Weidmüller

فرا اتصال رایان عصر

The easy way to Industrial IoT

„From Data to Value“



No self-purpose

The way to the Industrial IoT does not have to be complicated.

Whether access to valuable data is required or new, data-driven services are to be generated, we enable our customers to go from data to value, the easy way..

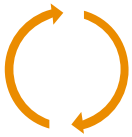
Our comprehensive and cutting-edge IIoT portfolio - „from data to value"– applies for both, greenfield and brownfield applications. We offer components and solutions from data acquisition, data pre-processing, data communication and data analysis.

One thing is clear: The Industrial IoT is not an end in itself. The added value is exploited in the specific use case, whether this is increasing the energy efficiency or deploying service technicians more efficiently thanks to remote maintenance. And last but not least, we enable our customers to develop new business models by using artificial intelligence.
Let's design the Industrial IoT together with and for the user: easily and efficiently.

Your benefits at a glance



Easy
Whether easy and fast retrofit of IoT solutions, open and webbased engineering or the building of machine learning models without any data science skills – discover the easy way to the Industrial IoT. „From Data to Value"



End-to-End
From „data to value": with our comprehensive and cutting-edge IIoT portfolio we enable our customers to go from sensor to cloud and beyond: data acquisition, data preprocessing and data communication form the infrastructure which the data analysis is based on.



Better positioned for the future
Flexibility and openness are key success factors in the Industrial IoT. We do not only focus on open platforms but also embrace existing and new partnerships with the clear target to position our customers as best as possible for the future.

Industrial IoT - an overview in 2 minutes

What does the Industrial IoT stand for? How is Weidmüller's position and concrete offering? And most important: what's in it for the customer? Watch the video with Dr. Thomas Bürger, Executive Vice President Automation Products & Solutions to find answers.

Industrial IoT – facts & figures

6%

of companies with 20 or more employees use AI technologies



Source: https://www.bitkom.org/Presse/Presseinformation/Startups-setzen-auf-Kuenstliche-Intelligenz

By **2025**, the number of installed IoT devices will be 5 times as high as in **2015**

14.41 bn.

75.44 bn.

Source: https://financesonline.com/iot-statistics/

1 Million **IoT devices** will

be **purchased** and **installed**

every hour in **2021**

1H

2021

Source: https://financesonline.com/iot-statistics/

Projected **growth rate** of IoT market

2017: $ 170 bn.
2022: $ 560 bn.

2017

2022

Source: https://financesonline.com/iot-statistics/



91%

of industrial companies invest in the development of **smart factories**

Source: https://alfapeople.com/me/smart-factory-industry-4-0-how-microsoft-technology-is-bringing-major-changes-to-manufacturing/

IoT use cases with the most investments

- Smart home
- Management of production facilities
- Freight monitoring
- Manufacturing operations

Source: https://financesonline.com/iot-statistics/

<1%

of **data** collected in factories is currently being evaluated and used

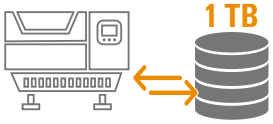
Source: https://alfapeople.com/me/smart-factory-industry-4-0-how-microsoft-technology-is-bringing-major-changes-to-manufacturing/

15.000.000.000.000

15 trillion

This is the total investment that companies will make in the IoT market by **2025**

Source: https://financesonline.com/iot-statistics/



1 TB of data is generated in an average factory today

Source: https://alfapeople.com/me/smart-factory-industry-4-0-how-microsoft-technology-is-bringing-major-changes-to-manufacturing/



Scan me!

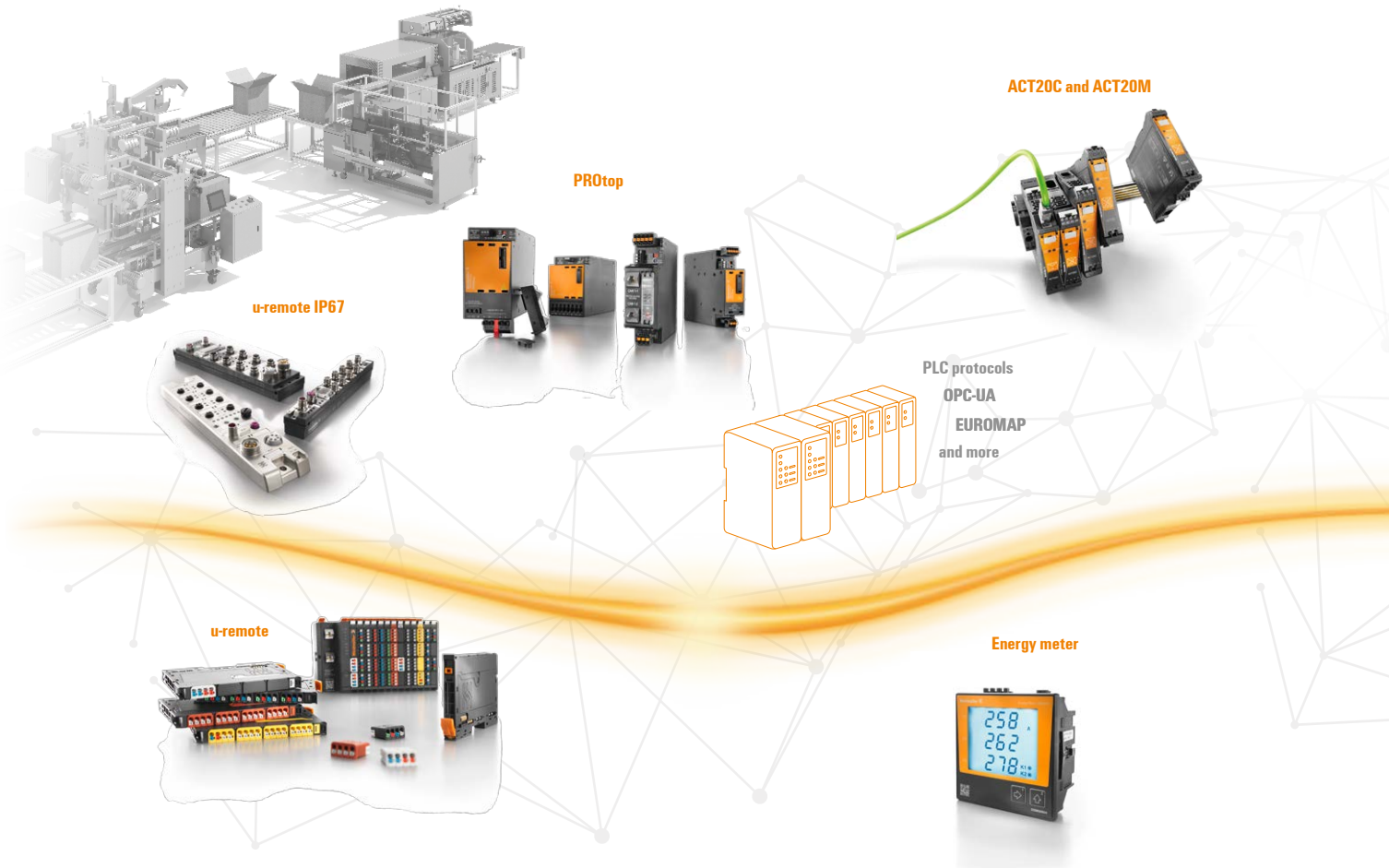
Create the basis for digital value-added services

Extensive portfolio for data acquisition and pre-processing

Acquire data reliably

Gain access to valuable data and information in greenfield and brownfield applications

- Digital data acquisition via interfaces to many controllers and machines
- Acquisition of sensor data with the I/O system u-remote (IP20 and IP67)
- Provision of energy data and process information via Energy Meter or PROtop power supplies
- Acquisition and replication of analogue signals using analogue signal converters



Pre-process data locally with IoT Edge technology

Reduce data flows and costs,
while generating initial insights on the spot

- Uniform web-based engineering for pre-processing and visualisation
- Data acquisition and pre-processing with u-control web with IoT functionality (optional real-time data processing)
- IoT Gateway for Industrial IoT solutions with mobile interfaces
- High performance integrated into compact IPCs with Intel® Core™ i3, i5 and i7 processors



Transfer and analyse data to create added value

Take advantage of our IT communication infrastructure and software solutions for maximum added value

Transport data reliably via network infrastructure

Provide the IT systems with valuable information from the plant

- Cross-network communication at the highest security level with the security routers
- Efficient networking of a wide range of network participants with managed and unmanaged Switches
- Establishment of wireless network connections for mobile end devices via Industrial WLAN

WLAN access point

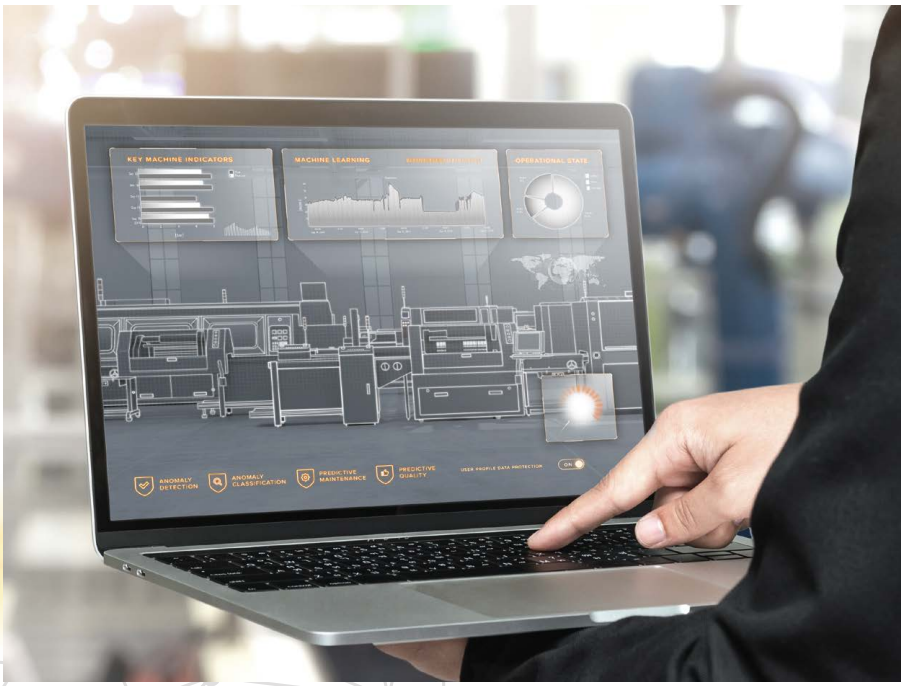


Managed and unmanaged switches



IoT Gateway with mobile communications





Security router



Creating added value through data analysis

Achieve concrete added value in your use case with data-driven, digital services

- Individual, platform-independent services for your specific application with the cloud platforms
- Consolidation and analysis of your resource and energy usage through optimal resource management
- Generate maximum added value from data based on artificial intelligence using Industrial Analytics
- Fast, worldwide service without the need of in-depth IT knowledge with the Remote Access u-link

Control

for small and medium automation tasks

Local standalone controllers, such as the u-control web, can perform their control tasks independently and without additional devices. They offer benefits compared to central solutions in a wide range of applications: They reduce system-wide data traffic, are resistant to interferences within the network, make troubleshooting easier and are very well suited to being combined with manual processes. u-control web is an open web-based controller and simplifies the programming process for standalone applications. It integrates real-time automation and communication for the Internet of Things and thus forms the ideal interface between the previously separate worlds of Information Technology (IT) and Operational Technology (OT).

The controller's web connection means that machines can be accessed from anywhere, with any end device and regardless of the operating system. This independence is achieved by transferring the software from the PC to the controller and by using open web technologies. With HTML5, CSS3 and JavaScript, every system can be monitored and programmed regardless of their operating system. With the u-control web controller, the web server is already installed along with the u-create web software, which integrates various software modules such as the PLC development environment, the Node-RED development software and an OPC UA server. Due to the software integrated on the hardware, i.e. the controller, no additional computer is required, only a display with web browser. Likewise, the user does not require any additional development tools or maintenance contracts. This results in permanent cost savings.

Web-based engineering and visualisation

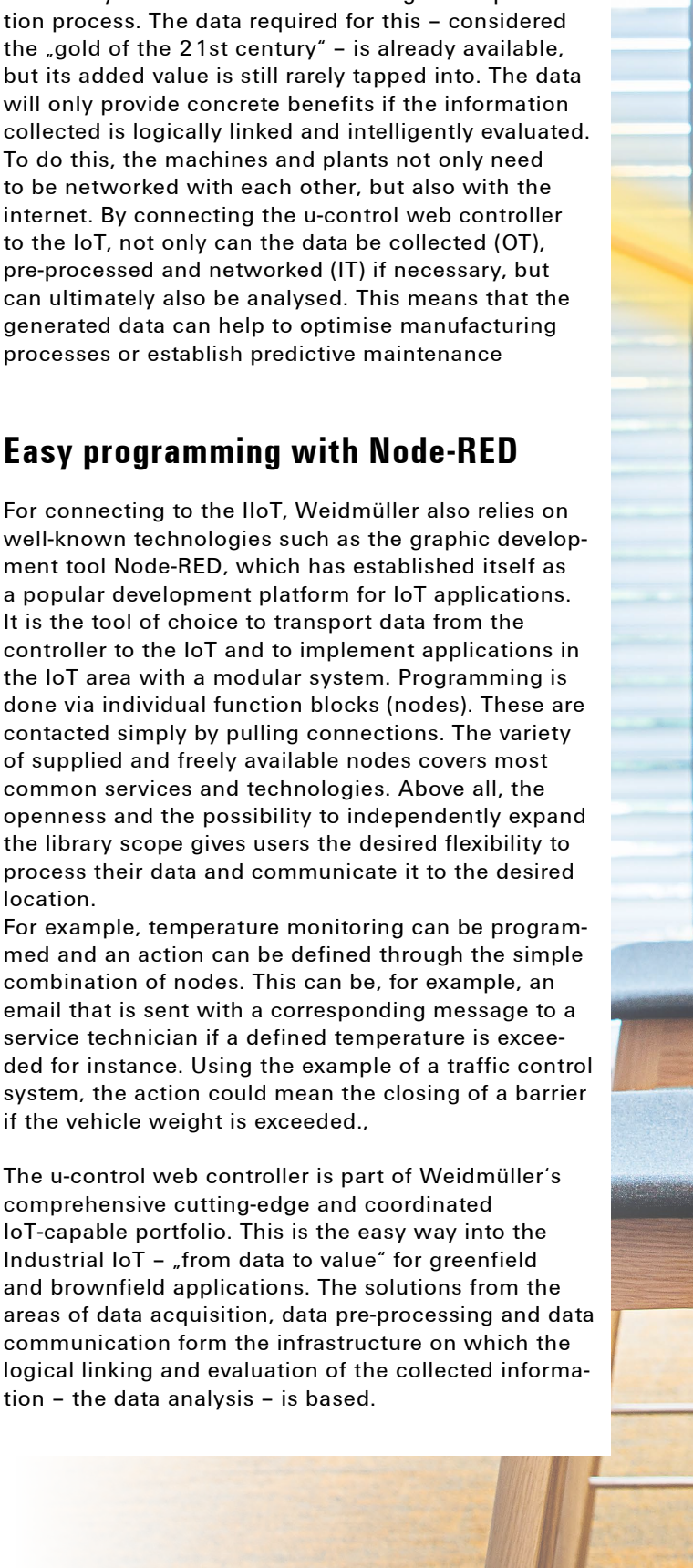
The integrated, web-based engineering software for configuration, system parameterisation and programming is based on IEC 61131-3, the worldwide standard for programming languages for programmable logic controllers. The structures and commands are familiar within the automation technology community and can be used immediately. These open standards are being pushed further by users and are therefore developing at a fast pace. So why not move away from proprietary standards and simply from and with these communities make machine programming increasingly intelligent? Programming, including web-based visualisation and operation, is particularly easy and efficient with u-control web. But today this is no longer enough.

Whereas in the past, the primary concern was to ensure that the plant functioned and produced, today quite different aspects play an essential role: and the focus is more upon increasing the efficiency of all processes. This not only includes production, but also areas such as planning, maintenance and process optimisation. In addition, it is becoming increasingly important to design your production processes flexibly in order to be able to produce on a customer-specific basis, with a batch size of one, while covering costs. This requires data analysis and constant monitoring of the production process. The data required for this – considered the „gold of the 21st century" – is already available, but its added value is still rarely tapped into. The data will only provide concrete benefits if the information collected is logically linked and intelligently evaluated. To do this, the machines and plants not only need to be networked with each other, but also with the internet. By connecting the u-control web controller to the IoT, not only can the data be collected (OT), pre-processed and networked (IT) if necessary, but can ultimately also be analysed. This means that the generated data can help to optimise manufacturing processes or establish predictive maintenance

Easy programming with Node-RED

For connecting to the IIoT, Weidmüller also relies on well-known technologies such as the graphic development tool Node-RED, which has established itself as a popular development platform for IoT applications. It is the tool of choice to transport data from the controller to the IoT and to implement applications in the IoT area with a modular system. Programming is done via individual function blocks (nodes). These are contacted simply by pulling connections. The variety of supplied and freely available nodes covers most common services and technologies. Above all, the openness and the possibility to independently expand the library scope gives users the desired flexibility to process their data and communicate it to the desired location.
For example, temperature monitoring can be programmed and an action can be defined through the simple combination of nodes. This can be, for example, an email that is sent with a corresponding message to a service technician if a defined temperature is exceeded for instance. Using the example of a traffic control system, the action could mean the closing of a barrier if the vehicle weight is exceeded.,

The u-control web controller is part of Weidmüller's comprehensive cutting-edge and coordinated IoT-capable portfolio. This is the easy way into the Industrial IoT – „from data to value" for greenfield and brownfield applications. The solutions from the areas of data acquisition, data pre-processing and data communication form the infrastructure on which the logical linking and evaluation of the collected information – the data analysis – is based.



One thing is clear: digitalisation is not an end in itself. The added value is exploited in the specific use case, whether this is ensuring availability with condition monitoring or deploying service technicians more efficiently thanks to remote maintenance. And last but not least, developing new business models through the use of artificial intelligence without having to be a data scientist – Weidmüller designs the digital transformation together with and for the user: it's simple and efficient.



The easy way to
Automated Machine Learning

For some years now, the visions of engineers and plant manufacturers have been inspired by the possibilities of artificial intelligence (AI). The collection and refinement of data enable increased efficiency and productivity; made possible by machine learning algorithms. What might sound very deep-tech at first, offers concrete advantages for the smart industry. Machinery and plants as well as production processes continuously generate data. Companies that are able to generate added value from this data will be successful in the future. Above all, added value can be achieved in the area of data analysis, such as in predictive maintenance. Simply put, the machine automatically signals when a spare part is likely to be needed. This means that in future, machine manufacturers will be able to offer new data-driven services and thus establish new business models. Manufacturing companies can increase their product quality and reduce their costs.

Weidmüller's concept involves the simple use of AI by means of Automated Machine Learning software for machinery and plant engineering. For this purpose, Weidmüller has standardised and simplified the use of ML for industrial applications to such an extent that domain experts without specialist knowledge of data science can generate ML solutions themselves. The software tool guides the user through the process of model development, which is why Weidmüller also refers to this as „guided analytics". Machine and process experts can easily create, modify and execute ML models without the support of data scientists, in order to reduce downtime and errors, optimise maintenance activities and improve product quality. The software helps with translating and archiving the complex application knowledge into a reliable machine learning application. The experts focus on their knowledge of machine and process behaviour and link this to the ML steps running in the background.

Automated Machine Learning can be applied in many areas, from the detection of anomalies and their classification through to error prediction. However, to detect anomalies and make forecasts on this basis, e.g. for predictive maintenance, the data needs to be collected and correlated. There is usually a sufficient volume of process-relevant data for machinery and plants. In order to obtain the added value from this data, it is analysed using machine learning methods and appropriate models are developed.

Simply guided through the softwaret

The software essentially provides two modules for the user. With the model builder, the domain experts can create ML solutions for anomaly detection, classification and error prediction. The application experts' knowledge is decisive here, since they have the experience of knowing what the regular or abnormal behaviour of their machinery and plants looks like. They can immediately recognise deviations from „normal" behaviour in the clear illustration of the data. They can detect and classify these deviations, and thus define them for creating the model.

The data set enriched with the application knowledge is the input variable for the subsequent automatic generation of the ML models. This results in ML solutions that are fully comparable with the solutions created manually by data scientists. Several models are proposed to the user that are based on different algorithms and value parameters. At the end of the model creation process, the user selects the most suitable model for the application according to certain criteria like model quality, execution time and any preferred parameters. The selected model can be exported and transferred to the execution environment. In the second module of the AutoML software, the models are finally executed on the machine – on-premise or cloud-based – in the runtime environment.

Crucial added value

The possibilities of machine learning are increasing with the ever-widening spectrum. This does not necessarily make it easier to achieve the best possible creation, implementation and operational application of ML without specific knowledge of data science. In other words: the creation of ML models is usually time-consuming and costly to implement. With the classical approach to the introduction of ML, various technical feasibility studies known as Proof of Concepts (PoCs) are conducted to find suitable ML use cases. Here, the results that can be achieved with ML are validated by machine experts and their economic efficiency is checked. ML automation with the Weidmüller Industrial AutoML Tool saves a great deal of time for the creation and comparison of models and results, and it shortens the time to market. The tasks can be implemented much more efficiently, which in turn saves valuable resources. At the same time, the user also benefits from the latest developments in the machine learning environment, which are continuously being incorporated into the tool. The Weidmüller Industrial AutoML Tool provides one decisive advantage above all else, however: Data analysis – which usually has to be carried out by a data scientist from an external partner or from within the company – is performed by the tool and is „simply" fed with the application experts' knowledge. This means that their knowledge about the machine and its use is fed directly into the modelling process. The symbiosis of technical expertise on the machine and data science knowledge, which is provided by the machine, delivers results quickly and easily. No need for extensive training. No need to purchase further expertise. In just one hour, a model can

be set up which then automatically detects anomalies. It couldn't be simpler.

Solutions for selected applications

Does one single solution really exist that suits all applications and automatically delivers the desired results? Absolutely not, we need to take a more differentiated view here.

Even though the work centres around time series-based data and common ML algorithms, the key to success lies in the targeted customisation of the ML automation by gradually reducing the search space. The wider the scope of application, the more general the design of the ML pipelines needs to be. This requires a balancing act to be able to cover as many applications as possible, yet be specific enough to achieve sufficient model quality, all the while with finite computing resources. It is obvious that monitoring a cooling system based on control data requires a different approach to monitoring a bearing using vibration data. The best results are achieved if the ML automations can be tailored to a process that is as specific as possible without becoming too compartmentalised.

If, for example, specific ML solutions are set up for storage and retrieval systems that are commonly used in intra-logistics, excellent results can be achieved according to the data that is available. Also, for clusters like pumps, compressors and blowers, the advantages of specific ML solutions are obvious. The full benefits of the automated creation of ML solutions are reaped here, from the avoidance of possible individual errors in the manual approach to the time savings achieved.

This shows that such application-specific solutions deliver excellent results, especially when best practice experience is incorporated. In addition, the user can understand the results of the algorithm very well. It is not simply a black box that spits out seemingly arbitrary results. Since it is easy to understand, the user is able to further optimise the models and thus the results over time through the input, for example by refining feature engineering or adding new annotations that represent time ranges of particular relevance in the sensor data, and can make them available for future model training in a targeted manner.

Machine Learning Models

easily create, operate and optimize

With Weidmüller Industrial AutoML you can optimize operations, increase product quality and create new business models by taking advantage of advanced analytics. As a machine or process expert you can easily build, deploy and operate machine learning models without needing any data science skills. The AutoML tool empowers you to transfer your data and domain knowledge into ML models that generate value for your business. Models can be deployed in existing manufacturing environments to put real time analytics and insights at the fingertips of production workers and stakeholders across your organization.

Industrial AutoML - Your benefits at a glance

Accelerate innovation
Benefit from advanced analytics while using your existing machine data and domain knowledge. No extra training required. Build your own machine learning models within minutes.

End-to-End solution
Create, deploy - on-premise or in the cloud - and operate machine learning models. You can continuously improve model performance easily by retraining models as you gain more insights and collect more data from machines and processes.

Build customer relationships and new models business
Increase customer satisfaction with improved products and services, and achieve a better understanding of your customer's needs and behavior powered by machine learning technology developed by you.

Benefit from machine learning without data science skills

Watch our 2-minute animation for a compact overview of the Weidmüller Industrial AutoML solution including its key benefits and an explanation on how it works..



Scan me!

Industrial AutoML in use



Scan me!

Scan me!



» We were fascinated by the solution, as we have a lot of process engineers who are very familiar with the machines and who are, to a certain extent, able to interpret the data. With Weidmüller's help, we can now transfer this knowledge to an algorithm. «

Matthias Heinrich, Manager Digital Solutions, GEA

Weidmüller – Your partner in Industrial Connectivity

As experienced experts we support our customers and partners around the world with products, solutions and services in the industrial environment of power, signal and data. We are at home in their industries and markets and know the technological challenges of tomorrow. We are therefore continuously developing innovative, sustainable and useful solutions for their individual needs. Together we set standards in Industrial Connectivity.

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