

DENSO robotics

Open controller interface architecture - enabling flexible and versatile robot application development



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DENSO Corporation at a glance

- 1949 –DENSO established as a separate entity of **TOYOTA Motor Co. Ltd.**
- **No 2** auto parts suppliers worldwide
- Developing/manufacturing robots since **1967**
- Over **145,000 robot** installations worldwide
- Over **23,000** own robots in use in DENSO factories.
- **OEM Supplier:** Companies around the world trust in the quality of our products
- A leading mfg of **small industrial robots**



47,9
in annual
revenue (USD)



158,000
employees in 200
group companies



9% of revenue
invested in R&D



DENSO Robotics Product Range



6-AXIS

Robot Model	VP	VS Series		VM	VMB	VLA	COBOTTA	COBOTTA PRO	
Payload (kg)	2.5/3	4	7	13	25	40/60	0.5	6	12
Arm reach (mm)	430/432	505/605	710/905	1.021/1.298	1.506/1.804	2.503	342.5	900	1.300

Controller

RC8A CONTROLLER



RC9



Built-in controller

CRC9



4-AXIS



Robot Model	LPH	HS-A1 Series	HSR Series	HM Series	XR Series
Payload (kg)	3	5	8	10/20	5 kg
Arm reach (mm)	400	350/450/550	480/550/650	600/700/850/1.000	450/760/1060 mm

Requirements for simplified robot integration

- Easy / seamless integration of factory automation devices
- Uniform protocols and programming languages structures for different peripheral devices
- Simplify and standardize communication between automation devices and software applications.
- Greater flexibility to simplify changes in production volume and product specifications

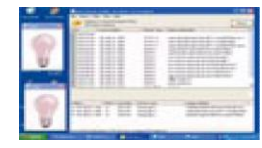
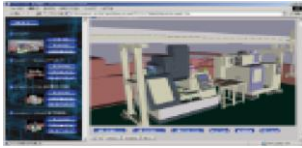


Current Industrial Scenario

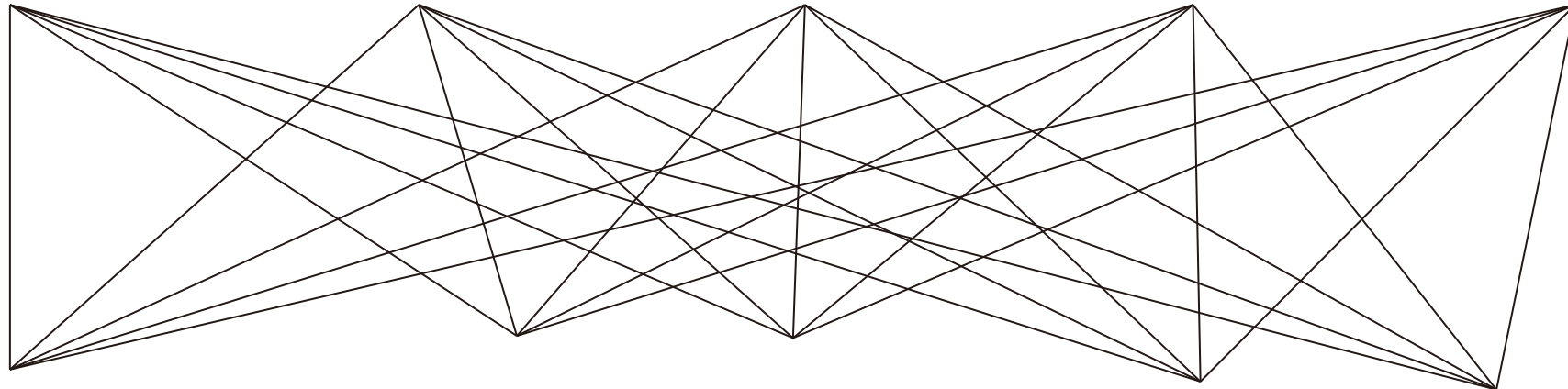
Various Devices and Applications from different Manufacturers requires to be interconnected

Application

Control and monitoring tools

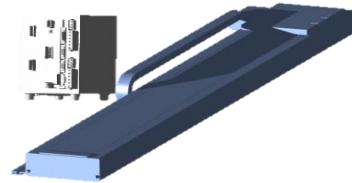


- proprietary interfaces
- own protocol
- specific programming language
- Dependent on different networks, protocols of each device



Devices

Robots, Motors, PLC, Vision, tracks, etc.

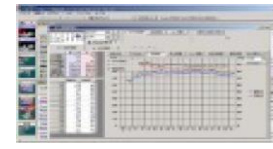
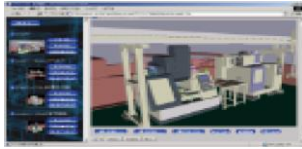


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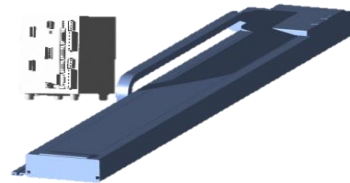
Control and monitoring tools



- ✘ Long development times
- ✘ High development costs
- ✘ High complexity
- ✘ High maintenance costs

Devices

Robots, Motors, PLC, Vision, tracks, etc.

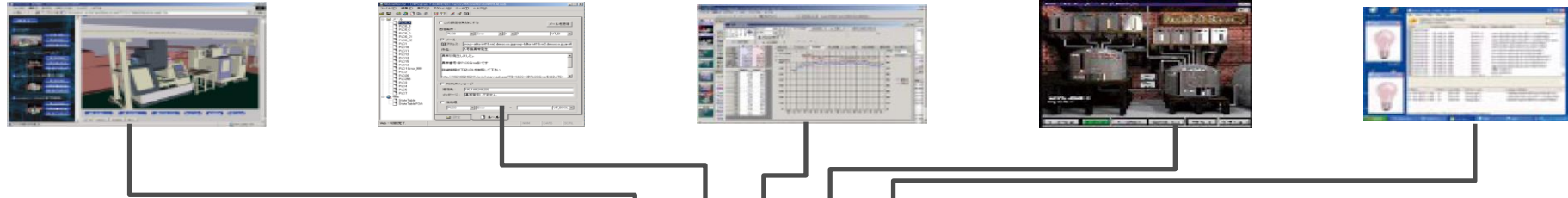


Established Solution: Standard Interface / common platform

Avoid complexity by using a middleware to create a "General" solution

Application

Control and monitoring tools



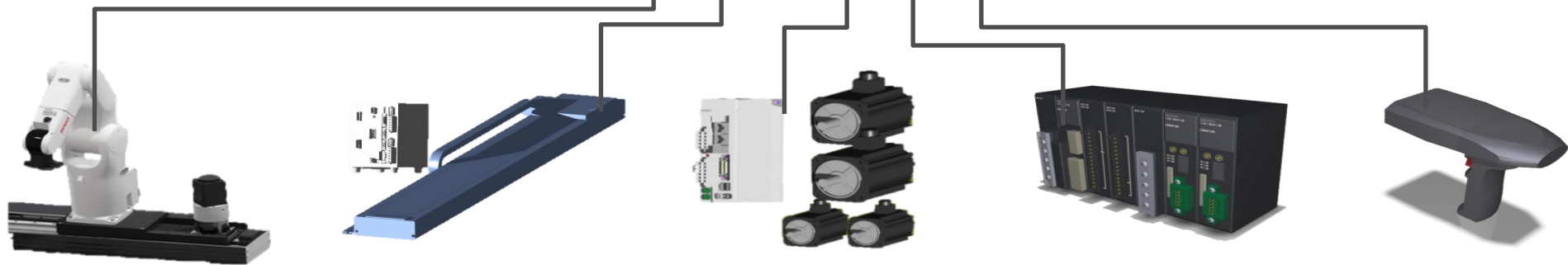
Engine

Providers



Devices

Robots, Motors, PLC,
Vision, tracks, etc.

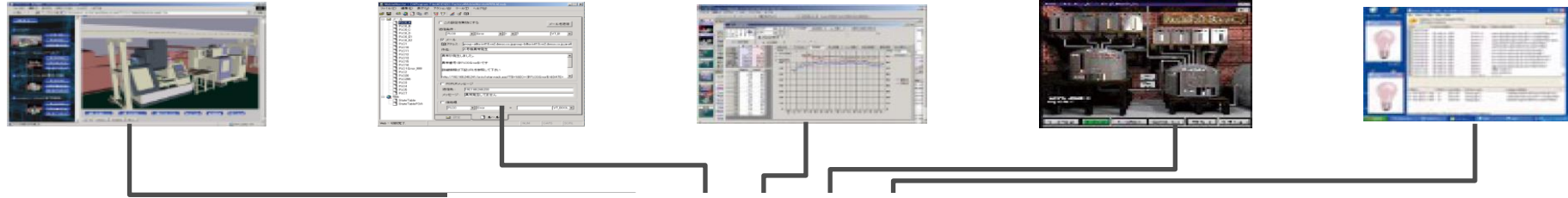


Established Solution: Standard Interface / common platform

Avoid complexity by using a middleware to create a "General" solution

Application

Control and monitoring tools



Engine

Providers

Devices

Robots, Motors, PLC,
Vision, tracks, etc.



- ✓ Shorter development times
- ✓ Lower development costs
- ✓ Simplified use
- ✓ Simplified maintenance

3. Open Platform – ORiN

Middleware platform to simplify & standardize communication between automation devices and SW applications.

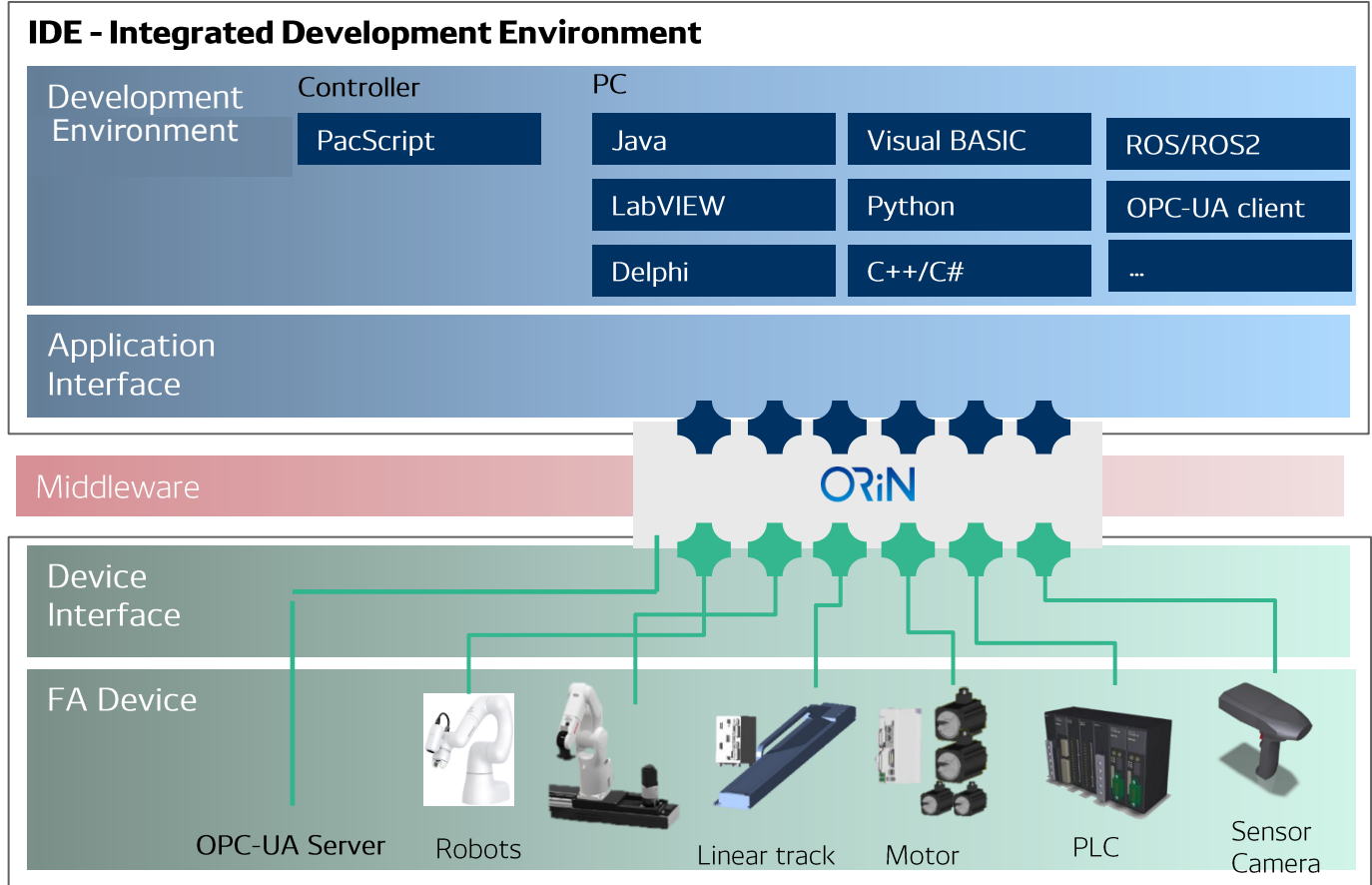
Established since 2006

Established as ISO 20242-4 in 2011

Application Layer: build software without worrying about device specifics.

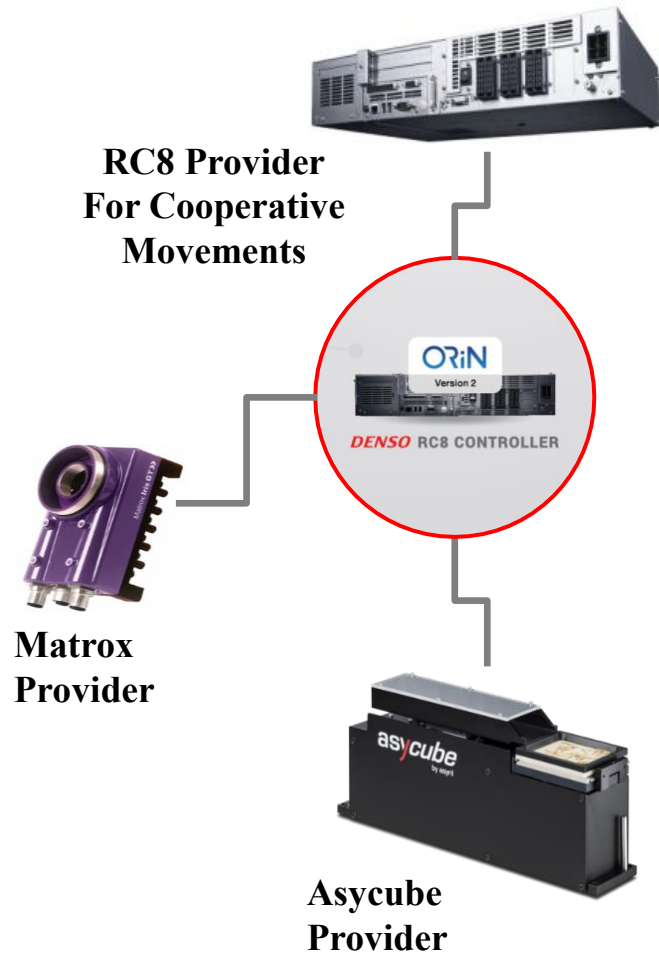
Engine Layer Middleware that handles communication between software and devices

Provider Layer: device-specific drivers or interfaces



More than 200 provider (device drivers) already included
Flexibility to create own provider to expand functionality

Use Case: ORiN based provider to connect various devices without PLC



Reference case COBOTTA PRO at DENSO Daian Corp. JP



Flexible manufacturing process for EV parts. Variable production line for varying product mixes and quantities.

Production system challenges

- shift from mass production to variable production.
- next-generation production system flexibly to changes in production volumes and product specifications.
- ensure both safety and productivity by utilizing human-collaborative robots.



Summary

ORiN is a middleware platform

- to simplify and standardize communication between automation devices and software applications
- enables seamless integration of factory automation devices—like robots, PLCs, cameras, and sensors—into PC-based applications
- abstracts device-specific protocols and programming languages, allowing to build applications using familiar SW like C++, Java, Python, and LabVIEW

Next-generation flexible production system

- enable changes in production volumes and product specifications.



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