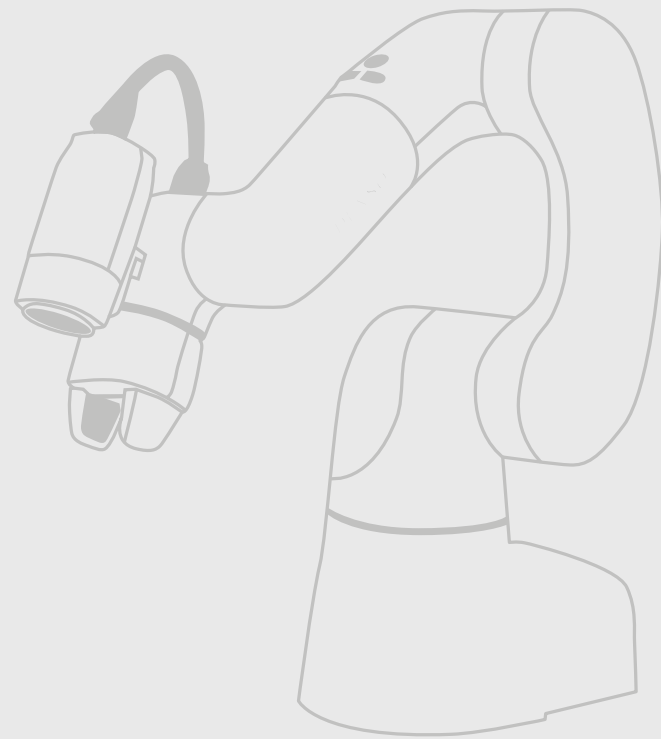




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DENSO
robotics



In the fast lane with DENSO
Robots for SMART education

Apprenticeship & further education

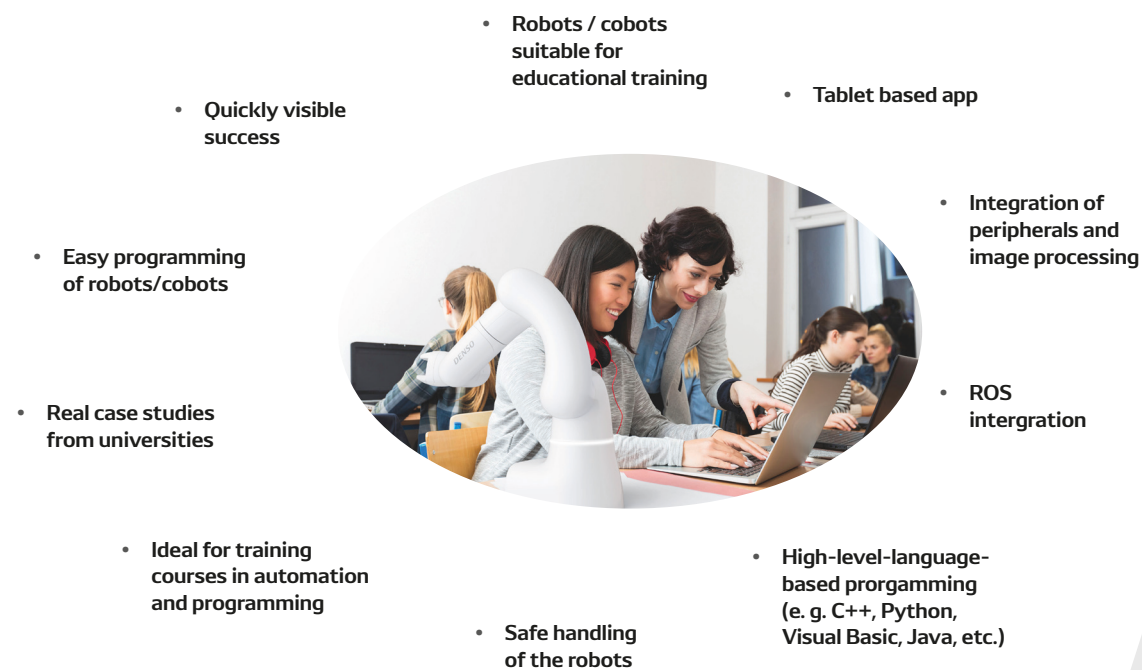
Efficient apprenticeship/ further education and development with DENSO in many branches of education

Examples:

- First points of contact with robotics
- Training for technical professions
- Companion for technical courses of study

Benefits:

- Easy integration of robotics in the education sectors
- From first-time users to robot experts - DENSO is your perfect partner
- Various software tools to achieve the respective training level
- Controlling the robot via PLC
- Development of camera-guided robot applications (2D/3D)
- Connection of numerous fieldbus systems
- High-level language programming via ORiN



Customer Voices

Duale Hochschule Baden-Württemberg

„COBOTTA is safe, can be taught easily or controlled using high-level language - a universal tool for introducing students to the functions and areas of application of robotics. This is why COBOTTA is an essential part of our projects to promote young talent, lectures, work and our digital learning factory.“

Prof.in Dr.in Marthe Kaufholz, Degree Course Mechatronics



FESTO Didactic

„From start to finish, COBOTTA from DENSO Robotics proved to be an ideal candidate to create a standardized mobile manipulator. The straight forward integration does not stop at a tiny hardware footprint, but it also includes ready-made software interfaces.“

Christian Deppe, Product Manager Robotics and Virtual Training



Maschinenbauschule Ansbach

„The DENSO robot covers the entire range of training and further education. From getting started in robotics to complex robot programming with object recognition and data exchange with a PLC, there is something for everyone.“

Bodo Maschmann, Head Of Department Metal



COBOTTA – your SMART partner

COBOTTA as a package for school and company based training.

Its low weight (4 kg) makes it a portable collaborative robot that can be operated without a safety fence (depending on the application and risk analysis). With its various equipment packages, it is suitable for every area of training.

Specifications

Arm reach:	342.5 mm (TCP 385 mm)
Payload:	0.5 kg (0.7 kg wrist direction downward within ± 10 degrees) ⁽¹⁾
Repeatability:	± 0.05 mm
Max. speed:	450 mm/s
Protection class:	IP 30
Weight:	4 kg
ISO standards:	EN ISO 102181:2011, EN ISO 13849 1:2015, ISO/TS 15066:2016
Software:	Standardtype: COBOTTA-specific operating system software OS, OSS-Type: open/without operating system

Camera installation kit

- Built-in A/F 2D Camera (N10-W02)
- End effector Ethernet cable

Built-in Electrical Servo Gripper (force controlled)

Standard components include:

- AC/DC adapter with cable
- Emergency stop with cable
- WINCAPS III
- EVP (Easy Vision Picking)
- COBOTTA World (Tablet App)
- Remote TP (Tablet App)



⁽¹⁾ without electrical gripper

Integrated electric vacuum generator / vacuum gripper



Field network interface module



PROFINET, EtherCAT & EtherNet/IP

For human-robot-collaboration



Inherently safe design & functional safety

The unique design of COBOTTA has no sharp edges or pinch points and ensures safe collaboration with humans. In addition, there are sensors built into the six axis for constant monitoring of speed and torque, to guarantee functional safety as well.

Portable Cobot

The COBOTTA arm with the integrated controller only weighs 4 kg, providing easy portability and maximum flexibility, i.e. to combine the robot with mobile platforms. The integrated controller reduces both the wiring and the required working space. Transporting and installing COBOTTA anywhere and anytime is simply & easy



Easy to use

COBOTTA offers a direct teaching function and an intuitive GUI for easy programming. The built-in A/F camera and the built-in electrical gripper combined with the standard programming Apps allows creating new applications quickly - even for users not yet familiar with robots.

Open Platform

The integrated controller consists of an open platform, allowing developers to create their own applications in the environment they choose (OSS version). In addition to DENSO Robotics standard OS and programming possibilities, the robot is compatible with various programming languages for individual development environment (Linux ROS) and can be connected to all kind of devices. ORiN is supported.



VP - Compact industrial robot

Easily integrate industrial robots into your curriculum. Whether you are a beginner or an expert, with our VP series we have exactly what you need.

With our robot package, designed for educational purposes only, you can teach your students the programming and practical use of compact industrial robots.

Specifications

Arm reach:	430 mm / 432 mm
Payload:	2.5 kg – 3.0 kg
Repeatability:	±0.02 mm
Max. speed:	3.900 mm/s
Protection class:	IP 30
Weight:	13 kg / 15 kg
Cycle Time:	0.99 sec

Control the robot with a high-level language:

- Python, C++, VB, LabVIEW, etc.

Various fieldbuses can be connected:

- ProfiNET
- EtherCAT
- EtherNET/IP
- and many more

Included in the special package:

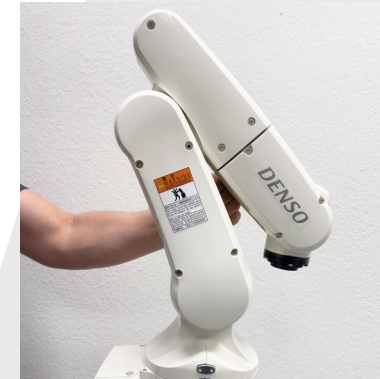
- VP robot arm
- RC8A controller
- M&E cabel
- Mini I/O cabel
- Wincaps III
- ORiN SDK (programming library for Windows)

RC8A controller:

Full functionality and robot Programming (PacScript)



Compact industrial robot



Compact lightweight robot

With an installation area of just 160 x 160 mm, a weight of 13 kg or 15 kg and a width of 65 mm, the VP series offers a highly precise and powerful industrial robot. Thanks to its space-saving design, it can be integrated into almost any system.

Highest precision in the smallest space

Thanks to its excellent repeatability of ± 0.02 mm, at an impressive speed of up to 3,900 mm/s it is possible to easily integrate industry-related applications into the curriculum.



Intuitive operation and programming

The DENSO Teaching Pendant is a simple and user-friendly interface between robot and operator. It enables programming, operation, training and maintenance of the robot. Furthermore, it is possible to easily program the robots with various high-level languages such as Python, C++, LabView and many more.

Low maintenance with maximum durability

As the gears are lubricated for life, the overall maintenance effort is reduced to a minimum. Only the batteries (every two years) and the toothed belts (depending on wear) need to be replaced regularly. This low maintenance requirement makes the VP series the perfect partner during training



Ready for Industry 4.0 and IoT

Almost anything is possible with DENSO, from programming to the standard Wincaps software to the IoT experience.



WINCAPS III - Offline Simulations- & Programming Software

3D-view of the robot arm

Displays the robot and peripheral devices in 3D and simulates robot motion

Online Functions

Connect online to robot controller to use various monitoring and debugging functions

Simulation functionality

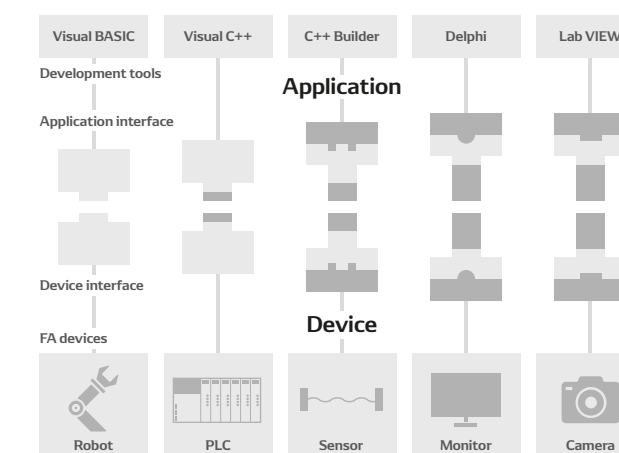
Execute offline user created programs on the pc to check cycle time, robot movement, position and interference. In addition, the syntax of the created program code is checked & errors are displayed.

ORIN

ORiN 2 SDK is a software tool kit used to develop an application program or provider based on ORiN2 specification.

It provides a standard communication interface for robots as well as various FA peripherals and databases.

The superior expendability of ORiN2 supports not only industrial robots, but a variety of devices (including PLC, CNC machine tools, bar code readers and many more) to enable application development that is independent of manufacturer or model.



Case Studies



expedition d – Digital Technologies | Applications | Careers

In expedition d - Digital Technologies | Applications | Careers, an experience truck tours (free of charge) to secondary schools throughout the state. In the double-decker experience truck, young people can experience future technologies live at 26 interactive stations, try their hand at being tomorrow's skilled workers, and learn about the applications and professions for which they are needed.

On board is COBOTTA - the innovative, compact and user-friendly cobot by DENSO Robotics for applications in human-robot collaboration (HRC). These cobots are now indispensable in university teaching and science as well as in corporate R&D - especially in „shared workplaces“ where humans and robots work together. In the future, cobots will also be able to interact with humans in real time thanks to facial and speech recognition and will be widely used in industrial production. Cobots such as COBOTTA are so cost-efficient that they are also worthwhile for medium-sized companies.

expedition d



KEA school of design and technology

Example of the use of DENSO VP/VS robots in the research area of the Copenhagen School of Design and Technology (KEA). In this case, the robots are used in combination with an AI hand recognition module to recognize and track human hands. Using Python, certain hand gestures are decoded to tell the robot which direction to move in.

Communication between the Python script and the robot is carried out using DENSO's ORiN2 software package. The control of the robot - movement and safety - is carried out in WINCAPS III with the PacScript development tool.

kea



Development of a high-rack warehouse system for collaborative robot systems

At the Baden-Wuerttemberg Cooperative State University (DHBW) Mosbach, collaborative robots (COBOTTA) from DENSO Robotics are used for laboratory experiments, teaching and research. The aim of this student research project is to realization of a high-rack warehouse prototype for the Cobotta. This should be able to execute logistics scenarios, as in industry. The creation and programming of a GUI for monitoring and controlling the process is being carried out in parallel by another student.

The initial ideas were collected in a morphological box based on the existing logistics accessories. These were translated into designs and then evaluated. The most important factors here are function, stability, expandability and modularity.

The design with the best rating was pursued further. For this purpose, test elements of the critical parts were 3D-printed in order to test them. The shelf elements were improved until the desired result was achieved. The final components were then 3D-printed and the shelving could be assembled.

Once the final design had been created, the parts were manufactured and demonstrated the expected properties. The previous tests have thus proven their effectiveness. The figure above also shows the expansion modules that were created to extend the system's range of functions. These include a pallet fork holder and an empty pallet rack.

