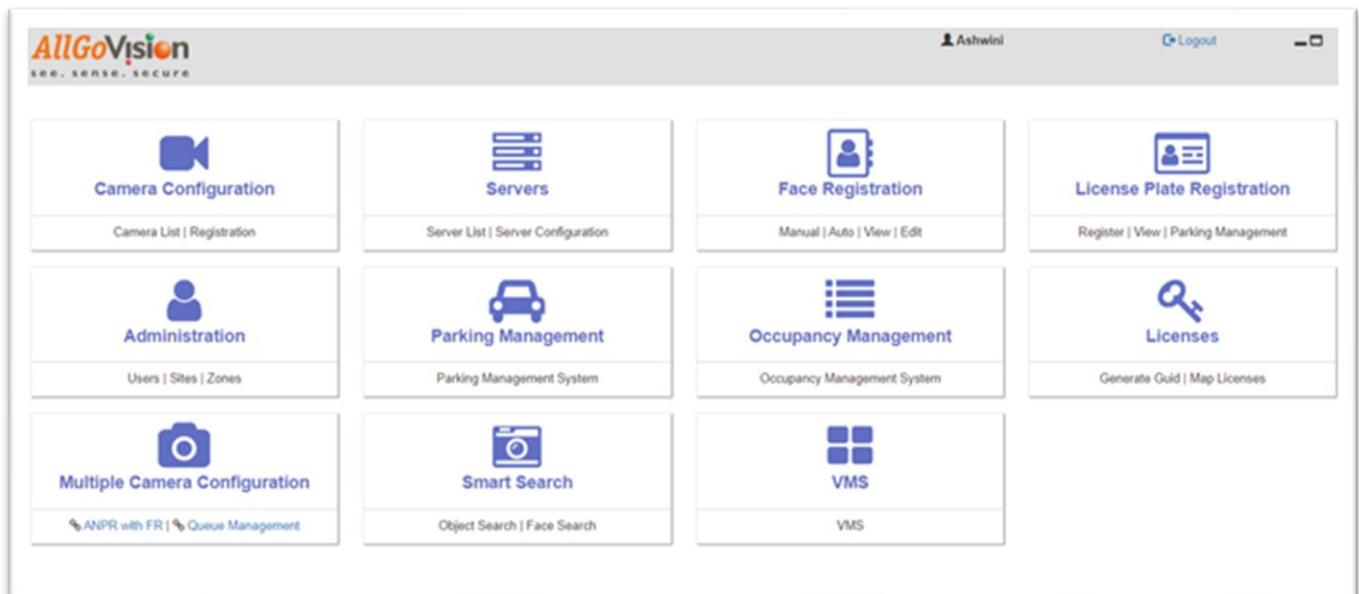
Redundancy / Failover

- Config Server can be setup for active/passive redundancy. NLB is used to manage the Active/Passive redundancy. When the active Config Server is up, all requests will be serviced by it. Only when it is down, requests are serviced by the passive Config Server.

- For video analytics, redundancy is achieved by having redundant server capacity for N:1 or 1:1 redundancy. When one or more VA Servers fail, the analytics pertaining to the cameras running in that server are re-assigned to a pre-designated set of servers.
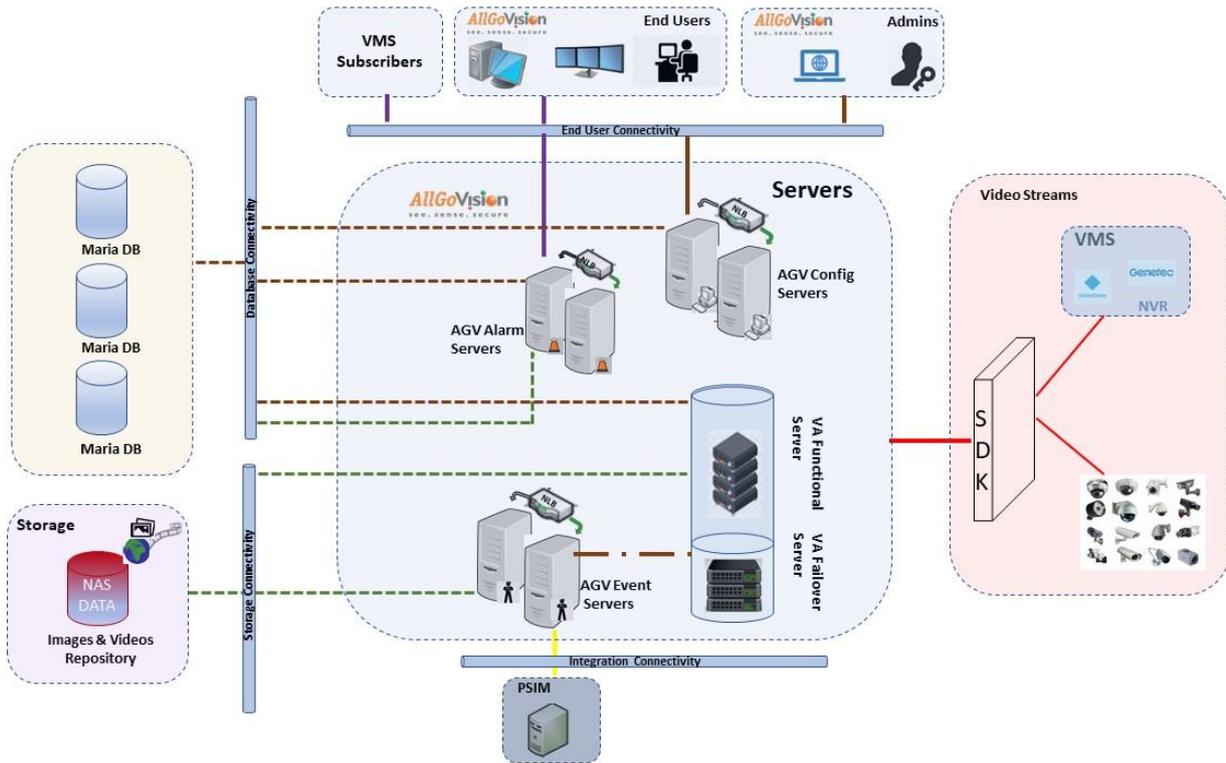
ALLGOVISION GUI

AllGoVision product offers a graphical user interface with the choice of native windows-oriented, tab based, point and pick interface along with the Web UI. The options are provided to add cameras directly or from VMS, provide configuration and view alarms whenever event happens.

AllGoVision Dashboard

Illegal Parking Setup

Wrong Way Detection Setup
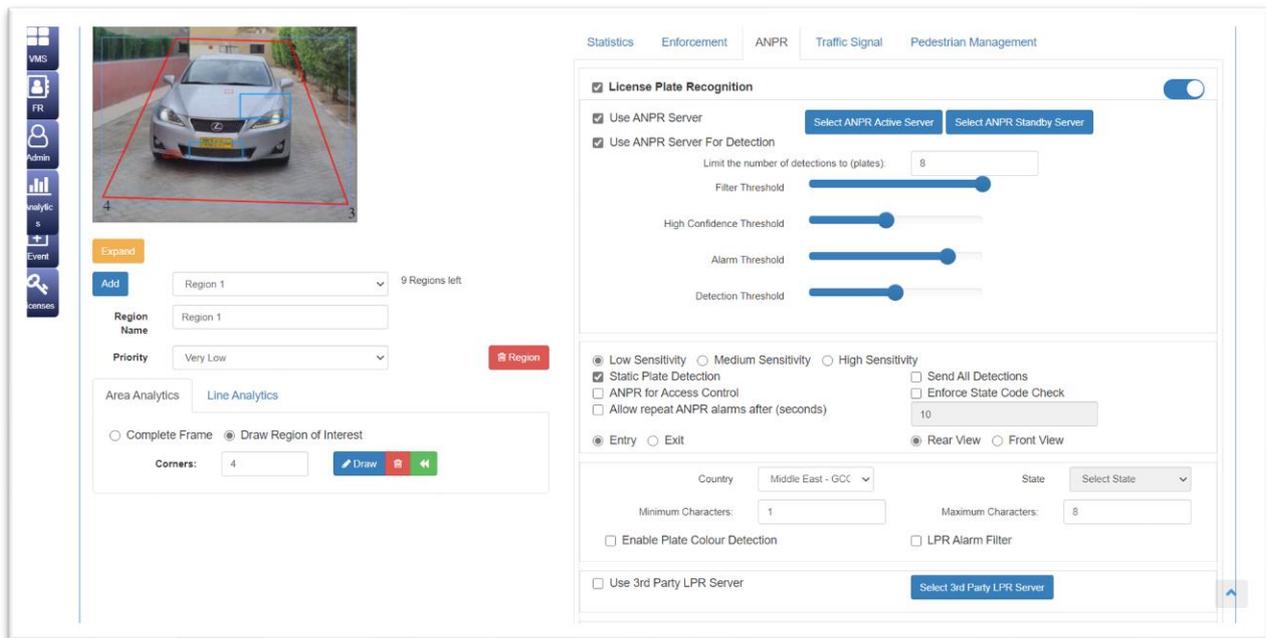
AllGoVision License Plate Recognition Configuration

ALLGOVISION ALARM CENTER

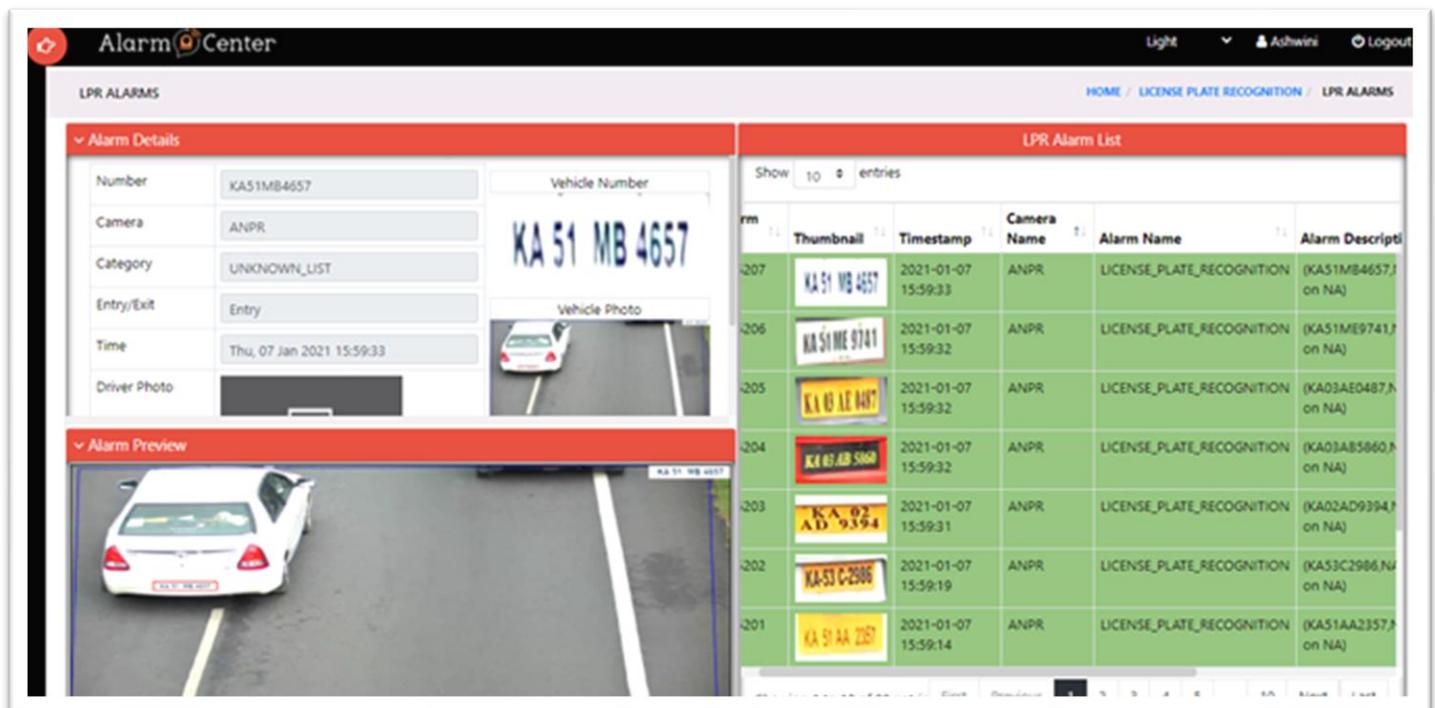AllGoVision Alarm Center is a Client to view all the alarms generated by AllGoVision analytics running on different systems across a LAN. It also supports report generation.

ANPR Alarm in Alarm Center

	Thumbnail	Timestamp	Camera Name	Site Name	Alarm Name	Alarm Description	O
			ANPR ⌄	⌄	Alarm Name	Alarm Description	C
6		2020-12-16 09:59:58	Speed with ANPR 1_India_P2S2	Ash	OVERSPEEDING	KA432972,131.794 mph	Ve
4		2020-12-16 09:59:56	Speed with ANPR 1_India_P2S2	Ash	OVERSPEEDING	KA51MJ4662,128.556 mph	Ve
2		2020-12-16 09:59:52	Speed with ANPR 1_India_P2S2	Ash	OVERSPEEDING	KA51MG5932,125.591 mph	Ve
9		2020-12-16 09:59:47	Speed with ANPR 1_India_P2S2	Ash	OVERSPEEDING	KA12Z2652,30.211 mph	Ve
7		2020-12-16	Speed with ANPR	Ash	OVERSPEEDING	AP09BR6205,136.036 mph	Ve

SPEED DETECTION with ANPR

mbnail	Timestamp	Camera Name	Site Name	Alarm Name	Alarm Description
		<Camera Name (ID) ⌄	⌄	signal	Alarm Description
	2021-01-07 14:54:22	Traffic Signal Detection	Ash	SIGNAL_DETECTION	COLOR:RED,STATUS:ON
	2021-01-07 14:53:42	Traffic Signal Detection	Ash	SIGNAL_DETECTION	COLOR:RED,STATUS:OFF
	2021-01-07 14:53:18	Traffic Signal Detection	Ash	SIGNAL_DETECTION	COLOR:RED,STATUS:ON

of 3 entries   First | Previo

RED LIGHT VIOLATION DETECTION