INDUSTRIAL VOICE CONTROL

VERSION 2020|1

VOICE CONTROL FOR THE INDUSTRY

spectra
Industrie-PC & Automation

VOICE CONTROL FOR THE INDUSTRY

FUTURE-ORIENTED TECHNOLOGY

Currently, every second user wants to lead manlike-dialogs with electronic devices via smart voice assistants . And when do you talk to your machine?

Voice control gives the human-machine interface a new dimension and can play out its advantages in all applications in which, for example, a third hand is required. It is also very helpful for the parallelization of manual work or control processes with logging tasks. Especially in applications where functions have to be selected from a large number of process parameters or have to be accessed quickly or even in real time and where there is a need for complex information and assistance, voice control helps to work more efficiently. Due to progress in speech recognition, speech control can now also be used in environments such as industrial halls.

With our solutions, voice capture and processing are done locally, not in the cloud. The definition of the vocabulary on a certain application domain allows an optimization of the recognition accuracy, a fast sense capture as well as a high reliability with little effort.

VARIOUS APPLICATIONS

> Supplementing HMIs with voice control
> Control of machines and plants
> Natural collaboration with robots
> Self-explanatory operating concepts

SPECTRA & VOICE INTER CONNECT

We see "voice control for industry" as an important innovation topic - that's why we have entered into a strategic partnership with voice inter connect (VIC). VIC has been working in the field of communication since 2001. Approximately 30 specialists in the fields of electrical engineering, acoustics, computer science and physics develop solutions at VIC for intercom and voice control applications.

Spectra has been known for over 35 years as a supplier of products and solutions in the fields of industrial PCs and automation and serves many customers from the device industry, Mechanical and plant engineering.

Together we carry the topic of "voice control for industry" forward.

BENEFITS OF VOICE CONTROL

HANDS-FREE

In situations where the user needs his hands for other activities and cannot use them for machine operation, voice control offers a clear advantage. This is also referred to as the "third hand".
Even if the user is not allowed to operate the HMI via touch for reasons of hygiene or if the operation of a touch panel is not possible due to special gloves, voice control can help.
Applications: Logistics, assembly, machine assembly, medicine, chemistry, pharmacy, ...

WITHOUT VISUAL FEEDBACK

Applications in which it is not possible for an employee to keep a permanent eye on the display benefit from voice control. This enables operation without visual feedback, because operator guidance and output of status messages are also possible acoustically, e.g. via operating tones and voice output.
Applications: Logistics, setting up a machine, assembly, evaluation...

PARALLEL

Voice operation is an excellent supplement to existing manual operating concepts, as it allows several functions to be operated in parallel.
It is also suitable for the process-accompanying documentation of service or maintenance measures in which the process is documented by dictation and the data is recorded by a protocol assistant and is converted to a text protocol.
Applications: Control of an additional function, interaction with a collaborating robot, Documentation of measures

EFFICIENT

By combining voice control with manual operation, more powerful and efficient user interfaces can be created. For example, the operator can call functions that are not visible on the screen at first. However, the screen content adapts to the dialog. And the output can be made by screen or speech as required.
Applications: Vending/ticket machines, point-of-information, point-of-sales

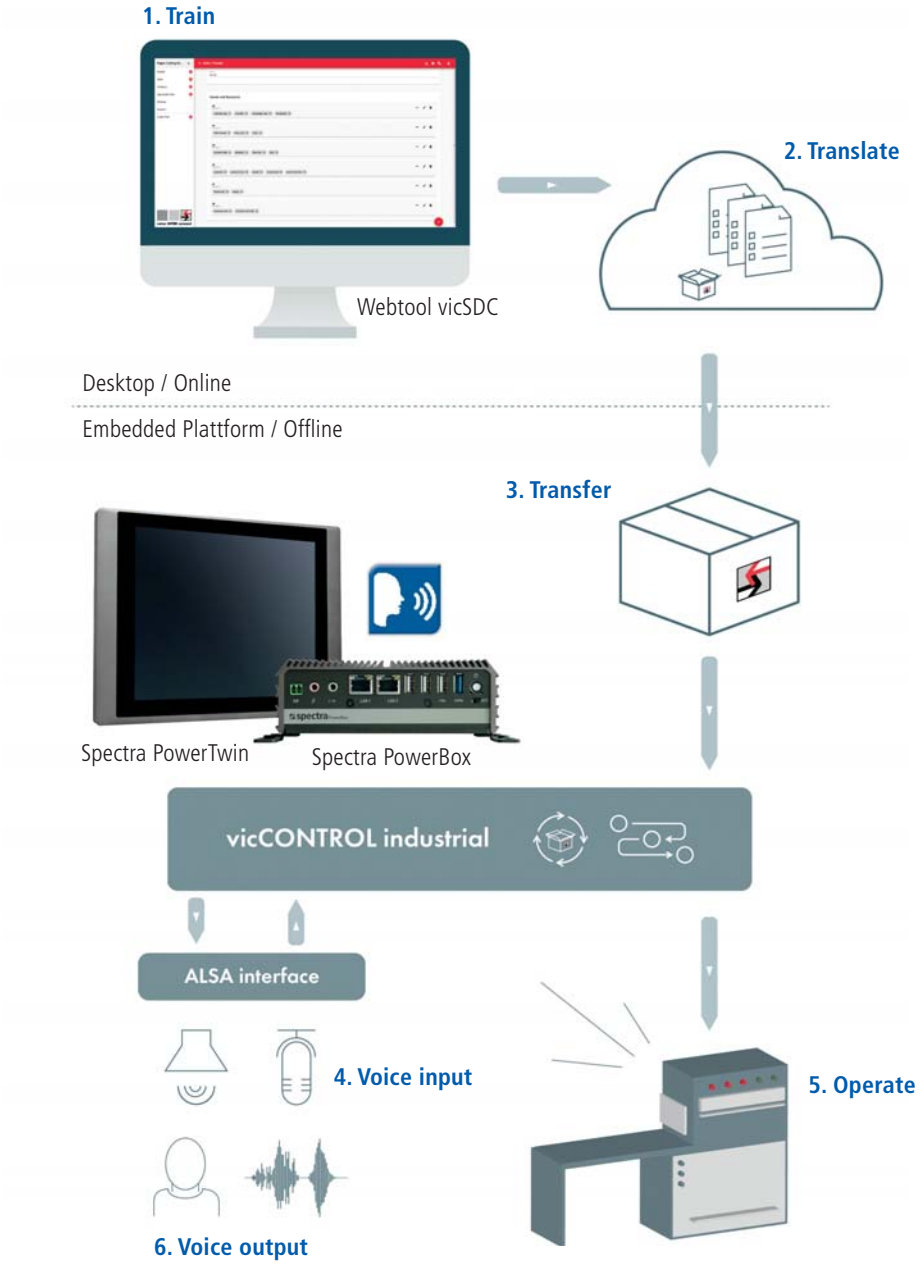
COMBINING

Voice input allows the combination of several commands/parameters with one input.
The user can save time by completing all necessary settings with one voice command.
and is not dependent on a complex menu guidance on the screen.
This saves time - especially in routine tasks and complex operating sequences or in cases where frequent retooling is necessary.
Applications: Setting up a machine, setting up a plant, assistance systems, service

EMBEDDED VOICE CONTROL

With the Spectra PowerBox PC or Spectra PowerTwin Panel PC and the included vicCONTROL speech dialog system, we offer a local speech control that allows the user a very flexible way of speech input. Several keywords (Intents, Slots) and parameters (Values) can be embedded in any phrases - without limiting the order of keywords and the structure of commands (Natural Language Understanding - NLU).

A semantic evaluation interprets the language input and determines the task to be performed and the parameters to be controlled. The universal IoT protocol MQTT enables reliable coupling and independent spatial distribution of voice operation and machine control in the local IP network. The availability in 30 languages means that it can be used worldwide.



BUILDING A VOICE APPLICATION

1. Train

The speech dialog is created in the web-based development tool vicSDC. First the desired national language is defined and an activation word is selected. Examples are defined for the definition of control tasks (intents) and their value assignment (slots) and the keywords and slots are marked manually.

2. Translate

The created project is compiled using AI-based methods, checked for errors and saved in a resource package. The compilation process adds variations of the natural language.

3. Transfer

The resource package is transferred to the Spectra PowerBox PC or the Spectra PowerTwin Panel PC. There it forms the basis for the customer-specific voice application.

4. Voice input

The operator has the possibility to use the learned commands in his natural language. Keywords are used to activate the speech dialog only when required.
As soon as the speech recognizer recognizes a command via the microphone, it is processed further.

5. Operate

The voice commands are linked to an MQTT command, which is either processed locally by the machine controller or transmitted to the machine via an existing Ethernet interface.

6. Voice output

As soon as an MQTT event comes back from the machine, this event can trigger functions in the voice dialog. The stored voice output texts are output via the loudspeaker and serve the operator, for example, as confirmation, answer or information on the machine status.

ALL-IN-ONE SOLUTION FOR YOUR APPLICATION

When delivered, the Spectra PowerBox 100-IVC Set is equipped with the voice recognition software vicControl industrial and a headset.
The web-based development tool vicSDC, whose license has to be purchased once, enables the user of vicCONTROL to independently create or expand his speech dialogs during the design phase by entering examples and marking intents, slots and values.
A customer-specific voice control consists of the application-independent, generic vicCONTROL voice dialog application and application-specific voice resources (voice vocabulary with intents, slots, and values, voice output, and control interface to the target application), which are created by the user during this design phase.

SPECTRA POWERBOX 100-IVC SET

FEATURES

- Extremely small, fanless, industrial voice control system
- Robust and attractive industrial design
- Pre-installed speech recognition software vicCONTROL industrial
- Headset included
- MQTT output via RJ45
- Optional:
  Developer license for VicSDC WebTool (required only once)

COMMUNICATION VIA TCP/IP

Communication between voice control and MQTT-enabled device is done via TCP/IP.
Using the MQTT protocol, voice commands in JSON format are sent to the MQTT broker.
The MQTT broker required to distribute the MQTT messages is pre-installed on the Spectra PowerBox100-IVC.
Your MQTT-enabled device subscribes the MQTT voice control messages from the MQTT broker.

VOICE CONTROL ENABLED HARDWARE

The easiest entry into voice control is a Panel PC or Mini PC that is prepared for voice control.
The hardware has an integrated microphone and a loudspeaker or is prepared for their connection. The operating system, Windows 10 IoT or Linux, contains the necessary drivers and the speech processing software is already pre-installed. In addition, the online design tool vicSDC makes it possible to create a customer-specific speech dialog quickly and easily. More than 30 languages are available.

VOICE CONTROL APPLICATION

The "ideal solution" is a newly developed operating concept that combines the functions of your existing operating concept with the advantages of voice control. This approach provides you with a solution tailored to your application.
The voice INTER connect team supports our customers with expert knowledge and many years of project experience in these mostly complex tasks, which result from process integration and the consideration of demanding application scenarios. By selecting the appropriate vicCONTROL product and the tailored process adaptations, an optimal rationalization with a robust complete solution is achieved.

ORDERING INFORMATION

N° 158453 Spectra PowerBox 100-IVC Set
Mini-PC with pre-installed voice recognition software vicControl industrial, incl. Headset

N° 159296 Spectra PowerBox 100-IVC Development licence
Voice Control WebTool vicSDC licence

FAQ ABOUT VOICE CONTROL

1. Which areas are suitable for voice control and which areas are not?

- Applications where a "third hand" is required
- Areas in which manual work processes and control or logging tasks must be parallelized
- When functions must be selected from a large number of process parameters or must be accessed quickly or even in real time
- For complex information and assistance needs, e.g. search in manuals or information archives
- Rather unsuitable for simple operating functions (knob) or interactive control tasks (dimmer)

2. Is speech recognition also suitable for use in noisy environments?

There is an optional additional module that separates the speech from the background noise and makes it available for further processing.

4. What does the Machinery Directive say about voice control?

As soon as safety-relevant functions are involved, special approvals are required. These are certainly feasible in the case of a project, but are time-consuming and expensive. Therefore we focus primarily on the accompanying functions of an application. Voice control should not be a replacement for existing functions, but a helpful supplement that makes operation more ergonomic and efficient. This leads to a higher user satisfaction, reduces the frequency of errors through interaction and thus increases productivity.

5. How many languages does the system "speak" and does it support multiple languages simultaneously without language switching?

Currently there are about 30 languages available for voice control. In the configuration of each individual application, it is defined which contents should be contained in which languages. Since the final application functions offline, without Internet connection as an embedded solution, a reduction of the languages makes sense not only because of the maintenance effort, but also because of the data volume.

6. Does the software also understand dialects like Bavarian and Swabian?

The speech recognition software is so intelligent that it also understands colloquial speech and other deviations (dialects) to a certain degree. As soon as there are other terms, they would only have to be "trained" in addition to the software.

7. Is there a clear semantics to be observed or does the software recognize the meaning of a spoken sentence?

The operator does not have to adhere to a given semantics, as is usual with car radios, but can speak in normal colloquial sentences. The software even recognizes several commands and variables in one sentence.

8. What exactly does the teaching process look like?

For teaching there is the online tool vicSDC of our partner voice INTER connect, in which the user can enter the desired keywords (variables) and their characteristics (values) and select the languages. After configuration, the result is saved as a project and transferred to the embedded system, where it is version-safe and ready for offline operation.

9. With which controls/HMI tools does speech recognition work?

The voice control has a serial control protocol. Alternatively, the MQTT protocol is supported. An OPC UA interface is in preparation.

10. Is a typical Bluetooth/telephone headset sufficient for voice input?

Theoretically yes, the requirements to the microphone and the loudspeakers are besides the environmental conditions only the suitable drivers. We offer solutions in which the microphone and loudspeakers are already installed, but we also make recommendations for microphones and loudspeakers.

11. Which system requirements are necessary?

Besides the microphone, the loudspeakers and a high-quality sound card, the hardware requirements regarding performance are not high. On our own panel PC (Spectra PowerTwin) and embedded systems (Spectra PowerBox) we offer a Linux operating system with pre-installed voice control. The installation of voice control on existing systems is currently only planned for project developments.

COMPARISON OF USER INTERFACES

If you have already dealt with the topic of voice control, then you have probably wondered where the advantages and disadvantages of voice control over other user interfaces lie. When considering this, it is important to ensure that voice control does not compete with other user interfaces, but represents an ideal extension and adds another dimension of interaction to the overall operation.

	Microphone / Speaker	Touch / Screen	Camera / VR-Display	Switch / Display
User Interface	Voice User Interface (VUI)	Natural User Interface (NUI) Graphical User Interface (GUI)	Perceptular User Interface (PUI)	Text User Interface (TUI)
Sensory organ	speaking / hearing	touch / sight	move / sight	touch / sight
Multi Language	yes	yes	yes	no
Mobile useable	yes	limited	yes	limited
Scope	voll	limited	limited	limited
Expandable	yes	conditional	yes	conditional

COMPARISON OF LANGUAGE ASSISTANTS

You may already have dealt with other, non-industrial language assistants and gained initial experience. The following table gives you a quick overview of the most important differences in how the different language assistants work and how they can be used.

	vicCONTROL	Alexa	Google Assistant	Siri
Availability	worldwide, since embedded	in a few countries	Play Store / App Store	pre-installed
Hardware	flexible (x86/RISC)	fixed	-	fixed
Internet	not necessary	necessary	necessary	necessary
Permanent ready	yes (also without Internet)	yes	yes	yes
Operating system	Linux / Windows	-	-	macOS
Noisy environment	yes, optional (Expansion module)	yes	yes	yes
Learnable	yes	-	-	-
Restrictable	yes	no	no	no
Multi-user	yes, optional	conditional	conditional	Fixed system: independant, Amazon, Android, macOS, iOS

powered by individuality

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