MVC-IVA-VGD IVA Pro Visual Gun Detection

IVA Pro

- Designed to detect persons and brandished guns (86.7% true positive rate under pre-defined conditions*) in order to reduce reaction time in hazardous situations
- Privacy protection: All computations are carried out on-edge, with no video data being required to leave the camera
- Easy installation: No additional server or camera calibration necessary
- Seamless integration with video management systems and other security infrastructure from Bosch and other partners
- Easy evidence retrieval with forensic search

Intelligent Video Analytics (IVA) Pro Visual Gun Detection is based on deep learning and is designed for automatic detection and classification of people and brandished firearms. It supports strategies to improve security, for example, of schools or government buildings. In pre-defined conditions*, the system achieves a 86.7% true positive rate in detecting guns held by people.
When someone brandishing a gun enters the detection zone, the system is designed to promptly alert personnel who can verify the incident and take proactive measures. This capability may enable quick and appropriate life-saving responses. Since the system is camera-based, security staff can also rely on high-quality video footage for forensics supporting first responders.
IVA Pro Visual Gun Detection can operate independently, but it is also compatible with many other systems like video, access control, and public address. These integration paths enable additional responses like human verification, locking doors, initiating automated public address and two-way radio announcements, and dictating smart lockdown and evacuation protocols.
To further increase accuracy in challenging scenes, AI Alarm Verification services for IVA Pro Visual Gun Detection are available as separate add-on.
*Required pre-defined conditions: the scene must be well illuminated (at least 200 lx); the gun must cover at least 5% of the image height, be less than 50% occluded and must be visible for at least one second.

Functions

Robust approach and entry point surveillance
IVA Pro Visual Gun Detection is equipped with the latest deep neural network-based video analytics that is designed to automatically detect upright persons and brandished guns. It is designed to ignore other, unwanted sources of motion in the environment, such as rain, snow, clouds, blowing leaves, lighting changes, or a shaking camera.

Brandished gun detection
IVA Pro Visual Gun Detection is designed to systematically secure approach and entry points. The software is designed to automatically detect different kinds of guns (including handguns as well as rifles) which are held by a person within pre-defined conditions*, in order to identify potential threats at an early stage and to involve a person to verify the threat and decide on further actions. Under those pre-defined conditions*, the system has the following performance:

- True positive rate: 86.7% (evaluated on 60 video sequences from a surveillance perspective containing a gun**)
- False positive rate: 0.1% (evaluated on 4095 short video sequences sampled from the publicly available MEVA dataset**)

*Required pre-defined conditions: the scene must be well illuminated (at least 200 lx); the gun must cover at least 5% of the image height, be less than 50% occluded and must be visible for at least one second.
**Evaluation based on video sequences: If a gun is detected at least once in the video sequence, it is considered an alarm

The detection distance (based on the pre-defined requirements* - that means having a resolution of 36 ppf) depends on the focal length and the size of the of the gun. Assuming the use of the FLEXIDOME 5100i 2 MP version, a gun size of 20 cm (7.9 in), the detection distance varies between 2.7 m (8.9 ft) (f = 3.2 mm) and
12.6 m (41.3 ft) (f = 10.5 mm), depending on the focal length as shown in the table:

Focal length	Detection range (m)	Detection range (ft)
3.2 mm	2.7	8.9
10.5 mm	12.6	41.3

High-performance people counting
IVA Pro Visual Gun Detection offers high-performance indoor and outdoor people counting for typical surveillance scenarios by using the built-in person detector.

Tamper detection
The built-in tamper detection generates alarms on camera hooding/masking, blinding, defocusing, and repositioning.

Object classes
IVA Pro Visual Gun Detection is designed to provide the following object classes:

- Persons
- “Gun in hand”, referred to as brandished guns in the datasheet

Alarm and statistic tasks
The following alarm and statistic tasks are available:

- Detect persons and brandished guns within, entering, or leaving a single or multiple (up to three) defined detection zones in specified sequence or timing
- Detect multiple line crossings from a single line up to three lines combined in specified sequence or timing
- Detect persons or brandished guns traversing a route
- Detect loitering in an area related to radius and time
- Detect persons and brandished guns that have started or stopped moving
- Detect persons and brandished guns with properties, such as size, direction, and aspect ratio, that change within a configured time according to specification
- Count persons and brandished guns crossing a virtual line
- Count persons and brandished guns within an area and alarm if a predefined threshold is reached
- Combine tasks using scripts

Filters
IVA Pro Visual Gun Detection can be configured to ignore specified image areas to enhance robustness. Furthermore, object size and two-way direction can be used in any combination to create specific detection rules for people and/or brandished guns. Statistics on object properties are stored and can be displayed for fine-tuning the object filters. Object properties can also be defined by selecting an appropriately similar object in the video.

Intelligence-at-the-edge concept
The intelligence-at-the-edge technology allows users to reduce bandwidth and storage in the absence of action and switch back to full image quality in case of video analytics alarms. Alarm conditions can be signaled by a relay output on the unit or an alarm connection to stream video to a decoder, or a video management system. Alarms can also be transmitted to a video management system to start extended alarm scenarios. As well as creating alarms, IVA Pro Visual Gun Detection produces metadata describing the content of the analyzed scene. This metadata is sent over the network and may also be recorded with the video stream or used independently of the video stream.

AI Alarm Verification
AI Alarm Verification by Bosch is a cloud-based Video Content Analysis alarm verifier for intelligent Bosch cameras. It uses specialized AI models in the cloud to verify alarms triggered by cameras, in order to improve detection accuracy and to reduce unwanted alarms even further.
In case of Visual Gun Verification, the service verifies alarms that are detected directly on the camera. The camera communicates with a cloud-based service directly. The results from the cloud are used by the camera to generate or reject alarms after verification. This service is offered separately and complements the camera-based IVA Pro Visual Gun Detection. Refer to the AI Alarm Verification datasheet, available for download in the Bosch online catalog.

Forensic search
The recorded metadata can be used for a full forensic search in which the rules can be changed within Bosch Video Management System (Bosch VMS), even after the fact. New tasks can be defined and adapted for each search, and the recorded metadata is then scanned and evaluated accordingly. Forensic search is very time efficient and can scan a huge recording database for events within seconds.

Intuitive graphical user interface
The setup is available via the Configuration Manager software. A wizard-based graphical user interface guides the user through the configuration. It provides all the necessary tools to set up IVA Pro Visual Gun Detection and specify detection or counting tasks. All configuration options are visualized as feedback overlays and can be edited directly for intuitive configuration. When movement is detected, the object is outlined in yellow on the display and its motion is displayed as a green trajectory. If an object and its motion match the rule conditions defined for one of the detector tasks, an alarm is created and the object outlines change to red.

Configuration
With minimal configuration and without calibration, IVA Pro Visual Gun Detection is designed to detect upright persons and brandished guns while suppressing any other objects or motion. Select a task and mark the area of interest in the image. Up to 64 objects can be tracked in real time. Scenario defaults provide example configurations for the most common tasks. More complex setups are also supported: Up to 16 independent tasks can be set up in the GUI, and the alarm objects for each task can be restricted according to their properties. A task script editor is available for fine-tuning and combining predefined tasks.

Notice

This version of IVA Pro Visual Gun Detection does not support camera rotation. Therefore, only mount the camera in a way so that the image is already upright and does not need to be rotated in the software.

Parts included

Quantity	Component
1	License

Technical specifications

Compatibility
For information on supported cameras, refer to the Bosch Video Product Selector:
www.videoselector.boschsecurity.com

Configuration
Configure IVA Pro with Configuration Manager, a free software available for download from this website: https://downloadstore.boschsecurity.com/.

Ordering information

MVC-IVA-VGD IVA Pro Visual Gun Detection
Video analytics software based on deep neural network technology, designed to detect upright persons and brandished guns.
Order number **MVC-IVA-VGD**

Services

CBS-AAC-VGD Visual Gun (Cam), 1ch, 1yr
Direct-to-Cloud Verification service for cameras with active IVA Pro Visual Gun Detection
Order number **CBS-AAC-VGD**

https://www.boschsecurity.com