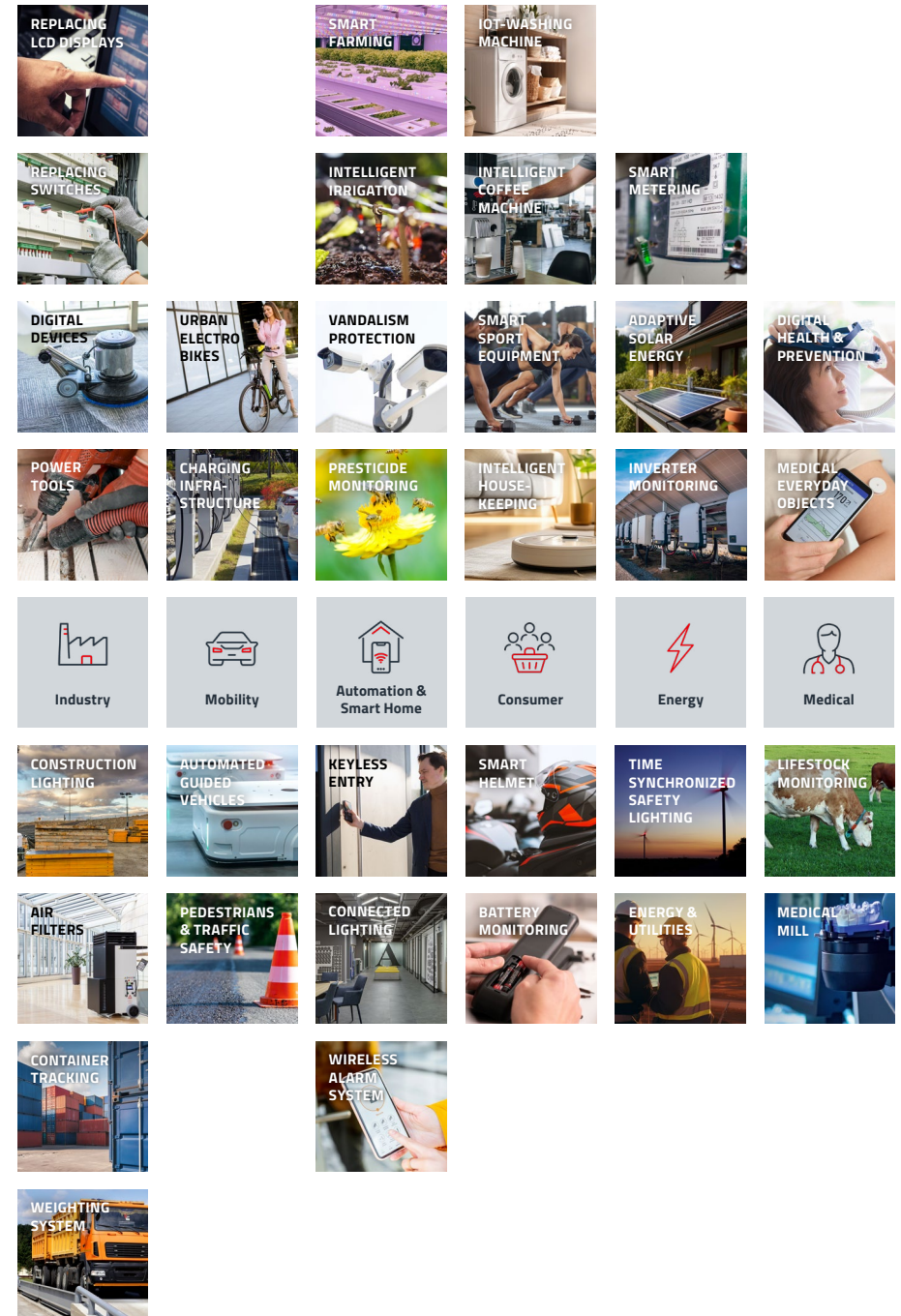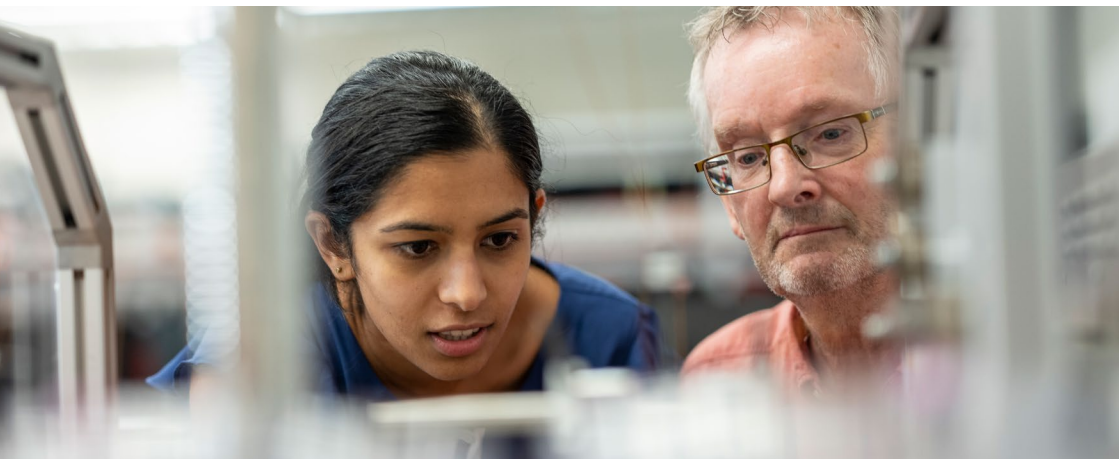# WELCOME TO
CREATING IDEAS!

You can explore some inspiring ideas that will help you unleash your creativity and come up with innovative solutions.

These Ideas are clustered in six focus markets: Industry, Mobility, Automation & Smart Home, Energy, Consumer and Medical. On the right, there is an overview about all stories that want to inspire you. Or you can simply browse through the following pages.

We wish you lots of fun and inspiration.
Your Würth Elektronik Wireless Connectivity team

Share your idea with us:
wcs@we-online.com

REPLACING LCD DISPLAYS

SMART FARMING

IOT-WASHING MACHINE

REPLACING SWITCHES

INTELLIGENT IRRIGATION

INTELLIGENT COFFEE MACHINE

SMART METERING

DIGITAL DEVICES

URBAN ELECTRO BIKES

VANDALISM PROTECTION

SMART SPORT EQUIPMENT

ADAPTIVE SOLAR ENERGY

DIGITAL HEALTH & PREVENTION

POWER TOOLS

CHARGING INFRA-STRUCTURE

PRESTICIDE MONITORING

INTELLIGENT HOUSE-KEEPING

INVERTER MONITORING

MEDICAL EVERYDAY OBJECTS

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Mobility

Automation & Smart Home

Consumer

Energy

Medical

CONSTRUCTION LIGHTING

AUTOMATED GUIDED VEHICLES

KEYLESS ENTRY

SMART HELMET

TIME SYNCHRONIZED SAFETY LIGHTING

LIFESTOCK MONITORING

AIR FILTERS

PEDESTRIANS & TRAFFIC SAFETY

CONNECTED LIGHTING

BATTERY MONITORING

ENERGY & UTILITIES

MEDICAL MILL

CONTAINER TRACKING

WIRELESS ALARM SYSTEM

WEIGHTING SYSTEM

REPLACING
LC DISPLAYS

MOBILE CONNECTIVITY – REPLACING LC DISPLAYS

LCDs are often used to indicate the status of devices, machines, and factory equipment. A little LCD Monitor on a machine looks elegant but it is not necessarily a sensible solution. LCDs age faster under harsh conditions and are wasteful in applications where they only need to be read a few times a year. Better: wireless data retrieval.

Anyone who provides machines or industrial plants with Liquid Crystal Displays should always consider whether such a display is necessary at this point, especially because every person who comes to the machine today carries a device with much higher display quality. With the industrial grade Bluetooth, WiFi and cellular modules from Würth Elektronik, it is easy to replace LC displays and output information to a mobile device app instead.
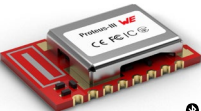
Benefits

Use your phone to check the machine

- ✔ Access is possible from anywhere, and system updates can be transmitted easily online by the manufacturer.
- ✔ Access to the data can be ensured via NFC or LE authentication.
- ✔ The use of cost-intensive displays can be avoided.

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Technologies in this application

BLUETOOTH®

Proteus-III

Make use of the screen from a mobile device while saving the cost of an integrated LC display in the machine.

we-online.com/Proteus-III   page: 115

BLUETOOTH® / WIFI

WiFi

Stephano-I

Possibility to connect via WiFi to the internet and via Bluetooth® to end users smart devices.

we-online.com/Stephano-I   page: 116

More ideas

CELLULAR
Adrastea-I   page: 100

WIFI
Calypso   page: 129

CONNECTION
WR-CRD NanoSIM Card Connector

BLUETOOTH®
Proteus-e   page: 114

CREATE DATA
Serial Bridge FeatherWing   page: 208
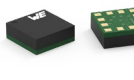
SEND DATA
Calypso WiFi FeatherWing   page: 204

ANTENNA
WE-MCA   page: 79

ACCELERATION
WSEN-ITDS   page: 28

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MOBILE CONNECTIVITY – REPLACING "OLD FASHIONED" SWITCHES

Rotary switches on control units were a sensible solution for a long time. Furthermore, there was always the risk of unauthorized use. The more modern and secure approach: make the control unit addressable via radio. Or even make it an IoT device.

The ubiquity of smartphones and the widespread use of WiFi networks open up the possibility of dispensing with rarely used switches on control units. With the slim Bluetooth LE and WiFi modules from Würth Elektronik, you can make your control unit capable of wireless communication. The big advantage: Access can be restricted by secure authentication. And where a connection already exists, it can also be used to update the control unit, or for management via the Internet.

Benefits

Use your phone to activate the switch

✔ Avoid external changes of the control unit.
✔ Authentication necessary for changes.
✔ Mobile device can update the control unit's main functions.
✔ WiFi: Cloud connectivity for status information, changes of settings from anywhere in the world etc..

REPLACING SWITCHES

Technologies in this application

BLUETOOTH®

Proteus-III

Replace the rotary switches with BT-LE and connect to Mobile device. Avoid external changes to the control unit. Advantages like Authentification needed for changes. Mobile device can update control unit main functions.

we-online.com/Proteus-III — page: 115

WIFI

Calypso

Connect the control unit to Internet. Cloud connectivity for status informations, changes to the settings from anywhere in the world etc.

we-online.com/Calypso — page: 129

More ideas

CREATE DATA

Serial Bridge FeatherWing — page: 208

SEND DATA

Calypso WiFi FeatherWing — page: 204

AppNote:
UART-to-WiFi Bridge using Calypso
we-online.com/ANR028

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IOT CONNECTIVITY FOR MONITORING USAGE

Professional devices have to perform at high levels and must be able to endure a tough workload. The Industrial Internet of Things enables better management of expensive tools via wireless communication. In conjunction with sensors that monitor appropriate use, new business areas, such as the leasing of equipment, are opening up.

The slim and energy-saving WiFi and Bluetooth modules from Würth Elektronik make professional devices capable of communicating. The devices can be linked up anywhere - in the workshop, in the vehicle, or on the construction site. In conjunction with temperature, humidity and motion sensors, the tools become smart. They can transfer data concerning usage and wear to a cloud application for instance. The advantage: maintenance cycles can optimally be scheduled, and rental equipment can be billed based on actual usage. Furthermore, inappropriate use or damage can additionally be detected with the help of sensors.
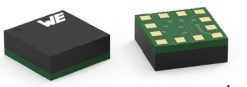
Benefits

Digital Devices capture data concerning the usage and share it wirelessly

✔ Access to device data at any time.
✔ Wireless data access prevents penetration of dust and water.
✔ Opportunity to install further systems, e.g. for localization of tools or sensors for drop detection.
✔ Data can be extracted, e.g. via a mobile app.

DIGITAL DEVICES

Technologies in this application

MOTION

WSEN-ITDS

Sensing Acceleration for getting device status (in use or not) to activate radio communication and for vandalism protection.

we-online.com/WSEN-ITDS — page: 28

WIFI

Calypso

Connect the control unit to Internet: Cloud connectivity for status informations, changes to the settings from anywhere in the world.

we-online.com/Calypso — page: 129

CELLULAR

Model: ADRASTEA-I
S/N: 13Dxxxxxx
IMEI: 35910054xxxxxxxx
2615011136000

NB-IoT
LTE-M

Adrastea-I

Connect the control unit to Internet: Cloud connectivity for status informations, changes to the settings from anywhere in the world etc.

we-online.com/Adrastea-I — page: 100

More ideas

BLUETOOTH®
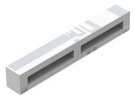
Proteus-III — page: 115

HUMIDITY & TEMPERATURE

WSEN-HIDS — page: 36

CONNECTION

WR-CRD NanoSIM Card Connector

ANTENNA

WE-MCA — page: 79

COMBINED

WiFi
Bluetooth

Stephano-I — page: 116

AppNote:
Calypso Cloud Connectivity
we-online.com/ANR023

AppNote:
Adrastea-I AWS Cloud Connectivity using MQTT
we-online.com/ANR032

POWER
TOOLS

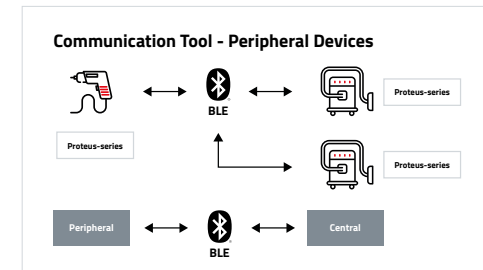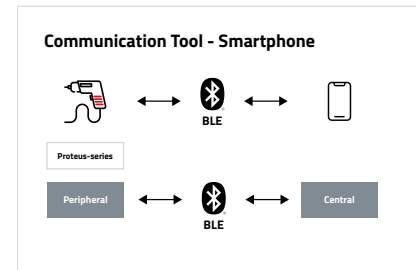# SMART INDUSTRY – CONNECTED POWER TOOLS

The interconnection of power tools offers various advantages and applications. Especially with battery-powered tools, there is no longer a connection between the tools, which does not allow a synchronized function.

With the help of Bluetooth networking, the various tools can be operated in coordination with each other. For example, a vacuum cleaner starts as soon as the drill is started. Ideally, the various functions can be controlled with the help of an app.

Via a mobile device, it is possible to download the usage and wear data, and as a result to optimally plan the maintenance cycles or, in the case of a rental device, to settle the accounts on the basis of actual usage.

Benefits

✓ Access to device data at any time.
✓ Contactless data access prevents the penetration of dust and water, extending device life.
✓ Installation of further systems, e.g. for localizing the location of the molds or sensors with fall detection. This data can be read out using a mobile app.

Communication Tool - Smartphone

Communication Tool - Peripheral Devices

Communication Smartphone - Tool - Peripheral Devices

Technologies in this application

MOTION

WSEN-ITDS

Sensing Acceleration for detection of used and not used devices and vandalism protection.

we-online.com/WSEN-ITDS | page: 28

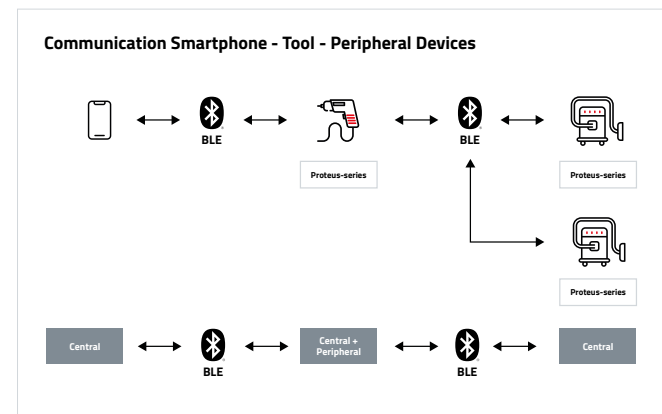**BLUETOOTH®**

Proteus-III

Connection between the tools, which want to be used in Sync mode: Sync mode one master tool controls the other(s). Meaning, activating this tool via the tool trigger will activate the synchronized tool(s) as well.

we-online.com/Proteus-III | page: 115

More ideas

HUMIDITY & TEMPERATURE

WSEN-HIDS | page: 36

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CONSTRUCTION LIGHTING

SMART INDUSTRY – INTELLIGENT MOBILE CONSTRUCTION LIGHTING

Mobile lighting at construction sites, especially on expressways, pose a great risk to the workers, if these lights are shifted by unobservant road users. Sensors and a communication mesh provide additional safety.

The lamps and warning beacons for road construction have sensors for detecting strong movement impulses (impact) as well as for location detection. The lamps are interconnected via a mesh network and report any change in location within a centimeter range. This eliminates the need for regular checks along the site to ensure that all luminaires are still in the right position. The interconnection of the luminaires can be realized with a Wirepas Massive Routing Mesh, or WE-ProWare Flooding Mesh by Würth Elektronik.

Benefits

Smart lamps form a mesh and control their own position

✓ Luminaires equipped with GNSS and acceleration sensors report any change in location.
✓ Further advantages are the constant control of all functions, such as battery charge level, set brightness, or even environmental factors, e.g. temperature and humidity.

Central Master Gateway

The Central Master Gateway is equipped with WSEN-HIDS, WSEN-ITDS sensors, Thetis-I and Adrastea-I module.

Technologies in this application

CELLULAR & POSITIONING

NB-IoT
LTE-M

Adrastea-I

Communication from Master Gateway at construction site to central server and getting location through GNSS Service.

we-online.com/Adrastea-I | page: 100

LORAWAN®

Daphnis-I

Connection of dozens or hundrets of devices over long distance.

we-online.com/Daphnis-I | page: 140

PROPRIETARY

Triton

Use a remote control connected wirelessly to the lamps and adjust settings.

we-online.com/Triton | page: 152

More ideas

HUMIDITY & TEMPERATURE

WSEN-HIDS | page: 36

ACCELERATION

WSEN-ITDS | page: 28

MESH

Thetis-I | page: 172

CONNECTION

WR-CRD NanoSIM Card Connector

CONNECTION

WR-UMRF SMA to UMRF

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WE-MCA | page: 79

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AIR FILTERS

CONNECTIVITY – AIR FILTERS

Equipping public buildings such as schools with air filtration devices to prevent infection, has burdened facility managers with an additional maintenance task. Manufacturers of such equipment would do well to simplify maintenance and operation – only a properly working air filter will protect.

The more air filters are in use, the more important remote maintenance becomes. Differential pressure and humidity sensors can be used to monitor the status of the filters. An internet gateway and a cloud application make remote maintenance convenient. WiFi modules can be integrated to connect the devices to the gateway. A particularly flexible solution is an 868 MHz radio module with the proprietary radio protocol WE-ProWare. Additionally, this allows the bridging of longer distances than with WiFi, if necessary.

Benefits

Proprietary network for remote maintenance

- ✔ WE-ProWare offers the possibility to customize functions by using simple commands.
- ✔ Unlike other sub-GHz standards, there are no license fees involved.

Technologies in this application

HUMIDITY & TEMPERATURE	DIFFERENTIAL PRESSURE	PROPRIETARY

WSEN-HIDS
Sensing room temperature & humidity.

we-online.com/WSEN-HIDS
page: 36

WSEN-PDUS
Measuring the pre- and post-pressure of a filter to detect filter contamination.

we-online.com/WSEN-PDUS
page: 42

Tarvos-III   **Telesto-III**
Connecting several air filter in large building with each other through a mesh network. Sub GHz because of LoRa® and sending data through walls.

we-online.com/Tarvos-IIII   we-online.com/Telesto-III   page: 150

More ideas

WIFI	ACCELERATION

Calypso   page: 129

WSEN-ITDS   page: 28

LoRaWAN®	CONNECTION

Daphnis-I   page: 140

WR-UMRF SMA to UMRF

AppNote:
Replacing 868 MHz Radio Modules by their 915 MHz counterparts
we-online.com/ANR015

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SMART INDUSTRY - CONTAINER TRACKING

Even during the pandamic, there were more than 150 Million containers shipped during 2021. It has never been as important to know, where your containers are, as it is at the moment! Due to shortages of materials, the bottle necks on asian harbors and during an pandemic, it is crucial to be aware of what happens with your products and where they are.

With Mesh communication every device can be used as wireless router and can act as a repeater for other nodes. With WE sensors it's possible to monitor the environmental conditions of your parts just in time, any time.

A network out of thousands of nodes, i.e. containers, increases the scale of the whole network and following the distance to bridge. A Mesh offers a so called Positioning engine which is helpful to locate containers even inhouse.

Benefits

✔ Monitor the conditions with environmental sensors
✔ Build up a mesh Network

Technologies in this application

MESH

Thetis-I
Building a huge network of sensor nodes with a robust wireless Mesh.

we-online.com/Thetis-I   page: 172
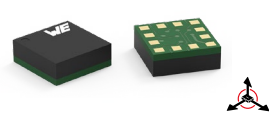
LORAWAN®

Daphnis-I
Connecting hundrets of devices to a gateway.

we-online.com/Daphnis-I   page: 140

ACCELERATION

WSEN-ITDS
Sensing Acceleration and impacts to have the information available when a container starts moving or in case a huge damage to the load has occured.

we-online.com/WSEN-ITDS   page: 28

More ideas

HUMIDITY & TEMPERATURE

WSEN-HIDS   page: 36

CELLULAR & POSITIONING

NB-IoT
LTE-M

Adrastea-I   page: 100

CONNECTION

WR-CRD NanoSIM Card Connector

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WR-UMRF SMA to UMRF

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WE-MCA   page: 79
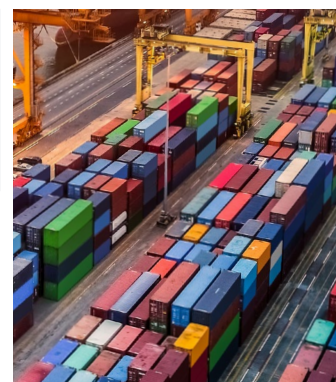
WEIGHTING SYSTEM

CONNECTIVITY – WIRELESS WHEELS WEIGHTING SYSTEM

Agriculture, biogas plants, haulers and industrial enterprises - there are many areas of application for a mobile axle load scale. When driving over it, the load on each single wheel of the vehicle is weighed separately. The measured values must then be merged.

In the case of mobile axle load scales, the weighing program calculates the total weight via the weighed axles. For this purpose, the individual scales must be linked by radio. Using a mesh network between the scales, the data can be collected and sent to a mobile device. Software in an mobile App can calculate the center of gravity of the load. Connecting the networked scales to the Internet and equipping them with GPS modules makes the management of the stock of these devices as simple as possible.

Benefits

Mesh-network of wheel scales

✔ WE-ProWare is ideal for individual mesh-networks of devices.
✔ Localization of scales and Internet-based management facilitates leasing business models.

Technologies in this application
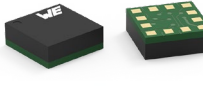
BLUETOOTH® / PROPRIETARY

Setebos-I

Mobile App Connectivity sending weight data through mobile app. Mesh between 4 scales for each wheel or axis.

MOTION

WSEN-ITDS

Sensing Acceleration for reliable measurement conditions.

More ideas

WIFI

Calypso

BLUETOOTH/ WIFI

Stephano-I

E-MOBILITY

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URBAN ELECTRO BIKES

In a sustainable world where e-mobility becomes more and more important and dominant, added services through connectivty solutions are crucial to differentiate from others.

Easy usage of an e-bike for any user – if it is your personal or a rental bike – can be simply ensured using technologies like LTE, Bluetooth & GNSS.

Instead of an attached fixed display, the control is simply done via smartphone. A Bluetooth Connect app is the smart Control Center and so the smartphone clearly displays the navigation and bike status and control even in daylight. Electronic locking can be performed and the cyclist can access diagnostics and support information for the bike. Once the settings are made, the engine automatically remembers the last rides settings.

It allows you to safely and freely explore the new road.

Thanks to a constant LTE connection, GPS tracking allows constant monitoring of the e-bike's position. Even in the worst case of theft, users around the world can be helped to get their beloved e-bike back.

Benefits

✓ Real-time location, route tracking, theft warning, navigation
✓ (Battery)Status of the vehicle / e-bike at any time
✓ Flexibility of the display /cost saving for bike manufacturer
✓ Being able to offer more than just a bike
✓ Creating a possible business model of recurring business

Technologies in this application

CELLULAR & POSITIONING
Adrastea-I
Access to all data (service and status Information) from anywhere in the world added by Live Tracking Signal of the e-bike / vehicle across the globe.

we-online.com/Adrastea-I — page: 100

BLUETOOTH® / PROPRIETARY
Setebos-I
Bluetooth function of the combined module to connect all control units on the bike like shifter etc. Secure proprietary mode for service personal only, to upload specific FW updates to e.g. the motor.

we-online.com/Setebos-I — page: 162

MOTION
WSEN-ISDS
Measuring the orientation of the bike. Can be used as compass to enhance the navigation.

we-online.com/WSEN-ISDS — page: 30

More ideas

ACCELERATION
WSEN-ITDS — page: 28
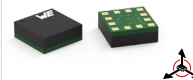
HUMIDITY & TEMPERATURE
WSEN-HIDS — page: 36

IOT PLUG-AND-PLAY
Calypso IoT Design Kit — page: 210

CONNECTION
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ANTENNA
WE-MCA — page: 79

AppNote:
Adrastea-I AWS Cloud Connectivity using MQTT
we-online.com/ANR032

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CHARGING INFRASTRUCTURE

CONNECTING THE KEY INFRA-STRUCTURE OF TOMORROW FOR EASY USABILITY AND INCREASED USER CONSENT

As e-mobility will be more and more a key for sustainable transportation, future charging infrastructure has to be both, smart and easy to use and also future proof and connected.

Especially the connection between different charging stations with each other and also the charged devices have to be able to communicate with the infrastructure directly. Additionally there is a third party in here – the human wishing to be able to communicate with the infrastructure and expressing his plans and wishes. All that can be achieved with clever communication possibilities: Connecting the charging stations with each other could be reached with clever mesh solutions, so that there is no additional wiring needed. Communicating with the cars themselves could be done via cellular communication. The direct communication to the user could be implemented either also via celluar or with direct Bluetooth or WiFi Interface.
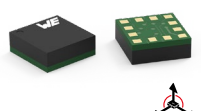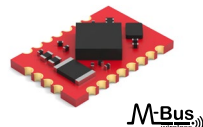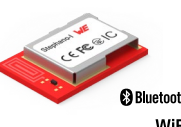
With smart MEMS sensors, a bunch of information could be generated to know as much as possible of the device.

For Payment cases there could also be the need of widespread communication standards as wM-Bus gives the possibilty to communicate standardized to Smart Meter Gateway (SMGW).

Benefits

✔ Empowering the infrastructure
✔ Easy installation and extension
✔ Scalability
✔ Increasing peoples consent because of easy usage

Technologies in this application

ACCELERATION

WSEN-ITDS
3D-orientation and TAP detection as input method for the screen.

we-online.com/ WSEN-ITDS — page: 28

RESIDUAL CURRENT

WE-RCDS
Residual current detection sensor designed for wallboxapplication to meet IEC 62955: 2018.

we-online.com/ WE-RCDS — page: 50

WIRELESS M-BUS

Metis-e
Wireless connection to read out multiple meters without wiring effort.

we-online.com/ Metis-e — page: 180

WIFI / BLUETOOTH®

WiFi

Stephano-I
Connectivity as service interface and for taking into operation.

we-online.com/ Stephano-I — page: 116

More ideas

MESH

Thetis-I — page: 172

HUMIDITY & TEMPERATURE

WSEN-HIDS — page: 36

IOT PLUG-AND-PLAY

Calypso IoT Design Kit — page: 210

CELLULAR & POSITIONING

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WE-MCA — page: 79

CONNECTION

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AUTOMATED GUIDED VEHICLES

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SMART INDUSTRY – AUTOMATED GUIDED VEHICLES

Automatic Guided Vehicles (AGV) or Autonomous Mobile Robots (AMR) are vitally important for flexible intralogistics concepts. While GNSS can be used for navigation outdoors, robots in factories and warehouses need different orientation techniques.

Key factors for the navigation of AMRs are wireless communication and acceleration sensors for inertial navigation. Würth Electronic does not only offer sensor and radio modules but also supports various communication protocols. Orientation via anchor point antennas distributed on the factory or warehouse floor as well as transmission of orders and status updates can be realized, e.g. with Bluetooth, Wirepas Massive Routing Mesh, or WE-ProWare Flooding Mesh.

Benefits

Autonomous Mobile Robots – autonomous but well connected

- ✔ Communication with intralogistics vehicles can be realized over a variety of protocols - even proprietary solutions might prove to be a good solution.
- ✔ With wireless communication, all kinds of information can be shared, e.g.battery charge status, transport weight, or condition of wear parts.

Technologies in this application

MOTION / GYROSCOPE
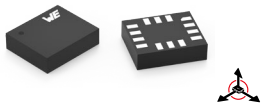
WSEN-ISDS

Measuring the orientation of the vehicle. Can be used to enhance the navigation.

we-online.com/WSEN-ISDS — page: 30

PROPRIETARY

Tarvos-III

Sub-GHz radio communication in industrial environment offers reliability.

we-online.com/Tarvos-III — page: 150

More ideas

BLUETOOTH®

Proteus-III — page: 115

MESH

Thetis-I — page: 172

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PEDESTRIANS &
TRAFFIC SAFETY

SMART SAFETY BARRIERS

Road side safety barriers ensure safety of pedestrians and traffic during construction and in case of accidents. Often these cones get displaced posing a threat to human life. Retrofitting these barriers with sensors ensures early detection of displacement thereby saving human lives.

An acceleration sensor can be used to detect a fall of a safety barrier and a positioning system accurately determines the position and timing of the barrier. This data can be transmitted via cellular link to a data platform. A cloud platform can be further used to analyse and notify the operator to take corrective action when necessary.

Benefits

- Using highly integrated intelligent sensors from WE, it is possible to accurately detect falls.
- Cellular module including GNSS can detect slightest change in position of the barrier and ensure cost effective connectivity from anywhere.
- Mesh networking between the barriers opens up a lot of possibilities for lighting control, traffic management and active signalling.

Technologies in this application
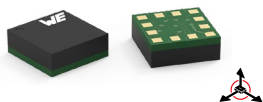
MOTION

WSEN-ITDS

Sensing motion detection and documentation.

we-online.com/WSEN-ITDS   page: 28

BLUETOOTH® / PROPRIETARY

Setebos-I

Interconnecting all sensors through the WE-ProWare mesh, while offering mobile device access through Bluetooth in one device.

we-online.com/Setebos-I   page: 162

More ideas

CELLULAR & POSITIONING

Adrastea-I   page: 100

IOT PLUG-AND-PLAY

Calypso IoT Design Kit   page: 210

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SMART FARMING

TAKE YOUR FARMING TO THE NEXT LEVEL

Climate change, loss of arable land, ever scarcer resources and a growing world population. There are more and more challenges in food production. New approaches are being sought to meet these challenges. One of them is smart farming.

With our WE line of FeatherWings you can rapidly prototype your own smart farming application. With the help of the Sensor FeatherWing you can measure data points such as temperature and humidity to check if the plants are feeling most comfortable.

This created data can be sent into any cloud using the Calypso WiFi FeatherWing. On Github, we are providing quickstarts and example-code to get data into Microsoft and Amazon IoT platforms. Here, the data can be displayed, stored and analyzed to optimize plant output.

Benefits

Actuators can now be controlled manually or automatically via RPC

- ✓ Turn on water pump to water the soil if the moisture is too low.
- ✓ Automatically fertilize the soil.
- ✓ Change the color and brightness of the LED depending on the time of day and the development of the plant.

Technologies in this application

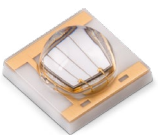### IOT PLUG-AND-PLAY

WiFi CERTIFIED
LTE-M
NB-IoT

Calypso IoT Design Kit

- Available as WiFi (Calypso) and Cellular (Adrastea) Design Kit
- Tool for simple Cloud Connectivity Prototyping
- Send data to any cloud for further use
- Create real IoT use cases
- Examples and Sourcecode available on GitHub for Microsoft Azure and Amazon Web Services

we-online.com/iot-designkit — page: 210

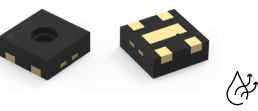### LED

WL-SMDC SMT Mono-color Ceramic LED

Use these Horticulture LEDs to feed the plants with the best light spectrum needed.

we-online.com/WL-SMDC

HUMIDITY & TEMPERATURE

WSEN-HIDS

Measuring humidity & temperature to check if the plants are feeling most comfortable.

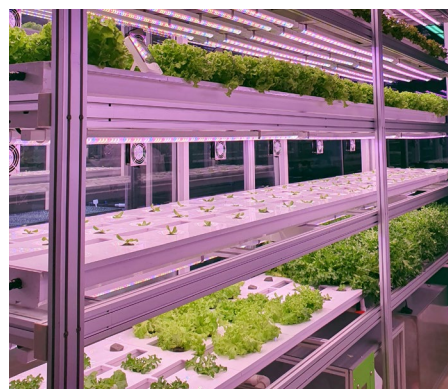we-online.com/WSEN-HIDS — page: 36

More ideas

POWER

WPME-LDHM

AppNote:
LED's – Die Zukunft der Horticulture-Beleuchtung
we-online.com/ANO002

AppNote:
Vorteile von LED-Beleuchtung in Gartenbauanwendungen
we-online.com/ANO003

INTELLIGENT IRRIGATION

CONNECTIVITY – INTELLIGENT IRRIGATION

A green garden is the jewel of any private or public building. But irrigation should be managed wisely. Especially in times of water scarcity, only as much water as necessary should be fed into the sprinkler system. With connectivity and sensors, sprinkler systems become intelligent.

A smart water pump detects when it is the right time to water the garden – based on wirelessly connected soil moisture sensors, the time of day, and maybe even from data about the availability of water resources like a cistern. By using several intelligent water pumps, gardens or parks can also be partially irrigated. Developers of irrigation systems should consider using humidity sensors and connectivity solutions like WE-ProWare Flooding Mesh or Wirepas Massive Routing Mesh to offer smart solutions which help their customers to save water.

Benefits

Mesh networks to control sprinklers

- ✔ An internet connection and cloud service can further enhance the benefits of a smart irrigation system.
- ✔ The user can analyze statistics on water consumption and watering times via a smartphone.

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Technologies in this application

WIFI

Calypso

Connect the central water pump to the Internet.

we-online.com/Calypso   page: 129
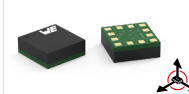
MESH

Thetis-I

Connecting hundreds of intelligent water sprinkler through a battery-saving routing mesh.

we-online.com/Thetis-I   page: 172

More ideas

ACCELERATION

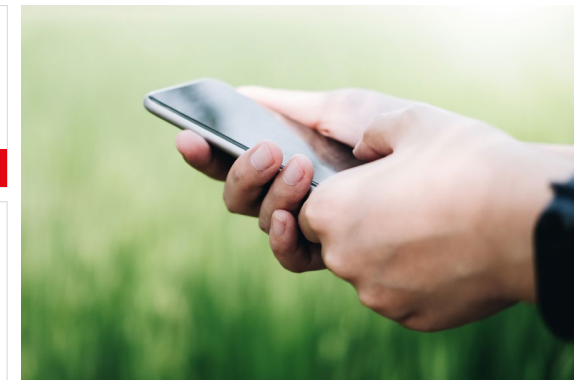**WSEN-ITDS**   page: 28

HUMIDITY & TEMPERATURE

WSEN-HIDS   page: 36

LoRaWAN®

Daphnis-I   page: 140

CONNECTION

WR-UMRF SMA to UMRF

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SMART BUILDING – VANDALISM PROTECTION

Electronic devices such as motion detectors or video cameras for surveillance purposes which are installed in public or easily accessible areas are particularly at risk. Criminals will always try to destroy these devices first. Therefore, the intentional destruction of such electronic devices must be detected and reported immediately.

To be able to detect any tampering with a surveillance device, a sensitive 3D acceleration sensor and a radio module should be integrated. With the high-quality and power-saving components from Würth Elektronik, solutions can be developed that immediately sound the alarm, if someone tampers with a surveillance camera or motion detector.

Benefits

Protect the protecting devices

✔ An alarm quickly puts burglars into flight, and you are alerted yourself. With an internet connection, a direct emergency call can also be sent.
✔ In addition to the main function of motion detection or image recording, cost-effective secondary functions for surveillance are available, e.g. measurement of temperature, humidity and atmospheric pressure.

VANDALISM PROTECTION

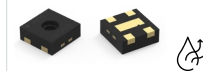**Technologies in this application**
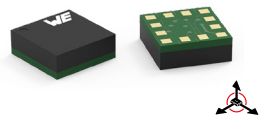
ACCELERATION

WSEN-ITDS

Sensing Acceleration for vandalism protection. Tamper detection is the ability of a device to sense an active attack to the device and the threat of the attack should initiate an event (e.g. alarm, shutdown of the device).

we-online.com/WSEN-ITDS | page: 28
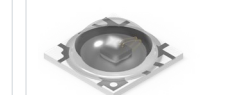
More ideas

HUMIDITY & TEMPERATURE	WIFI	POWER	INFRARED LED
WSEN-HIDS page: 36	**Calypso** page: 129	**WPME-VDMM**	**WI-SIQW**

AppNote:
Gigabit PoE Interface from an EMC perspective
we-online.com/ANP122

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PESTICIDE MONITORING

CONTROLLED PESTICIDE SPRAY SYSTEM

In this country local laws govern and limit usage of pesticide. In order to comply with environmental laws, a black box on the tractor monitors the amount of pesticide dispensed on the land allocated to the farmer. This way the amount of sprayed pesticide is controlled and overdosing is avoided.

In the pump box of the sparying installation mounted on the tractor, a radio module receives data from the spray nozzles. Every nozzle is fitted with differential pressure sensors monitoring an equal flow, and their radio module transmits in the correct time slot the flow figure. In the central unit the metrics are computed in order to match the volume of pesticide to the surface on which the tractor has covered.

To refine the calculation, GNSS can be added to match the volume to the land surface, and NB-IoT / LTE-M can be implemented in case the governing authority requests that the data should be stored on a server.

Benefits

Quick win of using a radio module or a sensor

- ✔ Closed & reliable control loop of the dispensing system
- ✔ Local and global access to any connected system in order to monitor & control pesticide usage
- ✔ Each spray nozzle for the pesticide can be controlled individually
- ✔ Saving the lives of many small creatures

Technologies in this application

CELLULAR & POSITIONING

NB-IoT
LTE-M

Adrastea-I

Enabling direct cloud access through cellular technology makes predicitive maintenance real.

we-online.com/Adrastea-I — page: 100

PROPRIETARY

Tarvos-III　　　**Telesto-III**

Collecting and sending data from sensor nodes in the pesticide spray system and transmitting those values to the cellular gateway For US customers, the 868 MHz radio module can be replaced by its 915 MHz pin- and software compatible counterpart, Telesto-II.
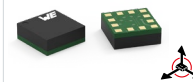
we-online.com/Tarvos-III　　we-online.com/Telesto-III — page: 150

More ideas

ACCELERATION	DIFFERENTIAL PRESSURE	CONNECTION	ANTENNA
WSEN-ITDS page: 28	**WSEN-PDUS** page: 42	**WR-CRD NanoSIM Card Connector**	**WE-MCA** page: 79

AppNote: Adrastea-I AWS Cloud Connectivity using MQTT
we-online.com/ANR032

AppNote: Replacing 868 MHz Radio Modules by their 915 MHz counterparts
we-online.com/ANR015

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KEYLESS ENTRY

KEYLESS ENTRY VIA BLUETOOTH AND AN APPROPRIATE APP

Who does not know it - forgot the key and locked out. Furthermore, they are uncomfortable in the pants or get lost in the handbag.

With the help of a unique assignment via Bluetooth and the appropriate app, such door opening systems are both secure and comfortable using a mobile device.

Benefits

✔ Fingerprints can also be stored or a numerical code can be used.
✔ The systems can also be protected by an acceleration sensor to trigger an alarm in the event of damage, for example.

Technologies in this application

MOTION
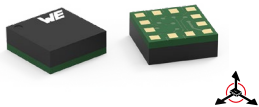
WSEN-ITDS

Sensing Acceleration for vandalism protection, e.g. tamper detection.

we-online.com/WSEN-ITDS | page: 28

BLUETOOTH

❤ Bluetooth

Proteus-I/-II

Connect to Mobile Device and connect Keys to Keypad.

we-online.com/Proteus-II | page: 113

CYBERSECURE WIFI

WiFi

Cordelia-I

Connect securely to the cloud.

we-online.com/Cordelia-I | page: 128

More ideas

SIGNAL INDICATOR

WL-ICLED

POWER

WPME-VDMM

CONNECTION

WR-MJ

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CONNECTED LIGHTING

001 1 00 1

SMART BUILDING – CONNECTED LIGHTING & ROOM CONDITIONING

Building automation is a great way to make indoor living more comfortable while saving energy. Lighting, heating, and ventilation systems only become really smart when they are adequately interconnected.
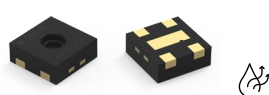
Sensors for humidity, temperature or CO_2 are needed to measure indoor air quality, as are connections to heating and ventilation systems, automatic window opening and shading systems. WiFi is suitable for connecting the gateway to the Internet for remote control, while mesh networks such as WE-ProWare are state of the art for interconnecting all sensors and actuators, light switches, and air conditioners.

Benefits
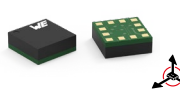
Mesh networks to control the ambience

✓ Smart lighting and air-conditioning serve our well-being.
✓ Connected lighting and room conditioning can be used to save energy.
✓ With a connection to the Internet, the system can additionally be managed by a mobile app.

Technologies in this application

HUMIDITY & TEMPERATURE

WSEN-HIDS

Measuring local room temperature & humidity simultaneously.

we-online.com/WSEN-HIDS — page: 36

ABSOLUTE PRESSURE

WSEN-PADS

Measuring local room air pressure to monitor unforeseen window openings e.g. during a burglary.

we-online.com/WSEN-PADS — page: 40

MESH

Thetis-I

Connecting hundreds of lights through a batterysaving routing mesh

we-online.com/Thetis-I — page: 172

More ideas

ACCELERATION

WSEN-ITDS — page: 28

COMBINED

Bluetooth®

Setebos-I — page: 162

Video:
Wirepas Mesh: From Concept to Prototyping
https://youtu.be/MLfikOM7yXM

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WIRELESS ALARM SYSTEM

SMART HOME – WIRELESS ALARM SYSTEM

Older houses often have many weak points and are particularly vulnerable to burglary. However, retrofitting wired security devices is expensive and laborious. Manufacturers should therefore also offer radio-based alarm systems.
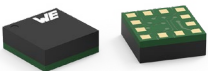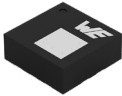
The development of retrofittable alarm systems with wireless technology depends on the right combination of radio technologies. For the control system, a connection to the Internet or to the mobile network is required. For connecting the sensors, radio frequencies in the sub-GHz and the 2.4 GHz range can be used, whereas both short and longer distances have to be bridged. Due to security reasons, the use of a long-established but not publicly known radio protocol, such as WE-ProWare by Würth Elektronik, is very advantageous. Intelligent sensor technology can detect the opening of windows or doors by measuring the change in barometric pressure, temperature or humidity and trigger a silent alarm.

Benefits

Proprietary radio protocol – a security advantage

- ✔ By intelligent combination and utilization of highly sensitive Würth Elektronik sensors, the opening of windows and doors can be detected without equipping the doors themselves with sensors.
- ✔ A wide range of Würth Elektronik radio modules allows variants for different spatial conditions.
- ✔ Arming and disarming of the alarm system can be executed via mobile devices if an internet connection via WiFi or cellular module is established.

Technologies in this application

MOTION

WSEN-ITDS

Recognizing movement of particular inventory like expensive art.

we-online.com/WSEN-ITDS — page: 28

ABSOLUTE PRESSURE

WSEN-PADS

Measuring local room air pressure to monitor unforeseen window openings e.g. during a burglary.

we-online.com/WSEN-PADS — page: 40

WIFI

Calypso

Connecting the alarm system main console to the local WiFi.

we-online.com/Calypso — page: 129

More ideas

HUMIDITY & TEMPERATURE

WSEN-HIDS — page: 36

CELLULAR

Adrastea-I — page: 100

PROPRIETARY

Tarvos-III — page: 150

PROPRIETARY

Thyone-I — page: 152

COMBINED

Setebos-I — page: 162

CONNECTION

WR-CRD NanoSIM Card Connector

ANTENNA

WE-MCA — page: 79

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IOT-WASHING MACHINE

SMART HOME – IOT-WASHING MACHINE

Smart homes need smart washing machines. Only a washing machine which is connected to the Internet of Things can be controlled remotely and switched on, for example, when there is a surplus of energy from the house's solar panels. Really smart machines come with excellent sensors.

Manufacturers who make their washing machines "intelligent" are opening up completely new business models. Machines that receive commands and provide feedback wirelessly can be sold as components of smart home concepts. If absolute pressure, differential pressure, temperature, and acceleration sensors are used to monitor the correct operation of a washing machine, leasing models can be developed, in which the customer only pays for actual use, for example in a laundromat or communal laundry. At the same time, the machine automatically reports the need for maintenance, for example, when its vibration behavior changes the material.

Benefits

Laundry becomes more sustainable

✓ Do not own, just use. Smart IoT machines are perfectly maintained machines – leasing becomes an attractive option for customers as well as for manufacturers.
✓ Robust and durable sensors from Würth Elektronik for long-lasting smart machines.
✓ Intelligent sensors, such as the differential pressure sensor, detect blocked filters.
✓ Personalized washing programs via mobile app and Bluetooth control.

Technologies in this application

HUMIDITY & TEMPERATURE

WSEN-HIDS

Measuring humidity & temperature in the machine while drying process.

we-online.com/WSEN-HIDS | page: 36

DIFFERENTIAL PRESSURE

WSEN-PDUS

Measuring the pre- and post-pressure of a filter to detect filter contamination.

we-online.com/WSEN-PDUS | page: 42

BLUETOOTH® / WIFI

WiFi

Stephano-I

Connecting to the internet via WiFi and to end users smart devices via Bluetooth®.

we-online.com/Stephano-I | page: 116

More ideas

ACCELERATION

WSEN-ITDS | page: 28

ABSOLUTE PRESSURE

WSEN-PADS | page: 40

AppNote:
Using multiple sensors on single I²C bus
we-online.com/ANM005

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INTELLIGENT
COFFEE MACHINE

SMART HOME – INTELLIGENT COFFEE MACHINE

Coffee machines are popular and in daily use. Modern machines allow creative compositions of personalized coffee variants. At the same time, leasing models are increasingly based on so-called wet hours or actual consumption – smart solutions are required.

Humidity and temperature sensors as well as Bluetooth, WiFi and cellular modules from Würth Elektronik: Equipped in this way, a coffee machine can become a smart device. With the help of integrated humidity and temperature sensors, it is possible to control the machine's optimal functioning. A change of the machine's values indicates a malfunction, which means that the need for maintenance can be displayed at an early stage or reported directly to a service center. In leasing, a billing system can be realized through live data transfer to the cloud. Convenient for the user: By using a mobile app, each user can design his or her personal coffee and preset, e.g. the amount of coffee, milk, or water.

Benefits

Coffee pleasure with pay per use

✔ With the connection to the Internet, a technician can get access to usage and consumption data at any time. The supplier of coffee, cocoa powder or milk will be on site only if necessary. This saves resources and protects the environment.
✔ Personalized coffee preferences can be adjusted via smartphone.
✔ Instead of paying a fixed monthly fee, the customer only pays for actual consumption.

Technologies in this application

IOT PLUG-AND-PLAY

WiFi CERTIFIED
LTE-M
NB-IoT

Calypso IoT Design Kit

- Available as WiFi (Calypso) and Cellular (Adrastea) Design Kit
- Tool for simple Cloud Connectivity Prototyping
- Send data to any cloud for further use
- Create real IoT use cases
- Examples and Sourcecode available on GitHub for Microsoft Azure and Amazon Web Services

we-online.com/iot-designkit — page: 210

CELLULAR

LTE-M
NB-IoT

Adrastea-I

Live data transfer to the cloud platform from anywhere.

we-online.com/Adrastea-I — page: 100

BLUETOOTH® / WIFI

Bluetooth® WiFi

Stephano-I

Connecting to the internet via WiFi and to end users smart devices via Bluetooth®.

we-online.com/Stephano-I — page: 116

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HUMIDITY & TEMPERATURE
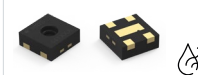
WSEN-HIDS — page: 36

CONNECTION

WR-CRD NanoSIM Card Connector

ANTENNA

WE-MCA — page: 79

AppNote:
Adrastea-I AWS Cloud Connectivity using MQTT
we-online.com/ANR032

Manual:
Calypso IoT Design Kit for Microsoft Azure
we-online.de/katalog/manual/2610059035001

SMART SPORT EQUIPMENT

MODERN FITNESS GADGETS HAVE TO BE SMART, CONNECTABLE AND UPDATEABLE – TO VISUALIZE YOUR TRAINING PROGRESS

With the newest sport equipment you can track your training status, choose your favorite mode and connect yourself with other users. Connecting punching balls, dumbbells, balls and lot more allows a smart way to connect the personal training to friends and colleagues and brings a high motivation in competeting each other.
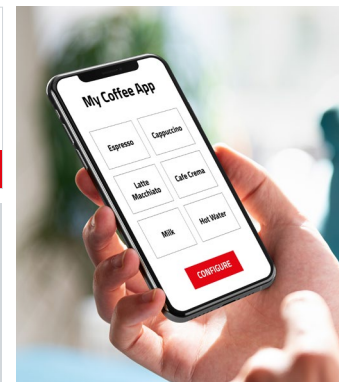
Würth Elektronik offers Bluetooth and WiFi to connect the smartphone to your favorite sport device. Quantities of pushes, measuring strength of a hit or counting time of a movement is all digital information, you did not have in the past in personal training. With this data it is possible to empower the athlete in documenting and recognising changes and developments as well as there is the possibility of competeting.

MEMS acceleration sensors are a very easy and cost effective way to raise this information. With Bluetooth Low Energy this data can be sent easily to the users smart device and directly into a competition cloud. Highest security requirements can be fulfilled.

Benefits

✔ Transparent training status
✔ Easy installation and extension
✔ Adaptable equipment
✔ Share your training progress online
✔ Online events

Technologies in this application

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LTE-M
NB-IoT

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we-online.com/iot-designkit | page: 210

ACCELERATION

WSEN-ITDS
Detection of shock and force like punching power.

we-online.com/WSEN-ITDS | page: 28

BLUETOOTH®

Bluetooth

Proteus-e
Transfer data to the smartphone like:
- tracking the performance
- real-time statistics
- choose training modes

we-online.com/Proteus-e | page: 114

More ideas

GYRO

WSEN-ISDS | page: 30

ABSOLUTE PRESSURE

WSEN-PADS | page: 40

AppNote:
Pressure Altimeter using Absolute Pressure Sensor WSEN-PADS
we-online.com/ANM003

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INTELLIGENT HOUSEKEEPING

NOT ONLY THE MOST ACCIDENTS HAPPEN IN THE HOUSEHOLD – IT IS ONE OF THE AREAS WHERE SMART TECHNOLOGY CAUSES THE BIGGEST COMFORT INCREASE

With raising technologie possibilities also the housekeeping gets more and more automated, intelligent and more comfortable. To do so, a lot of sensors and connectivity functions are needed. All data has to be sent via WiFi through the internet to userfriendly server applications.

In smart cleaning devices a lot of physical values are of interest. Temperatures have to be monitored, pressures, esp. for vacuums, have to be checked. You have to be sure, no humidity attacking your device. And lot more.

With Würth Elektronik digital MEMS Sensors there is a bunch of possibilities to collect data. Data of course is only useful if you know how to use it. Therefore a communication to the device itself but also to the controlling user or cloud systems above is important. With Bluetooth a communication directly to a smart device is easy and a taking into operation is possible without problems. WiFi enables to sent the data into a cloud and then to send back again to the user. And also brand new technologies like Matter can be integrated with radio modules.

Benefits

- ✔ Easy collecting data
- ✔ Standard connection to users
- ✔ Increase comfort level

Technologies in this application

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we-online.com/iot-designkit — page: 210

MOTION
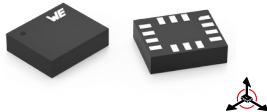
WSEN-ISDS

The gyroscope enables indoor navigation and movement detection.

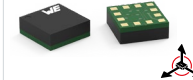we-online.com/WSEN-ISDS — page: 30

DIFFERENTIAL PRESSURE

WSEN-PDUS

Sensing the pneumatic pressure inside vacuum cleaner applications.
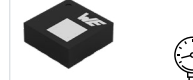
we-online.com/WSEN-PDUS — page: 42

More ideas

ACCELERATION

WSEN-ITDS — page: 28

ABSOLUTE PRESSURE

WSEN-PADS — page:40

BLUETOOTH®

Bluetooth

Proteus-e — page: 114

OPTICAL SENSOR

WL-OSEN — page: 53

SMART
HELMET

WEARABLES –
SMART HELMET

In the case of motorcycle accidents, it is of crucial importance to receive medical aid as soon as possible, as the collision might severely hurt internal organs. A smart helmet that can detect a crash and send an emergency alarm automatically could thus be a lifesaver.

Acceleration sensors and LTE mobile radio modules including localization (GNSS) by Würth Elektronik can be used to implement safety applications. In case the sensor system detects the movement pattern of a collision, an emergency call will automatically be sent or predefined persons could be contacted.

Benefits

A helmet which is able to communicate and to collect data can increase safety and comfort of the biker.

✔ The condition in the helmet can be measured via additional integrated sensors, for example temperature and humidity. The driver is alerted in time and thus protected from overheating.
✔ In addition, a communication interface for radio contact between driver and passenger can be implemented.

Technologies in this application

ACCELERATION
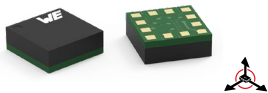
WSEN-ITDS

- Impact detection and initiating the radio module to setup an emergency call.
- Impact detection to gather information for the doctors for the grade of injury.
- Concussion detection

we-online.com/WSEN-ITDS   page: 28

CELLULAR & POSITIONING

Adrastea-I

Communication of data inclusive localization (GNSS) to predefined receiver.

we-online.com/Adrastea-I   page: 100

BLUETOOTH®

Proteus-III

Connection from helmet to mobile to download. Data from helmet like head movement, specific vibrations, etc.

we-online.com/Proteus-III   page: 115

More ideas

HUMIDITY & TEMPERATURE

WSEN-HIDS   page: 36

ANTENNA

WE-MCA   page: 79

CONNECTION

WR-CRD NanoSIM Card Connector

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BATTERY MONITORING

CONDITION MONITORING, OBSERVING BATTERY AGEING, THEFT PROTECTION AND POWER SAVING

Batteries are driving our world. Especially in the consumer field. Remotes, toys and lots of other devices only work with energy out of batteries. Technologie enables a lot possibilities in monitoring devices and also their batteries to be able to charge or exchange them in time. Ageing batteries behave differently and carry the risk of leackage or function loss.

Sensing temperature and in some cases also humidity is the first step to get information about the used battery above the only voltage level. If you also check movement of a device with the acceleration sensors and with this offer the possibility to easily detect whether the device is moving or not. With this information, the intelligent battery can shut down devices not in use and both save energy. The integrated functionality of the sensor can wake up a microcontroller behind only as the device is moving.

Beyond that, not only the device itself can be interested in the information, also the user could use the information about the battery condition and therefore connect via Bluetooth or WiFi to the device or directly to the battery to detect the needs of the application.

Benefits

✔ Reducing power consumption of every portable device
✔ Easy to implement
✔ High comfort level for high quality devices possible

Technologies in this application

MOTION

WSEN-ITDS

Detection of movement and possible damage because of crash with free-fall detection.

we-online.com/WSEN-ITDS — page: 28

TEMPERATURE

Marking

WSEN-TIDS

Precise measuring the temperature in battery cells to avoid overheating and ensuring devices operating inside the specified conditions.

we-online.com/WSEN-TIDS — page: 34

BLUETOOTH®

Proteus-III

❖ Bluetooth®

Proteus-III

Transfer data to the smartphone like:
- batterie status
- Apple Find My functionality

we-online.com/Proteus-III — page: 115

More ideas

HUMIDITY & TEMPERATURE

WSEN-HIDS — page: 36

WIFI

Calypso

WiFi CERTIFIED

Calypso — page: 129

WE-WPCC

Wireless Power Transmission

AppNote:
Adrastea-I AWS Cloud Connectivity using MQTT
we-online.com/ANR032

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SMART
METERING

SMART METERING –
THE KEY TO SUCCESS IN
RENEWABLE ENERGIES

With more and more renewable energies in the public power grid also the need of information about the produced energy, as well as the needed power, has to be increased significantly. Only with data the energy transformation could be managed.

With energy meters it is possible to detect energy consumptions as it is done for years. But as there are more and more decentralized energy providers producing green energy, more information is needed to transport the energy and also to use the grid securely. The measured power flows, that's where it all begins. This information has to be collected efficiently, as the enery meters should not have a high energy consumption for themselves. The very different use cases also need very different solutions.

In areas, where a lot of energy meters are installed, you should collect data from all of them and bring it into a superordinate system at one point. Predictive and curative maintenance can be triggered by intelligent digital sensors giving you the status of the environmental conditions in- and outside the housing and provides protection against natural destruction and exceptional failures.
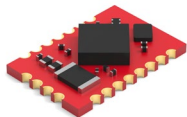
Data can be made acessable through secure cloud connectivity.

Benefits

✓ Easy connecting of dozens of meters without wiring effort
✓ Easy installation and extension
✓ Scalability

Technologies in this application

WIRELESS M-BUS

M-Bus

Metis-e
Wireless connection to read out multiple meters without wiring effort.

we-online.com/Metis-e — page: 180

CELLULAR

Model: ADRASTEA-I
S/N: 132xxxxxx
IMEI: 359100xxxxxxxx

NB-IoT
LTE-M

Adrastea-I
Far distance maintenance access – remote control.

we-online.com/Adrastea-I — page: 100
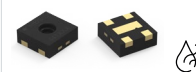
LoRaWAN®

Daphnis-I
Connecting dozens or hundrets of meters to one gateway wirelessly.
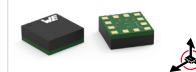
we-online.com/Daphnis-I — page: 140

More ideas

HUMIDITY & TEMPERATURE

WSEN-HIDS — page: 36

ACCELERATION

WSEN-ITDS — page: 28

BLUETOOTH®

Bluetooth®

Proteus-e — page: 114

IOT PLUG-AND-PLAY

Wi-Fi CERTIFIED
LTE-M
NB-IoT

Calypso IoT Design Kit — page: 210

CONNECTION

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OPTIMIZING ENERGY OUTPUT
WITH ADAPTIVE SOLAR PANELS

ADAPTIVE SOLAR ENERGY

The effectiveness of a solar panel is largely determined by the angle of incidence of the sun. If this angle can be dynamically adjusted, significantly higher energy yields are possible. Smart balcony power plants with batteries and wireless connectivity gives the customer insight and power to control his power usage and optimize it in order to make the most of his produced energy.

Adapting the angle of solar panels dynamically to the sun cann enlarge the profit out of the panel tremendously. Using MEMS Inerital Meauring Units (IMUs) gives the possibility of sensing the orientation of the panel in relation to the earth gravity and therefor allows to bring the panel in the perfect angle to the sun at every moment during the day. With this, the outcome can be increased easily.

By connecting multiple panels or groups of panels, the adjustment can be done simultaniously or intentionally not the same way. Using Bluetooth LE brings the opportunity to get a quick and easy access to the typical waterproof manufactured housings without effort for service or taking into operation.

LTE Cat.M conectivity allows alarming in case of malfunstions or damages caused by weather or animals (as i.e. sheeps are often used as lawn trimmers in these areas. Humidity sensor based on MEMS technology allews easy calyulation of dew point and whether there has to be activated any heaters in some kind of application.

Benefits

- ✔ Enlarge the outcome of the panels
- ✔ Easy connectivity to multiple panels
- ✔ Fast commissioning direct in the field

Technologies in this application

GYROSCOPE

WSEN-ISDS

Detection of movement, adjustion, shock and mechanical influence and stress, like bird pecking.

we-online.com/WSEN-ISDS   page: 30

BLUETOOTH® / WIFI

Bluetooth® WiFi

Stephano-I

Connect from smartphone or a WiFi network to the panel for taking into operation and as service intereface.

we-online.com/Stephano-I   page: 116

More ideas

HUMIDITY & TEMPERATURE

WSEN-HIDS   page: 36

CELLULAR

NB-IoT   LTE-M

Adrastea-I   page: 100

MESH

Wirepas

Thetis-I   page: 172

IOT PLUG-AND-PLAY

WIFI CERTIFIED   LTE-M   NB-IoT

Calypso IoT Design Kit   page: 210

INVERTER MONITORING
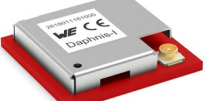
TRANSPARENT INVERTER CONDITION

In solar farms a permanently maintenance is required. This means to check the condition of the solar panels and inverters or to do some updates.

Würth Elektronik offers with the NB-Iot and LTE Cat. M connectivity the far distance management of the inverters, meaning remote monitoring and controlling, gives you either worldwide or locally enclosed access to your devices. In both cases highest security requirements can be fulfilled. If there is an firmware update for the inverter needed, this could be transfered via cellular too or via an service staff with Bluetooth in front of the inverter.
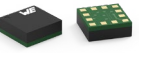
Benefits

- ✓ Wireless configuration of the inverter
- ✓ Easy installation and extension
- ✓ Save costs for condition monitoring
- ✓ Easy firmware updates

Technologies in this application

CELLULAR

Adrastea-I

Far distance maintenance access – remote control.

we-online.com/Adrastea-I   page: 100

BLUETOOTH®

Proteus-III

Connect from smartphone to the inverter to transfer data from and to the inverter

we-online.com/Proteus-III   page: 115

LoRaWAN®

Daphnis-I

Connecting dozens or hundrets of systems to one gateway wirelessly.

we-online.com/Daphnis-I   page: 140

More ideas

HUMIDITY & TEMPERATURE

WSEN-HIDS   page: 36

ACCELERATION

WSEN-ITDS   page: 28

RESIDUAL CURRENT

WE-RCDS   page: 50

ANTENNA

WE-MCA   page: 79

IOT PLUG-AND-PLAY

Calypso IoT Design Kit   page: 210

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CONNECTION

WR-UMRF SMA to UMRF

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TIME SYNCHRONIZED
SAFETY LIGHTING

TIME SYNCHRONIZATION LIGHTING

Runway firing requires the highest reliable synchronized lighting. Reducing the wiring lowers installation costs and improves the degree of scalability.

Easy integration of new windmills into the existing park requires a reliable and secure bidirectional radio communication to increase Green Energy sector.

Würth Elektronik offers LTE mobile radio modules including GNSS not only for localization but also for time synchronization. In combination with globally accepted radio standards like WiFi, Bluetooth, WE-ProWare, NB-Iot and LTE Cat. M the far distance management of machines, meaning remote monitoring and controlling, gives you dependend on the application either worldwide or locally enclosed access to your devices. In both cases highest security requirements can be fulfilled.

Predictive and curative maintenance can be triggered by intelligent digital sensors giving you the status of the environmental conditions in- and outside the housing and provides protection against natural destruction and exceptional failures.

Data can be made accessible through secure cloud connectivity.

Benefits

✔ Save kilometers of wiring
✔ Easy installation and extension
✔ Scalability
✔ Individual lights control
✔ Microsecond accuracy synchronization

Technologies in this application

CELLULAR & POSITIONING

Adrastea-I

Far distance maintenance access – remote control. Time Synchronization between different lights. Time Stamping for Events.

we-online.com/Adrastea-I — page: 100

PROPRIETARY

Triton

Proprietary for secure connection of the lighting network for individual lighting configuration.

we-online.com/Trition — page: 152

QUARTZ OSCILLATOR

WE-SPXO Quartz Oscillator

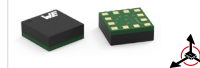Use this Quartz Oscillator for exact synchronization.

we-online.com/WE-SPXO

More ideas

HUMIDITY & TEMPERATURE

WSEN-HIDS — page: 36

ACCELERATION

WSEN-ITDS — page: 28

ANTENNA

WE-MCA — page: 79

IOT PLUG-AND-PLAY

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CONNECTION

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AppNote:
WE-MCA Multilayer Chip Antenna Placement & Matching
we-online.com/ANP057

ENERGY
& UTILITIES

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GREEN ENERGY MONITORING – SMART GRID

It would be important in the power sector to be able to provide clean technology and embedded software solutions to reduce power consumption and costs, as well as retrofit monitoring for power line infrastructure and solar and weather station kits. The solutions then monitor power line fluctuations and deflections, as well as fire risk areas as fire detectors, and provide monitoring and smart city solutions for government agencies.

There is an exciting and rapidly changing atmosphere in the energy and utilities industry. The rapid adoption of new technologies, particularly communications-based technologies, is enabling them to better monitor, control and optimize every aspect of their business. There is no doubt that connectivity is the key to the smart grid. Wireless connectivity is enabling tomorrow's power plants and smart grids.

Wireless connectivity and network intelligence provide the ability to centrally monitor, self-regulate and respond to demand. Remote cameras and sensors reduce the need for on-site maintenance staff. Sensors enable near real-time diagnosis of expected and unexpected faults, enabling more accurate and faster fault location. Wireless connectivity provides reliable, accurate, and secure data from the field and offers cost and deployment advantages over competing technologies.

Benefits

- ✓ Real-time insights from the renewable asset
- ✓ Reduced downtime and increased asset life
- ✓ Improved operational efficiencies
- ✓ Make use of the 4 major applications in the electricity industry (Control Services, Collection Services, Mobile application services, New services of the power grid)

Technologies in this application

CELLULAR & POSITIONING

Adrastea-I

Access to all monitoring and control data from anywhere in the world. Performing load balancing in the grid.

we-online.com/Adrastea-I | page: 100

LoRaWAN®

Daphins-I

LoRa® devices enable to install immediate prevention and control solutions in an established network.

we-online.com/Daphnis-I | page: 140

More ideas

HUMIDITY & TEMPERATURE

WSEN-HIDS | page: 36

WIRELESS M-BUS

Metis-e | page: 180

TEMPERATURE

WSEN-TIDS | page: 34

IOT PLUG-AND-PLAY

Calypso IoT Design Kit | page: 210

ABSOLUTE PRESSURE

WSEN-PADS | page: 40

CONNECTION

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ANTENNA

WE-MCA | page: 79

CONNECTION

WR-UMRF SMA to UMRF

AppNote: Adrastea-I AWS Cloud Connectivity using MQTT we-online.com/ANR032

DIGITAL HEALTH & PREVENTION

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CPAP MACHINE OR DIGITAL SPIROMETER

A CPAP machine is a machine that uses mild air pressure to keep breathing airways open while you sleep. The documentation process is very easy, if a wireless connection is established. Many people rely on such a machine and need medical support when evaluating the data. The current option of remote data transfer is a blessing, especially in rural areas with a low density of doctors.

With the well known radio standards like WiFi, NB-Iot and LTE Cat. M data can be simply transferred into a cloud system. Might this be a private solution or even a Cloud of a medical association with the highest security standards. Using the short range transfer capability of Bluetooth offers the patient the opportunity to evaluate the last night sleep on its own mobile device immediately in the morning.

For a digital spirometer in a handheld device size it is now possible to train the lung very well controlled at home. Expanding your lungs, strengthening your lungs, keeping your lungs inflated and clearing mucus and other secretions from your chest and lungs… all processes are precisely performed due to an App on your mobile device and a direct connection via Bluetooh. A well documented training progress is an added value as well.

Benefits

✔ Performing precise & well documented medical nurture
✔ Taking care of your health at home
✔ Use of the latest technologies by older people thanks to simple mobile apps

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Technologies in this application

HUMIDITY & TEMPERATURE

WSEN-HIDS

Precise control of the humidity in the inhaled and exhaled air, but also of the environment to process the right amount of humidity.

we-online.com/WSEN-HIDS — page: 36

DIFFERENTIAL PRESSURE

WSEN-PDUS

Measurement and monitoring of inhaled and exhaled air.

we-online.com/WSEN-PDUS — page: 42

BLUETOOTH®

Proteus-e

Connect from mobile device like smartphone to the CPAP machine or mobile spirometer for mobile app access.

we-online.com/Proteus-e — page: 114
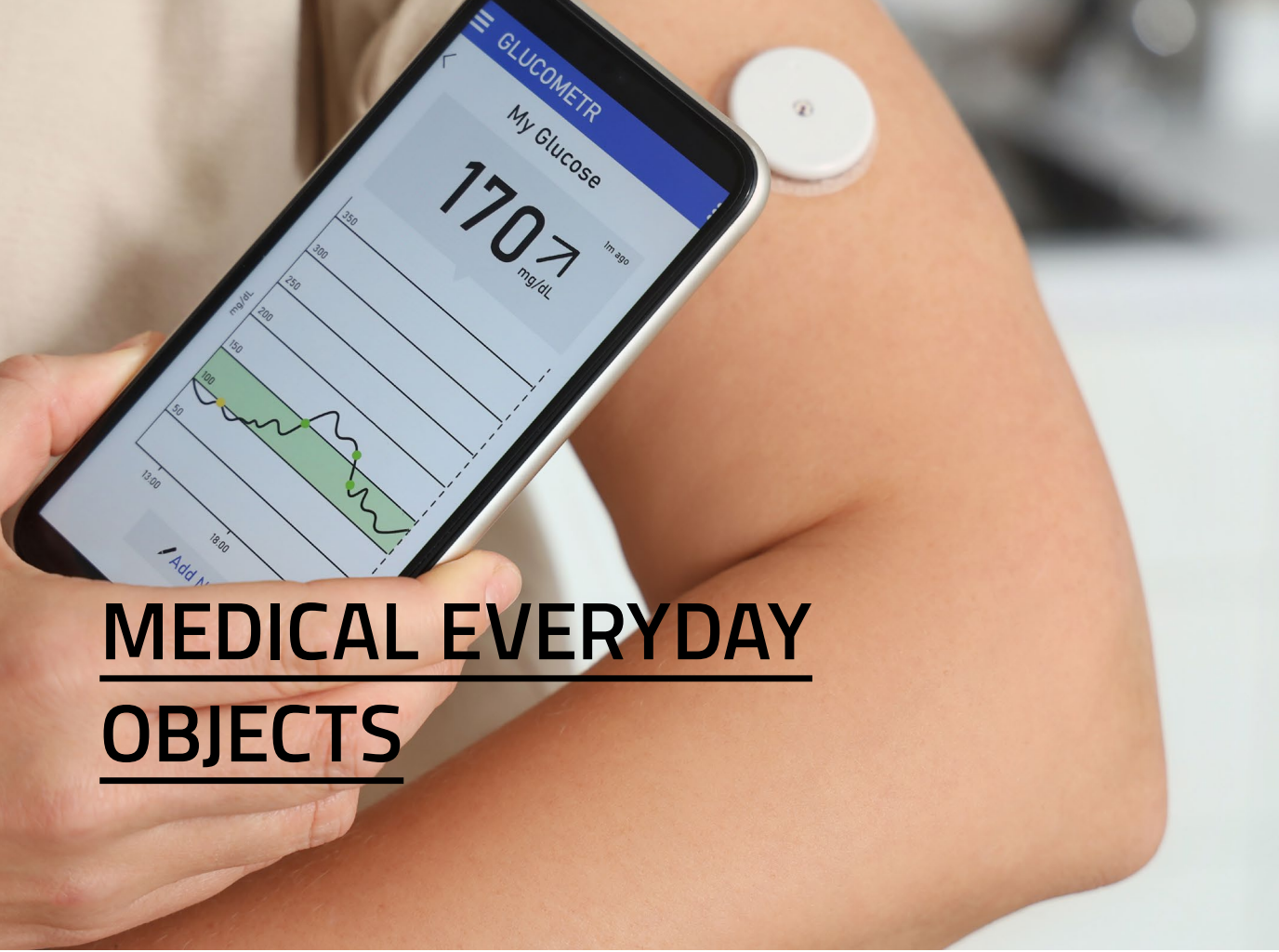
More ideas

CELLULAR & POSITIONING

Adrastea-I — page: 100

WIFI

Calypso — page: 129

ILLUMINATION

WL-SUMW SMT Ultraviolet Ceramic LED

AppNote:
Disinfection with UV-C LEDs
we-online.com/ANO008

Industry

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Automation & Smart Home

Consumer

Energy

Medical

MEDICAL EVERYDAY OBJECTS

INTELLIGENT HOME AND MEDICAL APPLIANCES CAN IMPROVE PROCESSES EVERYWEHRE

In medical environments a lot of processes have to be followed and documentated correctly. Not rarely this means, that a well educated person has to do or document things, consuming a lot of time missing for the really important works to be done, mainly the time to care.

Würth Elektronik offers a variaty of globally accepted radio standards like WiFi, Bluetooth, WE-ProWare, NB-Iot and LTE Cat. M the far distance management of devices, meaning remote monitoring and controlling, gives you dependend on the application either worldwide or locally enclosed access to your devices. In both cases highest security requirements can be fulfilled.

Predictive and curative maintenance can be triggered by intelligent digital sensors giving you the status of the environmental conditions in- and outside the housing and provides protection against natural destruction and exceptional failures. Data can be made acessable through secure cloud connectivity.

Benefits

✔ Saving time and money in care professions
✔ Improving data level
✔ Easy connectivity of formerly „stupid" devices

Technologies in this application

MOTION	BLUETOOTH®	WIRELESS POWER TRANSFER
WSEN-ISDS	**Proteus-e**	**WE-WPCC**
Detection of any movement, orientation and acceleration of the device.	Connectivity as service interface and for provisioning.	Powering enclosed devices for decontamination and desinfection.
we-online.com/WSEN-ISDS page: 30	we-online.com/Proteus-e page: 114	we-online.com/we-wpcc

More ideas

HUMIDITY & TEMPERATURE	ACCELERATION
WSEN-HIDS page: 36	**Adrastea-I** page: 100

IOT PLUG-AND-PLAY
Calypso IoT Design Kit page: 210

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LIFESTOCK MONITORING

HOOK STRAP FOR ANIMALS

In the course of more ecological and sustainable lifestock farming it is necessary to monitor the environmental and health conditions of the animals.
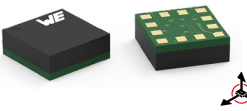
Acceleration sensors and LTE mobile radio modules including localization (GNSS) by Würth Elektronik can be used to implement monitoring applications. In case the sensor system detects the movement pattern of an animal, an alarm signal will automatically be sent or predefined persons could be contacted if an abnormal behavior is detected. humidity sensors can be used to monitor the status of the environment.

WiFi modules can be integrated to connect the hook strap to the gateway Bluetooth LE To read out the measurements via smartphone.Data can be collected and finally send to the cloud using AWS or Azure.

Benefits

✔ Reduce costs for the veterinary and drugs
✔ Optimize the environmental conditions
✔ Minimizing the ecological impact
✔ Track the animals

Technologies in this application

ACCELERATION

WSEN-ITDS
Activity tracking of the animal.

we-online.com/WSEN-ITDS — page: 28

CELLULAR & POSITIONING

Model: ADRASTEA-I
S/N: 132xxxxxx
IMEI: 35910054xxxxxxxx
QR Code
2615011136000
NB-IoT
LTE-M

Adrastea-I
Cloud connection for datas and alarm and localization of the cow.

we-online.com/Adrastea-I — page: 100

LoRaWAN®

Daphnis-I

Daphnis-I
Costeffective connection of dozens or hundrets of sensors to one gateway.

we-online.com/Daphnis-I — page: 140

More ideas

HUMIDITY & TEMPERATURE

WSEN-HIDS — page: 36

BLUETOOTH®

Proteus-III WE
Bluetooth

Proteus-III — page: 115

WIFI

Calypso WE
WiFi CERTIFIED

Calypso — page: 129

IOT PLUG-AND-PLAY

WiFi CERTIFIED
LTE-M
NB-IoT

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CONNECTION

WR-CRD NanoSIM Card Connector

CONNECTION

WR-UMRF SMA to UMRF

ANTENNA

WE-MCA — page: 79

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MEDICAL
MILL

HIGHLY SPECIALIZED MACHINES FOR MEDICAL APPLICATIONS

New and better materials make it possible to produce increasingly robust, lighter and more durable prostheses and implants. The manufacturing und processing of these materials makes new processing methods necessary again and again.

All moving machines like mills, lathes and CNC need an exact position and movement feedback. This could be realized with 6-Axis MEMS-Sensors from Würth Elektronik.

Pneumatic controlls need to be measured with high accuracy, i.e. with differential Pressure Sensors based on MEMS principles. These sensors are very accurate, temperature compensated and factory calibrated.

To get access to working machines without stopping automised processes, the service technican could connect wirelessly via Bluetooth or WiFi to the machine to read out running hours or fill levels or for calibrating the machine.
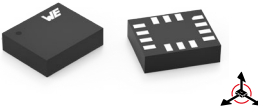
Benefits

✔ Save complex wiring
✔ Easy service interface
✔ Accurate sensing
✔ Temperature compensation
✔ Factory calibrated sensors

Technologies in this application

MOTION

WSEN-ISDS
Detection of any movement, orientation and acceleration of the device.
we-online.com/WSEN-ISDS — page: 30

DIFFERENTIAL PRESSURE

WSEN-PDUS
Sensing the pneumatic pressure inside the mill.
we-online.com/WSEN-PDUS — page: 42

WIFI

Calypso
Cloud connection for data and alarm.
we-online.com/Calypso — page: 129

More ideas

ADAPTER
WSEN-PDUS-Adapter

BLUETOOTH®
Proteus-e — page: 114

AppNote:
Calypso Cloud Connectivity
we-online.com/ANR023