AI BLOX

THE SHORTEST PATH TOWARDS EDGE INTELLIGENCE

Introduction

Edge intelligence is a modern approach to computing that places intelligence and processing closer to the source of data. It is a powerful way to reduce latency and improve the speed of data processing.

This guide provides an introduction to edge intelligence and explains how **AI-BLOX** can help you to accelerate the implementation of your edge intelligence applications. We explore the features and benefits of our Blox platform, its architecture, and how it is an asset for various industries.

What is Edge intelligence?

Edge Intelligence is a combination of AI and Edge Computing. It enables machines to make decisions on locally harvested data, instead of sending it to a centralized cloud server. It enables the deployment of machine learning algorithms to the edge of the device where the data is generated. Edge AI has the ability to provide artificial intelligence for every use case at any place.

Data processing

The more human tasks we transfer to computers and machines, the more abundant and pervasive the data and the wider the demand for artificial intelligence processing becomes. On top, with the proliferation of IoT & 5G data loads further explode. This increasing demand is no longer satisfied by centralized processing in data centres. The recent availability of small and low power supercomputers makes edge intelligence attractive for a lot of applications, and this will give a boost to AI adoption in many industries with real-life use cases (and real ROI).

Application industries

Since edge computing processes data locally — on the edge of the network, instead of in the cloud or a centralized data center — it minimizes latency and data transit costs, allowing for real-time feedback and decision-making. The always-on, instantaneous feedback that edge computing offers is especially critical for applications where human safety is a factor. For example, it's crucial for self-driving cars, where saving even milliseconds of data processing and response times can be key to avoiding accidents. It's also critical in hospitals, where doctors rely on accurate, real-time data to treat patients. Other than that, edge intelligence can be used in a variety of applications such as smart logistics, industrial automation, safety & prevention, smart cities, supply chain management, surveillance, waste management, ...

Industry 4.0

While many industries can have benefits from edge intelligence, the adoption is mainly happening in an industrial context. AI will be the driving force in the realisation of many industry 4.0 projects, boosting productivity, quality & safety initiatives. With IoT initiatives & 5G, we'll however soon see a boost in other industries as well.

Edge Computing as a catalyst for AI adoption

Edge computing is a catalyst for AI adoption because it addresses some of the key challenges that organizations face when trying to deploy AI in real-world scenarios. These challenges include:

1. Latency

Edge intelligence reduces latency and increases the speed of data processing. For cloud-based computing, the transmission delay can be prohibitively high. This is particularly important for applications that require real-time processing, such as self-driving cars or industrial automation systems.

2. Privacy

Edge computing enables data to be processed locally, reducing the need to send sensitive data to the cloud. This helps to improve data security and addresses compliance requirements.

3. Edge is reliable

By running AI at the edge, you ensure that your AI system continues to operate even if the network connection is lost. This is particularly important for critical applications such as healthcare, transportation or industrial settings. Intelligent services must be highly reliable, even when network connections are lost.

4. Network constraints

Edge computing helps to reduce the amount of data that needs to be transmitted to a centralized location for processing, and lowers the strain on network infrastructure to improve overall system performance.

5. Cost

By decreasing the amount of data that needs to be transmitted over the network, and reducing the need for powerful, centralized processing resources, edge computing can help to lower the overall cost of deploying and maintaining an AI system.

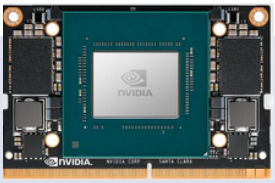
AI-BLOX: Modular Hardware for Edge Intelligence

BLOX Platform : hardware & architecture

BLOX is a modular hardware platform that is built to quickly and easily fulfil your application needs.

BLOX is modular by design :

- NVIDIA® Jetson™ processors to unlock powerfull compute requirements.
- Customizable interfaces for connecting cameras, radars, lidars or any other type of sensor.
- Ready to use communication modules to guarantee the best communication options for your application without any worries (4G, 5G, Wifi, Gigabit ethernet).



NVIDIA® Jetson™ processor

Interface modules

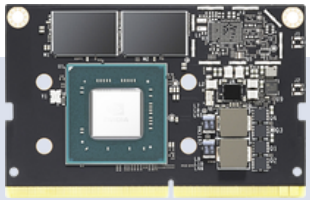
Communication modules

If an application requires local user interaction, BLOX is available with a 7” display with touchscreen.

AI-BLOX: Modular Hardware for Edge Intelligence

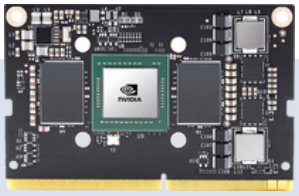
NVIDIA Jetson Module Line-Up

We're very proud to be a **preferred partner of NVIDIA®** and to be able to leverage the potential of this leading AI platform for your machine vision project. AI-Blox currently supports 8 different NVIDIA® Jetson™ modules in the same form factor. This allows you to optimize your application to the best computing power and product cost.



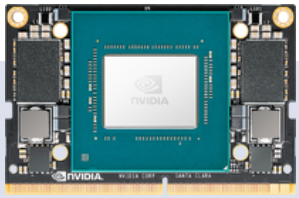
Jetson Nano

The entry-level option for your edge AI application.



Jetson TX2 NX

Provides 2.5x the performance of the Jetson Nano in as little as 7.5W

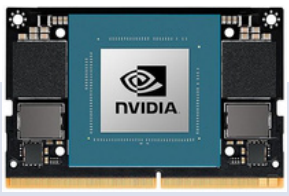


Jetson Xavier NX

A powerful edge AI computer, up to 21 Tops. Available in 8Gb & 16Gb version

Jetson Orin Nano

The newest addition to the Orin architecture marks a new era in edge computing. Reaching 40 Tops



Jetson Orin NX

The most powerful edge AI computer supporting the Blox family, with performance levels up to 100 Tops 😲

AI-BLOX: Modular Hardware for Edge Intelligence

For human-machine interaction

BLOX is available with an integrated 7" touchscreen, allowing humans & machines to easily interact with the AI algorithms. This setup is unique in the market and reduces points of failure by embedding compute power & interfacing into one device

Integration in AGV's (Autonomous Guided Vehicles) or other Industrial Vehicles

- Forklift trucks
- Warehouse robots
- Road Trucks
- Excavators
- Cranes

Data annotation & re-training

On-site quality inspection and re-classification

Touchscreen specifications

- Projected Capacitive Touch
- 7" wide
- 500 NITS
- 800 x 480 pixels

AI-BLOX: Modular Hardware for Edge Intelligence

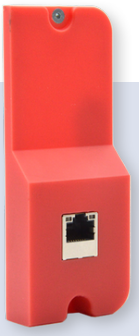
Module-X® technology

We're really serious about modularity. Our generic interfaces enable you to support any use case. Thanks to our propriety Module-X® technology, all of our modules can be plugged into the main board, just like Lego. We have our own library of modules but can easily customize them where needed, providing a fit-for-purpose solution in no time. This gives our platform endless possibilities, all in one platform.

4x Ethernet
4 DI/DO
USB

4x USB 3.0
4x DI/DO

6 x Mipi



GigE

GigE/Wifi
GigE/LTE

Wifi

AI-BLOX: Built for Machine Vision

Built for machine vision

A lot of the use cases we support are linked to machine vision. Thanks to **proven integrations with camera partners** we can support our clients with extensive knowledge on the vision aspect. There is a lot to take into account when making selecting the right camera solution for your project :

- Resolution
- Frame Rate
- Sensor Size
- Dynamic range
- Interface
- Environmental factors
- Cost
- Light
- Field Of View
- Working Distance
- Depth of Field
- Lens
- Contrast
- Distortion

Clearly it requires specialist advice to make the right choices for your project. Therefore we teamed up with various trusted partners. And we're open to meet new friends along the way!

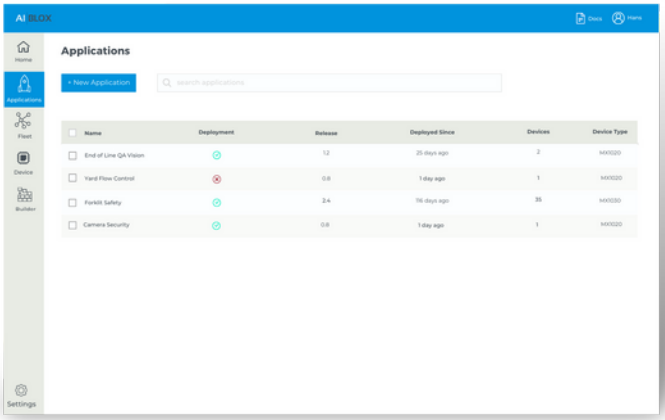
Allied Vision

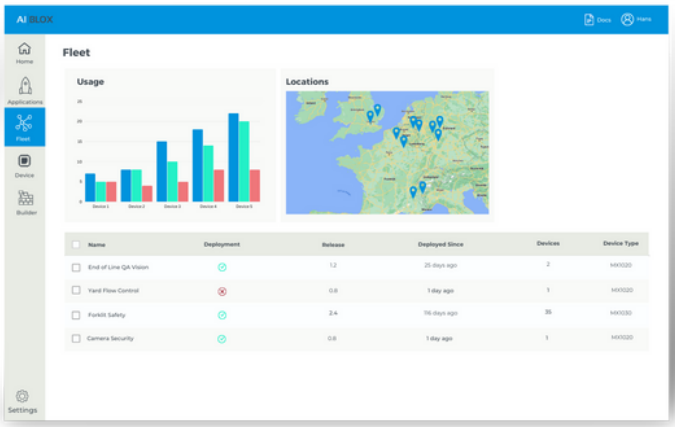
THE IMAGINGSOURCE® TECHNOLOGY BASED ON STANDARDS

e-con Systems™ Your Product Development Partner

Blox Operating System

Blox OS





Blox Operating System

Blox OS

As an AI & ML Application developer you want to focus on fast and efficient development without getting tangled up into developing the infrastructure. An Edge AI solution is a chain of interconnected devices and cloud services. Reliability, robustness and adaptability are key success factors of these solutions. Besides the Blox hardware platform with these properties, we also offer a software environment called Blox OS.

Blox OS Builder

To accompany the modulair Blox hardware platform with the same level of configurability you will be able to create your own custom Ubuntu based operating system image. The Blox OS builder will enable you to select the required packages and libraries suited for your Blox hardware configuration and software application. The Blox OS builder is based on the widely used and mature Yocto Build system. It will not only enable building custom images without having deep knowledge of the OS, it also guarantees compatibility and version controlled updates of all the OS libraries and packages.

Blox OS - more than just an OS

The Blox OS eco system will not only provide the tools to configure and build your own operating system image for the Blox hardware platform, it will also enable you to deploy, update and maintain your fleet of edge devices at scale. With the Blox OS cloud application, besides the OS builder, you will be able to provision each device, have a centralized overview of the operational information of your fleet and remote access over a secure VPN to each of your devices.

It just takes one push

What if you could deploy and update your edge AI applications over the whole fleet by just a simple git push? To keep up with the modern development and deployment tools, the Blox OS eco system integrates continuous deployment workflows from Github or other providers. As CD/CI pipelines are the de facto standard to deploy web services, the Blox OS CD will enable this for Edge devices.

Features & benefits

BLOX is a flexible, complete and modular system, meaning that our customers can add or remove components as needed.

Every application has different requirements. No application is the same. With our Module-X connector technology, we've made the modules on BLOX swappable & customizable to make sure it fits your application. Even for custom designs we have lower NRE cost & faster time to market.

BLOX offers an industrial-grade solution. We offer a fanless & rugged design that proves to be reliable in harsh conditions. It's designed to be reliable and has a 10+ year lifespan.

We love to work on OEM partnerships, to provide best value for money, also for smaller volumes.

Ease of use is important. We're working on a BLOX Operating System to provide a robust & performant low-level software layer dedicated to our platform

Being an NVIDIA preferred partner, our BLOX platform offers the most powerfull edge ai compute units in the market

"AI-Blox wants to take away the friction points in the AI value chain and speed up the implementation of edge AI applications for our clients"

Technical specs (1)

Technical data	MX1010	MX1020	MX1030 - 1/2	MX1030 - 3/4
GPU Module	Jetson Nano	Jetson TX2 NX	Jetson Xavier NX 8Gb	Jetson Xavier NX 16Gb
AI performance	0.5 TOPS	1.33 TOPS	21 TOPS	21 TOPS
GPU	128-core NVIDIA Maxwell GPU	256-core Nvidia Pascal GPU	384-core NVIDIA Volta GPU with 48 Tensor Core	384-core NVIDIA Volta GPU with 48 Tensor Core
CPU	Quad-core ARM Cortex-A57 MPCore Processor	Dual core Denver 2 64-bit + Quad-core ARM Cortex-57 MPCore	6-core NVIDIA Camel ARMv8.2 64-bit 6MB L2 + 4MB L3	6-core NVIDIA Camel ARMv8.2 64-bit 6MB L2 + 4MB L3
Memory	4GB 64-bit LPDDR4 25.6 GB/s	4GB 128-bit LPDDR4 51.2 GB/s	8GB 128-bit LPDDR4 59,7 GB/s	16GB 128-bit LPDDR4 59.7 GB/s
Storage	16GB eMMC 5.1	16 GB eMMC 5.1	16 GB eMMC 5.1	16 GB eMMC 5.1
Display	Optional: 7" with integrated capacitive touch screen			
Power Supply	10 V DC - 48 V DC			
Dimensions	Headless: 115 mm x 41mm x 227,2 mm With 7" display: 115 mm x 38,8 mm x 197,2 mm			
Weight	700g			
Operation temperature	-25˚C ... +60˚C			
Storage temperature	-40˚C ... +80˚C			
Protection Class	Max IP67, depends on interface blox			
Approvals / Marking	CE			
Vibration / Shock Resistence	conforms to EN 60068-2-6/EN 60068-2-27			
EMC immunity / emission	conforms to EN 60068-2-6/EN 60068-2-27			

Technical specs (2)

Technical data	MX1011-01/02	MX1011-03/04	MX1031-01/02	MX1031-03/04
GPU Module	Jetson Orin Nano 4Gb	Jetson Orin Nano 8Gb	Jetson Orin NX 8Gb	Jetson Orin NX 16Gb
AI performance	20 TOPs	40 TOPs	70 TOPs	100 TOPs
GPU	512-core Nvidia Ampere Architecture GPU with 16 Tensor cores	1024-core Nvidia Ampere Architecture GPU with 32 tensor cores	1024-core Nvidia Ampere Architecture GPU with 32 tensor cores	1024-core Nvidia Ampere Architecture GPU with 32 tensor cores
CPU	6-core Arm Cortex-A78AE v8.2 64bit CPU 1.5 MB L2 + 4 MBL3	6-core Arm Cortex-A78AE v8.2 64bit CPU 1.5 MB L2 + 4 MBL3	8-core Arm Cortex-A78AE v8.2 64bit CPU 2 MB L2 + 4 MBL3	8-core Arm Cortex-A78AE v8.2 64bit CPU 2 MB L2 + 4 MBL3
Memory	4GB 64-bit LPDDR5 34 GB/s	8GB 128-bit LPDDR5 68 GB/s	8GB 128-bit LPDDR5 102,4 GB/s	16GB 128-bit LPDDR5 102,4 GB/s
Power	5W-10W	7W-15W	10W-20W	10W-25W
Storage	Supports external NVMe			
Display	Headless : comes with Displayport Optional: 7" integrated capacitive touch screen			
Power Supply	10 V DC - 48 V DC			
Weight	700g			
Operation temperature	-25˚C ... +60˚C			
Storage temperature	-40˚C ... +80˚C			
Protection Class	Max IP67, depends on interface blox			
Approvals / Marking	CE			
Vibration / Shock Resistence	conforms to EN 60068-2-6/EN 60068-2-27			
EMC immunity / emission	conforms to EN 60068-2-6/EN 60068-2-27			
Dimensions	Headless: 115 mm x 41mm x 227,2 mm With 7" display: 115 mm x 38,8 mm x 197,2 mm			

Industries

The BLOX platform can be used in a variety of edge intelligence applications.

Industrial & Manufacturing

- Industrial quality inspection
- Material handling
- Factory floor video analytics
- Preventive maintenance
- Digital twin & Sensor Fusion

AGV's & Industrial vehicles

- Automation & safety in forklift trucks
- Smart farming Machines
- Safety features in road trucks
- Bring intelligence to excavators
- Operator assistance for cranes

Smart cities

- Surveillance & public safety
- Traffic analysis
- Vehicle counting
- Number plate detection
- Smart Parking system

Agriculture

- Intelligent Robot Assistant for harvesting
- Livestock health management
- Selective spraying systems
- Smart Farm Machines
- Autonomous vehicles

Transportation & logistics

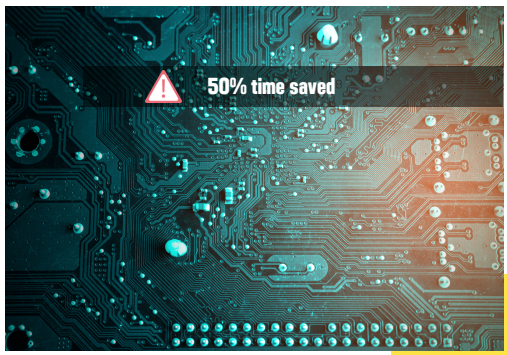
- Safety features
- Object detection & sorting
- Warehouse automation
- Digital signage
- Traffic flow management

AI-BLOX Customers Success Stories

AI-BLOX has already been tested & proven to be reliable in several industries.
We would like to tell you more about our solution
within these specific industries.

Quality Control

AI software company



Our client, an AI software company, was able to **reduce the time spent** selecting, configuring and implementing hardware by 50% compared to their previous project. The modular design of AI BLOX allowed them to start with one of our off-the-shelve platforms and get a head start.
The goals was to **automate quality control** on wooden panels, which required the device to be very ruggedized as it was coping with dust & vibration. Our **fanless design** prooved to be very robust.

Person detection

Surveillance company

A surveillance company launched an innovative AI-based solution for person detection supported by a Proof-Of-Concept hardware solution. Based on our experience with Nvidia-based solutions, we created a reliable and scalable custom hardware solution to support their future growth. Our solution proved to be more cost-efficient, reliable and future-proof than the initial solution.

Safety features

Manufacturing company

A factory floor can be very hectic with forklifts driving around everywhere. A manufacturing company installed the BLOX platforms with integrated touchscreens on forklifts to continuously scan their surroundings as a safety measure. They had the expertise to build it themselves, but decided to partner with AI-Blox to accelerate the implementation and market introduction by leveraging our deep hardware knowledge. In future Smart Logistics projects, the BLOX platfrom will be the preferred one due to its flexibility and fast integration capabilities.

Leveraging our expertise on edge AI hardware technology

Edge intelligence requires specific hardware and it is common for new edge AI applications to suffer on hardware, resulting in suboptimal solutions and a time loss. To overcome hardware challenges, we provide modular hardware blocks. Our hardware platform takes away some of the key friction points in the AI value chain and accelerates your edge AI application rollout

1. **AI software companies** : By using AI-Blox hardware, AI software companies can **reduce the time they spent** on selecting, configuring and maintaining their edge AI hardware with 50 %. On top, we bring specific hardware expertise to the table, so they can focus on software.

2. **Companies with a hardware based AI-offering:** We typically see Proof Of Concept setups with a variety of components & high cost. Most of these companies want to focus on the software side of the proposition. In this case, we offer OEM services to move towards a **cost-efficient solution that is tailored to their needs.**

3. **Manufacturing companies:** Big industrial concerns probably have the hardware skills in-house. But considering build vs buy strategies, it makes sense to set up a collaboration where we can **inject our extensive edge AI hardware knowledge into your team**, and **speed up the go-to-market** of your projects and products.

Jeroen Plasman & Hans Stevens, Co-founders of AI-BLox

AI BLOX

Edge intelligence is becoming increasingly important for businesses that need to make decisions in real-time or process large amounts of data quickly. It's the solution for real-life AI applications, and will accelerate the adoption of AI.

AI-BLOX provides powerfull, modular, secure, and reliable hardware to accelerate the rollout of edge-ai applications in your business.

Want to know more about AI-BLOX?

hello@ai-blox
www.ai-blox.com