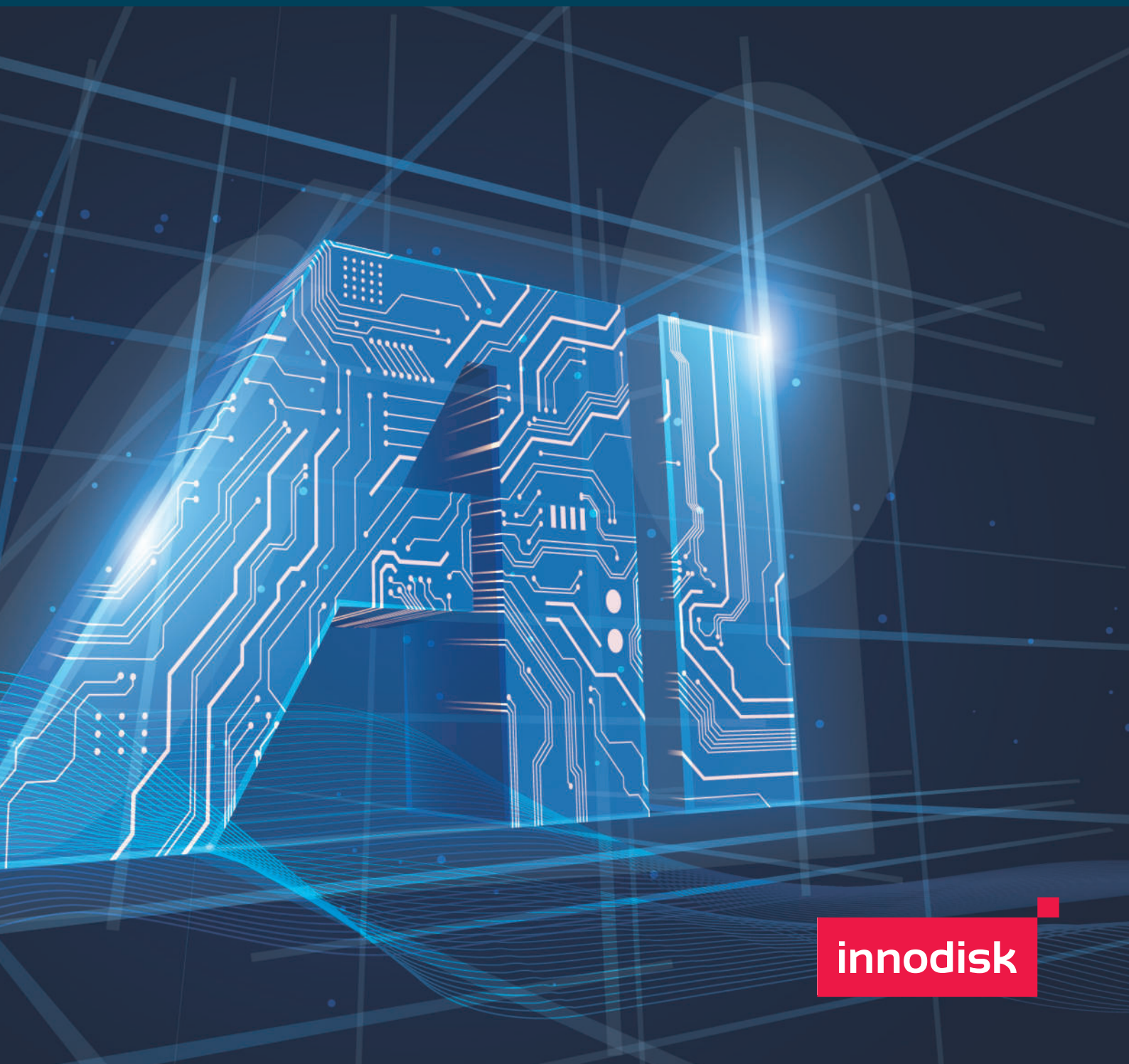
Innodisk AI Solutions

Developing AI Solutions to Build an Intelligent World



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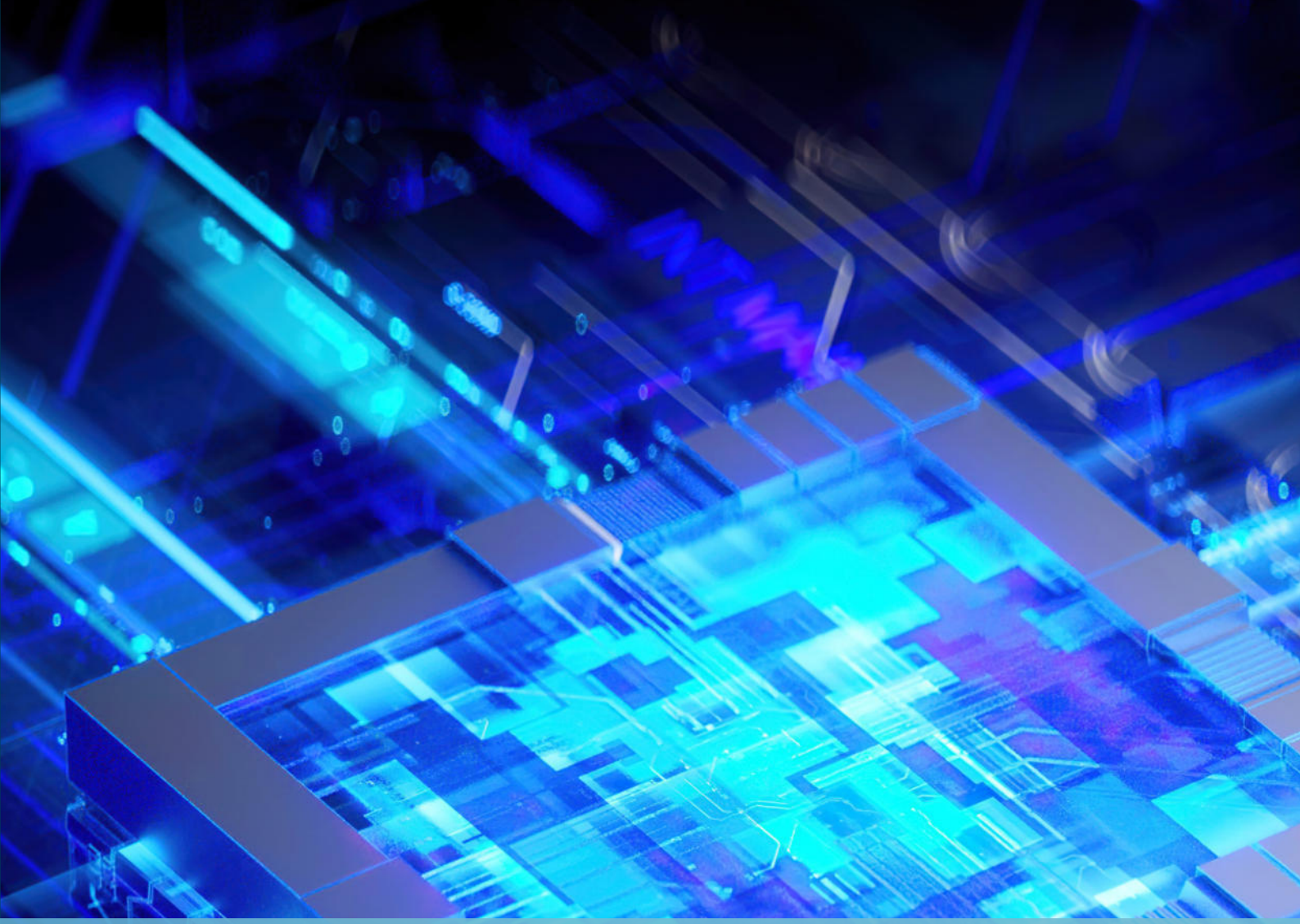


Artificial intelligence (AI) has become part of our daily lives. We interact with AI during almost all our daily activities, often times without even knowing it. Social media platforms, call centers, and chat bots are some of the most famous applications, but AI is now coming out of the cloud, and moving to the edge. Edge AI refers to artificial intelligence on hardware close to the end user at the edge of the network, as opposed to being done centrally in a data center. Because AI computation is done close to the user at the edge of the network, it is able to prosper with lower latency, lower power consumption, and greater privacy. At the edge, applications such as object recognition, activity detection, and gesture detection are all possible. These edge platforms will slowly override and replace conventional applications such as machine vision, traffic monitoring, and surveillance.

The Innodisk AI logo embodies the idea of “I am AI”. The logo is an extension of our brand logo, with the white Innodisk “i” sitting on a red background. In addition, from a distance, the first section of the logo appears as a red capital “A” with an “i” inside, further deepening the logo’s connection to artificial intelligence. The red square in the right corner of the first section is in conformity with our company logo, and represents the spirit of Innodisk, to create a permanent partnership with customers, and always think a little more.

Edge AI's Top Applications

Industrial Automation

- Low-cost, highly accurate and fast anomaly detection
- Intelligent condition monitoring systems inside factory equipment detects and diagnoses problems

Retail

- Facial recognition customizes user's experiences
- AI generated shopping recommendations based on information collected whilst browsing in store

Healthcare

- Smart wearable medical devices fast and accurate early AI detection of medical emergencies, such as strokes or cardiac problems
- AI analysis of X-ray film speeds up patient wait time

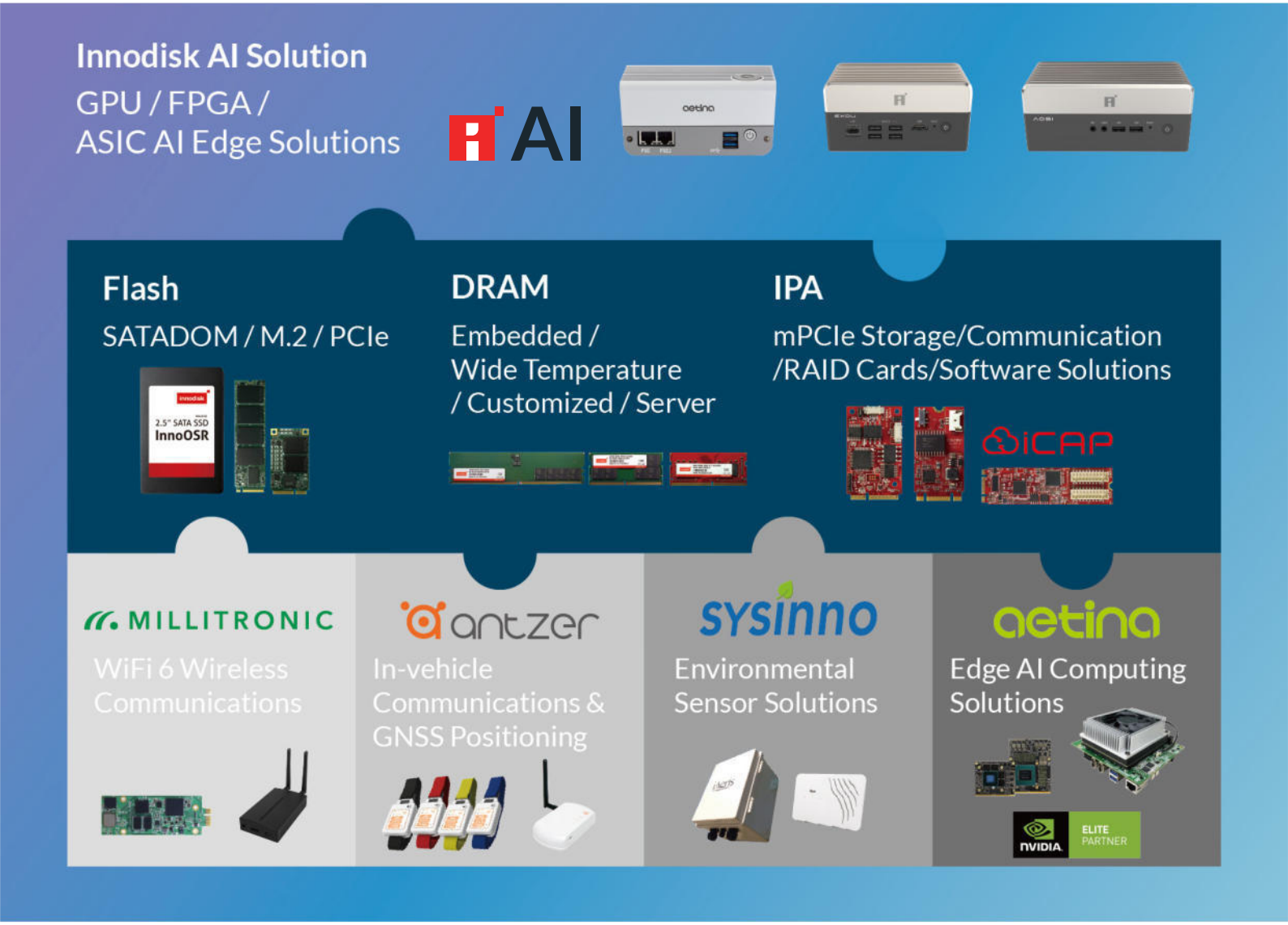
Smart Cities

- Facial recognition eases access to buildings
- Continued tracking throughout multiple cameras
- Prevention of unauthorized access
- Traffic violation monitoring such as illegal parking
- Dangerous driving detection and reporting

How Innodisk Group Ignites the AI Solution

With the advent of the 5G era, its high-bandwidth and low-latency characteristics have accelerated artificial intelligence in multiple different industrial applications. Innodisk is an industrial leader specializing in complete AIoT solutions, featuring the amalgamation of hardware, firmware, and software solutions.

With aggregated corporate resources, Innodisk has gathered the energy of different business units and subsidiaries to launch the Innodisk AI edge solution series. The Innodisk group's direction has now shifted from AIoT to AI. Innodisk AI is committed to delivering artificial intelligence at the edge with its architecture-optimized edge AI platforms. Featuring heterogeneous GPU, FPGA and ASIC computing architecture, Innodisk AI integrates hardware acceleration in AI deep learning work loads to create more efficient systems.



Innodisk AI edge solution focuses on three edge AI accelerators:

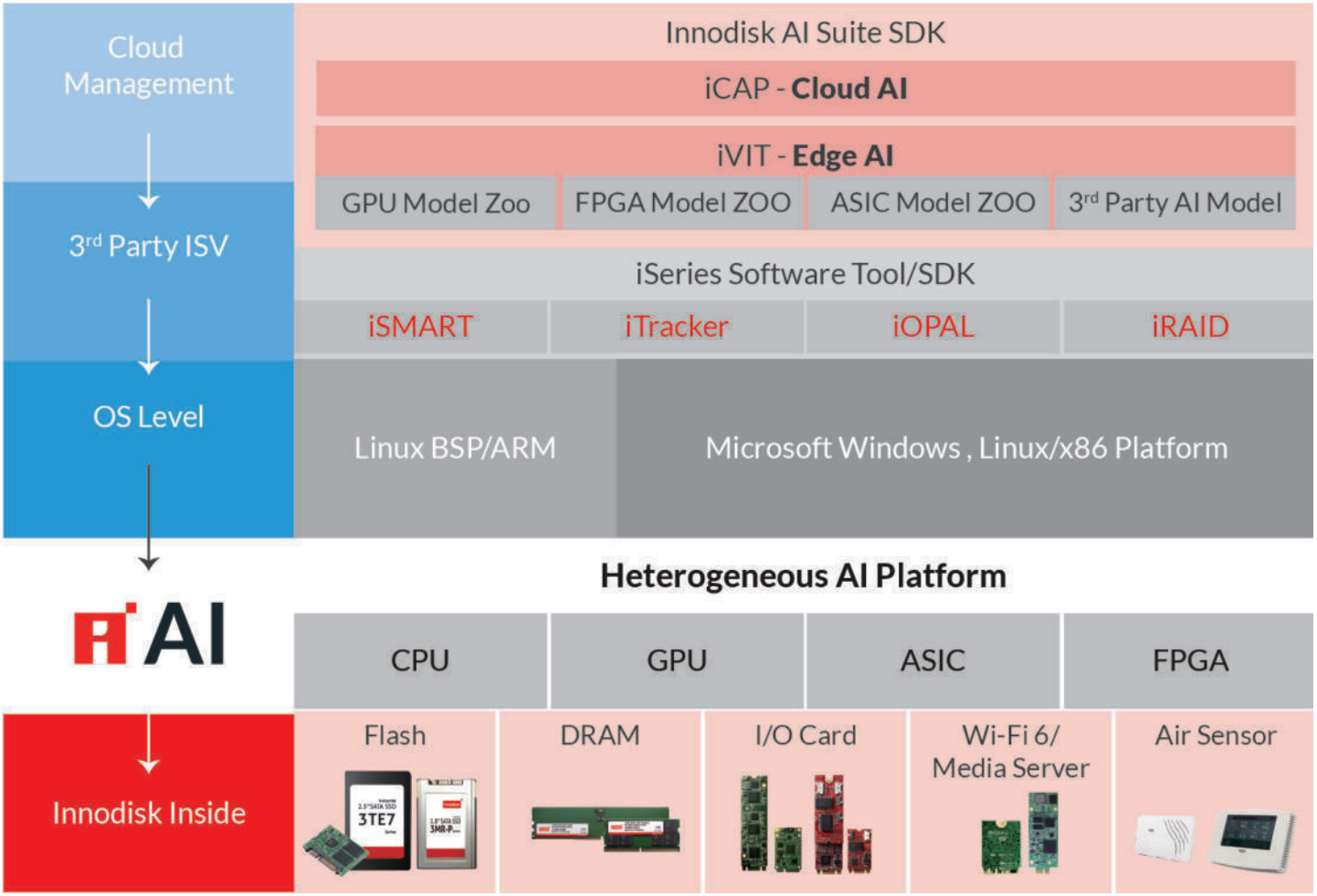
GPU 	Jetson GPU series from Nvidia	**FPGA** 	FPGA SOM from Xilinx
ASIC 	AI ASIC chips from Hailo,Blaize, Coral, Sophgo, and other partners		

GPU, FPGA, and ASIC all offer excellent, but different benefits:

Type	GPU	FPGA	ASIC
Performance / W / $	Good	Better	Best
Power Consumption	Good	Better	Best
Flexibility	Better	Best	Good
Integrated Development Environment	Best	Good	Good

Although ASICs remain the fastest accelerators, FPGAs' high flexibility, and low-latency acceleration mean that they are quickly becoming a popular choice amongst integrators. Nevertheless, all three accelerator types have their own strengths, and all are catered to by the "Innodisk AI" edge solution.

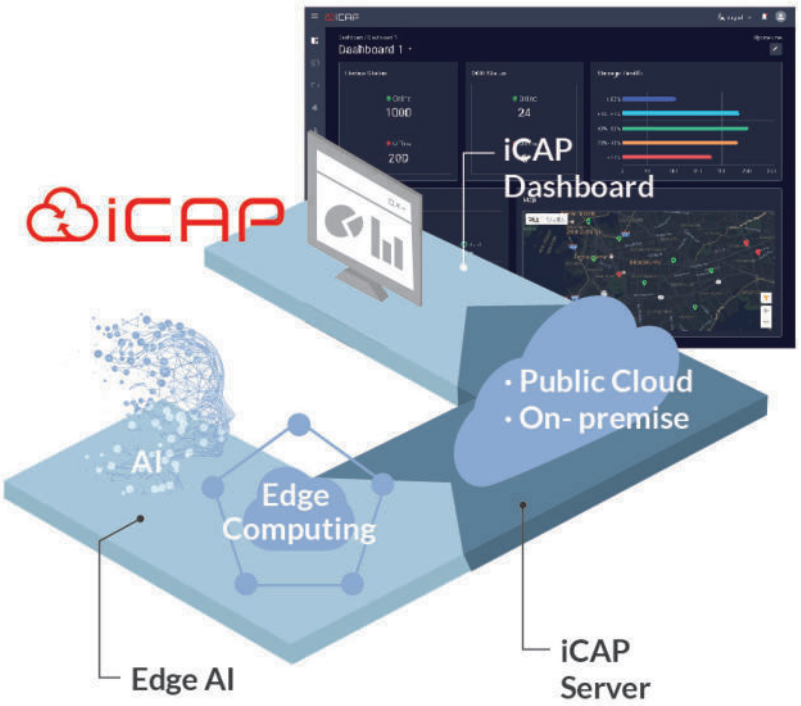
Catered to by Innodisk AI Solution



Innodisk AI Suite SDK

iCAP – Cloud AI

iCAP™ is a browser-accessed management and maintenance platform that allows you to manage heterogeneous edge AI solutions easily.



Device Management

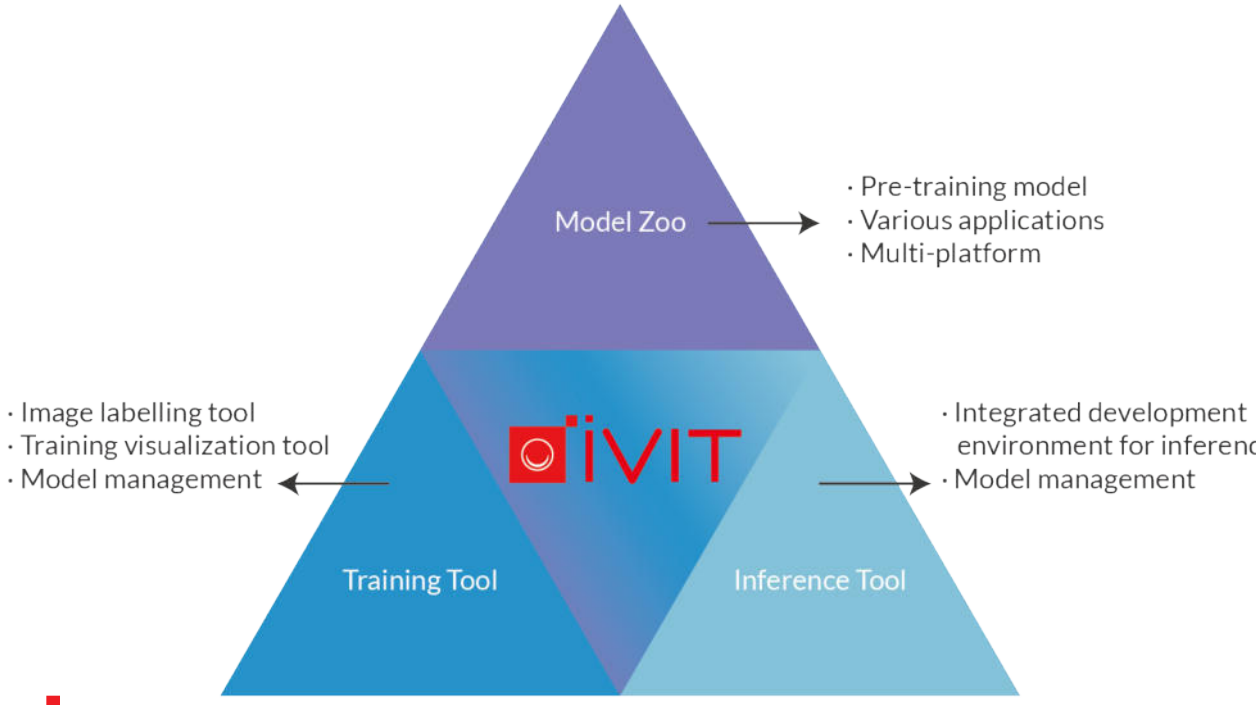
- Device Information
- Group Management
- Alert & Notification
- Out-of-Band Management

AI Management

- AI Model Management
- AI Model Group Deployment
- Edge AI Solution Compatibility
- Multiple Frameworks

iVIT – Edge AI

iVIT(Vision Intelligence Toolkit) provides a **"No code"** development tool suitable for training customized AI models aimed at different verticals and quickly performing model inference tasks on Heterogeneous platforms.



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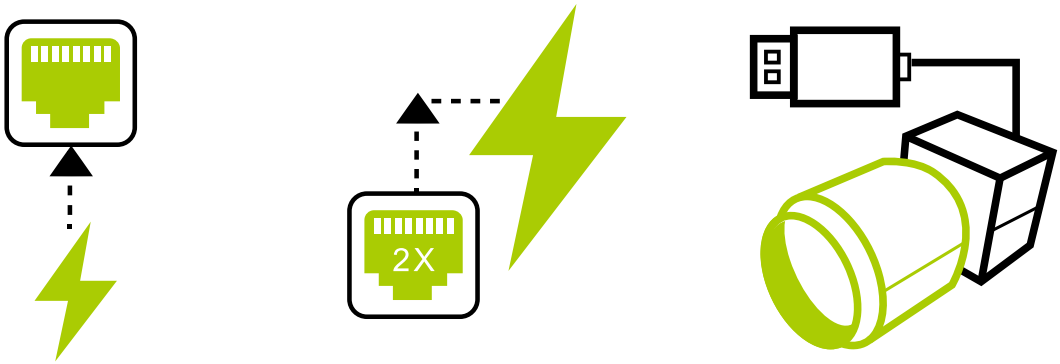
GPU Solution: Aetina Mini-Series

Mini Series is a palm-size system, featuring high performance and low power consumption to fit in limited spaces. With a fanless design, it runs silently and saves on maintenance costs. Customers are free to choose various modules based on performance requirements to create a system perfect for their unique AI application.



Support PD | **Support 2x PSE** | **Support 9x USB Camera**

M1 | **M2** | **M3**

Features

- Support NVIDIA® Jetson Xavier™ NX and NVIDIA® Jetson™ TX2 NX
- DC 12-24V power input
- 1 GbE LAN port, 1 x PD (**M1**), 2 x PSE (**M2**), 9 x USB (**M3**)
- Built-in M.2 M-key 2242 NVMe 128G SSD and support for M.2 E-key 2230 for Wi-Fi/BT/GPS
- Operating temperature range from -20°C to 50°C
- Fanless and compact design
- Smart button for one-key recovery

FPGA Solution: Innodisk EXOU-X261

Innodisk AI FPGA edge solution leverages K26 SOM, with an exclusive custom-built XCK26 SoC based on the Zynq® UltraScale+TM MPSoC architecture. K26 SOM is capable of up to 1.4TOPS AI processing and has an integrated H.264/265 video codec that can adapt to virtually any requirement in the field. Together with Innodisk's carrier board and system design, configured for the enhanced acceleration of vision AI application, Innodisk AI FPGA edge solution is ready for edge deployment.

Front

Back

Features

- Xilinx Kria K26 SOM featuring low latency and high-performance DPU
- Supports InnoAgent out-of-band (OOB) remote management
- Offers PCIe M.2 2230/2242 for wireless and storage devices connection
- Offers UART/I2C/CANbus/GPIO connection through 15pin Terminal Block
- Offers 4x USB 3.1 Ports for high-speed data transfer
- Prebuilt hardware acceleration with BSP/pre-trained AI models
- Supports hardware security TPM2.0

AI	Computing Power	1.4TOPS (Data Type: INT8)
	Deep Learning Framework	TensorFlow, Pytorch Caffe
	SDK	Xilinx Vitis AI
Processor	Controller	Xilinx Kria K26 SOM
Expansion Slot	M.2 (M Key)	1x 2242/3042 (PCIe x4)
	M.2 (A Key)	1x 2230 (PCIe x1/USB 2.0)
	Micro SD	1
Physical Characteristics	Dimension	310 x 320 x 88 mm
Environment	Operating Temperature	STD: -20°C ~ 50°C
Graphics	Controller	Arm Mali™-400MP2 based graphics processing unit
	Video Codec(H.264/H.265)	Up to 32 Streams (total resolution ≤ 4Kp60)
Storage	M.2 (M Key)	Up to 1TB
	Micro SD	Up to 512GB
Power Supplier	DC Plug	12V +/- 10% DC

ASIC Solution: AOSI-020

Hailo develops the world's best-performing AI processors for edge devices. The Hailo-8™ edge AI processor, featuring up to 26 tera-operations per second (TOPS), better performance per watt ratio, and a smaller footprint, significantly outperforms all other AI edge accelerators. Innodisk, a strategic partner of Hailo, now offers an Innodisk AI ASIC edge solution to fit into smart devices in various industries and use cases including automotive, smart cities, retail, and industry 4.0.

Front

Back

Features

- Intel Atom® x6000, N6000, or J6000 series processor
- Hailo-8™ AI processor
- 2x DP++, enabling resolution of up to 4096x2160 @ 60Hz
- 2x 2.5 GbE and USB3.2 high-speed data transfer
- OS supports Windows 10 and Linux
- Supports OpenGL 4.5, DirectX 12, OpenCL 1.2
- Supports TPM 2.0
- InnoAgent OOB Remote management

AI	Computing Power	26 TOPS
	Deep Learning Framework	TensorFlow, ONNX, Pytorch
	SDK	HailoRT
Processor	CPU	Intel Atom® Processor
Expansion Slot	M.2(B key)	1x2242/3042/2280
	M.2(E key)	1x 2230
	Nano SIM socket	1
Physical Characteristics	Dimension	168*107.46*68mm
Environment	Operating Temperature	STD: -20°C~50°C
Graphics	Controller	Intel® UHD Graphics
	Feature	OpenGL 4.5, DirectX 12, Open CL 1.2, Vulkan 1.1 HW Decode: AVC/H.264, MPEG2, VC1/WMV9, JPEG/MJPEG, HEVC/H.265, VP8, VP9 HW Encode: AVC/H.264, JPEG/MJPEG, HEVC/H.265, VP9
Storage	SATA DOM	Up to 512GB
	M.2(B key)	Up to 2TB
Power Supplier	DC Plug	12V +/- 10% DC

Edge AI GPU Solution in Smart Cities

Smart Street Lights for Smart Cities of the Future

A smart street lighting project was inititated by Taipei City Project Management Office, and the final solution was expected to provide lighting, safety warnings, traffic assessments, parking space detection, and environmental sensing through the configuration of air quality sensors.

Challenges

- Computing latency in automated license plate recognition (ALPR)
- Collection of environmental indicators from several sensors
- External components such as cameras need access to power

Solutions

- Aetina edge AI platform attains real- time, high-resolution image detection
- Sysinno's outdoor air quality detector allows users to choose up to nine air factors
- Mini-series M2 comes with PoE

Our Roadmap to Success

1. Aetina Mini-Series M2
   Palm-sized device, featuring high performance and low power consumption
2. Sysinno iAeris3 Outdoor Air Detector
   Environmental reporting, including temperature, humidity, PM2.5CO, TVOC-total volatile organic compounds, HCHO-formaldehyde, O3-ozone, SO2-sulfur dioxide, and NO2-nitrogen dioxide
3. Innodisk M.2 (P42) 3TE6 SSD
   DRAM-less SSD designed with PCIe interface and industrial 3D TLC NAND flash

Result

Aetina's Mini-Series M2, with two PoE powered cameras, along with Innodisk DRAM and flash, as well as Sysinno's outdoor air detector was able to create a total smart street light solution for the Taipei City Project Management Office. The solution enables safety warnings, traffic assessments, parking space detection, and environmental sensing in-line with their initial requirements.

Edge AI FPGA Solution in Factory Automation

AI Automated Optical Inspection (AOI) with Real-time Inference

Printed matter manufacturing includes roll-to-roll processing, trimming, line scan imaging, and marking defect plots. It's crucial to ensure a fast and highly accurate printed matter defect inspection system is in place to detect and prevent incidents from occurring during these advanced technical steps. Without AI, staff need to check each product manually, and it takes three seconds to check one item on average. Additionally, by manually checking for defects, the inspection accuracy can differ greatly depending on the ability of the worker. In order to make this process more efficient, and reduce innacuracies, Innodisk built an AI Automated Optical Inspection (AOI) solution.

Challenges

- It's time-consuming to setup cameras, sensors and AI computing platforms
- Unmanned systems often crash, and it's costly to have engineers on site

Solutions

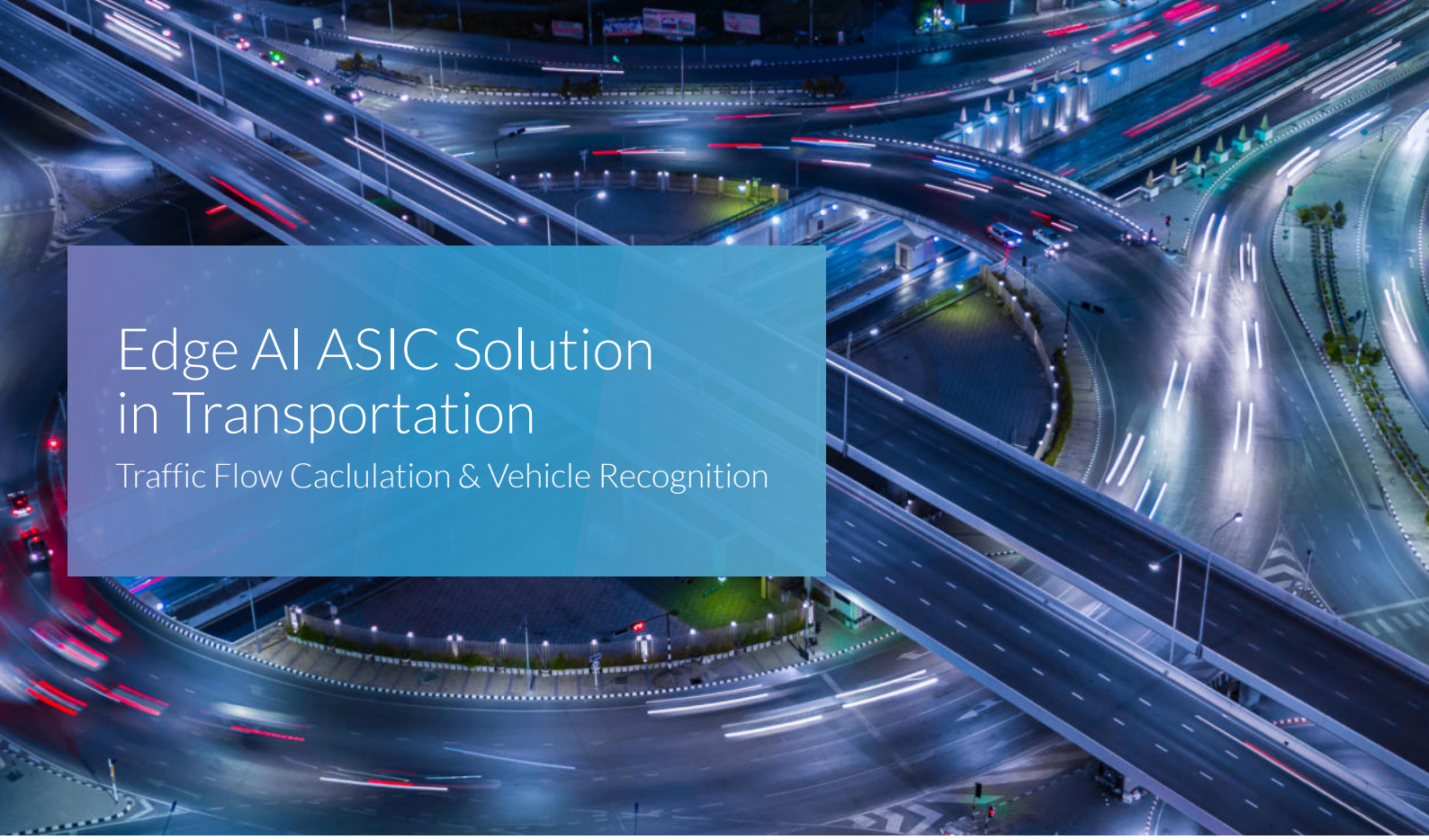
- Innodisk AI's total solution brings all aspects of AI computing platforms together easily
- InnoAgent out-of-band remote management module allows engineers to restart systems from anywhere

Our Roadmap to Success

1. Innodisk EXOU-X261:FPGA machine vision solution kit
2. Innodisk InnoAgent OOB Remote Management Module:Hardware module that allows out-of-band remote management of systems

Result

Innodisk's solution combines the advantages of the EXOU-X261 FPGA machine vision solution kit, and the InnoAgent out-of-band module to achieve automated vision inspection with out-of-band remote management. The system uses deep learning to detect and label assembly defects. In addition, the system can be deployed and managed at scale, enabling totally autonomous inspection in any factory. Thanks to the InnoAgent module inside, the system has high availability, and is able to be restarted remotely when the OS suffers issues such as blue screen, or the primary network connection is down. The InnoAgent out-of-band module also allows engineers to closely monitor systems statistics globally via Innodisk's iCAP platform.



Edge AI ASIC Solution in Transportation

Traffic Flow Caclulation & Vehicle Recognition

Traffic management is crucial to ensuring mobility on the road, and the flow of traffic. Real-time control and prediction are the first steps to smarter transportation management. TheInnodisk AI division was tasked with creating a total solution to ensure high performance, and near 100% availability.

Challenges

- Real-time control and prediction requires high performance AI computing
- Systems crucial to safety such as traffic management platforms require high availability, and 24/7 remote access

Solutions

- The Hailo-8™ edge AI processor features up to 26 tera-operations per second
- InnoAgent allows out-of-band remote management of systems, even if they have crashed, or are completely offline

Our Roadmap to Success

1. Innodisk AOSI-020 Fanless AI System
   Fanless AI system with Hailo-8™ edge AI processor
2. Innodisk InnoAgent OOB Remote Management Module
   Hardware module that allows out-of-band remote management of systems
3. Innodisk SATADOM-SH 3TE7
   Supports several industrial features, including TRIM, NCQ, and S.M.A.R.T.

Result

Innodisk AI ASIC edge solution, featuring the AOSI-020 fanless AI system, and the InnoAgent out-of-band module was successfully used to create a high performance traffic management system. The system has near to 100% up- time, due to engineers being able to remotely manage the system from anywhere via the out-of-band remote management capabilities of InnoAgent. In addition to high availability, engineers can also send remote commands to the system such as restart and power on/off, all via the InnoAgent module.