

Frame Grabber Solutions eBook



ADVANTECH iAutomation

Premier Partner



Vision AI

Build a full spectrum, reliable vision system



Vision
Solution



Application
Cases



Selection
Guide

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Vertrieb durch



AMC – Analytik & Messtechnik GmbH Chemnitz

Heinrich-Lorenz-Str. 55

Tel.: +49/371/38388-0

09120 Chemnitz

Fax: +49/371/38388-99

E-Mail: info@amc-systeme.de

Web: www.amc-systeme.de

Advantech Industrial Edge AI Systems

Vertrieb durch **AMC**
AMC – Analytik & Messtechnik GmbH Chemnitz
 Heinrich-Lorenz-Str. 55 Tel.: +49/371/38388-0
 09120 Chemnitz Fax: +49/371/38388-99
 E-Mail: info@amc-systeme.de Web: www.amc-systeme.de



AI Peripherals Integration for Flexibility

- 2D/3D Camera
- Thermal Camera
- Lidar & IMU
- Wireless



AI Integrated Solution Package for Fast Deployment

- NVIDIA Metropolis
- NVIDIA ISAAC ROS2
- NVIDIA AI Enterprise
- NVIDIA Holoscan
- NVIDIA NIM



AI Ecosystem for Various Industries

- Transportation
- Safety & Security
- Manufacturing
- AMR/AGV
- Medical Imaging



Large-Scale AI Deployment Support

- Remote Management
- Information Security

AMD intel. nvidia.

- ✓ x86
- ✓ GPU
- ✓ NPU



Industrial Edge AI System
MIC, UNO & IPC



Industrial Edge AI Server
SKY, HPC



Edge AI Superchip Server (MGX)
SKY-622G4



Edge AI SKY Rack

TOPS

AI Recognition **150**

High Precision AI **500**

Industrial Vision Language Model (VLM) **1000**

AI Micro-Cloud Service **2000+**

nvidia. Qualcomm

- ✓ Arm
- ✓ GPU
- ✓ NPU



Industrial AI Camera
ICAM



Industrial Edge AI System
MIC-AI



Industrial Edge AI Server
MIC-IGX Orin

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E-Mail: info@amc-systeme.de Web: www.amc-systeme.de

Industrial AI Vision Solutions

AI AOI

SKY-QUAD-A6000 + HPC-6240
+ ASMB622V3

Factory Automation

PCIE-1674E-BE + IPC-730

Packaging-Printing

PCIE-1154 + MIC 770 V3
+ MIC-75M20

Pharma Inspection

PCIE-1674E-BE + MIC-733-A0



Why Advantech AI & Computer Vision



Embedded with NVIDIA AI technology



Domain expertise in verticals



Global R&D resources for designed-in service



Eco-system partner to speed up deployment



Easy integration with video inputs



Remote management for large-scale deployment

Frame Grabber Product Series

Build a full spectrum, reliable vision system

GigE Vision



Camera Link



CXP



USB Vision



Build a full spectrum, reliable vision system



Inspection

Frame grabber cards are essential in industrial inspection, capturing high-resolution images for real-time analysis to detect defects and ensure quality standards through techniques like edge detection and shape recognition.



Production Traceability

Frame grabber cards record images during production, aiding in traceability. By capturing images at each manufacturing stage, they help track processes and ensure compliance with quality standards.



Position

In automation, frame grabber cards enable precise object positioning by processing image data from cameras and using computer vision algorithms to identify and locate objects, crucial for robotic operations and assembly lines.



AMR

In AMRs, frame grabber cards provide visual data for navigation and obstacle avoidance. They process images from multiple cameras, allowing robots to understand their environment and make efficient decisions.

Frame Grabber Features



Vision AI Software

NVIDIA GPUDIRECT,
NVIDIA Jetson AGX Xavier, AMD
DirectGMA



Robotics & AMR

Unsupervised AI, lower
learning curve Hybrid
computing and low latency



High Adaptive

Integration of various optics,
vision, I/O, graphics and
flexible and scalable deployment



High Accuracy

Improve the recognition of highly reflective
objects Long term supply of GPU and
system

**High Speed
Main Stream**



Claxon Family

The latest and highest CXP protocol

The Claxon series, features with the latest and highest CoaXPress protocol, deliver up to 12.5 Gb/s per link in PCIe Gen 3 form factor, while maintains the same architecture as the Cyton series, ensures the fully compatible with both CXP-6 to CXP-12 cameras.



Axion Family

Full Range Camera Link Base

The Axion series, features with the full range Camera Link Base, Medium and Full PoCL (Power over Camera Link) configuration, and supports one/two/four channels portfolio, offers a refined, robust, and adaptable solution for machine vision applications.



PCIE Family

GigE Vision, USB Vision machine protocol

The PCIE series, leverages the standard mainstream PC interface Ethernet and USB standard, follows the GigE Vision, USB Vision machine vision protocol, streams 1Gb/s, 5 Gb/s and 10Gb/s data rate with 5-100 meter long cable distance, the PCIE series strikes a perfect balance between price and performance for multiple camera applications

Claxon Family



CoaXPress

CoaXPress (CXP) is the latest Machine Vision designed camera to frame grabber interconnect standard. CXP supports a high speed downlink for video data, a low speed uplink for camera control, and power, all over standard coaxial cables. Multiple CXP connections can be aggregated to even higher speed cameras.

CoaXPress Version 2.0

CXP 2.0 doubles speed to 12.5 Gb/S, enhances industrial Machine Vision with faster uplink and trigger packet simplification for higher camera trigger speeds. New features include device to host event packet, micro BNC connector, and heartbeat packet for time synchronization of multiple cameras.

Application Support

Integrating the Claxon-CXP into applications is easy with the SDK supporting 32-bit and 64-bit systems. Develop applications using C/C++/C# with buffer management APIs and free drivers available for popular machine vision packages. The Claxon-CXP is compatible with Advantech BitFlow frame grabbers, enabling seamless migration from Camera Link or analog to CXP.

Flexible Camera Support

The three Claxon model cover most machine vision application, from a single low cost CXP-12 camera, to a monster quad CXP-12 beast, as well as multi-camera applications. For example, the Claxon CXP4 can handle four single link CXP-12 cameras.

Axion Family



Camera Link

Camera Link has proved itself to be low cost, high speed, robust and adaptable. For true machine vision applications, it has become the market leading interconnect standard. Advantech has continued to refine and improve our products, and is proud to introduce its 6th generation Camera Link frame grabber.

Borrowing from the Cyton

Advantech introduced the Cyton, a CXP 1.1 frame grabber designed for the Machine Vision industry with advanced features like a DMA engine, StreamSync acquisition engine, buffer manager, Timing Sequencer, I/O capabilities, and Frame Sequencer. These features provide powerful solutions for real-world Machine Vision challenges.

Camera Compatibility

The Axion-CL is compatible with high-speed Camera Link cameras, including 80-bit cameras, and can handle two 80-bit/85 MHz cameras at once. It also supports base/medium/full Camera Link cameras.

Application Support

Integrating Axion-CL into applications is made easier with SDK support for 32-bit and 64-bit systems. Develop using C/C++/.NET with advanced buffer management APIs. Free drivers are available on the website for most 3rd party machine vision packages. Axion-CL is compatible with Advantech frame grabbers, allowing smooth migration between Camera Link, Analog, and CoaXPress applications.

PCIe Family



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AMC – Analytik & Messtechnik GmbH Chemnitz
Heinrich-Lorenz-Str. 55 Tel.: +49/371/38388-0
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E-Mail: info@amc-systeme.de Web: www.amc-systeme.de

High-Speed Data Transfer

PCIe Frame Grabbers provide fast and stable data transmission, ensuring real-time capture and processing of high-resolution images.

Easy Integration

With a straightforward installation and configuration process, they easily integrate with existing systems, reducing development time.

Reliability

Designed with stability in mind, they are suitable for long-term operation and maintain consistent performance across various environments.

Versatile Applications

Ideal for various machine vision applications, especially in less demanding scenarios, offering flexibility to meet different requirements.

Industrial Camera Interface Comparison

Camera Interface	Camera Link	CXP	GigE Vision	USB Vision (USB3.0)
System	High-Level		Basic-Level	
Bandwidth	6.4	50 (12.50*4)	1	5
Realtime signaling	YES	YES	NO	NO
Host CPU loading	0%	0%	>5%	<5%
Cable length(Meter)	10	30*	100	4.5
Star Products	Axion Series	Claxon Series	PCIE-1674,1182	PCIE-1154,1158

AI-Powered 6C Detection: Revolutionizing High-Speed Railway Maintenance with Precision and Efficiency



Description :

6C Detection System developed by the China Railway Corporation, which utilizes AI-based image processing technologies to monitor and inspect pantograph-catenary systems in high-speed railways. This system addresses the challenges of maintaining railway infrastructure as it expands.

Challenges :

Maintaining the catenary and track infrastructure is increasingly difficult due to the rapid expansion of high-speed rail networks. Manual inspections are time-consuming and can lead to safety issues if not performed regularly and accurately.

Solutions & Benefits :

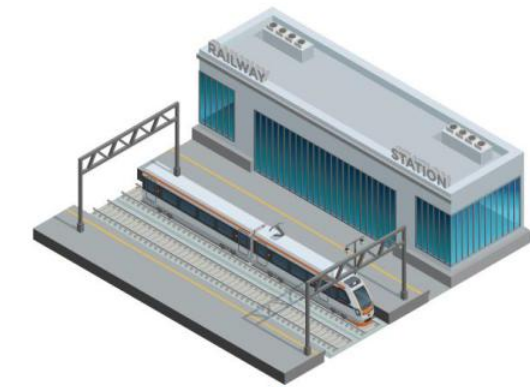
HPC 6120+ASMB 610, support high-performance computing with minimal latency and data inference capabilities. Benefits include:

- Enhanced safety through automated monitoring.
- Improved efficiency in inspections, reducing downtime.
- High-resolution data collection for intelligent preventative maintenance.
- Collaboration with Micron Technology for reliability and performance.



System Diagram

Pantograph Video Checking Device (CPVM)



Camera Beside Railway



Control Room
beside Railway on Rack

HPC-6120+ASMB-610

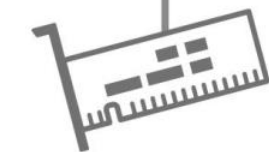
1U Edge Accelerator Server

Data Analysis

Data Storage



GPU Card: 2*A2



RAID Card

Transforming Warehouse Logistics with Smart 3D Vision: Enhancing Efficiency through Real-Time Automation



Description :

Smart 3D vision technology in industrial automation, particularly in warehouse logistics management. It highlights how this technology enables precise positioning, detection, and classification of packages, thereby enhancing operational efficiency.

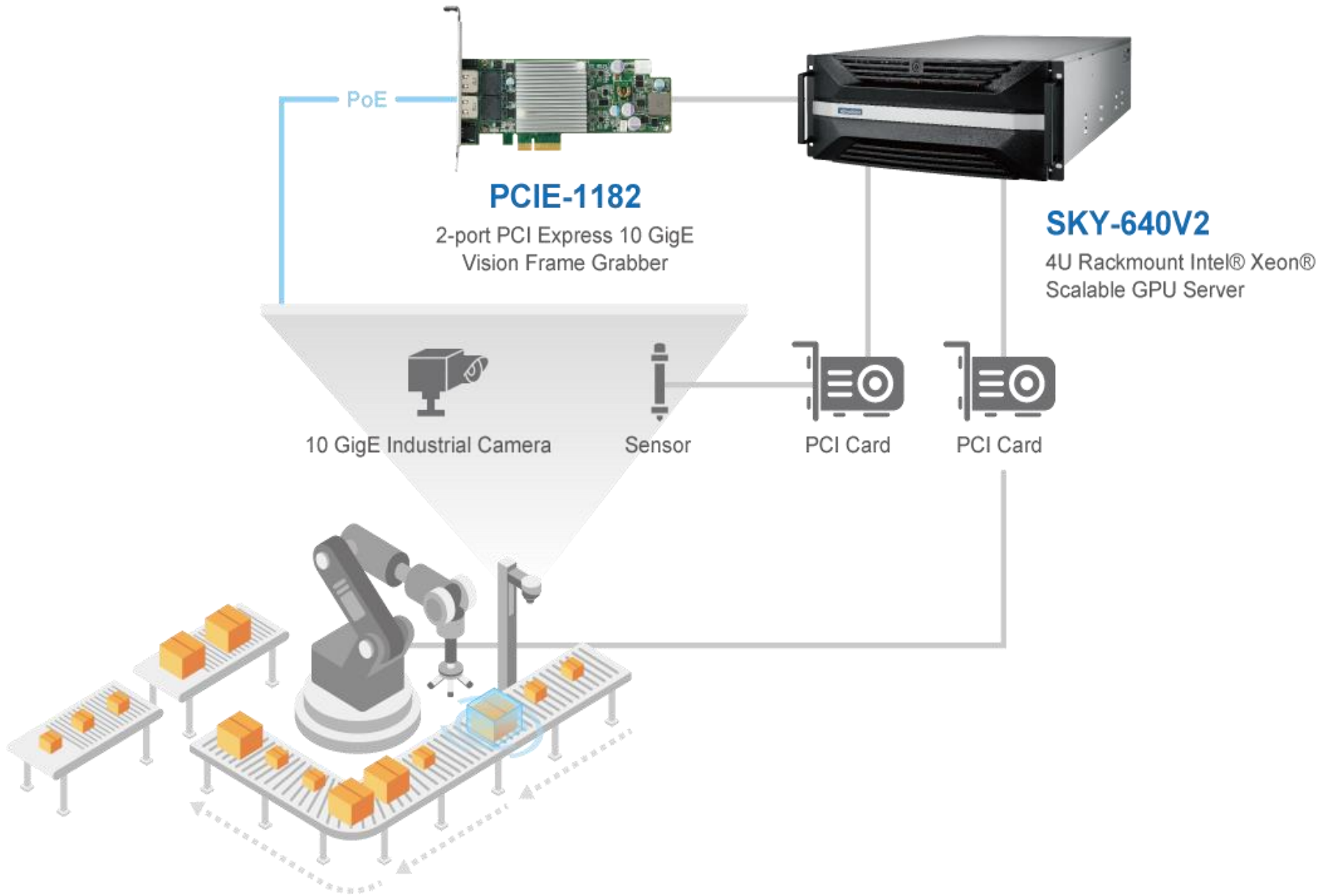
Challenges :

Traditional automation systems face limitations such as low flexibility, high deployment costs, and difficulties in integrating new elements into existing production lines. These challenges necessitate the need for advanced logistics systems to cope with the rapid growth of e-commerce.

Solutions & Benefits :

The proposed solution is a 3D robotic vision system that integrates high-resolution cameras, a GPU card, a server, and a motion controller. This system enables real-time image analysis and defect detection. Implementing this solution improves operational efficiency, enhances reliability, reduces manual labor, and supports predictive maintenance, leading to better quality control and more effective logistics operations.

System Diagram



Selection Guide

Vertrieb durch **AAC**
AMC – Analytik & Messtechnik GmbH Chemnitz
 Heinrich-Lorenz-Str. 55 Tel.: +49/371/38388-0
 09120 Chemnitz Fax: +49/371/38388-99
 E-Mail: info@amc-systeme.de Web: www.amc-systeme.de



Model		Axion-1xE	Axion-2xE	Axion-4xB	Claxon-CXP1	Claxon-CXP2	Claxon-CXP4
Camera Interface	Compatibility	Camera Link 2.0			CXP-12		
	Configuration	Base/Med/Full/79-bit		Base	-		
	Camera Number	1	2	4	1	2	4
	Speed	-			3/6/12 Gbps		
	Connector	SDR Camera Link connectors			Micro BNC		
	Bus Interface	PCIe x4 Gen2 (also works in x8 and x16 slots)			PCIe x4 Gen2	PCIe x8 Gen3	
Processor and Software	Processor Architecture	x86, Arm64					
Support Package	Operating System	Windows 7, 8, 10 (x86 only), Linux SDK C, C++, C#, Python			Windows 7, 8, 10 (x86 only), Linux SDK C, C++, C#, Python		
Power Requirements	Input Voltage	12 VDC direct from PCIe slot, or AT/ATX system power input					
	Overload Current Protection	Present					
	Connection	AT/ATX Power Jack					
	Power Output	Supports both PoCL and non-PoCL cameras with SafePower			up to 13W, 24 V _{DC} each CXP link (total max. 52W with AT/ATX system power input)		
Environment	Operating Temperature	0 – 50°C (32 – 122°F)					
	Storage Temperature	-20 – 80°C (-4 – 176°F)					
	Operating Humidity	5 – 95% RH					
Mechanic	Dimension (W x D)	174 x 106 mm	174 x 106 mm	174 x 106 mm	140 x 77 mm	174 x 106 mm	174 x 106 mm
Certification	Compliance	FCC CE Class A					

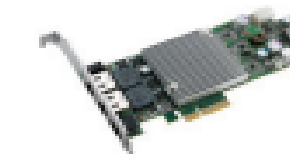
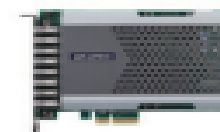
✓: supported, – : not supported, △ : optional

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AMC – Analytik & Messtechnik GmbH Chemnitz

Heinrich-Lorenz-Str. 55 Tel.: +49/371/38388-0
 09120 Chemnitz Fax: +49/371/38388-99
 E-Mail: info@amc-systeme.de Web: www.amc-systeme.de



Selection Guide

Model		✓ PCIE-1154-BE	✓ PCIE-1158	✓ PCIE-1672E	✓ PCIE-1674E	✓ PCIE-1182	
Power Requirements	Input Voltage	12 V _{DC} direct from PCIe slot with optional 12 V _{DC} AT/ATX					
	Overload Current Protection	Device auto recovers after fuse tripped when rated currents > 2A					
	Connection	AT/ATX Power Jack					
	Power Output	5 V _{DC} power output, max. 4.5W per port		48 V _{DC} PoE Power output, Max. 25.4W (1 port) (total Max. 60W (2 ports) with AT/ATX System power)			
Environment	Operating Temperature	0 – 60°C (32 – 140°F)		0 – 50°C (32 – 122°F)		0 – 60°C (32 – 140°F)	
	Storage Temperature	-20 – 80°C (-4 – 176°F)					
	Operating Humidity	5 – 95% RH					
Mechanic	Dimension (W x D)	153 x 106 mm (6.02" x 4.17")		165 x 110 mm (6.49" x 4.33")		167 x 68.9 mm (6.57" x 2.71") PCIe low profile	
Communication	Communication	USB 3.0		GigE		10 GigE	
	Interface/Compatibility	USB 3 Vision		IEEE 802.3, IEEE 802.3u, IEEE802.3ab, IEEE802.3x, IEEE802.3af, IEEE802.3at			
	Speed	5Gbps		10/100/1000 Mbps		10,000/5,000/1,000 Mbps	
	No. of Ports	4	8	2	4	2	
	Port Connector	USB 3.0 Type-A		8-pin RJ-45 copper			
	Bus Interface	PCIe Gen2 x4 (up to 2.0 GB/s)					PCIe Gen3 x4
	Jumbo Frame	-		9KB		-	
Safety	Controller	Renesas μPD720202		Intel® Ethernet Controller I350		Intel® Ethernet Controller X550	
	ESD	8KV (air), 4KV (contact)					
	EFT	2 KV					
	Surge Protection	1 KV					
Digital Input/Output	Isolation Protection	2.5 KV					
	No. of Channels	-		-		4 input and output	
	Input/Output Range	-		-		0-30V opto-isolated	
	Max. Frequency	-		-		1KHz	
	Digital Input Interrupt	-		-		Falling and rising edge, normal and invert	

✓: supported, - : not supported, △ : optional

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