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Role of Surveillance in Traffic Management

Interviews

Kunal Kumar
Joint Secretary, MoHUA

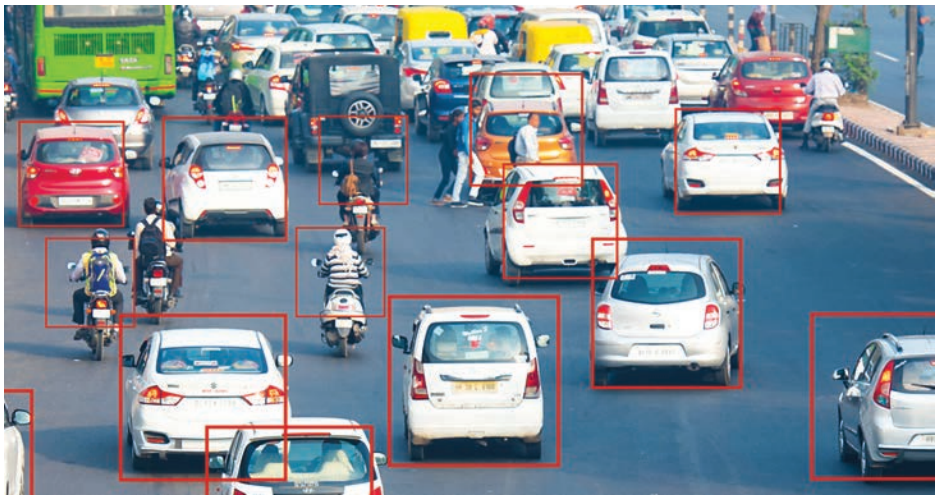
Katsuo Matsumoto
Chief Representative, JICA

Smart Technology: Securing Cities' Transportation

The Indian security and surveillance market is moving from security in closed spaces to security of public places, led by spending from both the government and the private sector. That said, the smart and intelligent security solutions backed by Artificial Intelligence (AI), Deep Learning, Advanced VCA, Machine Leanings, Internet of things (IoT) and big data technologies are redefining the security industry with Traffic and Transportation specific solutions

With the recent advances in AI and ML, Video Analytics technology has made rapid strides in solving real-world problems. Today, camera-based Automatic Number Plate Recognition (ANPR) is allowing police to issue e-Challans automatically for traffic violations; and advanced face recognition technology allows police to search for a suspect through hours and hours of footage recorded from surveillance cameras.

(To read more on how city traffic police are managing traffic, turn to page no 36).

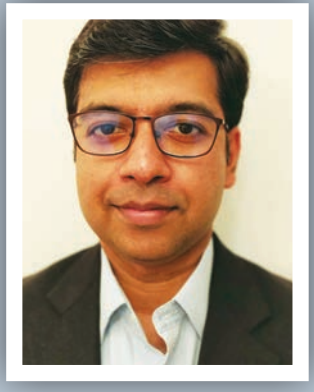


The Opportunities in City Surveillance

According to Richard Canday, Head – Marketing, Securens Systems Pvt Ltd, "The Indian surveillance market is witnessing immense growth from sectors such as city surveillance, hospitality, airport security, BFSI, retail, BPO, manufacturing, and educational institutes. The government, in general, is the biggest segment in terms of volume demand." He continues, "About 87% of surveillance needs are for commercial purpose, whereas 13% are for residential."

As per the assessment by K Srinivasan, Chief Executive Officer, AllGoVision, with the increasing number of roads and traffic, intelligent traffic management and automatic incident detection systems are likely to witness high demand in the years to come. He continued, "Moreover, the response time to any incidents will be much quicker and in real time. The

'We are implementing IoT-based solutions for major cities'



Ashish Modi, Vice President and General Manager, Honeywell Building Technologies, India

How many smart city projects Honeywell is part of now and how many are in offing?

Honeywell is playing a defining role in the building of smart cities in India with a focus on people, process and technology. Honeywell has a dedicated team of subject matter experts who share knowledge around technology and policies. This team of experts are continuously developing ways to enable governments to build smart cities, which is aligned to India's demographics and ambition to provide ease of living to its citizens.

Honeywell is engaged with several cities in India, including Bhubaneshwar, Aurangabad Industrial City- AURIC, Rajkot, Ranchi, multiple cities in Madhya Pradesh, and many more. We have established an optical fibre cable network which covers 8.45 sqkm to support the installation of CCTV cameras, Wi-Fi access points and a command and control system in AURIC. The system will integrate various functions of city management including power, water, security, telecommunications and other utilities. The project includes traffic management

overall market is estimated around USD 8.55 billion by 2023 which is at a CAGR of 21.5% during the forecast period (i.e., 2018-2023)."

That apart, safe and smart city market has become one of the fastest-growing markets for video surveillance in the last few years. The smart cities mission and safe city projects are getting a major boost from the government. These two are the key drivers of growth in the Indian security market. Ashish Dhakan, MD & CEO, Prama Hikvision India Pvt Ltd, says "The government has taken some bold steps to revamp homeland security, urban transportation (Metro rail, railway and BRTS), and critical infrastructure verticals."

That said, the surveillance market offers ample opportunities for OEMs, system integrators at various levels, including transition, upgrades, customisation, and other value-added services. The increased focus of the Central and State governments on security and

system, environmental sensors, solar panels, multi-service digital kiosks, and a solid waste management system.

We are partnering with state governments and local authorities to implement IoT-enabled citywide security and surveillance systems, including the installation of closed-circuit televisions, emergency response solutions, ANPR system, and intelligent traffic management technologies. The sensors capture data, analyse it, and turn it into information that enables better situational awareness for decision-makers, aiding the state governments, local smart cities authority and surveillance goals.

How significant is the IP-based surveillance in providing a fool-proof security cover?

Honeywell's solutions range consists of IP & analogue cameras and domes, digital and network video recorders, intelligent video analytics and sophisticated video management systems. Honeywell cameras provide exceptional image clarity and definition whilst the video systems allow easy migration from analogue to IP-based technology. Honeywell's redefined IP video portfolio feature a simplified user interface with full integration to recording devices with new technology that makes checking the status of the system faster and easier.

The new equIP cameras have the latest technology providing higher resolution, bandwidth optimisation and embedded video analytics to detect line crossing or left baggage at large transportation points such as airport terminal or railway station. Using H.265 Codec technology, the cameras reduce video recorder storage costs without sacrificing image quality, providing better bandwidth usage. Honeywell video analytics software improves surveillance accuracy, and responsiveness helping users to reduce financial losses and limit business interruption.

surveillance projects is poised to create bigger safe city project opportunities for OEMs, system integrators and technology partners.

According to Ashish Modi, Vice President and General Manager, Honeywell Building Technologies, India, the surveillance market is fast changing with new technologies being introduced, coupled with the technological advancement being more towards integrated and software-based solutions. He further adds, "In India, the preference has long been for analogue-based surveillance systems, but recent trends indicate a shift towards IP-based surveillance systems which are used increasingly in different verticals across the private and public sector."

That said, IoT and increasing dependence on connected solutions are shifting the market focus towards convergence of platforms with IP technology backed by open and scalable platform and video analytics integration. IoT is driving the need for edge device interconnectedness to a central intelligence/ analytics hub. Modi adds, "We are witnessing increasing adoption of ANPR and RLVDS in city surveillance and traffic management."

With Integrated command and control centres (ICCCs), working as a decision support system, the cities have been able to get a 360-degree view of the key functions. As many as 73 smart cities are at various stages of implementation of ICCCs, a state-of-the-art facility for centrally managing safety and security of citizens along with other urban services such as transport, water, and solid waste management. As per the government data, 24 smart cities have operational ICCCs worth Rs 2,771Cr; centres in 31 cities are under construction with projects worth Rs 2,261Cr while tenders for 18 more have been processed with projects worth Rs 2,551Cr.

ICCC - Third Eye

ICCCs are the eyes and ears of a city and function as a single source of information and point of resolution of the civic functions of the city. Here Kunal Kumar, Joint Secretary & Mission Director (Smart Cities Mission), Ministry of Housing and Urban Affairs, Government of India tells us that there is a significant focus on ICCC in Indian cities. He continues, "ICCC is improving public safety through better surveillance to enable city administration and police department to keep a

'We offer intelligent traffic solutions to bolster security and safety in transportation sector'

Ashish Dhakan, MD & CEO,
Prama Hikvision India Pvt Ltd

How is surveillance becoming increasingly relevant in the ecosystem of transportation in India? How significant is the IP-based surveillance in providing a fool-proof security cover?

The intelligent traffic cameras are revolutionising human and computer interactions by enhancing the capabilities of intelligent traffic systems. In many Indian cities, building new road capacity is not an option – either because of available space, disruption to economic activities, or budgetary constraints. In these circumstances, city authorities are beginning to look for smart technologies to make people's journeys faster and safer.

Increased penalties for traffic violations, under the Motor Vehicle Amendment Bill, are expected to bring discipline. With ANPR cameras installed at various traffic junctions, e-Challans are issued to the traffic violators helping the traffic police authorities. However, an effective traffic violation fine recovery mechanism is required for better outcomes.

The adoption of IP –based surveillance is growing significantly with smart and intelligent transportation solutions. We at Hikvision are committed to providing a foolproof IP–based surveillance products and solutions. Hikvision is certified with ISO 9001-2015 standard certification in India. The company is focusing on various initiatives, including ISO 9001, BIS, PESO, GDPR, FIRST, FIPS 140-2, common criteria certification to further the cause of product reliability and cybersecurity.

According to you, which are the verticals that have witnessed maximum traction in the last one year?

We are focusing on the fast-evolving vertical market by offering vertical-specific solutions to bolster growth. In the current scenario, the government is taking proactive measures to upgrade the internal security mechanism. Some of the important verticals include homeland security, smart cities, safe cities, BFSI, critical infrastructure, hospitality, retail, education, real estate and heavy industries

How many smart city projects are you part of now and how many are in offing?

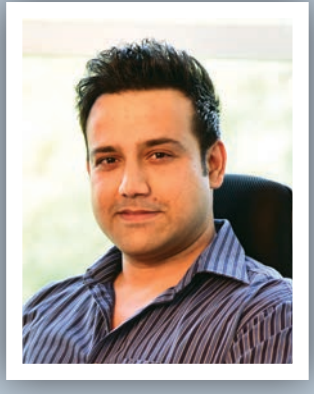
As a pivotal consortium partner, we are part of some of the key smart city projects in India. Meanwhile, these smart city projects, which we are part of, are at the various levels of implementation. We would like to specially mention the Naya Raipur Smart City Project, where Hikvision is the OEM partner. The project has been successfully implemented.

watch on sensitive areas such as major traffic junctions, municipal parks, tourist places and key gathering places."

He says, "Use of ANPR and RLVD systems have been incorporated for traffic enforcement and e-Challan. Cities are implementing Women Safety initiatives through the use of face recognition cameras, emergency call box at various strategic locations and also through mobile helpline app for the same."

*(**Turn to page 44 to read more about smart initiatives by various cities**)*

'Hybrid video surveillance solution is the new normal'



Richard Canday, Head - Marketing, Securens Systems Pvt Ltd

How is surveillance becoming increasingly relevant in the ecosystem of transportation in India?

India needs to guarantee the safety of its people, resources, private properties, and to be aware of internal and external threats; hence, the need for such video surveillance measures is increasing more than ever. In India, maximum people utilise public transport as a favourable mode of commuting, and it's imperative to make public transport safer for people to travel. Facial detection, emergency alerts, real-time command control centre connectivity, day and night surveillance, 3G/4G connectivity for authorities to be alerted of incidents on their smartphones in real-time, are a few of the solutions that need to be installed to make public transport safer.

Delhi's Indira Gandhi International Airport recently started a three-month trial of biometric facial recognition entry system for domestic passengers of Vistara airline at Terminal 3. With the facial recognition technology, passengers' entry would be automatically processed based on facial recognition system at all checkpoints, including airport entry, entry into security checks, and aircraft boarding.

How significant is the IP-based surveillance in providing a fool-proof security cover?

Technology is ever-evolving, and that holds in the realm of CCTV security

Innovative Solutions

The smart and intelligent security solutions backed by AI, deep learning, advanced VCA, ML, IoT and big data technologies are redefining the security industry with traffic and transportation specific solutions. Intelligent traffic cameras are an integral part of intelligent traffic system; they are enabling critical traffic management functions with precision by enhancing the security and efficiency quotients. As the surveillance and security boom is fed by several companies, ranging from joint ventures such as Prama Hikvision to multinationals—Honeywell, Securens, AllGoVision and Axis—these companies believe in providing solutions that innovate for a smarter and safer world.

Responding about the products and solutions, Sudhindra Holla, Director, Axis Communications, India and SAARC says, "The company has implemented a project in a historical Karnal city of Haryana, which of late was plagued by an increase in cases of violence against women, mob congregation and traffic violations. Upon inclusion in the smart city project, the importance of surveillance was realised by the Haryana government."

> Safe and smart city market has become one of the fastest-growing markets for video surveillance in the last few years.

systems, too. In comparison to the old-fashioned analogue camera-based technology IP cameras provide the following advantages and benefits:

Image Quality: The image quality from digital security cameras is significantly higher than an analogue, with many cameras capable of recording and transmitting high-definition video. Plus, digital cameras are more likely to have digital zoom features, which can have zoom distances over 100 ft.

Coverage Area: A single digital camera can cover an area that would require three or even four of its analogue counterparts. As a result, one may require lesser cameras and be able to maintain security surveillance over a broader area.

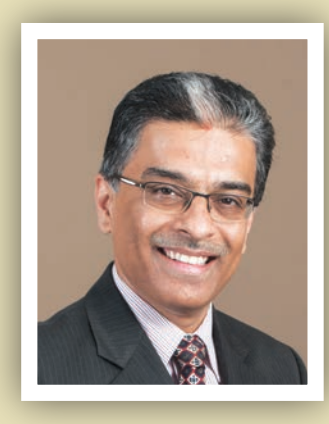
Video Analytics: IP cameras can be connected to monitoring platforms and surveillance software to provide video analytics.

In an IP based surveillance, the encoding and processing are done on the camera. The video footage is stored on the SD card and then streamed. As the camera records on the direct-attached storage, the video recording is available continuously even when there is a network outage.

Currently, all the users carry a minimum one smart mobile device. These devices are capable of accepting video stream or playback in .mp4 or .avi formats. This makes network video recorders (NVR) the ideal video recorder. The control and playback applications enable the users to view the video recording from anywhere at their convenience, enabling remote monitoring.

Here, the streams gathered through the network can be processed and appropriate classification and tags can be inserted while video recording. This will help during forensics as the enhanced playback capabilities allow multiple ways of retrieval. High availability of video recording is necessary for being compliant to the company's business continuity. Hence the video recording is expected to be available locally and remotely. Using IP cameras in conjunction with NVR is easily possible by pulling video stream from the camera in parallel to store video on the local NVR and the remote NVR.

'Advanced surveillance technology plays a critical role in the transport sector'



Sudhindra Holla, Director, Axis Communications, India & SAARC

City surveillance has been part of most of the smart city projects and in many smart cities, actual deployments that have happened were around surveillance. So far, how's the progress in this direction?

We have been working closely with most of the smart city projects in India, and the 'Smart City' vertical is a very crucial vertical for our growth. Karnal, Haryana is a historical city that off late was plagued by an increase in cases of violence against women, mob congregation and traffic violations. Upon inclusion in the smart city project, the importance of surveillance was realised by the government. We installed 104 Axis fixed box cameras (AXIS P1365) and 25 Axis PTZ cameras (AXIS P5635-E) across major junctions, streets and tourist spots in Karnal.

These cameras were primarily selected due to its ability to capture rapid movement in high definition and deliver excellent image quality even in low-light conditions. These cameras come with Axis proprietary Zipstream technology which enables compressed format streaming in real-time, allowing transfer of data on low bandwidth. The technology also boosts the compatibility

He further adds, "The solution by Axis Communications involved implementation of 104 Axis fixed box cameras (AXIS P1365) and 25 Axis PTZ cameras (AXIS P5635-E) which were installed across major junctions, streets and tourist spots in the city."

That said, modern problems require modern solutions; new technology has enabled the company to create smarter surveillance solutions that can be used for more than just surveillance. "The Axis license plate reader is one such solution that can be used for traffic management and vehicle counting. Parking lots can be automated using the license plate reader. Heat mapping is another solution which enables quick identification of hot spots, dead areas and bottlenecks to visualize traffic patterns over time as well as in real-time," he avers.

Some of the solutions showcased by Axis for smart traffic are:

- P1356 MkII – which is ideal for securing locations such as governmental and industrial sites, airports, railway stations, parking lots, school grounds and university campuses.
- AXIS Network Horn Speaker – is a simple-to-install outdoor loudspeaker that provides clear, long-range speech for remote speaking in live video surveillance. Audio can be manually or automatically triggered in response to an alarm and deter unwanted activity through pre-installed or uploaded audio files.
- PTZ Network Camera – ideal for city surveillance applications such as monitoring of public squares and parking lots and other open areas. It features four 2-megapixel sensors to provide a complete 360° field of view over large areas.

quotient making it ideal for integration with other products in the long-run. As a result, the security upgradation across Karnal, Nanded, Kolhapur and Hyderabad have been instrumental in helping the city police to shift from the traditional method of post mortem analysis to digital real-time monitoring thereby assisting the authorities to bring down crime and traffic violation.

How is surveillance becoming increasingly relevant in the ecosystem of transportation in India?

Cars getting stuck in traffic in cities is not a new-age travel issue. With cities expanding, and an increase in purchasing power, we see a trend of a family having more than one car. Smart transportation can reduce travel delays and reduce emissions released by vehicles. Apart from traffic, street lighting and parking are the common woes of citizens, and smart transportation can devise solutions to tackle these problems.

Vehicles with built-in cameras and sensors are a critical part of transportation. Cameras with facial recognition features will help save time, as the car's system will have pre-configured customised settings of the driver, and all he has to do is get in the car and drive. Sensors attached to the car will be able to identify objects within a certain radius of the vehicle, which should help in parking, as well as ensure safe driving.

How can thermal-based cameras be a help in strengthening security set up of cities?

A thermal camera creates images based on the heat that radiates from any object, vehicle or a person. Thermal cameras are less sensitive to problems with light conditions such as shadows, backlight, darkness and even camouflaged objects; and deliver images that allow users to detect and act on suspicious activity

The advantage of using thermal cameras is, that they can be used for uninterrupted surveillance, round the clock. During the daytime, they

function as regular CCTV cameras, and during the night when visibility is a hindrance, the thermal feature enables operators to monitor the surrounding perimeter reducing crime rates at night especially on the highways.

Since traffic congestion, security concerns, overcrowding etc., are driving the demand for smart technology, a big focus of these investments is in sensors, IoT and cloud-based platforms that can capture data, analyse it and provide real-time information and insights that can boost safety and security. These technologies help create actionable insights that city authorities and municipalities can use to improve their situational awareness and create productive environments that people and businesses want to call home.

Ashish Modi, of Honeywell Building Technologies talks about how the company invested in advanced technologies such as integrated video management systems that integrate CCTV, advanced AI-based video analytics software such as automatic license plate recognition (ANPR), Red Light Violation Detection

Key ICCC Projects in India

- Orissa Government invested Rs 51.5Cr in Bhubaneshwar for core utility operations integrations city operations center equipped for alerting, monitoring and incident management.
- Tamil Nadu government has commissioned command and control center in Vellore for Rs 40Cr with alerting and operations system equipped with datacenter and conference facilities.
- Panaji - setting up of the integrated command and control centre to monitor the city and installation of 400-odd surveillance cameras
- In Rajasthan, all the four smart cities in the state— Jaipur, Udaipur, Kota and Ajmer— have Abhay Command and Control Centres for taking care of internal security, disaster management and taking care of civic amenities management through IoT enabled technologies.
- Allahabad/Prayagraj: At the ICCC, 120 experts worked round the clock on surveillance and crowd management. Crowd analytics for surveillance of entry/ exit points and bathing ghats. Facial recognition software to trace people with the help of a photograph. Number plate detection software to track the movement of a vehicle captured on any of the 1,150 cameras.
- Chandigarh - MoU has been signed with Bharat Electronics Limited (BEL) for setting up an ICCC in the city, which will help in surveillance through fixed/PTZ cameras and intelligent traffic management system, along with an adaptive traffic control system.
- Chandigarh – government in partnership with Bharat Electronics Limited (BEL) is setting up an ICCC in the city, to help in surveillance through fixed/PTZ cameras and intelligent traffic management system, along with an adaptive traffic control system in places like markets, public parks, schools, colleges and community centres.
- Surat became the first Indian city to engage with Microsoft CityNext, using 60+ digital solutions. The department created a data-centre using Microsoft Dynamics, SQL Server and Windows 7, to monitor street activities by tapping into state and national surveillance grids. To improve the existing process of tracking citizen requests, the department created an e-application system that allows the public to view the status.

(Source: SCI-2019 presentation)

> IoT is driving the need for edge device interconnectedness to a central intelligence/ analytics hub.

System (RLVDS) etc., to effectively identify violator, pro-actively prevent traffic violations, and hence contribute in keeping the city roads decongested. With AI-based crowd management analytics solution, technology can proactively alert the operators about the possible formation of large gathering or crowd or even long queue at ticket counters or security check-in points in cities. One of Honeywell's offerings is a unified command and control centre, which stitches together key city services and systems such as emergency response, traffic management, solid waste, smart lighting etc.

Prama Hikvision is committed to provide complete and innovative solutions in ITS. Ashish Dhakan adds, "The latest solution from Hikvision Smart IP Solutions – the ITS, includes dedicated, high-performance cameras for event capture, reliable embedded video terminals for event recording, and a centralised video management platform - perfectly unifying all the ITS devices and delivering service-extensible applications." In the portfolio of available traffic easing technologies, latest-generation video technology is the star. According to Dhakan, innovations in AI and DL have transformed standard video monitoring with features that alert operators about traffic issues in real time. This allows them to take immediate action to keep lanes clear and to keep traffic flowing.

For nearly 10 years, Securens has been providing intelligent video analytics turning cameras into smart cameras. The company has always been at the forefront of surveillance technology in the field of IoT, AI and Deep Learning. With more than 10,000 verified crimes detected and deterred, 99% accuracy in detection and deterrence, over 25,000 client sites under surveillance and over 150,000 CCTV cameras across India connected to its international award-winning Active Deterrence TM technology and Central Monitoring Station (CMS), it's no wonder that leading companies recommend Securens.

Key Safety and Security Projects in India

- In 2017, Bihar government has sanctioned a project in Patna with a project value of Rs 148.5Cr for installing smart poles with notification systems and CCTV cameras for city surveillance.
- Maharashtra government equipped Nashik city with 4,000 cameras with 800 to be dedicated for monitoring vehicular traffic, especially road mishaps and hit-and-run cases.
- Greater Visakhapatnam Municipal Corporation has been installing 500 CCTV cameras under the Smart City project.The automatic number plate recognition (ANPR) cameras would help them in curbing crimes like vehicle thefts and rash driving.
- Raipur - Around 372 CCTV cameras have been installed at strategic locations for better surveillance, 'Intelligent' (automated) traffic signals have also been put up at 40 locations, besides 36 automatic number plate recognition cameras at six locations and red-light violation detection devices at 23 locations
- Patna - More than 300 CCTV cameras have been installed in the city by different agencies, including traffic police. The proposal of the Patna Police for installation of 591 CCTV and 31 automatic number-plate recognition (ANPR) camera are already installed in the city.
- Bhubaneswar Smart City - The surveillance will be done through 4,000 high-end intelligent CCTV cameras with red light violation detection and speed violation detection system.
- Rajkot Eye Way Project - In the first phase of the project, more than 500 cameras have been installed at 107 locations. In addition, at 7 locations ANPR/RLVD cameras have been installed to monitor traffic activities and system of e-Challan has been started. In the second phase, a total of 109 locations have been identified to install 277 Fix Cameras, 109
- PTZ Camera and in 10 other locations a total of 84 ANPR/ RLVD will be installed.
- Cochin Smart Mission Ltd (CSML) is implementing ICSS under its smart city project and installing integrated crime surveillance system (ICSS) across 135 locations.
- Jalandhar - The project would come up at a cost of Rs 116Cr under which 1250 CCTV cameras would be installed at 250 locations
- Thane - CCTV Surveillance of 400 cameras has been installed across 10 wards of the city.
- Surat Municipal Corporation (SMC) will install 3,148 CCTV cameras in Surat for 24*7 surveillance of its facilities. The work is implemented under the Suman Eye Project and is expected to cost Rs 14Cr.

(Source: SCI-2019 presentation)

According to Richard Canday, IoT and increasing dependence on connected solutions are shifting the market focus towards convergence of platforms with IP technology backed by open platform and video analytics integration. IoT is driving the need for edge-based devices interconnectedness to central intelligence/analytics hub. "There is increasing adoption of edge-based analytics in applications like city surveillance and traffic management for ANPR, RLVDS and Speed Enforcement Systems, vehicle tracking, connected cars and home automation," he avers.

The Securens Central Monitoring Station connects businesses to the surveillance technology resources they need and is equipped with highly trained personnel to detect and deter crime, smart technology, advanced sensors, video analytics and AI capabilities can prevent and protect businesses from financial loss and/or loss of life due to criminal activities or operational interruptions i.e. fire, theft, burglaries, pilferage, acts of violence, vandalism, unauthorised access etc.

In case of AllGoVision, the company has stood out from the rest of its competitors in traffic/transport solutions with the implementation of advanced AI-based algorithms combined with image processing for best-in-class performances, claims K Srinivasan.

Meanwhile, for Srinivasan, Deep Learning has been a game-changer for the company. The technical alliance with brands like Intel has helped the company surge the processing power and enabled with the faster search on GPU.

Can thermal-based cameras be a help in strengthening city's transport?

CCTV cameras cannot see at night and will have problems with direct sunlight and shadows. Thermal cameras overcome these limitations because these do not make use of visible light, but rely on thermal radiation, or heat given off by everything in their field of view as thermal cameras do not get confused by sun glare, darkness, headlights, shadows, wet streets, snow or fog.

This, according to Richard Canday, makes the thermal camera an ideal component of a 24/7 traffic monitoring solution. Based on temperature differences between objects, thermal imaging sensors produce a clear image in any lighting condition, day or night. An additional benefit of thermal imaging is that this technology enables operators to see through smoke. This can be a life-saving feature in smoke-filled buildings and can provide valuable information to firefighting teams about the possible location of people.

Ashish Dhakan, says, "The thermal cameras can be very helpful in the transportation vertical for human and vehicle detection at crucial points. Thermal cameras are useful in places like tunnels where it can detect people and forewarn the driver (Metro Rail, Train, Bus, Tram, etc.), with the relevant information. In places such as unmanned level crossings, thermal cameras can prevent collisions between trains and obstacles by detecting if a vehicle stops on railway tracks and is obstructing the path of a running train, in a real-time scenario."

In public transportation, thermal imaging cameras offer many new possibilities to enhance safety and efficiency. In public transportation tunnels, thermal cameras can help prevent fires, by detecting hot spots, or detect fires in an early stage so they don't have a chance to spread. Thermal cameras, for example, can be used as a rearview camera for railway vehicles that are conducted by a single person. When parked, thermal sensors could be used to monitor trespassers in a certain perimeter around the vehicle. Thermal cameras can also monitor equipment, like overhead lines, and generate warnings when component failure is imminent. Generally speaking, all electronic equipment and components heat up before they break down. These potential problems will be clearly shown in a thermal image.

When thermal-based cameras are combined with video analytics technology they can identify potential threats and immediately notify the relevant authorities. Thus being able to see in all light conditions and their ability to integrate with analytics software to reduce false alarms, thermal cameras are ideal for strengthening security in cities.

Some of the key features includes:

i) Smart city traffic enforcement (ITMS): Can be used with Red Light Violation Detection. Integrated with RTO: e-Challan.

ii) Parking Management: Calculates the vehicle occupancy time for each parking slots.

iii) Entry / Exit / Tollbooth Vehicle Monitoring: This is a typical use case for what we call Video analytics for smart buildings. Implementations include:

   a) Comparing number plate with Blacklist and White list
   b) Time spent by vehicle inside premises
   c) Alert on vehicles that haven't exited end of the day
   d) Daily reporting: Vehicle counting reports.

iv) Video incidence detection for highways (VIDS)

   a) Illegal parking detection in no parking areas
   b) Wrong way detection
   c) Speeding detection
   d) Sudden stop detection in the middle of the road indicating accident
   e) Traffic Classification into Congested, Stop and Go and Normal
   f) Vehicle classification, colour detection, multi-lane vehicle counting and reports.

Meanwhile, Aabmatica Technologies' focus is centred on traffic management and enforcement solutions. Arvind Tewari, General Manager, Aabmatica Technologies Pvt. Ltd sees a sharp increase in the demand of products in these verticals as it forms part of all smart city and traffic police modernization projects. He adds, "With the current emphasis on traffic safety and amended Motor Vehicle Act, we foresee a further use of technology in these fields. The policy makers as well as the government wants technology to replace all feet on ground ensuring a transparent and fair system."

In order to reduce waiting time at traffic junctions and understand traffic status across the length and breadth of cities, usage of various types of sensors has increased. The company has been able to make major breakthroughs in traffic management solutions and expects an exponential growth in this market.

Rahul Kamat