



## Pushing edge computing to the limit

The Gatekeeper is so much more than just a camera, it is a visual IoT sensor that is used for computer vision applications such as ANPR (LPR), people detection, people counting, object recognition and all other video content analysis (VCA) applications. By integrating the latest technology in embedded processing units, LED illumination and high-speed camera sensors, this visual IoT device is powerful, versatile and unique. Through seamless integration of AVUTEC's expertise in hardware, software, artificial intelligence and system integration, the Gatekeeper pushes edge computing to the limit, while ruggedness is maintained.

Designed to excel, the Gatekeeper offers maximum accuracy, speed, flexibility, convenience and agility to end users. The Gatekeeper can flawlessly recognize, detect or count people, objects and number plates at a close range, as well as at distances up to 25 meters thanks to a professional, remotely controllable zoom lens. In addition, the Gatekeeper has infinite possibilities to integrate and interface with third-party systems, such as security systems, parking, traffic, transport or logistics management systems, carwash installations, POS terminals, dashboards and any other intelligent system. Locally, remotely or in the cloud. The Gatekeeper can even make payments triggered by number plate recognition.

## Facts and figures about the Gatekeeper

- The Gatekeeper contains both an infrared sensor and a full colour HD context camera.
- The NIR daylight filter decreases sensitivity to direct sunlight and headlight disturbances.
- The large viewing angle of 40°, combined with the motorized zoom lens, makes the projection and positioning of the Gatekeeper infinitely flexible.
- As a result of the internal IR LED illumination, this embedded IoT sensor recognizes number plates in both low light conditions and the dark.
- Versatile video recording and management facilities are available to bookmark events in VMS
- The Gatekeeper has IP66/67 rating. Due to the wide operational temperature range of -18°C to +45°C, the Gatekeeper can function in outdoor applications and industrial harsh environments
- The Gatekeeper is a plug and play IoT device (PoE+, IEEE 802.3at) that just needs a single network cable for both electricity and Internet and/or local network connectivity.
- An integrated and sealable junction box at the back of the embedded IoT sensor makes sure the device is easy to install, solid and vandal proof.
- The Gatekeeper has configurable outputs and includes a Wiegand interface for access control.
- Delivers the highest by users measured ANPR accuracy and processing speed available, under the most challenging conditions.
- Maintenance costs and response time are minimized because of the fully remote configuration and monitoring, made easy and cost effective by the license free CortexClient.



## The Gatekeeper as an ANPR camera

One of the main advantages of the Gatekeeper as an ANPR camera is the included embedded server, manufactured by in-house computer vision engineers. In addition, this IoT sensor is fully remotely managed. For deep learning computer vision applications, neural processing units are embedded as well.

As a result of the I/O extender at the back of the Gatekeeper, this visual IoT sensor independently performs actions such as opening a gate, steering traffic lights or starting a carwash program as soon as a number plate is recognized. The Gatekeeper therefore is an excellent choice for any ANPR system, as no extra processing devices or peripherals are required, while minimizing the network bandwidth.



AVUTEC's I/O extender to automatically operate a barrier or car wash

## AVUTEC's ANPR solutions

### Access control

AVUTEC's access control integration supervises the entry allowance of vehicles through highly accurate ANPR. A single Gatekeeper handles all incoming vehicles in real-time and communicates with security or parking management systems. For complete autonomous vehicle access control applications, refer to the AVUTEC CortexParking information.

### Petrol stations

With the use of one or more Gatekeepers, number plates that enter a petrol station are read and compared to a blacklist of the European drive off registry. This ANPR solution prevents fuel theft at all connected petrol stations, while marketing and loyalty information is provided.

### Carwash

The Gatekeeper is well appreciated at carwash locations reading number plates and sending ANPR data including media to POS systems in order to facilitate payments for the services ordered. AVUTEC's reliable and accurate ANPR solution for carwashes in various forms and sizes is suitable for both loyalty programs, carwash subscriptions and pay-per-use applications, while minimising the latency and optimising the throughput. Now the full capacity of the carwash installation will be used.

### Free flow traffic

The Gatekeeper Access models are already fast ANPR sensors, as they support vehicle speeds well over 50 KM/hour speeds. But for free flow traffic and highway applications, AVUTEC offers the Gatekeeper Traffic for ANPR between 6 to 20 meters of distance, at a true 60 frames per second sensing and processing speed, supporting a reliable ANPR at speeds up to 200 KM/hour.

### CortexDashboard

AVUTEC's CortexDashboard provides a visual display of cloud based ANPR data registration in a browser. Data is monitored at a glance, since it is all presented on a single screen. The dashboard provides insights in customer behaviour, productivity or delivers ANPR based security overviews.



## The Gatekeeper as an IoT device

AVUTEC offers various computer vision solutions to run on its CortexFramework platform, such as people detection, people counting, object detection and tracking. Visual searches, video content analyses and image recognition based on deep learning algorithms help businesses and organisations to improve their efficiency, security and revenue, based on measured visual data.

The Gatekeeper can run any tailored AI computer vision system application, regardless of what needs to be recognized, detected, counted or tracked. AVUTEC provides a full circle deep learning service to help businesses develop a customized deep learning model which for instance automates processes or personalizes customer experience. Refer to our deep learning brochure or our website AVUTEC.com for more information on our machine and deep learning services.

## AVUTEC's computer vision applications

### People detection

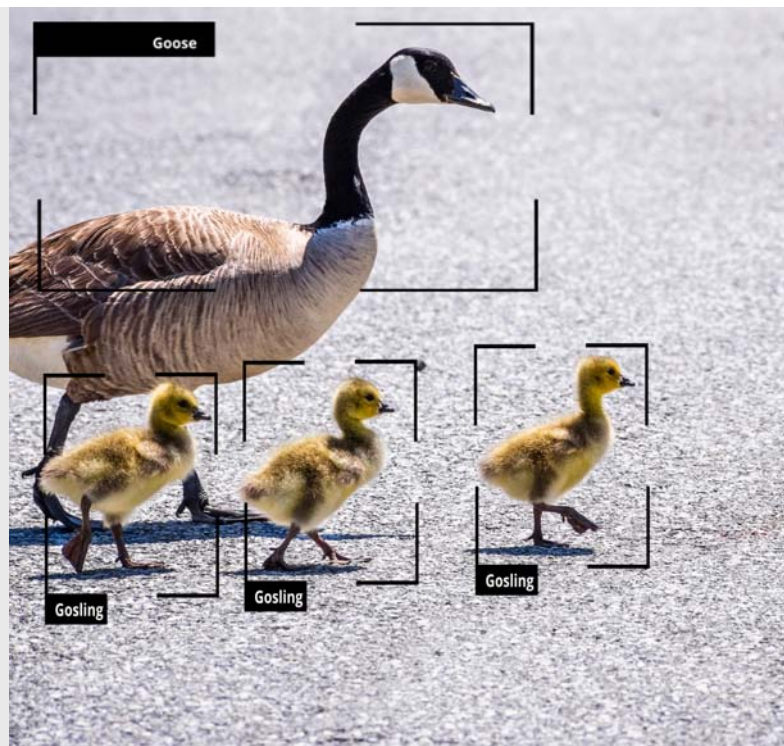
People detection is used as a security measurement at for instance building sites, perimeters and business parks. By sending a message to a security control center or security staff as soon as a person or vehicle is detected and classified outside office hours, the Gatekeeper is a cost-effective solution to prevent vandalism and theft.

### People counting

At shopping centers and inside stores, crowded areas or major events the Gatekeeper can provide valuable information by counting people that walk through or are gathered in a specific area. For shopping centers, counting people can identify the prime locations or generate heat maps within the building or area and help to set realistic rental rates and make marketing strategies interactive. In the retail market, tracking the number of people who walk through the door or are focussed on specific products or offers, provides important data to make the right decisions at strategic and tactical level.

### Object detection

Object or animal detection and classification have a wide range of applications, with use cases ranging from security, consumer to industry or governmental applications. Regardless of the objects or the application, the embedded machine and deep learning engine inside the Gatekeeper can be trained to detect all defined objects, serving countless applications.





### **CortexFramework: a powerful computer vision platform**

The basis of AVUTEK's intelligent ANPR camera is CortexFramework, a powerful computer vision platform. It is built inside every Gatekeeper, allowing users to build, run, manage and (re-)configure personalized computer vision applications from a single modular development and operational environment. Standard to enhanced computer vision applications can be built with a wide variety of available building blocks (Axons) to develop customized ANPR or VCA configurations (Cortexes).

### **Example Axon functionalities**

- Produce camera video streams for video recordings and video bookmarking;
- Real-time video cropping, cutting, rotating and compression;
- Direction and vehicle speed estimation;
- Trajectory vehicle speed control and speed measurement;
- Performing parallel processed deep learning video content analysis;
- Interfaces to tablets, POS terminals, PMS, cloud-based dashboards, etc.;
- Database native integration, synchronizing or external queries;
- Master-slave Gatekeeper configurations;
- Pay By Plate direct debit payments or loyalty interfaces;
- FTP and web service communications.

### **Integration with third-party systems**

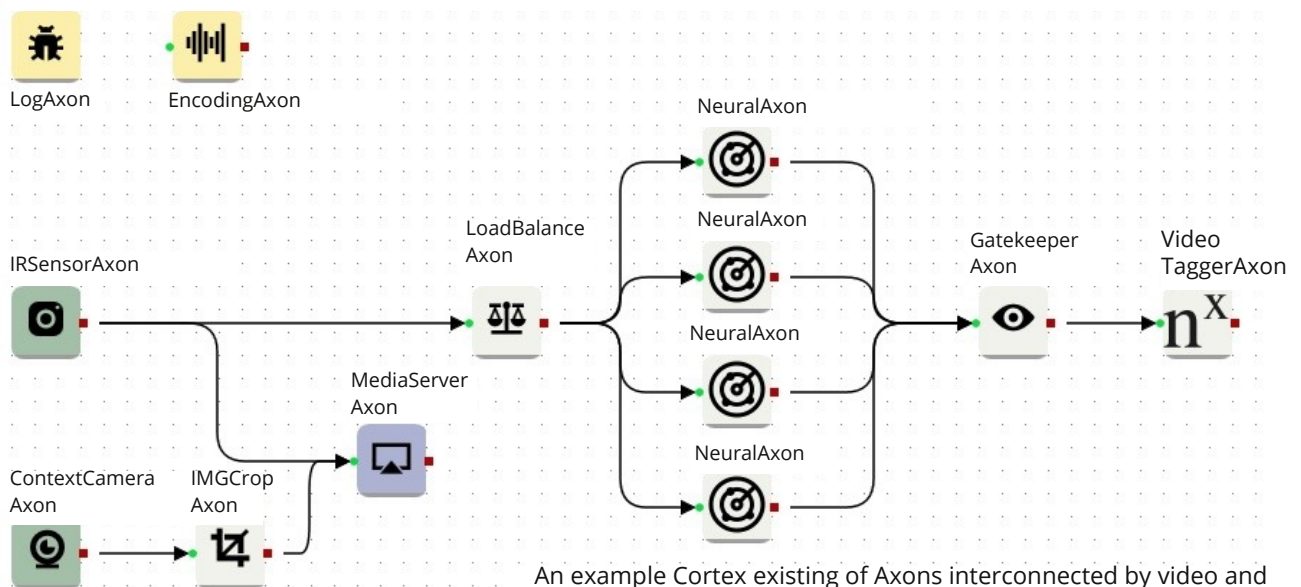
The Gatekeeper integrates with security systems, parking management systems, access control units, carwash equipment, point of sales terminals and many others. Integration of these third-party systems or self-made middleware is done in CortexFramework, where the SDK and Cortex.NET toolboxes provide all the necessary resources for integration.

A feature rich developer SDK is available for integrators to build server or client-side applications. The CortexFramework SDK, Cortex.NET, provides all the necessary resources for a seamless integration. Due to the extensive library with countless available functions in Cortex.NET, even basic programming skills will be sufficient to integrate the Gatekeeper with every external system, while a lot of middleware Axons are also available off the shelf.



## Customized and enhanced solutions

The flow chart shows a customized solution, a Cortex, in which images from both the Gatekeeper ANPR sensor and context camera are send to a MediaServerAxon that turns both these cameras into ONVIF camera sources. It delivers two separate RTSP video streams that video management systems can easily connect to in order to record and monitor the video. A video cropping Axon first cuts out the region of interest that needs to be recorded, e.g. to narrow the network bandwidth required.



The Neural Axon (Neural0-3) contains the deep learning model that detects the defined objects. As the IRSensorAxon sends thirty images each second, a single NeuralAxon will get too busy and use a lot of processing power. Therefore, three more NeuralAxons are added. The LoadBalanceAxon distributes the images to all NeuralAxons. Optionally a ThresholdAxon can be inserted before the results are send to the GatekeeperAxon, depending on the VCA application. The VideoTagAxon (Nx0) bookmarks an event into a video management system. Detection meta data will be added to each bookmark, which makes searching and finding the desired video fragments easy.

## AVUTEC

As a Dutch developer and manufacturer of ANPR sensors, system and cloud solutions, AVUTEC's expertise and know-how have set a benchmark for quality, speed, accuracy, flexibility and ruggedness. The in-house developed AI computer vision hardware and software cooperate seamlessly to provide the best possible accuracy and speed in ANPR or other VCA processing. From embedded ANPR IoT sensors to a comprehensive computer vision system, AVUTEC provides nothing but the best.



## Gatekeeper models

Model	Video sensor	Lense
Gatekeeper 410	NIR 1.9MP, 30 fps sequencing	4-10 mm motorized zoom
Gatekeeper 1250	NIR 1.9MP, 30 fps sequencing	12-50 mm motorized zoom up to 25 metres
Gatekeeper Traffic	NIR 1.3 MP, high frame-rate sequencing	12-50 mm motorized zoom up to 20 metres

More variations are available, like having full colour camera sensors inside for other VCA applications during daytime. Also, custom coloured Gatekeepers and OEM models are being engineered and manufactured.

## Specifications

ContextCamera	Full HD wide angle colour camera with cropping / ONVIF options
Motorized zoomlens	Remote controllable with iris setpoint and (auto) focus
Processing unit (micro server)	Embedded octa core 2.0 GHz 64-bit CPU or multi-core NPU
Video Connectivity	ONVIF profile S, RTSP
Power supply	PoE+ (IEEE 802.3at or higher), RJ-45 connected
Engine	AVUTECH neural network on integrated CortexFramework platform
Daylight filter	850 nm IR passing filter, small transparent eye (context camera)
Illuminator	Synchronized 850 nm IR illuminator for recognition / illumination in total darkness. Up to 25m ANPR with reflective number plates
Ethernet	1 x 10/100/1000 Base-T Ethernet port
Operating system	Linux / CortexFramework (SDK, API available)
I/O	TCP/IP, optional Wiegand driver, potential free contacts
Watchdog	Hardware integrated, software heartbeat via SDK
Temperature	-18 °C to +45 °C environments
Water and dust resistance	IP-66
Dimensions	305 x 192 x 72 mm. (l x w x h)
Weight	2.5 kg. excluding camera bracket
Bracket footprint	Conform WBOVA2, Videotec standard
Color	RAL9002 or costum colors and prints
Speeds	Gatekeeper 410 and 1250: 0 to 50 km/h
	Gatekeeper Traffic: 0 to 200 km/h