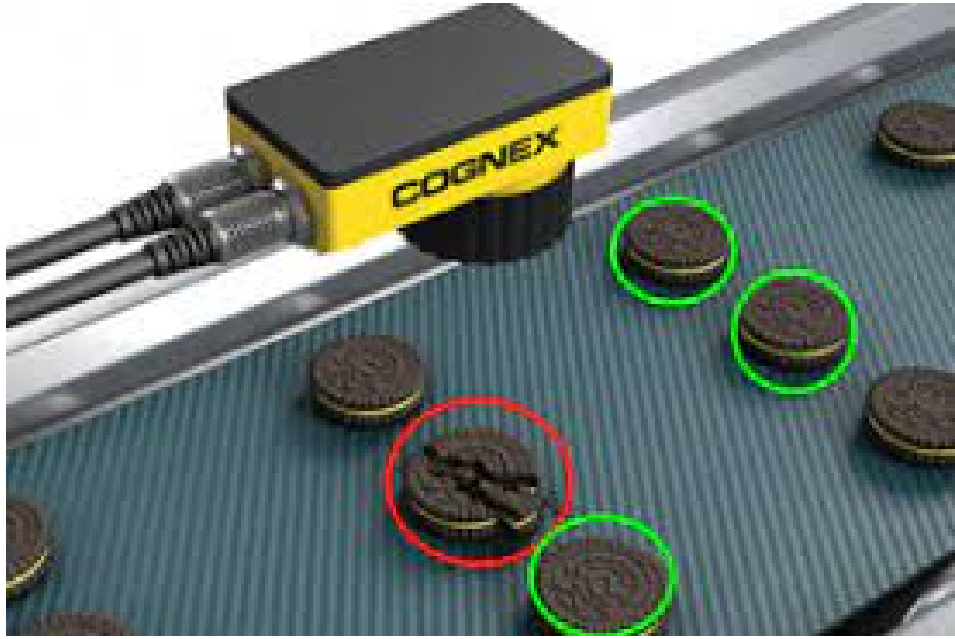
JHCTECH

Accurate Capture

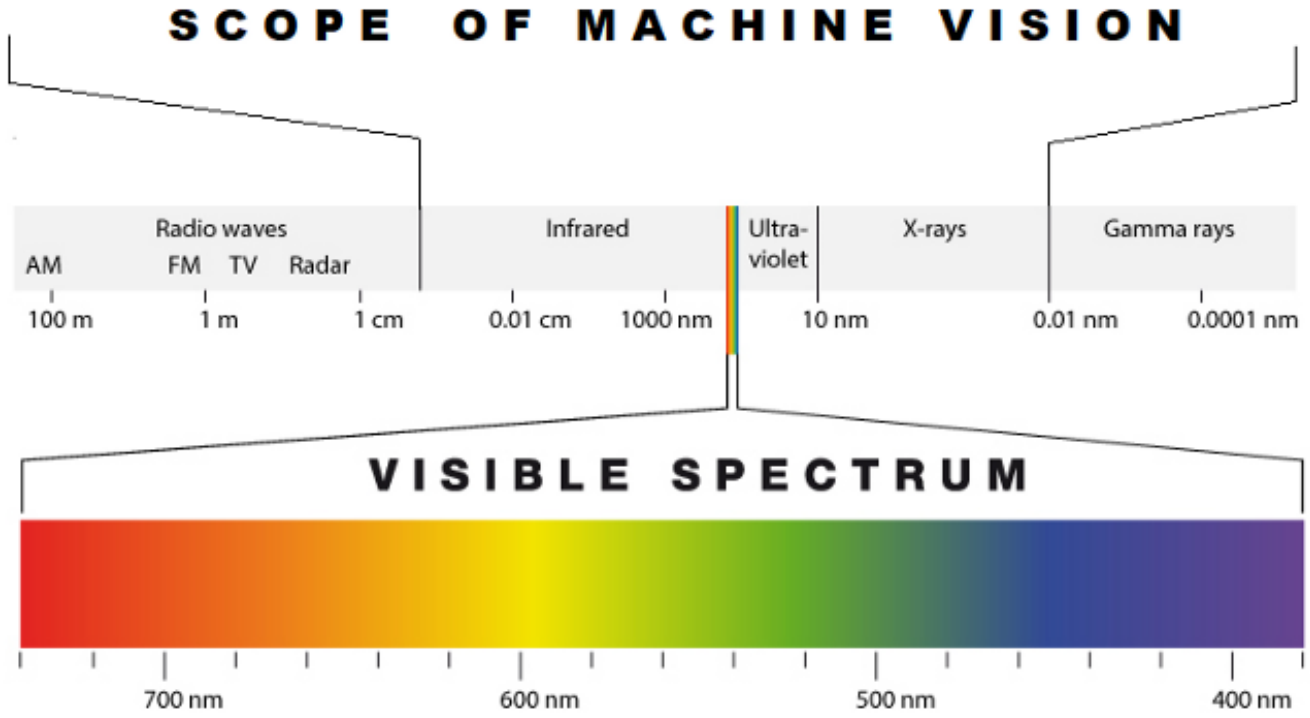
-- AI-based Automation of Appearance Defect --

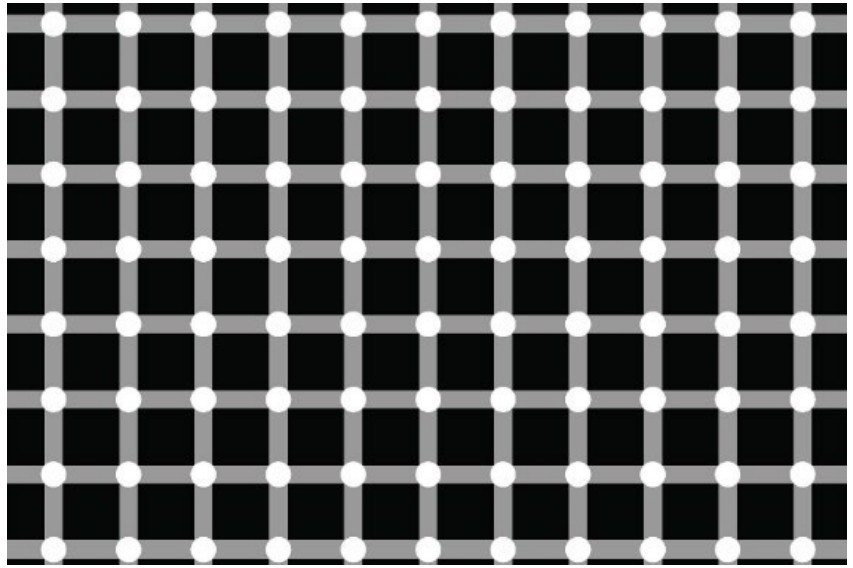
1

Automatic Visual Inspection

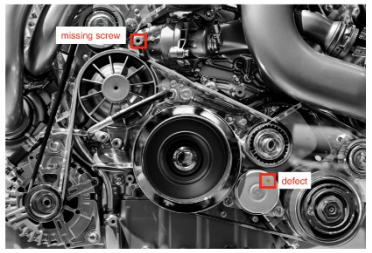


Automated Visual Inspection





Automated Visual Inspection



Inspect automobile parts for defects

Identify defective products on your assembly line

Targets / Defects

Automobile parts

Materia parts
Resin parts
Fabric

Defects: Scratch, Crack, Dirt, Dent, Burr / Chip

Electronic parts

PCB
Electrobnic parts
Electrical component
Panel

Defects: Scratch, Crack, Burr / Chip

Building materials

Wood board
Sash
Metal fitting
Tile

Defects: Scratch, Crack, Dirt, Dent, Surface Pattern

Nonferrous metals

Wire, Cable
Aluminum
Stainless
Steel

Defects: Scratch, Crack, Dirt, Dent

Raw materials

Chemical fiber
Rubber
Glass
Paper, Pulp

Defects: Scratch, Crack, Dirt, Dent

Food

Processed Food
Beverage

Defects: Foreign object, Wrong print, Leak

Medical

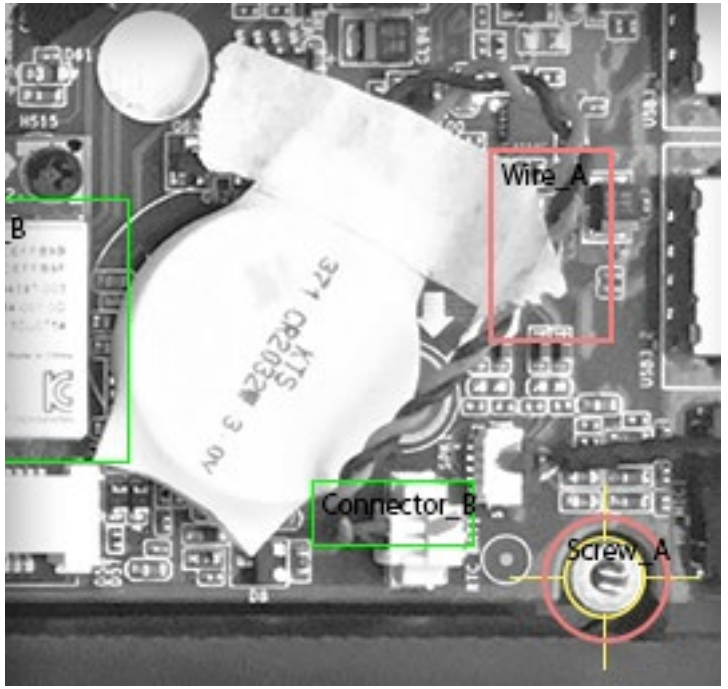
Medicine

Defects: Foreign object, Wrong print, Crack

Others

Materia parts
Resin parts

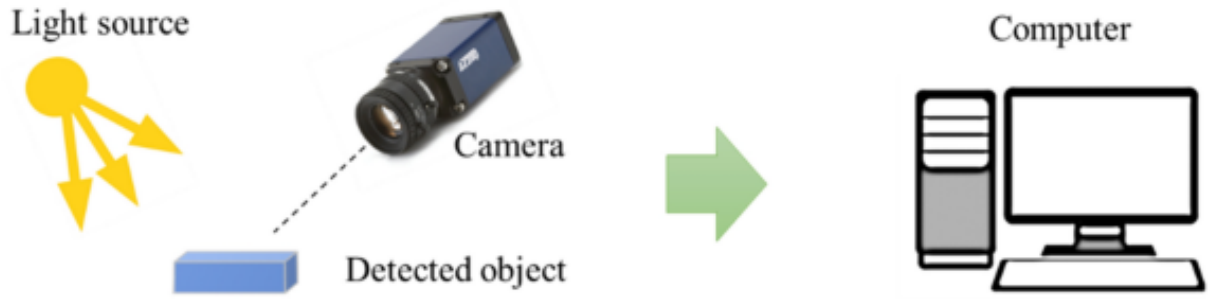
Defects: Defect classification, Shape check



Source: NEC

Automated Visual Inspection

Light **Eye** **Brain**



Hardware platform *Algorithm*

Optical illumination + **Image acquisition** ⇨ **Image processing and defect detection**

- Light source
- Fundamental illumination modes
- Illumination system design

- CCD and CMOS
- Image acquisition schemes

- Image preprocessing
- Classification
- Localization
- Segmentation
- LSTM-based periodic defect recognition
- Multi-feature fusion detection based on DBN and SAE

Image recognition techniques for visual inspection and failt detection leads to productivity of **+ 50%**

AI based visual inspection – defect recognition by up **to 90%** as compared to human detection

Automated Visual Inspection

Digitalisation

- Sensors
- Storage
- Communication
- **Processing**

Automation

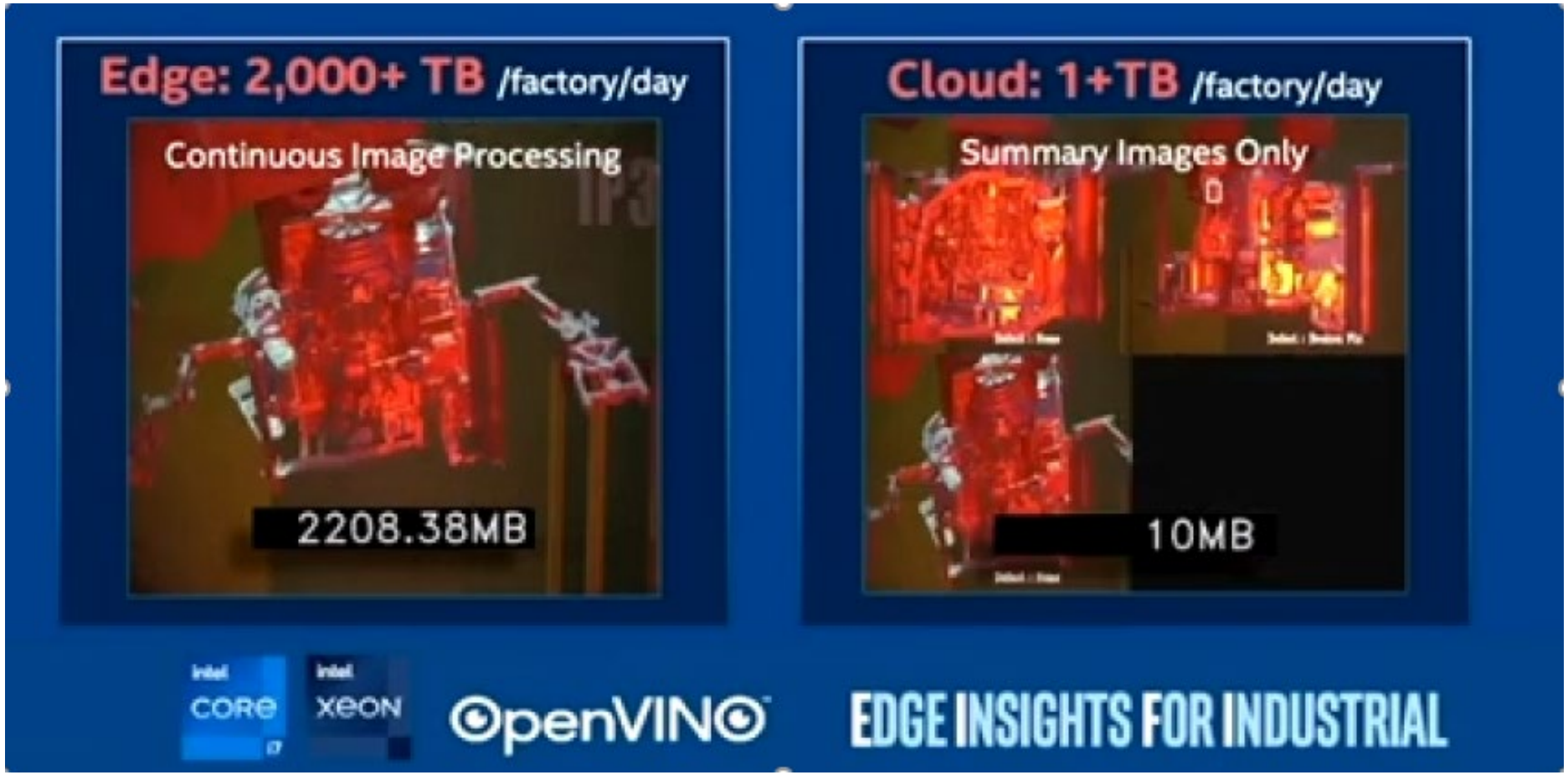
- Process Automation
- Automation Optimisation
- Self-Learning and Self-Diagnostics / Machine Learning
- Real AI (no human reliance) algorithms

JHCTECH AI Ready Embedded Computing Solutions

Autonomy **Control** **Computing** **Connectivity**

Embedded Computing

Intel Direction

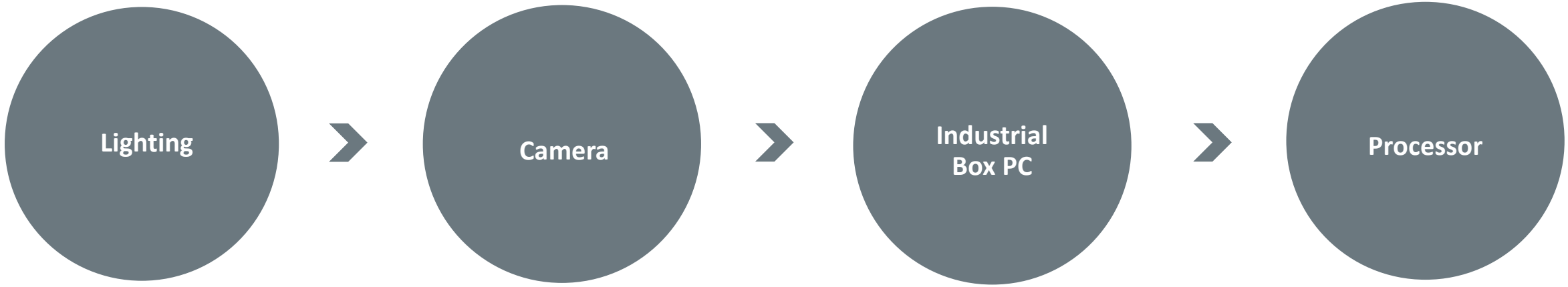


2

JHCTECH Solutions for Appearance Defect Inspection

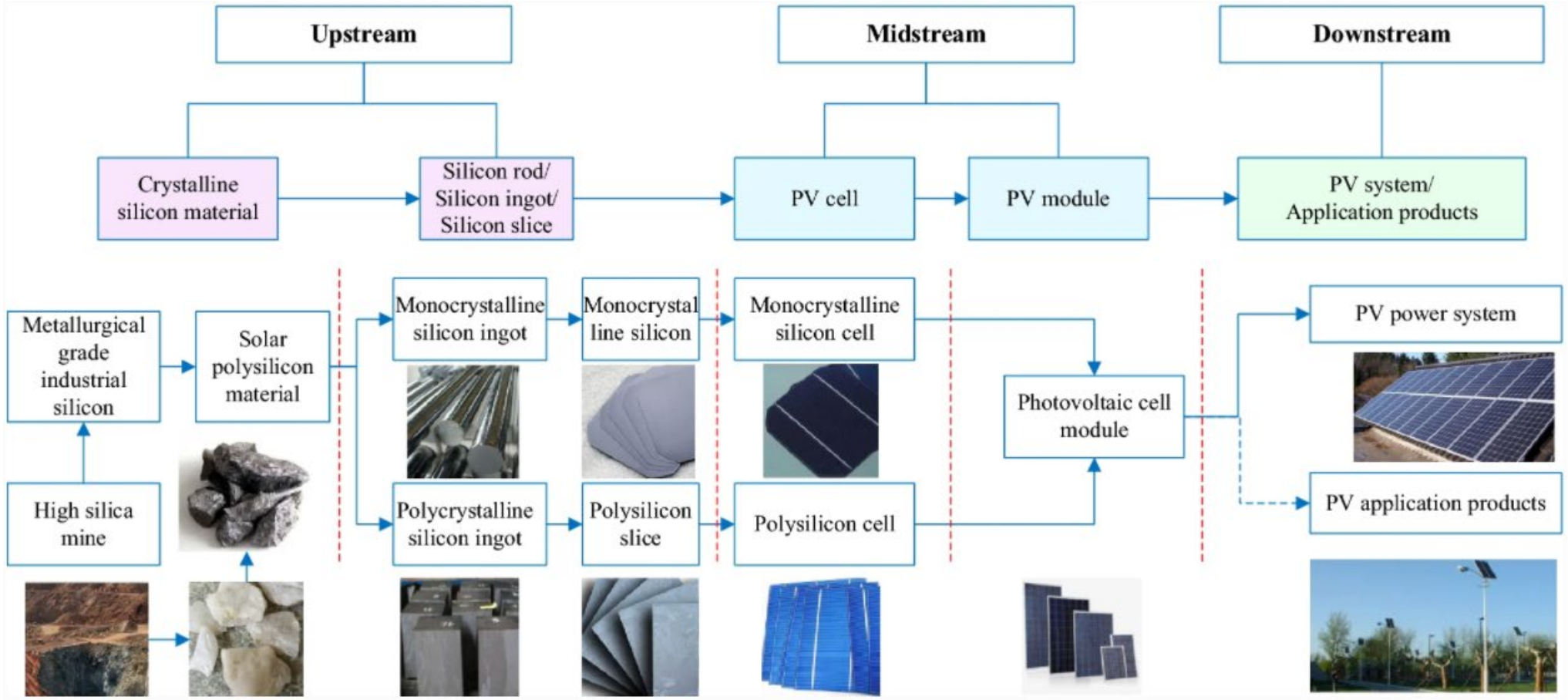
Components of an automatic inspection system

The components of an automatic inspection system usually include lighting, a camera or other image acquiring device, a processor, software, and output devices.



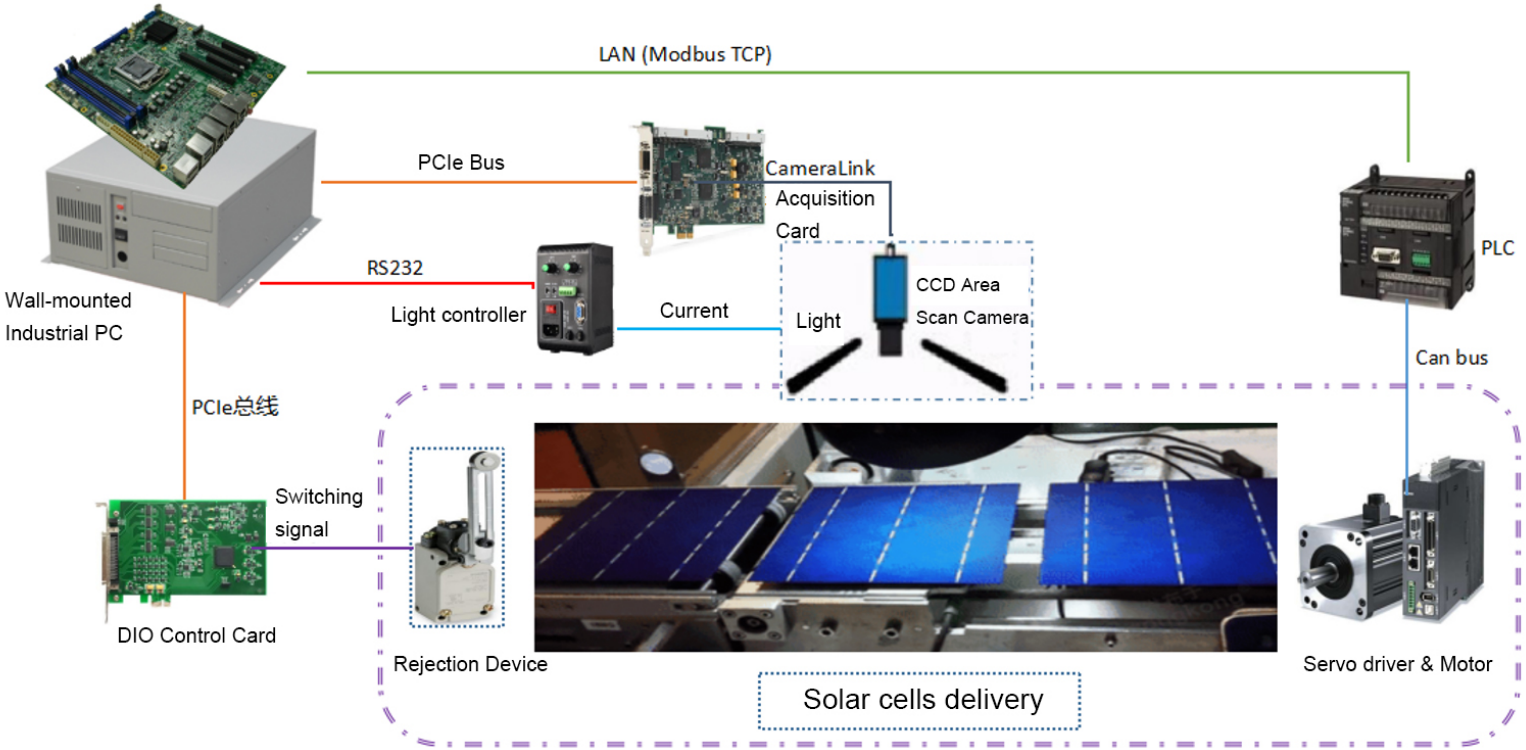
Defect Inspection in **Solar Cells**

Solar Industry Chain



The flow diagram of PV industry-chain

Image from Springer Link



Defect Inspection of Solar cells-Hardware Architecture

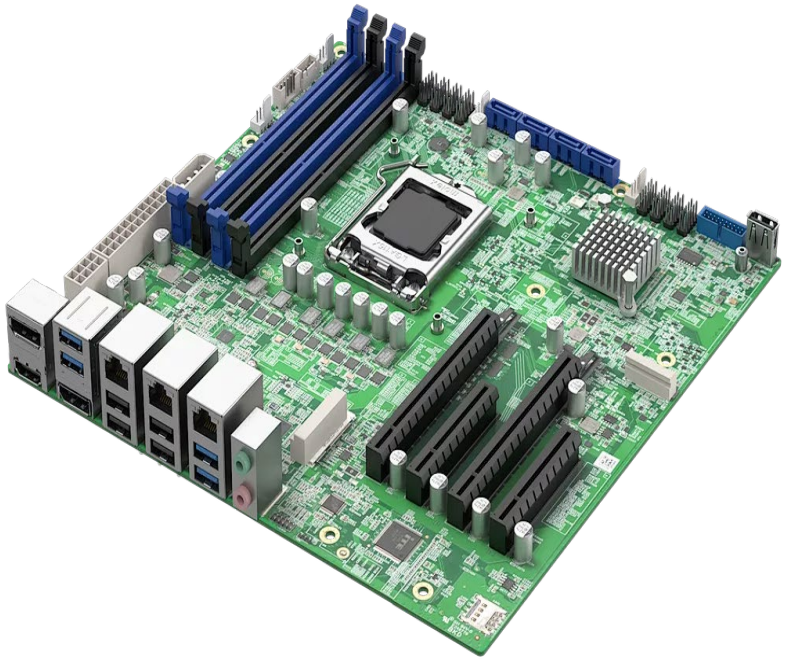
The Basic Visual Inspection System includes:

- Main Controller X86 Industrial PC;
- CameraLink video capture card
- DIO control card
- Optical Acquisition Sensor—Array CCD camera
- Light Controller;
- PLC, Servo drive and motor;
- Rejection Device
- Smart Vision System Software

Why we need x86?

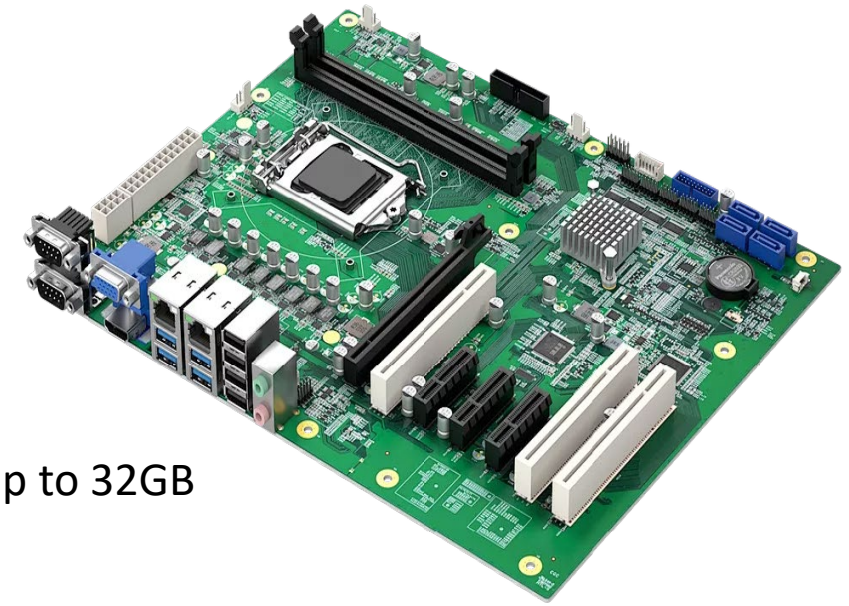
- The maximum configuration of 65 million pixel array industrial camera, accuracy up to 0.04mm /pixel;
- Achieve 2mm edge damage, can detect 1*1mm surface holes or foreign body defects;
- Identify scratches with a length of more than 2mm, and detect fault grids with a length of more than 1mm;
- Open platform: Intel mature X86 architecture +Windows10 open operating system;
- Powerful computing power: Intel Coffee Lake or Cometlake Core I3/I5/I7/I9 CPU, up to 8 cores and 16 threads, up to 5.0ghz overclocked version processor;
- Engineering software architecture: general vision platform software, customizable GUI;
- Visual tool library compatible: VisionPro, Halcon, OpenCV and other visual tool library;
- Compatible with a variety of 2D/3D camera brands: support LMI, SmartRay, Cognex, Keyence, SICK, PhotoNeo, etc., convenient for users to select the camera;
- PLC communication: integrated with a variety of PLC communication protocols, registers can be accessed in the form of Siemens, Mitsubishi, Omron and other brands PLC communication, more compatible with different transmission line servo control;
- Robot communication and guidance: integrated TCP/IP protocol, can directly communicate with ABB, Kuka, Yaskawa and other robots, can realize the visual positioning of the Robot arm application expansion;
- Project management and interactive interface: integrated parameter setting, data storage and management, data analysis, report output, record storage and analysis, etc., friendly and convenient operation interface

JHCTECH MATX-I961 Advantages



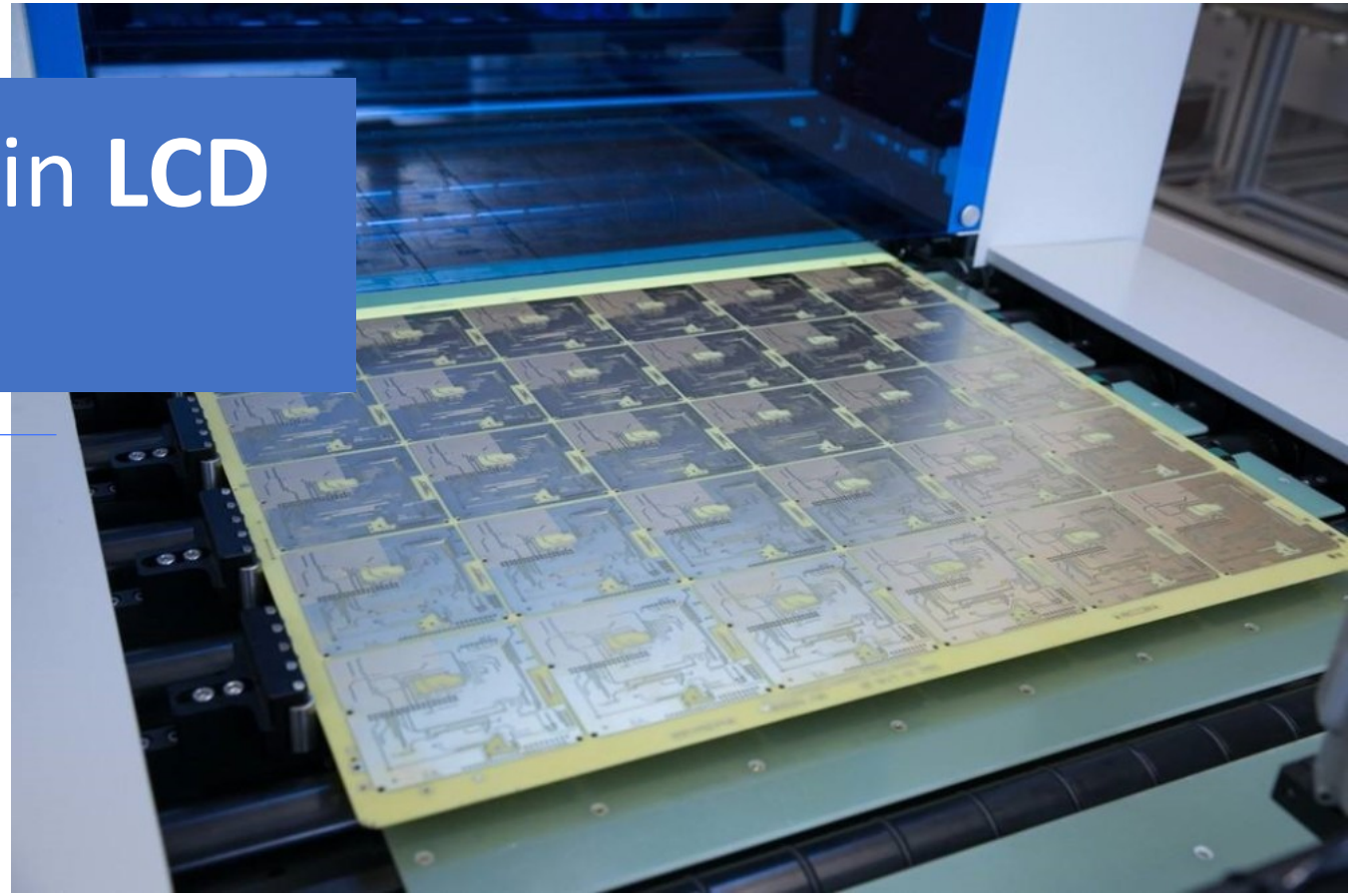
- Intel® Xeon® E or 9th/8th-Gen Core™I9 / i7 / i5 / i3 / Pentium, Celeron CPU
- Intel ® Q370 / C246 Chipset
- 4 x DDR4 2666 MHZ or 2400MHz dimms with a maximum of 128GB
- 2*DP, 1*HDMI, support 3 independent 4K display
- 3*LAN, 6*USB3.1 Gen2, 7*USB2.0, 4*COM
- 1 x PCIeX16 or 2 x PCIeX8+2 x PCIeX4 High bandwidth multi-slot expansion
- 1 x Mini PCIe with a SIM card slot and supports WIFI/GPS/GSM/BT
- 4 x SATA3.0 supports RAID0, 1, 5, 10, and 1 x m. 2 2280 m-key (PCIe X4)NVME high-speed storage
- Supports TPM 2.0 security encryption, AMT12.0, Intel® Vpro technology
- Standard 24Pin ATX+8Pin 12V ATX power supply design

JHCTECH ATX-I971 Advantages

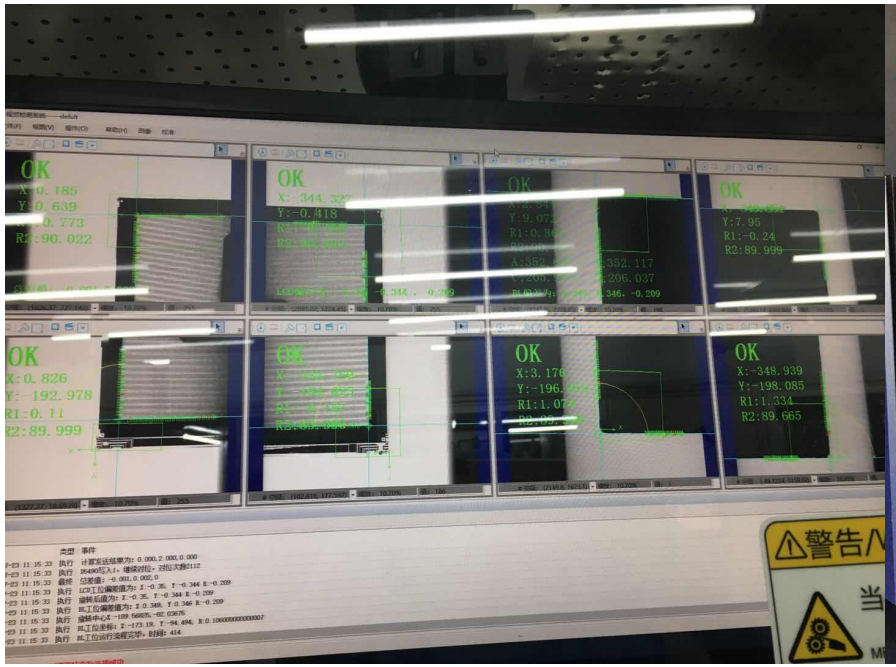


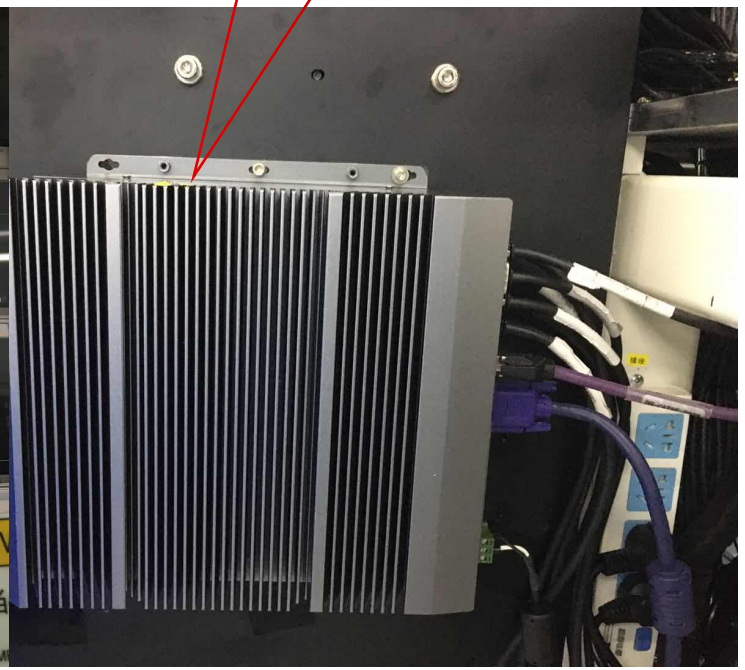
- Intel 10th Gen. Cometlake-S Core™ i9/i7/i5/i3/Pentium/Celeron CPU
- Intel H420E Chipset
- Dual-channel 2 x DDR4 2933MHz dual in-line memory modules (dimms), up to 32GB
- Intel UHD Graphic core display, 1 x VGA and 1 x HDMI dual display
- 1*I219LM gigabit network port and 1*I225V chip 2.5G network port
- 6*USB3.0, 4*USB2.0, 6*COM, 8bit DIO
- 1*PCIeX16, 3*PCI, 3*PCIeX4(X1 signal) a total of 7 expansions, can be flexibly set through the BIOS into a PCIeX4 expansion slot
- 4*SATA3.0 6.0Gbps, optional audio, optional TPM2.0
- The standard 24-pin ATX + 8-pin 12V ATX power supply design supports a maximum of 120W CPU power supply
- Standard ATX hole size, fully adapted to the market frame and wall - mounted chassis

Defect Inspection in **LCD Panel Surface**

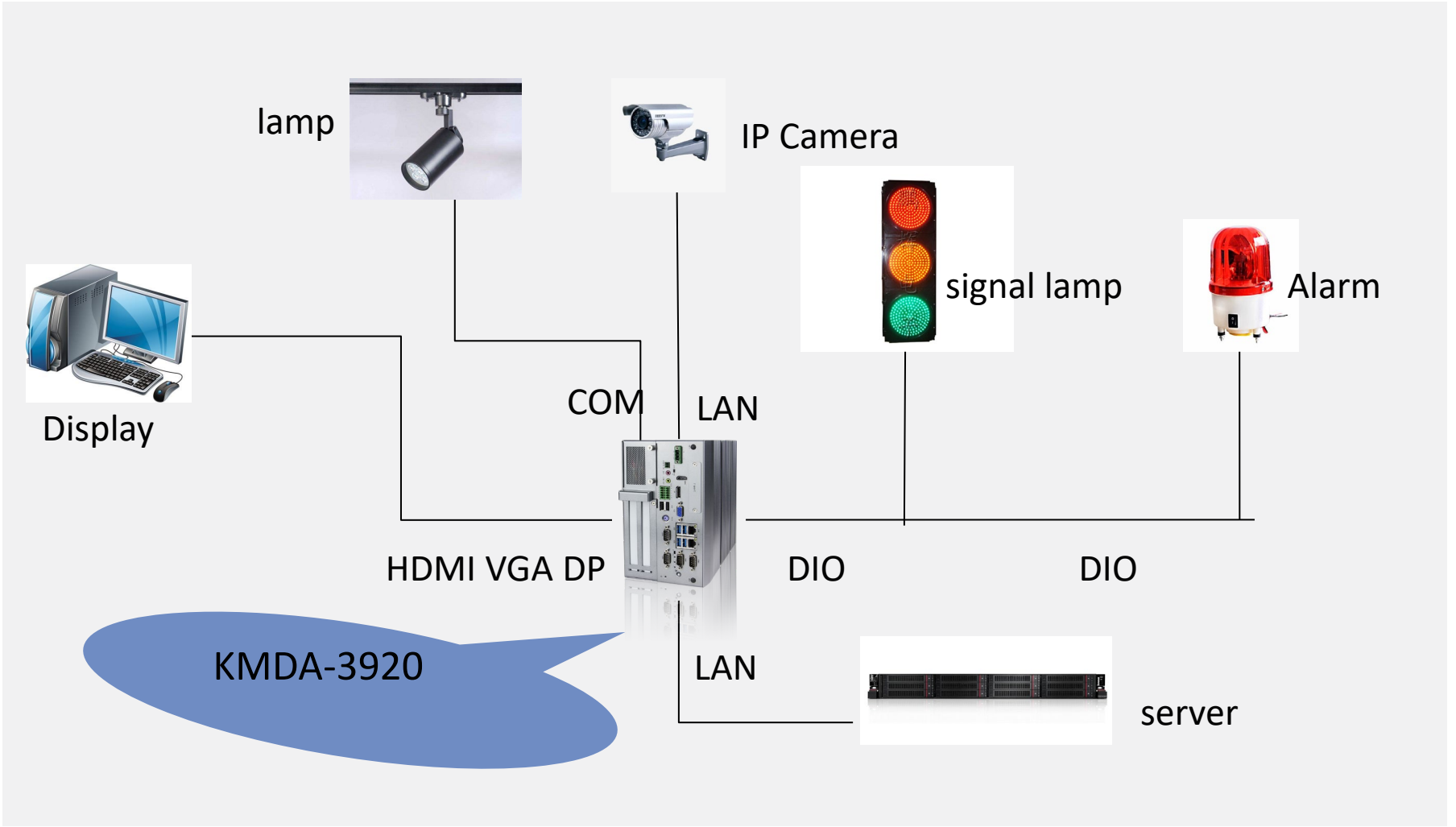


KMDA-3920

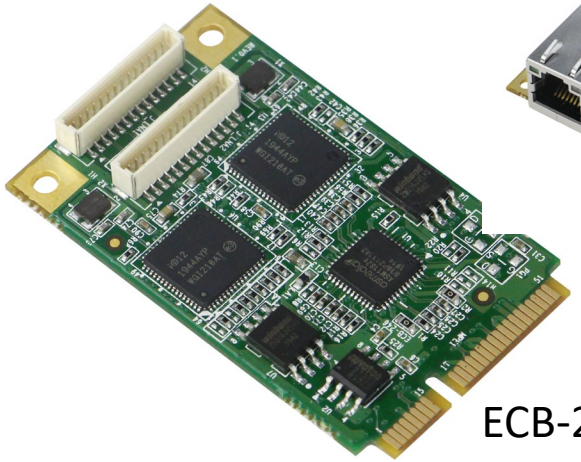

OK
OK
OK
OK
OK
X:0.826
Y:-192.978
R1:0.11
R2:89.999
OK
X:3.176
R1:1.074
OK
X:-348.939
Y:-198.085
R1:1.334
R2:89.665



Topography


lamp
IP Camera
signal lamp
Alarm
Display
COM
LAN
HDMI VGA DP
DIO
DIO
KMDA-3920
LAN
server

KMDA-3920



ECB-246

BRAV-7302

KMDA-3202

KMDA-3920

RoHS COMPLIANT 2002/95/EC CE FCC

PCIe/PCI Expansion -20~65℃ 4K Ultra HD 4G LTE RAID Wide 12-24V DC Power

Key Specification

- Chipset H110/Q170
- Intel®Kabylake-S/Skylake-S Core I3/I5/I7 CPU
- 2*DDR4 2400/2133MHz SODIMM, up to 32GB
- DP+HDMI+VGA, Optional 3 independent displays(Q170)
- 2/4*LAN, 4*USB3.0, 3*USB2.0,4*COM,8-bit DIO
- 1*Mini PCIe(PCIe+USB),1*M.2 2242B-Key
- PCIeX16+PCIeX4 or 2*PCI expansion
- 1*mSATA, 2*2.5" SATA, suppprtRaid0,1(Q170)
- Support Intel® iVpro(Q170)and TPM2.0
- DC 12~24V Wide Power Input
- Desktop Mounting,Wall Mounting

KMDA-3202

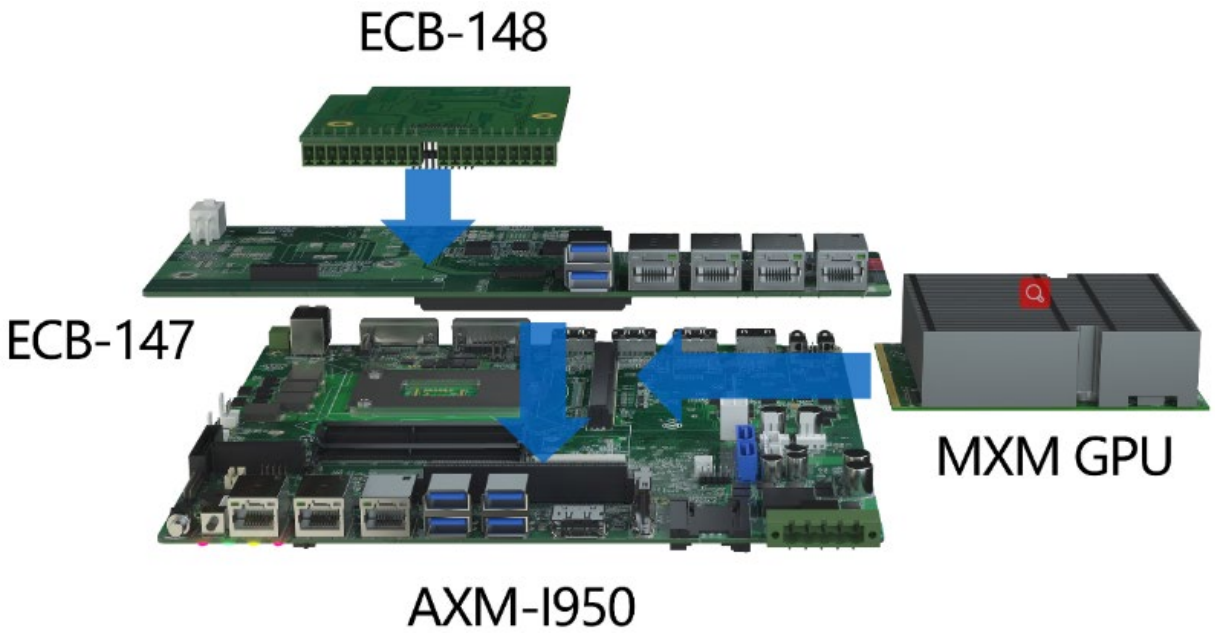
RoHS COMPLIANT 2002/95/EC CE FCC

Fanless -20~70 °C POE Power Over Ethernet 4K Ultra HD DIO ISOLATED 4G LTE

Key Specification

- Intel® Skylake-U/Kabylake-UCPU
- 2*DDR4 2133MHz SODIMM, Up to 32GB
- 1*DP, 1*HDMI, Dual 4K display
- 3*Gig LAN, 4*POE, 4*USB3.0, 5*USB2.0(one inside)
- 6*COM, 1*PS/2, 16bit Iso. DIO, 8bit DIO, Audio out/Mic
- 1*F-Mini PCIe(PCIe+USB),1*M.2 2242 B-Key
- 1*F-mSATA, 1*2.5" SATA HDD/SSD driver bay
- Support Intel iVpro and TPM2.0
- DC 9~30V Wide Power Input
- Desktop Mounting

Skylake/Kabylake-S+MXM GPU(1050Ti,1060,1070)



BRAV-7302

4G Module

WIFI

BRAV 7302

Key Specification

- CPU and GPU fan cooling, independent air passage
- Intel® Kabylake-S/Skylake-S Core I3/I5/I7 CPU
- 2400/2133MHz SODIMM, Up to 32GB
- 1*MXM 3.1 socket, support NVIDIA/AMD GPU Intel
- 1*DP+1*HDMI+1*VGA, GPU 3*DP+1*HDMI
- 3/7*LAN, 6*USB3.0, 3*USB2.0, 4*COM,16DIO,Audio
- 1*Mini PCIe(PCIe+USB),1*M.2 2242 B-Key
- 1*mSATA, 1/2*2.5" SATA, suppprt Raid0,1 Support Intel®
- iVpro and TPM2.0
- DC 6~48V Wide Power Input

RoHS COMPLIANT 2002/95/EC CE FCC

Wide 6~48V DC Power NVIDIA GEFORCE GTX 4K Ultra HD 4G LTE RAID

Stay in Touch

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