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endrich NEWS

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Wish
you
a
Merry
Christmas

✦ & ✦

HAPPY NEW YEAR

Thank you very much for your trust and we look forward to continue our good cooperation!

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REVIEW OF ELECTRONICA 2022 IN MUNICH



For endrich the electronica 2022 trade show was a very positive experience. In view of interrupted supply chains, rising energy prices, inflation, war and climate change, it was important to finally meet again our customers and suppliers. After four years it was time to directly see new technology trends and to exchange ideas in person again. We saw great interest from the customers for our presentation of newly customized projects like an e-paper room thermostat as well as room control units, a charging station for e-cars with a large touch display.

Our visitors were also very interested in the Endrich Smart-Board, which is the latest board in the Endrich IoT family. With this central WLAN-LPWA gateway, sensors can now be connected wirelessly via the Sub Gigahertz module from Neocortec (868 MHz). The sensors can be networked via the Neo-Mesh network. The mesh property means that there does not have to be a direct connection from each sensor to the gateway, as only the connection between the "smart sensors" is possible. Thus, the range between sensors and gateway can be significantly increased. Via the LTE-M/NB-IoT module from Fibocom

(MA510), which is also located on the Endrich smart board, all data from the sensor modules is collected and sent to the Endrich cloud. For more details, see the following article "e-IoT in practice".

Another highlight at the electronica was the topic of wireless radio communication. „Smart devices" or so called "connected devices" can actually be found in all market segments. In the areas of Smart Industry and Smart Building, the latest Bluetooth and WiFi modules from Panasonic Industry Europe PAN1770 and PAN1781, as well as from our new manufacturer Feasycom, including the 5.4x5.8 mm small FSC-BT690, could be examined. In addition to Bluetooth and WiFi, the radio technologies LTE-M/NB-IoT and LTE-CAT1bis were in demand. Here, the current modules of the world's second largest supplier Fibocom were on display. The portfolio was complemented by antennas, and we had very interesting discussions about customer-specific solutions in the automotive and wearable sectors.

So we are pleased to have been there and to have met all of you!

endrich-IoT IN PRACTICE

Hardware and software elements of the E-IoT concept

In previous Endrich News, we have detailed the hardware components of Endrich's E-IoT concept, and the state-of-the-art technologies used by them, such as NB-IoT or LTE-M services implementing the LPWA networking, talked about the application of ARM and RISC-V architectures in the field of microcontrollers, and mentioned about our choice for local wireless sensor network solution: the NEO-MESH network. In this article, we would like to summarize the entire concept from both the hardware and software side, presenting the devices that engineering colleagues in the field of IoT can access at endrich.

Structure of the E-IoT hardware family

The basic concept of the entire family is organized around the E-IoT Board, the multi-award-winning RISC-V-based industrial data acquisition computer. When this device was born, the most important aspect was the development of an industrial single-board computer capable of sensing various environmental parameters on its own, processing the data of the applied sensors with the help of its microcontroller and delivering them to the Endrich IOT Cloud through the available LPWA (NB-IoT / LTE-M) or – in their absence via the GSM 2G network. All this has been made possible so, that a significant part of the installed electronic components are the products of our own suppliers. Therefore, the E-IOT board is also suitable for being an engineering evaluation kit to support component sales.

1. The structure of the E-IoT hardware family


Today, our sales engineering colleagues are able to successfully demo the operation of seven different sensors, GSM and GPS antennas, DC/DC converters, MEMS oscillators etc. by presenting a single device. When a customer is willing to develop an IoT node based on our solutions, there is no need

to install a separate GIGADEVICE GD32 RISC-V and FIBOCOM MA510 evaluation kit, our partners can access a combined test panel that can be applied to a wider range of tasks on much more favorable terms. In addition, on the <https://E-IoT.info> knowledge base portal, we published the complete hardware and software description of this SBC computer with free access according to an open source concept, including the access of the toolkits and the relevant sample codes. As an additional evaluation kit, a complete demo package has been released for testing the CE-RED certified 3BIG-MOD LPWA modem. The basic concept of E-IOT has a triple scope, the first being to use it as an evaluation tool to support the sale of the demonstrated components, however, the real goal of the development is the additional two segments. E-IoT is capable of turning arbitrary traditional devices into "smart" devices in a "retrofit" way, by properly fitting this telemetry hardware into the original device – while leaving its functions unchanged. With this method we therefore build in an IOT computer into the enclosure of the conventional device to connect it to the Internet of Things. Well-chosen external or on-board sensors make the traditional device suitable for continuously sending its detected operating parameters (or possible anomalies) to the cloud, receiving commands from there in case of a possible two-way data connection (e.g. when using MQTT protocol). At this year's fairs and exhibitions, we presented a number of such "smartened" devices, such as the smart streetlamp, which is capable of detecting vibration or noise that may occur in addition to sensing brightness and temperature conditions of the light engine.

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**Root Concept:
E-IoT Board & Accessories**

- 2G/LTE-M/NB-IoT subversion
- LTE 4G Subversion
- B31/450 MHz subversion
- Concept eval board (PoC)

1. Component sales booster
2. Retrofitting - Convert2Smart
3. Evaluation platform for own product development


Evaluation board for Endrich components

- MCU, Modem full eval board
- Components: antenna, DC/DC, MEMS, Oscillators, Passives, Displays, SENSORS etc...



„We make your device SMART“

- Street lamp → Smart street lamp
- Conventional fridge → Smart fridge
- Air purifiers



Own product platforms - derivatives from E-IoT Concept



Author: Mr. Zoltán Kiss



NEWS



Our slogan on this important development field is “We make Your Device Smart”, could be read on our booth walls at several exhibitions all over Europe in 2022.

Another example is the smart refrigerator concept, which monitors and logs not only the internal and external temperatures, but also the number of door openings and their duration, the operation of the internal fridge-lamp or the humidity level in the cabinet. The E-IoT concept offers a much more complicated and complex solution, when using the it in the UV-C air purifiers distributed by our sister company eurolighting GmbH, since here, in addition to continuously logging the operating parameters, it also implements a user comfort function, namely air quality monitoring. The basic telemetry supports preventive maintenance (repair and replacement of wear-and-tear parts), air quality monitoring elevates user comfort. This product variant also foreshadows the third, most important goal of E-IOT, providing an evaluation platform for our own IoT-based product development. With the help of the E-IOT Board and the external sensors attached to it, a "plank model" of the final product to be developed can be created, with which the trial, testing and even the entire software development can be carried out immediately and we gain time to create the final product, optimized in size and functionality. We ourselves have also produced a number of these derived PoC (proof of concept) conceptual or final products. Such devices are amongst others the telemetry device developed for the aforementioned UVC air purifiers, which has since been awarded by the Grand Prix of the HungExpo exhibition May 2022. Its extended and improved version, the "Smart Board", our first local WLAN-LPWA gateway, can also accept data from a MESH network of wireless smart sensors. Using the NeoMesh protocol with a sub-gigahertz carrier frequency, the wireless sensors can seamlessly deliver their data to the Smart Board in harsh industrial environments. The Smart Board device acts as a NeoMesh – LPWA gateway and ensures that the data provided by each element of the local sensor network is delivered to the Cloud using one of the available LTE/GSM standards NB-IoT, LTE-M or 2G.

As endrich is also engaged to protect the environment, we developed a brand new other LPWA gateway device, the cityBox, created to monitor urban air quality. This device is also a descendant variant of the E-IoT hardware platform. On this development field we chose our slogan accordingly: “We care about the environment...”.

Among the available wired peripherals, I would also highlight the cheap individual sensors boards, that can be fitted via the I 2C or SPI bus, as well as the "mini monitor" with a pmOLED display.

For engineering colleagues working on other MCU platforms, we have developed a family of sensor and communication shields (2IN1 solution) that turns an Arduino Leonardo or Raspberry Pi-compatible single-board computer into a standalone IoT node. In this way we can also address large development communities working on a different principal way than we do, but still enabled to use our sensor and communication solutions. Here our slogan is “We make your MCU board IoT Ready ...”

E-IOT Software Features

Hardware is not worth much without software components, it is quite obvious that the E-IoT concept also has a complex software toolkit. The first group of these services is the embedded software layer, these firmware versions written in C/C++ are designed for ARM / RISC-V-based microcontrollers. The source code and sample code of the UDP and MQTT communication, human and machine readable versions for the E-IoT v052 board are freely available with detailed explanations at <https://e-iot.info> The hardware components of E-IoT discussed so far are based on the GigaDevice GD32 (ARM and RISC-V), Microchip SAMD21 and SAMD51, and RP2040 MCU families, so in this software layer we can also find the corresponding firmware versions.

The next important service package is the WEB-based Endrich Cloud Database, hosted by an Apache Web Server running under a special Linux distribution in combination with a MySQL relational database. This is where the ECDB user administration takes place and the authorized IoT devices can also be managed here.

Author: Mr. Zoltán Kiss



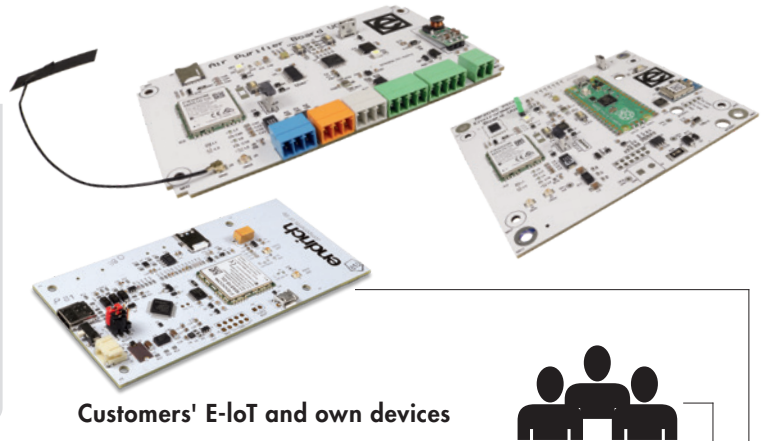
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UDP port monitoring service and the upcoming MQTT broker ensure that you don't miss saving data from any smart sensor to CloudDB. For the device

management, a WEB-based administration portal is available, where our partners (having access) can freely register their own E-IoT or other IoT devices.

E-IoT Software Services



Embedded Software Layer
Firmwares for our hardware products

- E-IoT Board (UDO and MQTT, Human and machine readable)
- 3BIG-MOD Evaluation Board Firmware
- Air Purifier Board Firmware
- Smart Board Firmware
- cityBox (Environmental Board) Firmware

Cloud Server Software Layer – Apache Web Server on Linux Distribution

- PHP & MySql
- Restricted port access for security

UDP port listener (MQTT Broker) User and device management

DataBase Server Layer – MySQL based Data Storage

- User and device
- Sensor data

Administration Layer → Visualization Layer → Data Access Layer

Web Based Portal for User & device administration "ADMIN TOOL"

- User and device data management
- Sensor raw data access
- Initialization of customized visualization services

Web Based Visualization Portal „VISUAL GATEWAY“

- 4 static data and 4 historical data (in function of time) visualized
- Graphical data reading

IoT App for data visualization "IPHONE APP (under development)"

- Graphical data reading

NEW

Web Portal to download raw sensor data "ADMIN TOOL"

- Download raw sensor data in EXCEL format

Application Programming Interface for sensor data "E-IOT SENSOR API"

- HTTP request for certain sensor data (with IMIE code & date period)
- Answer arrives in JSON format

NEW

NEWS



endrich-IoT IN PRACTICE

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2. Software Toolkit for E-IoT

The cloud-based database simultaneously takes care of administrative tasks, allows customers to download sensor data, and serves the Endrich Visualization Gateway, the web-based free graphical data visualization service, which allows you to monitor the data of your smart sensors on a mobile device connected to the Internet.

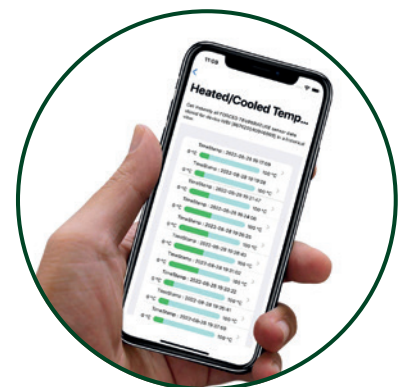


The user interface of the ADMINISTRATION LAYER is the WEB-based "Admin Tool". The VISUAL LAYER is made up of the aforementioned Endrich Visual Gateway service and the new-ly developed IoT App for in-stallation on Apple devices

3. User interface of the E-IoT iOSApp

The specialty of the application is that next to the data visualization functions, Endrich has integrated an entire knowledge base, technical information related to E-IoT, hardware and software guides, videos, lectures, TV appearances. Also the collection of white papers and technical writings of the author of the article can be found in a collected form.

However, the users should not only access data through a simple visual display, but also get raw data on their own devices (DATA ACCESS LAYER). You can do this through the Admin Tool, where you can extract data in Excel format, or query the values in real time via the brand new E-IoT Sensor API. In this case, a special WEB call is required, and by specifying the IMEI number of the device and the required time interval of the query as parameters, the measurements of the sensors arrive in JSON format. With the latter method, our partners are able to process their data stored in the Endrich Cloud in their own developed software system in real time.



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BUSINESS MEDAL

of the State of Baden-Württemberg was awarded to Dr. Christiane Endrich

For outstanding entrepreneurial achievements and in gratitude for special services to the economy of Baden-Württemberg, Minister of Economic Affairs Dr. Nicole Hoffmeister-Kraut awarded our CEO Dr. Christiane Endrich with the state's economic medal at a ceremony in the New Palace in Stuttgart on December 1, 2022.

Minister of Economic Affairs Dr Nicole Hoffmeister-Kraut said: "In these times of change, we are making a significant contribution through high-tech, through innovations, dear Dr Endrich, that is what you are doing with your company. Digital networking, keyword IoT - Internet of Things, presents many companies with great challenges and you have already recognised this early on with a continuous



expansion of your product portfolio. You regularly prove that your products are always at the cutting edge.

With the endrich IoT platform, your company has created an open source hardware and software ecosystem that helps developers to follow design guidelines and develop products in the IoT sector with a short time to market. For this outstanding and innovative solution, your company was already awarded the German Innovation Award this year."

This award fills me with pride and gratitude and is a great motivation, both for our company and for me personally, to continue to drive innovation forward and to actively help shape our future and Baden-Württemberg as a business location.



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