A SENSE OF SECURITY

ENABLING SAFER, SMARTER CITIES WITH VIDEO ANALYTICS AND AI

MOTOROLA SOLUTIONS

INTRODUCTION

Video security cameras are an ever-present facet of urban living in virtually every town, city and municipality in the developed world.

CCTV cameras managed by local authorities play a central role in supporting public safety. The presence of cameras in streets, buildings and open spaces can have a powerful deterrent effect, contributing to reduced levels of crime, terrorism and anti-social behaviour while helping citizens feel safer.

The video footage they capture also plays an instrumental role in helping authorities and law enforcement agencies successfully prosecute cases ranging from traffic offences to assault, theft, vandalism and public disorder.

Local authorities are under constant scrutiny to demonstrate they are improving the quality of life for citizens while enabling their own employees to perform more effectively. At the same time, administrations are publicly accountable to demonstrate tangible returns from investments in services, people and infrastructure that are often shrinking in real terms.

These pressures are felt keenly in the domain of public safety and law enforcement. Against a backdrop of a steadily rising urban population, increasingly outdated CCTV and video surveillance systems are proving an inadequate tool to safeguard people, property and public assets in an increasingly complex and challenging threat landscape.

This paper discusses the advancing role of video analytics, Artificial Intelligence (AI) and Machine Learning (ML) in helping government authorities enhance public safety and respond more effectively to critical incidents.

Supporting and enhancing human decision making in the moments that matter, the latest generation of video solutions is designed to make today's urban environments safer and more welcoming – while allowing local authorities to deliver more efficient, sustainable public services.
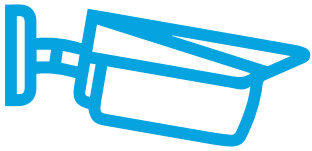
MORE PEOPLE. MORE CAMERAS. MORE CHALLENGES.

Many developed economies are characterised by a steady shift to increasing urbanisation. By 2050, it is estimated that the urban population in Asia will grow by 50%, which is an additional 1.2 billion people living in urban rather than rural environments[1].

This gradual rise in our urban population is paralleled by the increasing penetration of video security and surveillance systems in towns and cities. Public anxiety in the face of crime, terrorism, civil disturbance and antisocial behaviour places a burden on governments, local authorities and law enforcement agencies to demonstrate their effective response to a rapidly-evolving threat landscape.

While agencies must respond to valid questions surrounding ethical issues including personal privacy and other citizens' rights, the perceived value of video surveillance to support law enforcement and public safety has consolidated its importance in virtually every modern municipality. These trends are reflected in a global market for security cameras – many of them installed in urban environments – that's currently growing at 13% (CAGR) per year[2].

From the perspective of a local authority and its stakeholders, simply adding more cameras might appear to be an obvious solution to

any public safety need. No local authority has access to limitless budgets for hardware, personnel and operations. But equally, there are other considerations to balance when judging the value of any investment in video security and surveillance.

Installing more cameras means more video sources for employees to monitor. In a typical control room, one individual may be responsible for actively watching and making time-critical decisions – such as placing a call to the emergency services – based on video images displayed on as many as 20 or 30 screens.

Research confirms that human task performance deteriorates rapidly when an individual is asked to perform monotonous tasks, especially when they are complex or require high levels of attention. Faced by dozens of monitor screens covering a city precinct or transport hub, it's almost inevitable that a human operator will fail to notice a suspicious package that's been left unattended. In the event of a critical incident

such as a terrorist act or public disturbance, operations staff must immediately deal with a far higher workload. This further increases the likelihood of human error in a rapidly evolving situation.

As the threat landscape becomes more complex and unpredictable, local authorities are challenged to deliver a safer, more appealing environment for citizens while dependent on limited technical and human resources.

1.2 BILLION
THE EXPECTED NUMBER OF ADDITIONAL PEOPLE LIVING IN URBAN ASIA BY 2050.

APPLICATIONS FOR VIDEO IN URBAN ENVIRONMENTS

TRAFFIC MONITORING

Monitoring traffic flows and gaining insights into environmental impact. Leveraging rich metadata e.g. licence plate, vehicle type.

PUBLIC SAFETY

Increasing human operator's ability to detect, interpret and respond to anomalous activity and behaviours.

CRIME/ ANTI-TERROR

Intelligence gathering to support collaborative operations across multiple agencies.

INCIDENT RESPONSE

Real-time aggregation & visualisation of multiple data sources to improve speed and quality of response.

AUDIT AND COMPLIANCE

Monitoring Key Performance Indicators (KPIs); supporting generation of fully auditable incident reports.

MEETING EVERY STAKEHOLDER'S NEEDS

In a local authority context, video security systems can deliver significant value to support the objectives of a wide range of stakeholders.

VIDEO SECURITY SYSTEM

MAYOR/CHIEF EXECUTIVE

Delivery of better services, enhanced public safety and an improved environment; reducing citizens' fear of crime; increasing detection and prosecution rates; reducing costs.

CHIEF INFORMATION SECURITY OFFICER

Ensuring robust cybersecurity framework: alignment with regional camera codes of practice.

DIGITAL TRANSFORMATION OFFICER

Building scalable future-proof platform; leveraging AI and machine learning; development and delivery of clear technology roadmap.

COMMUNITY OFFICER

Demonstrating responsible use of technology to the public and other stakeholders.

CONTROL ROOM SUPERVISOR

Providing rapid, reliable response to incidents; augmenting the essential role of human operators; ensuring consistent quality of response; delivering better insights from connected information sources.

POLICE AND EMERGENCY SERVICES

Assisting ability to rapidly access and share data collected from local authority cameras as required by means of Digital Evidence Management System.

CITIZENS

Enhancing feeling of personal safety; providing visible deterrent to reduce levels of crime, terrorism and antisocial behaviour.

VIDEO SECURITY THROUGH AN ETHICAL LENS

Video analytics powered by AI can allow local authorities, police and other agencies to crystallise valuable insights from vast amounts of visual information. However it is critical that any AI technology is applied responsibly to protect the interests of citizens and other stakeholders.

The purpose of AI in a video surveillance context is not to displace human judgement. In contrast, its role is always 'advisory', guiding public employees' own decision making while reducing the likelihood of staff missing potentially important events or making mistakes.

SEEING THE LIMITS OF LEGACY CCTV SYSTEMS

Mobile phones from ten years ago seem antiquated compared with the smartphone in your pocket today. Far slower and less intelligent than their descendants, they lacked high-resolution cameras and screens, 5G connectivity or AI-powered features like facial recognition.

Many CCTV security and surveillance systems currently deployed by local authorities are a decade old or more. While comparatively young by the standard of other urban infrastructure projects, the performance of these systems – just like an outmoded smartphone – is eclipsed by the abilities of today's IP networked video solutions.

The inferior picture quality of 'legacy' CCTV cameras can severely limit the evidential value of images they capture. While modern IP cameras can offer HD, 4K or even higher video resolution, footage from a ten-year-old analogue CCTV camera is unlikely to exceed SD (Standard Definition) quality at best. This consequent lack of image detail limits a camera's ability to accurately resolve human faces, vehicle licence plates or unattended objects.

Similarly, in most cases older cameras offer inferior low-light performance. Footage captured at twilight or on dull, overcast days often results in dark, muddy and indistinct images. New technology can capture evidentiary colour in very low light environments and helps identify objects of interest in challenging lighting situations.

MORE THAN MEETS THE EYE: CONNECTED CAMERAS WITH INTELLIGENCE

Aside from fundamental limitations in image quality, legacy cameras suffer other drawbacks that limit their effectiveness in metropolitan security and surveillance applications.

Until relatively recently CCTV cameras have been intrinsically 'dumb' devices. Their sole function is to capture video images (and often audio) that are transmitted to another location – typically a security suite or emergency control room – for monitoring, recording and analysis.

By contrast the modern surveillance camera is an intelligent node in the Internet of Things (IoT) – a fast growing network of connected devices that's transforming industries as diverse as manufacturing, transportation, logistics and medicine.

Many cameras for surveillance and monitoring applications are now IP-enabled devices. Streaming securely encrypted video, audio and other information over the Internet, they are under the management of a remote operator who can view images on a PC screen or mobile device while adjusting exposure, controlling pan/zoom movements and more.

Modern IP cameras are also a rich source of metadata – or 'data about data' – that adds further context to a video stream. This can include information such as camera position, date and time, as well as vehicles, people and other objects in a scene. Metadata is inherently 'machine friendly', capable of being indexed, searched and reported on. It's also suitable for deeper analysis, allowing a software application to spot subtle patterns or anomalous behaviours that even a trained human operator may miss.

GETTING THE WHOLE PICTURE: VIDEO ANALYTICS IN ACTION

Supporting the critical role of the human operator, AI-assisted video monitoring and analytics solutions from Motorola Solutions can support local authorities in maximising value from their investments in video security infrastructures.

Here are three use cases where the application of AI can reduce the risks of a human inadvertently missing a crucial incident – and enable them to make better-informed decisions in the moments that matter.

APPEARANCE SEARCH

Appearance search allows an operator to pinpoint relevant CCTV footage matching a specific query like 'adult male wearing a red top'.

OBJECT DETECTION

Object detection can be used to identify the presence of a person or vehicle in an unauthorised area.

UNUSUAL ACTIVITY DETECTION

Unusual activity detection features new edge-based intelligence, using advanced AI technology to detect atypical behaviours - such as people and vehicles travelling at faster speeds or in unusual locations - and issue an alert to operators.

FOCUSING ON EVENTS THAT MATTER MOST

Motorola Solutions offers a complete portfolio of video security and analytics solutions that assist local authorities in their mission to support citizens' safety while allowing staff to perform more efficiently.

SECURITY CAMERAS

Rugged, reliable video security cameras, with high image resolution in all weather conditions, plus intelligent on-board video analytics capabilities including facial recognition.

DECISION MANAGEMENT SYSTEM

Improves consistency and effectiveness of response actions, presenting security operators with better insights from connected systems and offering step-by-step guidance.

VIDEO MANAGEMENT SOFTWARE

Leveraging the power of AI technology, giving local authorities enhanced control over video security with easy to use interface and powerful analytics capabilities.

1 UN-Habitat, 2012-2023
2 IDC, July 2020
3 UK Police Scientific and Development Branch (PSDB), 1994

MOTOROLA SOLUTIONS