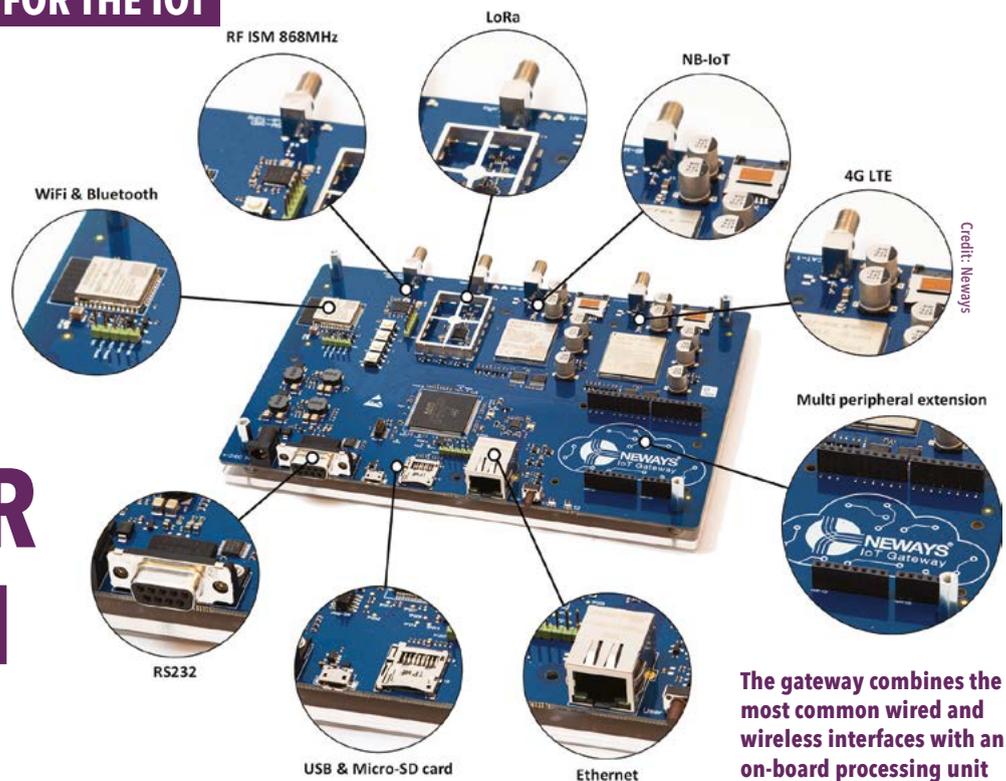# PAVING NEW WAYS FOR NEXT-GEN IOT

Credit: Neways

The gateway combines the most common wired and wireless interfaces with an on-board processing unit and expansion possibilities.

In the last decade, a wide variety of Internet-of-Things technologies and applications has emerged, producing an ever-increasing stream of data. Neways is chipping in to create common IoT ground and control the floodgates.

Nieke Roos

According to a recent study by Juniper Research, the global number of industrial connections to the Internet of Things will increase from 17.7 billion in 2020 to 36.8 billion in 2025. Smart manufacturing is identified as a key growth factor. As many of these industrial IoT systems use their own platforms, interoperability already is an issue, and with the ever-expanding network, it will only become a bigger challenge. There's no global reference standard and none is foreseen soon.

Recognizing the need for an integrated approach, Neways Electronics International participated in the European Inter-IoT project, which ran from 2016 to 2019. This has resulted in a framework enabling interoperability among different IoT platforms, including a gateway for device-level support. Neways has taken it upon itself to further develop and market the hardware and software for this gateway, as part of an interoperable IoT platform. In parallel, it has embarked on a new European initiative, Assist-IoT. In November, this project has started work on a novel architectural approach for the next-generation IoT.
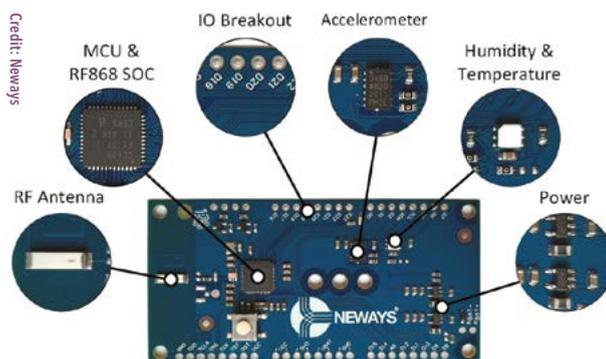
Building blocks

Continuously expanding its IoT capabilities, Neways has developed its IoT gateway to serve both as a technology showcase and as a prototyping platform with which it can quickly react to customer wishes. The gateway implements the most common wired and wireless interfaces. These are combined with an on-board processing unit and expansion possibilities. "At the moment, Ethernet, 868 MHz RF and Lora are supported," says Dennis Engbers, team leader and senior software engineer at Neways in Enschede. "Work is ongoing to expand this with interfaces such as Bluetooth, 4G LTE, NB-IoT and Wi-Fi."

The gateway stack is protocol agnostic, Engbers points out. "The stack abstracts away from the sensor and actuator protocols. At one end, it has a strict interface that the IoT devices need to implement and at the other, it has an interface to implement for connection to the middleware running in the cloud."

As an electronics, embedded software and firmware developer, Neways

The generic sensor/actuator board serves as the basis for a motion sensor using a 3-axis accelerometer and an ultrasonic distance sensor.
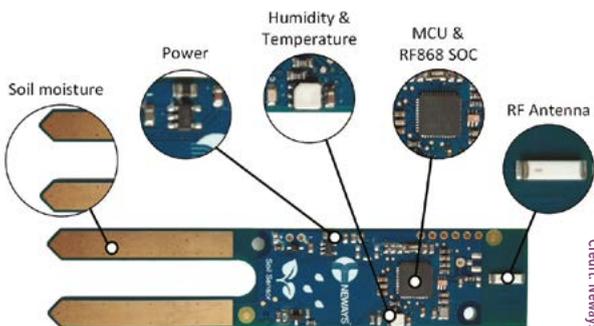

Credit: Neways

focuses on the IoT device layer, from the sensors and actuators up to and including the gateway. For this, it's providing the building blocks ready for use in customer projects. "Think of such a building block as a board schematic and layout, plus the software drivers and the gateway stack," clarifies Engbers. "For demonstration purposes, we've programmed our own Java middleware on top of this, but that's not our core business. For commercial applications, we have specialist partners providing the layers from the middleware upwards."

Smart office

As part of Inter-IoT, Neways has built a smart office demonstrator, incorporating the gateway prototype. It showcases how multiple IoT technologies work together using the framework developed in the project. "The demonstrator features a touchscreen with a card reader where flex workers can sign in and reserve a desk," illustrates Engbers. "The desk chairs contain motion sensors to monitor their ergonomic use. Level sensors in the trash cans indicate when they need to be emptied. We also measure the room temperature and humidity and the soil moisture of the office plants. All this data is combined and displayed in a dashboard."

For this demonstrator, Neways developed a soil sensor, a generic sensor/actuator board and a shield board. The latter interfaces with a single-board computer acting as a device gateway. The sensor/actuator board serves as the basis for a motion sensor using a 3-axis accelerometer and an ultrasonic distance sensor.

The original demonstrator includes multiple gateways to capture the data

Credit: Neways

The smart office demonstrator showcases how different IoT technologies can be made to work together.

For the smart office demonstrator, Neways also developed a sensor to measure the soil moisture of plants.

Credit: Neways

and relay it to the dashboard. They each run a different IoT solution, but they talk to the same Inter-IoT middleware through Inter-IoT APIs. A new demonstrator is currently in development that uses a single gateway to connect to all sensors and actuators and send their outputs to the middleware in the cloud.

Neways' IoT gateway – acknowledged by the European Commission's Innovation Radar as "market ready with a high potential of market creation with the innovation" – has also found its way to a first customer project. Here, Lora sensors are used to monitor the water quality in remote areas, which are frequently out of operators' sight. Multiple gateway devices collect the measurement data and send it to the customer's dashboard. The Lora functionality developed in this project has been incorporated as a building block in the gateway offering.

Decentralized approach

With its membership of the Assist-IoT consortium, which kicked off on 12 November and will run for three years, Neways is further expanding its IoT expertise. Engbers, explaining his company's involvement: "IoT devices are now flooding the internet with data. They just pump everything into the cloud for analysis – without closer inspection. Assist-IoT is going to look at ways to make smarter decisions already at the edge, using machine learning and other artificial intelligence techniques to filter the data before it's being sent over the network. Local analysis is faster because you don't have to go to the cloud and back, and it saves bandwidth and cloud storage because you're sending a lot less data."

Assist-IoT will run three pilots. "In the Malta Freeport terminal, we aim to automate container logistics, using a decentralized edge approach and looking at the automated alignment of cargo-handling equipment, yard fleet assets location, augmented reality and tactile internet HMIs for fleet yard drivers and remote equipment control," details Engbers. "With Ford, we're going to dive into decentralized powertrain and vehicle condition monitoring. And on Polish construction sites, we're looking to make the workplace safer and healthier by using smart IoT devices to control access to restricted zones, monitor the workers' health parameters and identify suspicious and undesirable behavior."

Although the project has just taken off, Neways already sees several applications for its results. "Take equipment manufacturers," Engbers names a promising one. "They're collecting loads and loads of data from their machines, sending everything over the internet for the purpose of health monitoring and preventive and predictive maintenance. By doing more at the edge, we can make these processes more efficient." ⏻