

MVC-IVA-VGD IVA Pro Visual Gun Detection

IVA Pro



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.

*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.

- ▶ 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

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 4095 video sequences sampled from the publicly available MEVA dataset**)
- False positive rate: 0.1% (evaluated on 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.

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 (BoschVMS), 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. 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 Visual Gun Detection with Configuration Manager, a free software available for download from the Bosch 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**

Represented by:

Europe, Middle East, Africa:
 Bosch Security Systems B.V.
 P.O. Box 80002
 5600 JB Eindhoven, The Netherlands
 Phone: + 31 40 2577 284
www.boschsecurity.com/xc/en/contact/
www.boschsecurity.com

Germany:
 Bosch Sicherheitssysteme GmbH
 Robert-Bosch-Ring 5
 85630 Grasbrunn
 Tel.: +49 (0)89 6290 0
 Fax: +49 (0)89 6290 1020
de.securitysystems@bosch.com
www.boschsecurity.com

North America:
 Bosch Security Systems, LLC
 130 Perinton Parkway
 Fairport, New York, 14450, USA
 Phone: +1 800 289 0096
 Fax: +1 585 223 9180
onlinehelp@us.bosch.com
www.boschsecurity.com

Asia-Pacific:
 Robert Bosch (SEA) Pte Ltd, Security Systems
 11 Bishan Street 21
 Singapore 573943
 Phone: +65 6571 2808
 Fax: +65 6571 2699
www.boschsecurity.com/xc/en/contact/
www.boschsecurity.com