

ROBOTS FOR EVERYONE

Innovative robot teaching without programming efforts

It is no longer possible to imagine the industrial environment without robots. They are the backbone of the smart factory. Increasingly, however, the digital helpers can also be found in other environments. The Dresden-based company Wandelbots has now developed a solution that makes the use of robots interesting for small and medium-sized companies in many industries.

An industrial PC from Kontron plays a central role in this setup.



🎯 OBJECTIVES

- ▶ Easy and practical access to robotics for different industries
- ▶ Development of a universally applicable robot teaching platform independent of the respective programming language

🚀 CHALLENGE

- ▶ The industrial PC as the central element of the robot programming solution must be compact and flexible
- ▶ Long-term availability and robustness of the system and all components
- ▶ Numerous communication interfaces and WiFi functionality required

💡 RESULTS

- ▶ Innovative and reliable robot teaching solution with Kontron's high-performance and individually configured industrial PC as the control center
- ▶ Planning security with a competent and reliable partner with regard to future evaluations



wandelbots

Wandelbots GmbH

Dresden

Project:

Robot teaching solution TracePen

Kontron platform:

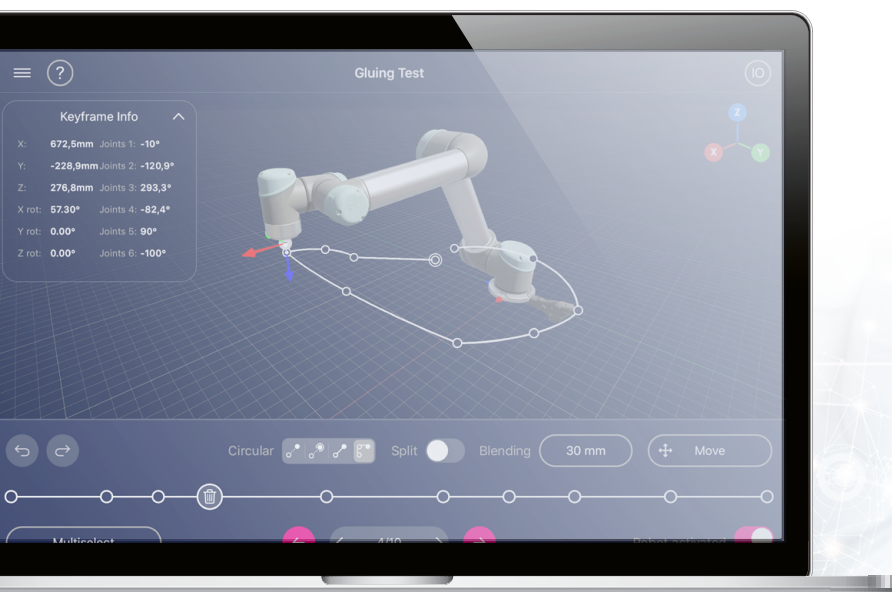
Customized embedded Box PC KBox B-series

Wandelbots was founded in December 2017 by seven scientific staff members of the Faculty of Computer Science at TU Dresden with the goal of democratizing robot programming. From its headquarters in Dresden, the Wandelbots team now serves customers throughout Europe and is currently working on providing access to the technology for interested parties in Asia and America as well. Around 110 employees from 14 nations work here hand in hand on various robotics-related solutions.

www.wandelbots.com

Many laboratories are reaching their capacity limits in times of Corona. Staff is overloaded, processes come to a standstill, results are delayed. Often, scientific specialists also have to perform tasks that other employees could easily do - if they were available. Qualified employees are also scarce in laboratories. Here, special robotic solutions are needed to perform routine jobs such as pipetting. This frees up scientific staff for more demanding processes, such as evaluating test series. In the industrial environment, robots can simplify work in hard-to-reach places and the execution of complicated and repetitive motion paths. Skilled personnel can thus be deployed more effectively elsewhere.

But the programming of appropriate robots is highly complex, expensive and time-consuming. In addition, there is a glaring shortage of skilled workers in this field. Wandelbots now offers an innovative and intuitive robot programming system that enables even non-programmers to learn how to program robots. The solution was developed specifically for the requirements of small and medium-sized enterprises (SMEs) and can be used cost-effectively and flexibly without in-depth specialist knowledge.



SCIENCE WORKS FOR INDUSTRIAL PRACTICE

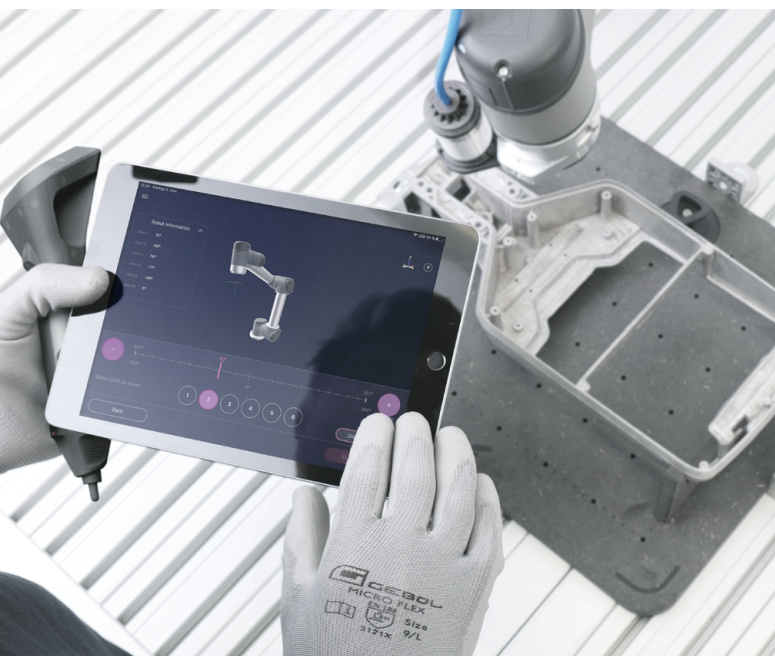
Wandelbots was founded in December 2017 by seven scientific staff members of the Faculty of Computer Science at TU Dresden.

The goal was to make robotics so effortless and practical that everyone, regardless of prior robotics knowledge, would have access to robots. To this end, the team, initially still at the TU Dresden, first developed the prototype of a smart jacket. Finally, the 'TracePen', a handheld, intelligent pen for intuitive robotics teaching that can be used for various applications, reached market maturity and was presented at the GIFA trade fair in Düsseldorf in June 2019.

From its headquarters in Dresden the Wandelbots team now serves customers across Europe and is currently working to provide access to the technology to interested parties in Asia and the Americas. Around 110 employees from 14 nations work hand in hand on various robotics solutions. Wandelbots not only wants to appeal to programming experts, but also to make robotics accessible to a broad range of users. Robotics could help on various levels to use new technologies creatively and productively.

ROBOTS FOR EVERYONE

One of the latest developments is an intuitive robot programming system that uses an app and the special teaching device, the 'TracePen', to implement or modify robot processes easily and flexibly. The TracePen is the latest product from the Dresden think tank and enables robotics to be used in a wide range of application scenarios in different industries.



The current Wandelbots platform is not a homogeneous, self-contained system. Rather, the solution supports numerous different robots and their programming languages.

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And that is exactly what is revolutionary about the solution.

Until now, robots were more or less closed systems with their own programming for specific tasks. Reprogramming to new processes was costly, time-consuming and usually only carried out by specialists.

Dr.-Ing. Patrick Grosa, Head of Business Acceleration at Wandelbots

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This is where Wandelbots comes in with its solution. The use of the universally applicable Wandelbots platform makes it possible for almost any employee to set up a robot for a new task in the shortest possible time, carry out the necessary reprogramming and read out the robot data - regardless of the programming language. The interaction of robot, intuitive app and teaching device simplifies programming. This increases flexibility and productivity and also reduces costs.

This solution can be used in many industries where monotonous routine tasks have to be performed that would otherwise tie up qualified personnel. Today, complex automation processes in particular benefit from the new programming method by pointing. In industrial environments, for example, robots can easily perform tasks in hard-to-reach places or on complicated motion paths. Examples include not only optical inspection but also welding processes or the application of adhesive webs.

ROBOTS HAVE TO LEARN

The TracePen, which is a central component of the solution package, is used to introduce a robot to its task area. The movement of the TracePen shows the robot the path to be learned. The software in the app represents this movement in detail. By defining individual points (keyframes), the result can be readjusted and refined. In this way, adjustments in the precision range of repeatability are possible. The way in which the robot is to move between the defined points can be variably adapted to the requirements. The user can directly control the individual robot joints, as a joint control is integrated. In addition, any range can be defined in which the robot is allowed to move.

STEP BY STEP TO THE SOLUTION

The solution is installed in several steps, the first of which is the installation of the hardware. These are tracking stations, TracePen, tablet as well as the industrial computer. Then the Wandelbots platform is connected to the industrial PC, which is connected to the robot's controller as the control center for the TracePen.

With the support of the tracking stations, the TracePen is then calibrated in the second step. In this process, the pen is fixed to a holder provided for this purpose on the respective robot. Depending on the robot, different adapter holders are available for this purpose. Calibration via infrared light patterns is fully automatic and is completed in less than 30 seconds.

Once this basic installation work has been completed, the actual programming can begin. "For this, the process understanding of the task is crucial, not the user's programming skills," says Patrick Grosa. To initiate this process, the operator selects the appropriate attachment for the TracePen and starts the app. He then uses the TracePen to perform the respective activity. The data is recorded simultaneously by the software, accurate to a tenth of a millimeter. The exact sequence of this teaching process can be tracked in the app.

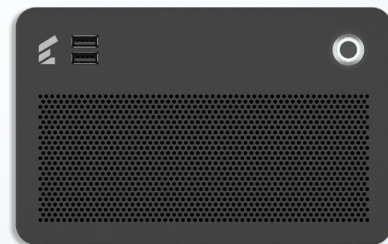
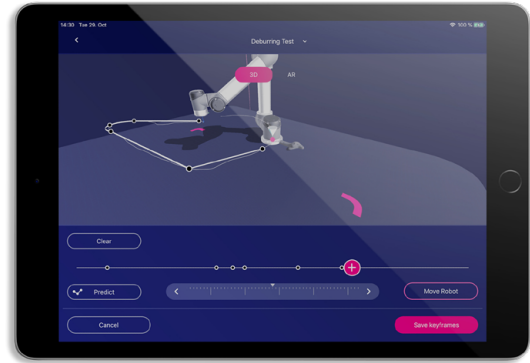
VARIABLE USE OF SKILLS

The skills taught to a robot for a specific task can be further processed and refined in the next step. Frequently used skills can be reused, modified and implemented in new skills with the help of the keyframe selector.

Finally, the code for the robot is generated in the programming language used. This process takes place within a few seconds and is fully automatic. The robot is then ready for its tasks. The generated code can also be edited manually at a later stage. This process is compatible with all conventional certification and simulation processes. The code can then also be transferred to other robots.

ROBOTICS FOR A WIDE RANGE OF SCENARIOS

With its innovative robot solution, Wandelbots opens up the possibility for a wide range of users to deploy the digital helpers to perform and optimize recurring processes, work in hard-to-reach places or even complicated motion paths. The programming system is compact and can be used flexibly in many environments. Kontron's industrial PC, which is a central element of the robot programming solution, contributes significantly to this flexibility.



SOFTWARE AND COMMUNICATION ARE ESSENTIAL

The core platform for the robot teaching solution is a customized industrial PC based on Kontron's KBox B-series. The entire programming software stack is based on this. The Dresden scientists had been in contact with Kontron experts in the field of industrial automation for quite some time. It was therefore obvious that a Kontron industrial PC was among the options tested during the development of the new robotics solution. Wandelbots felt it was important that the components for the system be robust and flexible, have sufficient communication interfaces, but also have special specifications such as WiFi functionality, and that firmware and BIOS updates could be performed easily. The provision of two additional Ethernet ports via the additional PCIe interfaces offered by the Kontron KBox and, last but not least, the modern and appealing design also influenced the decision in favor of the Kontron product.

After an extensive test phase with different industrial PCs, Wandelbots made the decision to use the customized KBox for the new robotics programming platform. "We had a clear idea of what the unit should offer," recalls Patrick Grosa. "The KBox met our expectations in full, and Kontron also implemented our requirements or wishes regarding some individual customizations without any problems. We were looking for a competent partner with many years of experience, especially with the industrial requirements that a system has to meet. We found this in Kontron. In addition, the partnership gives us planning security with regard to future evaluations. Also, the competence of the Kontron team has been very helpful to us during the entire test and implementation phase. The partnership has resulted in solutions that will enable us to reach a large number of users in different industries. We are only at the beginning of a development here," says the robotics specialist.

KBOX B-SERIES

Compact high-end industrial PC for demanding applications such as SCADA/ MES, artificial intelligence and machine learning

- ▶ High processing capability: up to 9th Gen Intel® Core™ i7/i5/i3 (Socket LGA1151, max. 65 W TDP)
- ▶ RAID functionality with up to four storage devices
- ▶ Two PCIe expansion slots for graphics, network cards or other PCIe cards
- ▶ WiFi functionality
- ▶ Low noise design
- ▶ Removable 2.5" SSD



▶ For more information about KBox B-Series please visit:
www.kontron.com/products/systems/embedded-box-pc/kbox-b-series

About Kontron – Member of the S&T Group

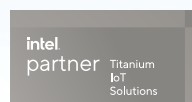
Kontron is a global leader in IoT/Embedded Computing Technology (ECT). As a part of technology group S&T, Kontron offers a combined portfolio of secure hardware, middleware and services for Internet of Things (IoT) and Industry 4.0 applications. With its standard products and tailor-made solutions based on highly reliable state-of-the-art embedded technologies, Kontron provides secure and innovative applications for a variety of industries. As a result, customers benefit from accelerated time-to-market, reduced total cost of ownership, product longevity and the best fully integrated applications overall.

For more information, please visit: www.kontron.com

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