T IoT

Success Stories from the Internet of Things

connect. digitize. get ahead.

IoT in Practice

How digitalisation meets the greatest challenges of our time

Supply bottlenecks, high energy costs, a shortage of skilled workers - these are just some of the many challenges currently facing companies in a wide range of sectors. At the same time, the Institute of the German Economy states that digitalisation is the number one opportunity for companies, the state and society. The practical examples in our new e-book show how the Internet of Things (IoT) can help.

Making business future-proof with IoT Monitor supply chains via a global cellular connectivity, prevent production failures via specialized IoT networks and quickly train untrained staff thanks to intelligent cloud software. The IoT in particular offers cost-effective solutions for many industries on how to future-proof your business model and offer your customers added value.

Meeting challenges with the IoT
Crises often force companies to put their business model to the test. Currently, the trend to digitalise and automate business areas is picking up significantly. Companies that relied on future-proof technologies such as the IoT at an early stage are now benefiting from this. In this e-book you will find reference examples from a wide range of industries:

Read how:

- the logistics service provider Dachser supervises transports
- the machine manufacturer Kässbohrer becomes a service provider
- Lichtwart's IoT solution illuminates buildings efficiently
- glass refiner GlasGo controls the temperature of its kilns
- Bauer AG monitors sheet piling on construction sites
- the lighting manufacturer Osram needs fewer commissioners
- Biotronik saves lives with connected pacemakers
- Deutsche Bahn promotes sustainable transport
- and many more exciting use cases!

Enjoy the reading!

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Stable Supply Chains

Monitoring and protecting goods in transit, efficiently managing and maintaining fleets of vehicles – IoT brings crucial added value to functioning supply chains.

Transport & Logistics

Transparent Logistics Thanks to Connected Swap Bodies

Internationally active logistics service provider Dachser relies inter alia on swap bodies that it now connects by means of the Internet of Things.

The Challenge
Using around 8,500 swap bodies, Dachser mainly ships goods between its central facilities throughout Europe. Swap bodies – unlike semitrailers – are not restricted to specific trucks, but this flexibility made tracking them across Europe in real time a major challenge.

The Solution
Dachser equipped its swap bodies with tracking modules supplied by Telekom partner Mecomo that incorporate high-end Telekom SIM cards. The trackers relay the swap bodies' current position regularly by LTE-M to the cloud, where Dachser can evaluate and visualize the data. Thanks to Telekom networks, roaming partners and GSM fallback the trackers have connectivity throughout Dachser's European operational area. In addition, the hardware is robust and suitable for use in both hot and cold climates.

Customer Benefit
The logistics service provider always knows where its swap bodies are and can estimate arrival times accurately. If a delivery is delayed, the local drivers at Dachser's 237 European road logistics branches do not need to wait. They can use the cargo space for other shipments that are ready to go in the warehouse and then set out to deliver them punctually and fully laden. That streamlines processes, reduces numbers of free parking bays and multiple journeys and thereby benefits sustainability. As Dachser can now provide precise arrival time information, transparency is improved from the customer's point of view.

> "The tracking solution enables us not only to optimize our own processes but also offer our customers more transparency."
>
> **Lars Relitz**, Head of Corporate Digital Innovation & Development at Dachser

DACHSER
Intelligent Logistics

IDS Logistik Uses GPS Solar Modules to Locate Swap Bodies in Real Time

In order to transport general cargo by truck optimally in swap bodies and to be able to locate the standardized containers in real time IDS connected them with the Internet of Things.

The Challenge
Until recently main run arrival times were almost impossible to estimate and employees counted the number of swap bodies available on their daily walk around the yard. As a result, main run processes lacked transparency and manual correction postings created additional administrative complexity.

The Solution
IDS Logistik GmbH developed positioning software. To connect its swap bodies with the software the Telekom partner MECOMO installed a solar-powered GPS hardware solution on the swap bodies. Telekom kitted out the GPS solar modules with cellular network contracts to ensure stable transmission of real-time position data in Germany.

Customer Benefit
IDS Logistik GmbH now always knows when incoming main runs are due to deviate from their scheduled time of arrival. Local deliveries can then be rearranged efficiently in time and empty runs can be avoided. Manual correction postings and the daily walk round the yard are no longer needed, so IDS employees save time.

> “The IoT solution enables automated processes to replace manual administrative input. That makes our logistics chain markedly more efficient.”
>
> **Tatjana Scheuring**, Head of Product and Process Management, IDS Logistik GmbH

IDS LOGISTIK VON MENSCHEN GELEBT

Transport & Logistics

IoT trackers make the last mile more efficient

Thanks to Drive & Track, citkar always has an eye on the usage data for its e-cargobikes and can therefore offer customers predictive maintenance and better reliability.

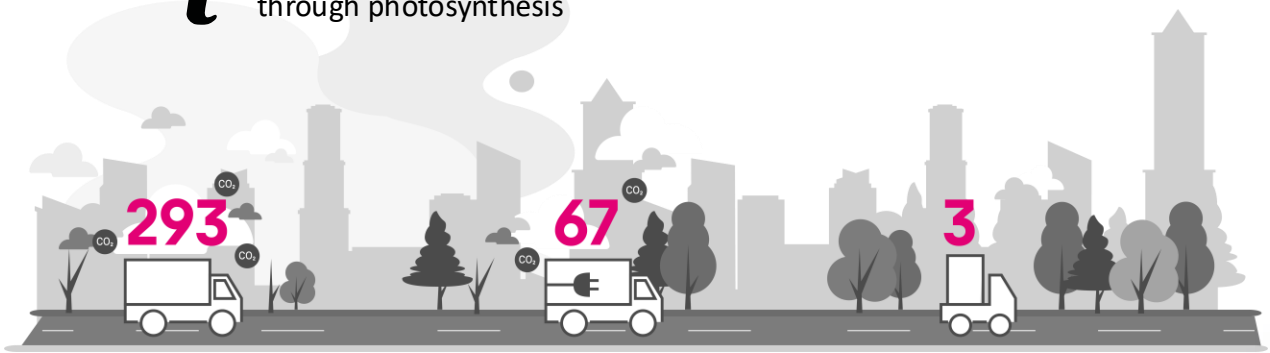
Transport & Logistics

The Challenge
citkar is the manufacturer of Loadsters, a four-wheeled e-cargobike that helps delivery services and transport companies get through city traffic more eco-friendly and efficiently. To optimize reliability and quality assurance as well as implement predictive maintenance, citkar wanted to be able to access usage data of the bikes as well as digital checkbooks.

The Solution
citkar now employs Drive & Track. IoT trackers on the Loadsters collect data on the speed and distance traveled and transmit it to the Cloud of Things. Via the online portal, citkar can view this information as well as the digital checkbooks.

Customer Benefit
The data allows citkar to ideally plan the maintenance cycles of the Loadsters and implement predictive maintenance. This improves the reliability of the e-cargobikes and prevents breakdowns. In addition, the manufacturer can improve quality control and replace fragile components. In the future, the system will be expanded to include the CAN bus inter-face, familiar from the automotive industry, which will allow even more detailed motor and electronics data to be collected. Firstly, citkar's customers save financially: instead of paying 11.20 euros for a car with an internal combustion engine or 4.10 euros for an electric car, they pay an average of just 0.70 euros per 100 kilometers with the Loadster.

A tree can process about 0.01 tons of CO_2 per year through photosynthesis



A **car** with an internal combustion engine emits 2.93 tons of CO_2 per 10,000 kilometers

An **electric car** produces 0.67 tons of CO_2 emissions per 10,000 kilometers (electricity generation)

The **Loadster** generates 0.03 tons of CO_2 per 10,000 kilometers (power generation)

Delivery Services

Beverages from the Cloud

The beverage and food delivery service Flaschenpost responds flexibly to short-notice market fluctuations by means of computing power from the Microsoft Azure cloud and fiber-optic links between its corporate headquarters and its warehouse facilities.

The Challenge
Order drinks online for delivery within 120 minutes is the Flaschenpost business model, but when working at high capacity the delivery service's in-house server capacities and data center resources reach their limits. In addition, the drivers' handhelds are difficult to configure and update and the wearables in the warehouses were often unreliably connected.

The Solution
All of Flaschenpost's infrastructure and platform services have with Telekom support been migrated to Microsoft 's Azure cloud platform. Updates to delivery drivers' IoT devices are now automatic and no longer need to be installed manually. Handhelds are preconfigured and equipped with IoT-enabled SIM cards. The scanners used in the company's intralogistics are now cordless IoT wearables attached to the order pickers' gloves that record the barcodes of crates automatically.

Customer Benefit
"Drinks for everyone immediately" is a promise to customers Flaschenpost can continue to keep because computing power and server capacities in the cloud simply grow with the company. Order spikes are no longer a challenge for the IT. Head office and warehouses are stably connected to the Internet. Handheld devices help to pick orders swiftly and reliably and show drivers the fastest route to the customer. Using the collaboration tool MS Teams employees organize themselves efficiently in project groups, share documents, process them in parallel and trade news and views in chats and web conferences.

"With the new IT infrastructure that we have rolled out jointly with Telekom, Flaschenpost is in a position to respond flexibly to the latest market developments and to new customer wishes."

Aron Spohr, Chief Technical Officer, Flaschenpost

flaschenpost.de

Optimized Supply Chain Thanks to Connected Lubricant Tanks

Now that tank drums are connected Ernst Meister can deliver lubricants to its customers just in time. The SME has optimized its supply chain and can extend its business model as a consequence.

The Challenge

Until recently neither Ernst Meister GmbH nor the company's customers could see how full their lubricant tanks were. Customers phoned the company at regular intervals to arrange delivery dates. That required administrative input and could also lead to deliveries arriving too early or too late. Deliveries were inefficient. After every delivery superfluous lubricant had to be taken back and the tanker cleaned. Delivery too late? In the worst case that meant a production outage for the customer.

The Solution

Using Telekom's IoT fill level gauge Ernst Meister connected the tank drums and developed a retrofit solution. An IoT sensor now pokes through a hole in the service hatch into the tank's interior and measures the fill level ultrasonically. Once a predefined level is reached Telekom partner Autosen's io-key gateway sends the fill level sensor's data to Telekom's Cloud of Things IoT platform.

Customer Benefit

Ernst Meister can view individual tank fill levels on a Web dashboard. When a predefined level is reached the company is notified by e-mail. The customer no longer needs to call and deliveries that are too early or too late are a thing of the past. That reduces customer outages and costs, and thanks to IoT connectivity Ernst Meister can optimize its business model and provide a more efficient service.

> "Thanks to the IoT solution we can now offer our customers a markedly more efficient service. We have already noticed positive effects with both existing and new customers.
>
> **Daniel Schulte**, Certified Lubricant Technology Specialist, Ernst Meister GmbH

Meister
Schmierstoffe | Energie | Recycling

Waste Disposal

Innovative Products and Services with IoT

Smart, connected products provide insights into customer needs, enable innovative services and open up new revenue streams.

Kässbohrer: Networked PistenBully Works More Efficiently

Kässbohrer Geländefahrzeug AG has connected its PistenBully snow groomers on the cell network. Ski slope operators benefit from more efficiency, sustainability and safety in preparing ski slopes.

The Challenge

Snow production and slope preparation are significant cost factors for Kässbohrer customers who need reliable data-based snow depth information in order to work more safely, more efficiently and more resource-savingly. For the PistenBully Kässbohrer required mobile connectivity that would enable its snow groomers to transmit this data in real time, and every PistenBully driver had to be aware at all times of conditions on the slopes.

The Solution

Kässbohrer equipped all new PistenBully vehicles with a communication module that incorporated a Telekom SIM card. During slope preparation they communicate autonomously with each other and share with the data center information about snow depth and precise position. This data is visualized on a map of the terrain that drivers see on a monitor screen.

Customer Benefit

Information about snow depth and slope areas already prepared enables the driver to navigate more specifically and eliminate duplication, saving time and fuel. Efficient use of available snow resources relieves pressure on the environment because less artificial snow is required and vegetation beneath the snow cover is protected. Water, electricity and fuel are also saved and the IoT solution enables slope operators to extend the skiing season. Drivers are safer too because danger points can always be seen – even in poor visibility. Remote access to telemetric data from vehicles enables malfunctions to be analyzed in advance and resolved in a more targeted manner. And thanks to Telekom's global footprint Kässbohrer can offer this service to customers all over the world.

> "Thanks to cellular connectivity we can now offer our customers new, extended services."
>
> **Christian Mönig**, Business Development Manager, Kässbohrer Geländefahrzeug AG

KÄSSBOHRER GELÄNDEFAHRZEUG AG

Manufacturing

Everything at a Glance on the Construction Site

PERI GmbH SE has connected its formwork elements for construction sites and can now offer its customers a comprehensive localization service.

Construction Industry

The Challenge

PERI GmbH SE, a specialist in formwork and scaffolding systems headquartered in Weissenhorn, Bavaria, is involved in the daily challenges posed by construction work in over 70 countries around the world. In order to record the deployment or storage location of formwork elements faster and more precisely PERI was on the lookout for a tracking solution suitable for the construction industry.

The Solution

A combination of two IoT tracking systems now ensures transparency. Telekom's Low Cost Tracker is in charge of the rough localization of the elements. Connected by LTE-M, NB-IoT or 2G to the Cloud of Things, Telekom's IoT platform, it shows which part is on which construction site. A second tracker supplied by Telekom partner Syfit reports by Bluetooth Low Energy the exact position of the formwork elements on the site.

Customer Benefit

Connectivity on the Internet of Things has several advantages for PERI. The manufacturer can now offer its customers an additional service when they purchase formwork elements. PERI itself has an up-to-date overview of parts rented out, can manage stocks more efficiently and announce a precise delivery time to customers.

> "Thanks to the tracking solution, our customers and we ourselves always have our formwork systems in view. In this way, we make a significant contribution to the digitalization of the construction site."

Wolfgang Span, Senior Global Digital Solution Manager bei PERI

Manufacturing

Networked Ventilators on the Internet of Things

ZIEHL-ABEGG, a family firm in Künzelsau, Baden-Württemberg, manufactures high-quality ventilation and air conditioning systems for a variety of uses. The new Zabluegalaxy platform was develope to ensure that customers are better able to monitor their ventilators. Customers can now keep an eye on them and take immediate action in the event of a malfunction.

The Challenge

ZIEHL-ABEGG ventilators are used in critical environments such as factories, laboratories, agricultural enterprises or server facilities where reliable operation of the ventilation technology is of crucial importance. Maintenance cycles were set at correspondingly close intervals that involved a high level of effort and expense. ZIEHL-ABEGG also wanted a customer and administration portal where customers would have access to their live status and operating data and could be offered additional services such as optimal management, maintenance and procurement.

The Solution

ZIEHL-ABEGG's air echnology products will in future be equipped with additional sensors that at intervals of seconds send a status update by Bluetooth to the IoT gateway. Data collected can be electricity consumption, internal and external temperatures, operating hours or vibrations indicating a possible imbalance. Via a local WiFi, LAN or cellular network connection the gateway relays the bundled data to the IoT platform. With a mouse click on their user interface customers can access the status of their equipment. ZIEHL-ABEGG gains insights into the performance of its equipment in order to improve the planning of maintenance, servicing, product requirements ad service life. Current status information or malfunction notfications for individual items of equipment can also be accessed on the Zabluegalaxy platform, on WhatsApp, by e-mail or by SMS.

Customer Benefit

Connection to the cloud and the Internet of Things now enables the ZIEHL-ABEGG team and customers themselves to monitor connected devices continuously. Threshold levels set in the system ensure that customers and service technicians receive timely alarm notifications. Device downtimes are thereby reduced significantly and unnecessary on-site servicing of ventilators is avoided. ZIEHL-ABEGG has been able to reduce its global customer service costs sustainably and its research and development department benefits from the consolidated device parameters across the entire product lifecycle that networking on the Internet of Things provides.

ZIEHL-ABEGG

Manufacturing

Mit der Cloud zur Smart Kitchen

Dank der IoT-Plattform kann MKN seinen Kunden eine Ende-zu-Ende Lösung anbieten, um ihre Profiküchen zu digitalisieren.

The Challenge
MKN wanted to connect its combi steamers to the Internet of Things in order to provide its customers with digital cookbooks and automatic steaming programmes. In addition, comprehensive analytics and predictive maintenance were to guarantee even greater efficiency and quality of the devices.

The Solution
An end-to-end solution: with the IoT Cloud, Deutsche Telekom provides not only the technological foundation, but also the hardware and connectivity via LAN, WLAN or a mobile network. As such, all device data is consolidated via the Cloud of Things and made available to provide a visual presentation tailored to each end customer's requirements.

Customer Benefit
The IoT platform allows uniform steaming programmes to be installed on the devices. These programmes are based on expert experience and automatically ensure high-quality results. The users benefit from centrally controlled steaming processes, status checks for optimal device use and automated checks for hygiene regulation compliance.

> "Efficient processes and reliable technology are vital in the restaurant sector as professional chefs are today confronted with high expectations, time pressure, a lack of specialist staff and strict demands when it comes to food hygiene."
>
> **Peter Helm**, authorised officer and Head of Innovation and Digitalisation at MKN

Stay Competitive with Data from the Cloud

From brake wear to service requirements: To service cars more efficiently, SELECT AG provides independent workshops with vehicle information from the cloud.

Automotive

The Challenge
Since 2018, new cars must be equipped with a SIM card that can send an emergency signal in the case of an accident. These cards can also provide manufacturers with valuable vehicle data that they can use to recommend maintenance work at authorized workshops, even before damage or wear is audible or visible. But the more than 21,000 independent workshops in Germany do not have access to this vehicle data and therefore cannot offer services such as predictive, data-based maintenance.

The Solution
SELECT AG offers its customers the opportunity to network cars via an on-board diagnostic adapter and a SIM card. In the case of newer vehicles, an existing car connection can be used. Independent workshops can retrieve telemetry data centrally via an IoT platform, which had been developed by Telekom's digitization for SELECT AG, to store and analyse all the data.

Customer Benefit
Independent workshops now know when an inspection or repair is due for which customer. Through the connection to the cloud platform, the driver quickly receives a recommendation for action. This way, workshops can increase customer loyalty and offer better and faster service. They can service cars in a predictive manner and always have spare parts on site in time to reduce outages.

> “Thanks to this connection and evaluation independent workshops that cooperate with us know exactly when their customers will need a specific repair and are able to recommend appropriate measures, thereby boosting customer retention.”
>
> **Daniel Trost**, Chief Digital Officer SELECT AG

Transportation

POC

Self-propelled Vehicles and Autonomous Transport Systems

Auve Tech is an Estonian company specialized in the development and deployment of self-proplelled vehicles and autonomous systems.

The Challenge

At present, Auve Tech shuttles—like many other self-propelled vehicles—use sophisticated, cost-intensive LiDAR technology. With the aid of LiDAR the shuttle recognizes its surroundings and calculates its position in relation to other physical objects and obstacles. As a backup in case the LiDAR technology fails (in bad weather, for example) Auve Tech uses GNSS Precise Positioning, which in relation to possible sources of error is largely independent of LiDAR and is also one of the least expensive sensor systems in the context of autonomous navigation technology.

The Solution

To test the accurac of positioning when navigating without LiDAR Auve Tech installed an evaluation kit with a Precise Positioning GNSS module (PGM) developed by Swift Navigation in its shuttles.

Customer Benefit

The test revealed that the PGM and the Skylark Precise Positioning service enable safe and accurate positioning for autonomous navigation. The same test run was undertaken first just with LiDAR technology and then repeated with Precise Positioning. The monitoring system showed the same results for both runs. LiDAR and Precise Positioning defined the same area so that Precise Positioning can demonstrably be used as a standalone solution for autonomous transportation. In a next step Auve Tech will be working on a few minor discrepancies that came to light in the test and optimizing the solution for use in production.

> “We at Auve Tech make the world’s most flexible ecosystem for last-mile transport: our autonomous shuttles. The Swift Navigation GNSS module was tinstalled in our shuttle to improve our autonomous mobility system. Intensive tests carried out on our system serve to make our navigation even safer by means of Precise Positioning.”
>
> **Jorma Hiie**, Project Lead, Auve Tech

auvetech

Manufacturing

Staying competitive with data

The window manufacturer is setting itself apart from the competition by installing chips in its window frames, which can send dimension data and maintenance information to a smartphone.

The Challenge

Cheaply manufactured windows from Eastern Europe are flooding the German market. IDEAL hopes to use digital services to impress demanding target groups from specialist retail with the quality products from the Rhineland-Palatinate region in Germany.

The Solution

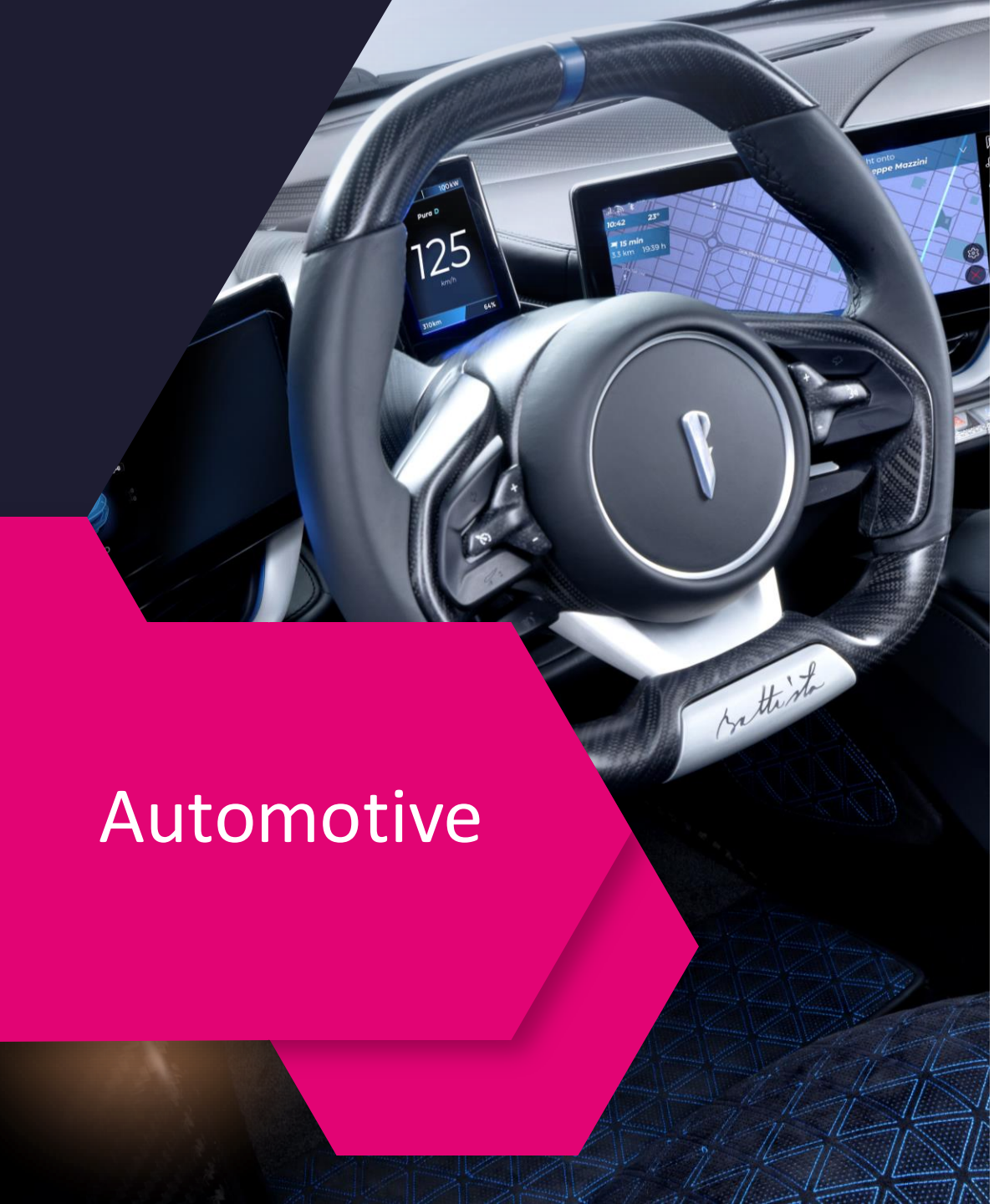
Since 2019 NFC chips have been incorporated into all IDEAL windowframes. Using an app-based solution from Syfit, a Deutsche Telekom joint venture, and a software-as-a-service solution, dealers and end customers can scan the chips with a conventional smartphone for information about dimensions, certificates and care instructions.

Customer Benefit

Leafing through catalogues, searching through storage facilities and measuring by hand are all now a thing of the past: the app immediately provides retailers with all the information they need on a window. Accordingly, **defects** can be repaired more easily and returned goods can be processed more quickly.

> “Our customers know Deutsche Telekom as an established company. With a solution from them, we are underlining the trust our clients already place in us.“
>
> **Claudia Otten**, Marketing Managerin at IDEAL

IDEAL-FENSTERBAU WEINSTOCK
...mit der Technik von morgen



Automotive

The world’s first globally connected electric hypercar

A Telekom eSIM connects Automobili Pininfarina’s Battista hypercar, which will debut in 2019, with the Internet of Things all over the world, including infotainment, telemetry and remote fault diagnosis.

The Challenge
Developing 1,900 PS, accelerating from 0 to 100 km/h in less than two seconds and reaching a top speed of 350 km/h, Automobili Pininfarina’s Battista EV hypercar is the most powerful automobile ever made in Italy. With a range of 500 km the new hypercar can cover an impressive distance on one battery charge. And its connectivity has to equal this performance in every respect.

The Solution
The Battista is equipped with a permanently installed Telekom eSIM via which the super sports car can connect with the Internet in more than 50 countries around the world. Automobili Pininfarina manages connections for the car in all countries via a central Telekom IoT portal. The platform is operated to the highest data and security standards from
a data center in Frankfurt.

Customer Benefit
Via the Battista’s Internet access Automobili Pininfarina can download and evaluate comprehensive vehicle and telemetry data in real time, diagnose faults remotely and update software in the car over the air. Reliable connectivity makes infotainment offerings such as route planning possible in real time, including pointers to free charging points.

> “All of these elements of connectivity contribute to our seamless Life on Board Concept. Everything from the driver-orientated user-experience to the convenience features such as the global roaming and OTA updates have been developed and engineered to bring heightened convenience to our luxury hyper GT.“
>
> **Paolo Dellachá**, Chief Product and Engineering Officer, Automobili Pininfarina

AUTOMOBILI pininfarina

Automotive

BMW I Global IoT Connectivity

On the Move and Always Online

For large mail attachments, video conferences or streaming services, Telekom's HotSpot Drive provides BMW drivers in selected models with swift and stable internet access on the move.

The Challenge

If you use your mobile data volume in your car to take part in video conferences or enable passengers to use streaming services and watch movies, it won't be long before you are notified that your data volume is almost used up. Wouldn't it be better to be able to access swift and stable in-car WiFi on the move as comfortably as at home?

The Solution

Jointly with Telekom, BMW offers in most BMW model ranges an optional mobile WLAN hotspot. Using Telekom's HotSpot Drive service, BMW drivers can now surf the Net across Europe with swift and stable WiFi. Up to ten mobile terminal devices can be connected to the hotspot simultaneously and a separate SIM card is not required.

Customer Benefit

BMW drivers are now connected with the Internet on roads all over Europe via a fixed antenna. The HotSpot Drive is much faster than smartphone hotspots and personal data volumes are not affected. Thanks to perfect reception jerky video conferences or interrupted streams are no longer a problem.

> "With Telekom's HotSpot Drive BMW offers its customers even better service and makes driving more enjoyable by providing high-speed Internet access on attractive terms in many European countries."
>
> **Sebastian Bales**, Account Manager M2M / IoT Automotive bei Deutsche Telekom IoT

Smart Beermat for Gastronomy

Thanks to a connected beermat from Hoffmann + Krippner, bars and breweries are finding out more about the drinking habits of their guests and customers.

The Challenge
Breweries, bars and restaurants know very little about their customers' consumer behavior. When do they drink and which drinks do they prefer? Are special offers and advertising campaigns effective? Hoffmann + Krippner, a manufacturer of flexible data entry systems, was looking for a digital solution to enable it to provide beverage manufacturers and bars with relevant data.

The Solution
Hoffmann + Krippner developed a smart beermat. It records the weight of a glass by means of a pressure sensor; from that the quantity consumed can be inferred. In addition the company incorporated tiny Telekom M2M SIM cards in the beermats. They send the data by NarrowBand IoT (NB-IoT) to the Cloud of Things, the Telekom IoT platform. The data is then processed for sending to beverage manufacturers, bars and restaurants.

Customer Benefit
Breweries and caterers learn more about their customers' consumer habits and can make them customized offers. They now know which kind of beer is drunk in which quantities and when. Waiters can see from the quantity consumed which guests might want to order another glass and can approach them proactively. Initial tests show that the IoT can help to boost sales by between 10 and 20 percent.

> "If we enrich the beermats with extra information such as the weather conditions, beverage manufacturers and caterers can customize special offers to match the the situation."
>
> **Ralf Krippner**, Managing Director, Hoffmann + Krippner GmbH

Hoffmann+ Krippner

Gastronomy

AI-powered IoT sensors optimize the search for parking spaces

Cleverciti and Deutsche Telekom connect parking spaces with AI-supported sensors and IoT technology. The smart solution reduces traffic congestion and optimizes parking space management worldwide.

Challenge

According to surveys, around 30 percent of inner-city traffic is caused by the search for parking spaces. This leads to traffic jams, increased emissions and frustration among drivers. Cities need an efficient solution to better manage parking spaces and quickly direct drivers to available spaces.

Solution

Cleverciti's system for monitoring and controlling parking spaces is based on optical sensors that are mounted on existing infrastructure such as streetlights. One sensor can detect up to 100 parking spaces and uses AI to analyze their occupancy in real time. The occupancy data is transmitted securely and in compliance with data protection regulations to the cloud via Deutsche Telekom's 4G/5G network. Digital displays guide drivers to free parking spaces. A smartphone app also offers navigation and payment options. Cities receive detailed analyses of parking space usage for better planning and more efficient management. Deutsche Telekom's global mobile coverage enables Cleverciti to use the solution worldwide.

Customer Benefit

The Cleverciti solution halves the average time spent looking for a parking space. This reduces emissions and noise and thus increases the satisfaction of residents and visitors. Retailers benefit from increased customer footfall when there is more time for shopping or eating out. Cities optimize their parking management through data-based decisions. The utilization of parking spaces increases, which leads to additional revenue.

> „Thanks to Deutsche Telekom's global IoT network, we can deploy our solution worldwide and help cities transform their parking operations."

David Parker, CEO Cleverciti

Cleverciti

Smart City

Expensive energy resources

Since 2021, companies in the heating and transport sectors have had to buy emission rights as certificates. At the same time, the prices for oil and gas are rising. IoT can reduce these costs.

Smart Light for the Berliner Bogen

Lighting controlled smartly and not just switched on or off: Lichtwart's IoT solution illuminates the Berliner Bogen in the heart of Hamburg energy-efficiently and cost-effectively.

The Challenge

By day the Berliner Bogen in the heart of Hamburg seems to hover over the water. By night the office building, which is one of the city's most important architectural highlights, shines in the light of 28 LED panels. To ensure that the impressive lighting is always well maintained and incurs the lowest energy costs possible, the operator relies on smart functions from the Internet of Things.

The Solution

IoT instead of a simple time switch: Lichtwart handles the Hamburg building's smart light management. Equipped with a twilight sensor and connected with the Internet via Telekom's mobile network, the solution adjusts the system precisely to the prevailing light conditions. On the Web interface of the Cloud of Things, Telekom's IoT platform, the operator has an overview of the lighting's current status. If problems occur, he may also, as requested, receive alarm notifications by e-mail or SMS.

Customer Benefit

Compared with conventional alternatives, smart light management enables the operator to achieve an energy cost saving of up to 40 percent that contributes toward the building's sustainability. Defective LEDs do not go unnoticed for weeks, the building is always well lit, and it looks prestigious in the dark. If LEDs are nearing the end of their service life the operator can replace them by means of predictive maintenance.

> "With the Lichtwart IoT solution we can control and monitor the LEDs on the building quite simply and without on-site technicians That increases energy efficiency enormously and reduces costs."
>
> **Dennis Peizert**, CEO, Hanselicht GmbH

LichtWART®

Building Management

Building Management

Using and Managing Buildings Effectively

Transparency in the condition and utilization of rooms: World-leading facility services provider ISS is using sensor technology and the IoT to digitize its building management.

The Challenge

Which work areas do employees use? And what about the air quality in rooms? Rather than heating and air conditioning all rooms uniformly and irrespective of their utilization, the ISS approach to building management measures and regulates temperature, humidity and air quality individually.

The Solution

Based on sensors, a gateway and an IoT cloud platform and Web portal, a digital building management system ensures transparency. The walkthrough Telekom solution monitors effectively with a usage orientation working areas, building technology, room quality and comfort parameters in buildings. Sensors measure and record the utilization and occupancy of rooms, the status of doors and windows, carbon dioxide, humidity, noise, light and temperature. As soon as defined limits are exceeded the user is notified. The solution can be optionally extended and combined with every customer system.

Customer Benefit

Building managers, operators and even users always have an up-to-date overview of room utilization. Heating and ventilation as required ensures a better room climate and saves energy. Lighting is only switched on in rooms where there are people. Environmental systems can be maintained predictively, and rooms can be cleaned as required. Areas can be used more efficiently, bundled, let or otherwise utilized. When rental and service costs correspond to actual requirements customer satisfaction is sure to increase.

Founded in 1901

485,000 employees

Headquarters in Copenhagen

Smart City

IoT Connectivity for Smart Lighting

The Portuguese startup Omniflow manufactures smart IoT lamppoles powered by wind and solar that with Telekom's international IoT connectivity can be connected and put to a wide range of uses.

The Challenge
Conventional street lighting uses a lot of energy and provides just lighting. That makes it expensive to operate and maintain and means bad news for the energy efficiency of cities and municipalities. While many cities switch to energy-saving LED street lights, this infrastructure lends itself to a wide range of smart additional functions.

The Solution
Street lighting, WiFi access point, security camera: the Portuguese startup Omniflow's smart IoT lamppole incorporate numerous Smart City functions and Telekom's 4G small cell technology provides WLAN street light connectivity. Broadband is the basis of many IoT functions, including a link with the cloud. Customers can check and evaluate on a Web portal data raging from air quality to traffic volumes. The lighting is also extremely energy-efficient and sustainable; they run on solar and wind turbine power.

Customer Benefit
Omniflow smart IoT lamppole with Telekom international 4G connectivity offers cities and municipalities around the world- a powerful basis on which to embark on Smart City projects, to collect and evaluate measurement data and, at the same time, to save energy.

> "We supply municipalities, citizens and tourists with smart and sustainable street lighting accompanied by numerous useful extra functions. Telekom makes it possible with international IoT connectivity and a broadband link to our cloud."
>
> **Pedro Ruão**, CEO, Omniflow

Omniflow®

Fleet Management by IoT: More Service, Lower Costs

Facility services provider Avant uses a fleet management solution to plan its vehicles' routes. That reduces fuel consumption costs and journey times by up to 20 percent.

The Challenge
Service provider Avant used to plan the routes of its cleaning teams using Google Maps in the order in which jobs were received. That was how inefficiently coordinated its employees were as they drove around their entire operational area day by day. In addition, they could only use company vehicles privately by applying the 1 % list price method.

The Solution
Avant fitted out 23 vehicles with GPS trackers. They can be installed by plug and play via the OBD2 interface. The company then uses Telekom's Drive & Track powered by Fleet Complete. On the fleet management solution's web interface, the company can see the exact location of each connected vehicle and use the software to plan the optimal routes for its cleaning teams. The solution can be used intuitively on the online portal and no training by external specialists was needed.

Customer Benefit
Avant has reduced its fuel costs by up to 20 percent and now deploys its employees much more efficiently. It discusses directly with its customers schedules that make sense. Customers are also notified without delay when the cleaning team is due to arrive. Avant's managing director can also see on the online portal how much time the vehicles spend at cleaning locations or elsewhere. If necessary, he can discuss times with his employees and optimize them. Employees benefit from an electronic logbook if they want to use a vehicle privately.

Drive & Track Benefits

- Lower costs
- Better customer service
- Ease of handling

Avant GEBÄUDEDIENSTE GMBH

Logistics

Bottle Bank, Please Report!

REMONDIS, one of the world's largest public service, recycling and waste management companies, has optimized the collection cycles of waste glass containers with an IoT solution.

The Challenge

Until recently, REMONDIS drove to its glass recycling containers in towns and municipalities on a rotational basis regardless of whether they were full or not. On emptying, the bottle banks were, on average, at only 60 percent capacity, indicating unnecessary trips and wasteful fuel consumption. On the other hand, the containers were repeatedly overfilled at peak times, with bottles overflowing outside them, risking accidents, injuries, and environmental pollution.

The Solution

The recycling containers were then equipped with ITCPRO, an IoT fill level meter developed by REMONDIS in collaboration with the Fraunhofer Institute and Deutsche Telekom. Via an integrated NarrowBand IoT (NB-IoT) radio module, the laser sensors now automatically report when the specified fill level is reached.

Customer Benefit

REMONDIS can optimize route planning thanks to IoT: Glass collections are now made on an as-needed basis using accurate fill level data. On average, the containers are now 90 percent full before emptying, an increase of 30 percent. REMONDIS uses its fuel-consuming crane equipment to load its collection vehicles much more effectively. This means a considerable reduction in CO_2 emissions per ton of waste glass collected. Workloads have also reduced, enabling REMONDIS to better cope with the increasing shortage of drivers. At the same time, there is no longer any unsightly and labor-intensive overfilling at container locations. Another advantage is the tamper-proof, automated documentation of messages and emptying times. Thanks to NB-IoT, the radio modules are inexpensive to manufacture and energy-saving in operation, so they remain ready for use for up to five years without requiring maintenance. REMONDIS can offer its customers a more efficient collection service thanks to IoT.

> “We are absolutely delighted with Telekom's solution, which pays off for us in more ways than one. Together with our municipal partners and customers, we all benefit from the emissions saved.”
>
> **Arne Brosch**, CEO REMONDIS Olpe GmbH

REMONDIS®
IM AUFTRAG DER ZUKUNFT

Waste Management

Waste Paper Container, Please Report!

Document and information logistics company Rhenus Data Office has optimized the collection of its customers' document recycling containers with the help of networked IoT sensor technology.

The Challenge
Secure Rhenus containers for document disposal are often on different floors in office buildings. Whether they are full can only be checked manually, which leads to a high number of messages between the Rhenus call center and its customers. With some containers full and others half empty, collections can be inefficient and difficult to plan.

The Solution
Rhenus and Deutsche Telekom have equipped the containers with the ITCPRO IoT fill level meter. The meter uses a laser to measure how full the containers are and automatically reports via the NarrowBand IoT (NB-IoT) standard when they are ready for collection. The data is processed in the cloud and visualized clearly in a web dashboard. Customers' systems, such as ERP or route planning, can also be connected to the cloud platform.

Customer Benefit
Rhenus, and if required, the customer's facility manager or other designated person, have an overview of the current fill level of all containers via the web dashboard. This information means that the collection cycle can be adapted to actual demand, conserving resources. Another advantage is that data protection is always guaranteed as containers are replaced before they overflow. Moreover, NB-IoT enables connection even from basements or warehouses. The battery-powered radio modules operate maintenance-free for several years because of the energy-efficient technology. Thanks to IoT, Rhenus now offers its customers a more efficient document collection service.

> "The newly developed fill level sensor turns our document disposal containers into smart safety garbage cans and optimizes collection for the benefit of our customers."
>
> **Michael Wiegmann**, CEO, Rhenus Data Office

RHENUS LOGISTICS

Waste Logistics

Future-proof Operating Processes

Predictive maintenance, demand-based delivery, usage-based billing – operational processes optimised with IoT save time and money.

Machinery Constantly in View

Construction companies locate their machinery and record all of its operating parameters on the Sharemac SaaS-solution.

The Challenge
Construction companies often don't know exactly where their machinery is. For a significant amount of time, it is left unused and unproductive on construction sites or in storage facilities. Sharemac developed tracking modules to locate machines. The startup then worked on a solution to connect the modules and make construction machinery easy to find.

The Solution
Telekom equipped the telematics boxes with LTE-M-SIM cards and helped with configuration and programming. In addition to location, the modules record parameters such as operating hours, battery status, or idling. All of this information converges on a management platform.

Customer Benefit
Construction companies locate and manage their machinery, record operating hours for billing and gain an overview of the condition and utilization of their machinery on the Sharemac software. Using the GPS geofence function, an anti-theft alarm can also be set up. In a next step Sharemac aims to combine the management system with a rental platform for construction machinery and thereby create a comprehensive solution for construction companies.

> "Telekom's technical expertise and professional approach, plus its image as the provider of the best network, were what won us over."
>
> **Rezi Chikviladze**, Mitgründer & COO der Sharemac GmbH

SHAREMAC

Construction

Controlling Conveyor Systems efficiently with the IoT

The RUD Group maintains its conveyor systems predictively via the Internet of Things (IoT). That strengthens customer relationships and makes new business models possible.

The Challenge

The RUD Group is the market leader for conveyor chains that are used to remove ash in coal-fired power stations. The chains are essential for the production process because the power station only operates trouble-free if the incineration waste is removed. Chains need to be replaced regularly because the material is severely impacted by the heat, the weight of the ashes and 24/7 operation. The right time for replacement or the material load have until now been determined by means of a rough estimate.

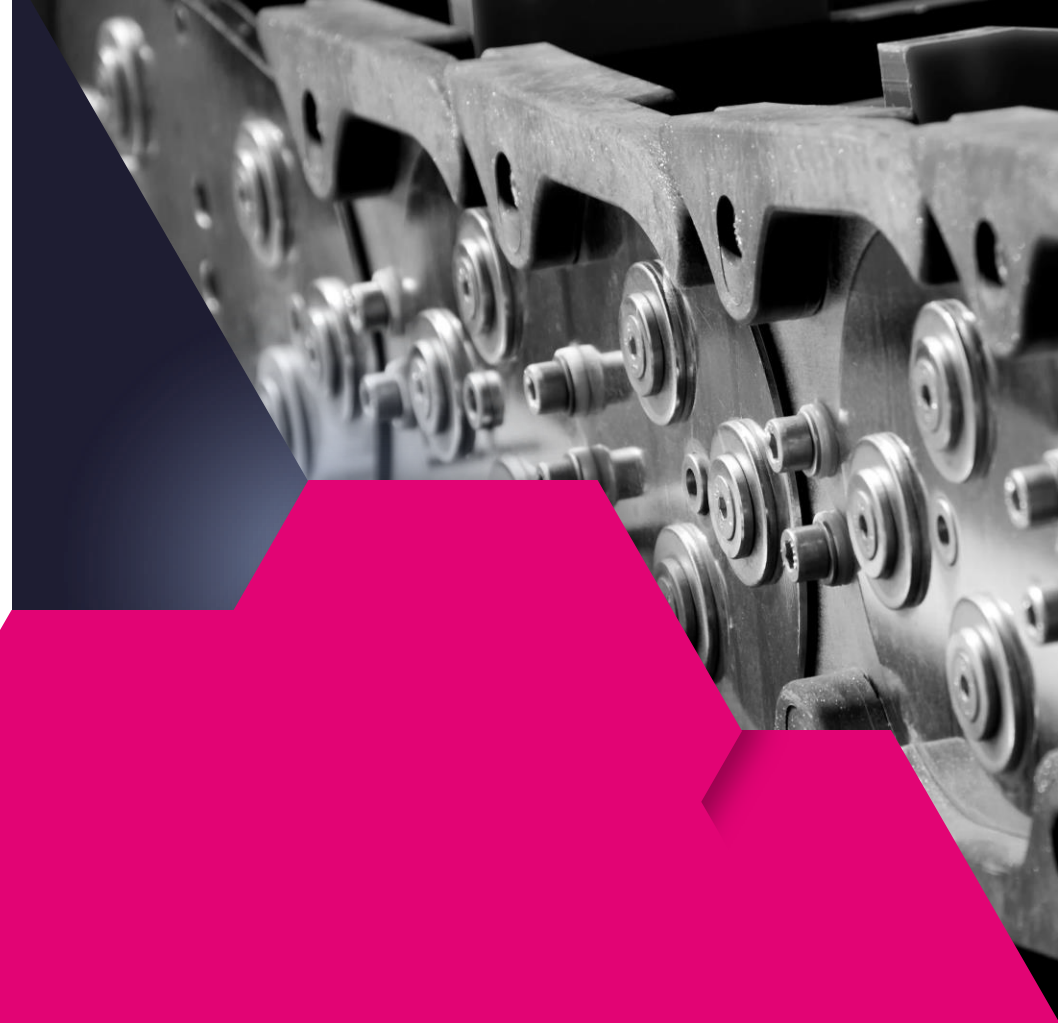
The Solution

To gain a transparent overview of the wear and tear and service life of conveyor chains the RUD Group joined forces with Telekom and fitted them out with IoT sensors. Built-in SIM cards using GSM encryption record all readings and relay the data to Telekom's Cloud of Things. RUD Group employees and customers access the data via the IoT platform's specially secured dashboard, evaluate data, carry out long-term analyses and receive current status reports. If the readings differ from the control values the system triggers real-time alarms.

Customer Benefit

Rather than relying on their gut feeling, RUD service technicians maintain and replace high-performance chains exactly when needed. Customers benefit from plannable plant downtimes and, thanks to predictive maintenance, the RUD Group can schedule and deploy maintenance personnel and replacement material as required. The RUD Group is thereby able to enhance the innovative pioneering role that it plays in its market segment.
With the Telekom IoT solution we are positioning ourselves as an innovator and generating tangible added value for our customers."

> "With the Telekom IoT solution we are positioning ourselves as an innovator and generating clear added value for our customers."
>
> **Klaus Pfaffeneder**, General Manager Conveyors and Drives, RUD Group



Engineering

RUD®

Construction

Otto Heil I Asset Tracking

Bluetooth Beacons Boost Efficiency on Construction Sites

It’s always good to know where tools and construction materials are: How the Otto Heil construction company benefits from its digital asset management.

The Challenge
Otto Heil employees often faced the problem of not knowing exactly where construction machinery and tools were. They were mostly not found to be missing until after employees had dismantled the site. Moving equipment from one site to another was documented only by handwritten delivery notes. In the long term that proved time-consuming and inaccurate.

The Solution
To tackle the problem the company began, jointly with Telekom and its partner Syfit, to attach Bluetooth beacons to items of equipment. Their exact position can then be determined with the aid a smartphone. The data is relayed to and processed on Telekom’s IoT platform the Cloud of Things. A mobile app then shows locations, battery runtimes and other usage data.

Customer Benefit
Otto Heil now knows at all times where every item of equipment is. The company is also notified of how many of each item is at which location. Employees save time by no longer needing to write delivery notes. Communication is easier. Usage periods can be calculated precisely via an ERP connection. Inventories take less time and are less complicated.

IoT Benefits

- Quick search fort products and components
- Time saved by digitization
- Data visualization in the Cloud

OTTO HEIL

Construction

Bauer AG | Condition Monitoring

IoT Improves Safety in the Excavation Pit

Bauer AG uses IoT sensors in its sheet piling to check the extent to which surrounding soil is a burden on excavation pits. That helps to prevent damage and protect employees.

The Challenge
Concrete or metal sheet pilings protect excavation pits and terrain jumps from water or rocks in the soil. Load sensors attached to strain gauges on the walls supplied Bauer AG with data about pressure and possible damage. Engineers monitored these load cells on-site. They noted the data by hand and it was often not manually evaluated for days, so any damage that occurred between checks was only noticed after a time lag.

The Solution
A robust local Telekom IoT control unit receives the signals from all of the load cells and evaluates them. The device relays data continuously via the Telekom LTE network to Bauer AG's Microsoft Azure cloud, where it is visualized and compared with historic data. As soon as the readings exceed or fall below threshold levels the device sounds an alarm to warn construction workers on the site.

Customer Benefit
Thanks to real-time data the engineer in charge can spot the slightest movements immediately and initiate timely countermeasures to prevent serious damage. In addition, he is notified of incidents by a push message. In this way digitized information makes the interplay between construction workers, engineers and construction machinery easier.

IoT Benefits

- Visualize real-time data and couple with historic data
- Compare and optimize construction site structures
- Central data pool saves time and money

Building Management

Polygon | Condition Monitoring

The Box Takes Care of Measurement and Documentation

Connected with the Cloud, the electricity consumption of dehumidifiers can be monitored, saving time and ensuring accurate billing.

The Challenge
To remediate water damage the Polygon Deutschland Group uses dehumidifiers on-site. With proof of consumption the customer can claim from the insurer the cost of the electricity consumed. Providing proof used to be a time-consuming analog process in which the consumption data could not be determined with absolute accuracy.

The Solution
Since 2018 the damage remediator has used the PV-E-Box, developed by Telekom Deutschland and T-Systems. An intelligent extension cable between the power connection and the dehumidifier, it records energy consumption dedicatedly and relays it to Telekom's Cloud of Things. Combined with a smartphone app a dehumidifier pair (dehumidifier + box) is assigned to an order. Electricity consumption is measured during the drying process and relayed to the customer's backend.

Customer Benefit
Polygon is becoming a preferred partner of insurers, due not only to its simple and precise determination of consumption but also to the manipulation security it provides. For the technicians and the back office the digital solution replaces a time-consuming handwritten process. Polygon also improves customer satisfaction by billing promptly on the basis of timely data.

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Founded in 1992 > 3,000 employees

80+ branches Headquarters Olpe

POLYGON

Manufacturing

Smart furnaces for crystal-clear quality

Glass finisher GlasGo is able to monitor temperatures in its furnaces using IoT sensors. This keeps the amount of rejects to a minimum and avoids machine downtimes, reducing energy costs by 10%.

The Challenge

The global market leader in the area of glass finishing coats up to 200,000 glasses a day. The special coating is very sensitive to fluctuations in temperature: if it's too hot, the coating will burn, if it's not hot enough, it won't stick properly to the glass. Previously, employees used to monitor production manually but were unable to precisely measure the ideal firing temperature of around 180 °C. If GlasGo received complaints, the lack of transparency meant they were unable to prove that everything was in order during the firing process.

The Solution

GlasGo has equipped its furnaces with IoT sensors to create transparency in the process of monitoring the firing quality. These sensors measure the inside temperatures of the furnaces every ten seconds and send all information to the Telekom Cloud of Things via NarrowBand IoT (NB-IoT) using a connected IoT gateway. Data is processed in real time on the IoT platform and the results are displayed. The shift supervisor is automatically notified via text message or email as soon as the temperature exceeds or falls below the limit values.

Customer benefit

More precision in planning production cycles has reduced downtimes of the sensitive machines by six hours per month on average. It also allows users to avoid unexpected malfunctions as the system immediately alerts you of any fluctuations in temperature. A constant temperature feed also reduces energy costs by 10%. The glass finisher's waste has also been reduced by a few hundred glasses a month.

> "Our customers can also see the measured values of their batches – a special service with which we can further increase the trust of customers."
>
> **Hans-Jürgen Hirsch**, CEO, GlasGo GmbH

GlasGo®

Skilled worker shortage

Almost all industries are affected by the shortage of skilled workers – and the trend is rising. IoT can help by making training easier, reducing the workload and improving working conditions.

Manufacturing

Digital parking space management made to measure

By using a digital parking space management system, employees at the camper van manufacturer lose less time when searching for parked vehicles prior to them being moved to production.

The Challenge
Dethleffs used to rely on technologically outdated hand scanners and paper lists for its parking space management. This process cost employees a lot of time before they could find the right vehicle from a stock of over 4,000. This often resulted in delays, as vehicles were often not ready and waiting for the next production step.

The Solution
With an app-based solution from SYFIT GmbH, a joint venture with Deutsche Telekom, the GPS positions of the hand scanners are determined when an employee scans a bar code on the vehicle. The data is transmitted to the back end via a mobile network and is then always available on mobile end devices and in a browser.

Customer Benefit
Long searches in the large parking area are now a thing of the past, as are production delays. Drivers can locate the vehicles quickly and accurately. In addition, stock can be taken at the push of a button. This saves effort, reduces costs and enables just-in-time production.

> “In Deutsche Telekom, we have found a partner that supports us in digitalising search processes in our production.“
>
> **Alexander Leopold**, Managing Director, Dethleffs GmbH & Co. KG

Dethleffs

Precise Time Recording on Construction Sites

At Dekora, a craft business enterprise, digital terminals and apps now take the place of error-prone paper time sheets and automate time recording, payroll accounting, and billing.

The Challenge

Like so many small and midrange enterprises, Dekora Malereibetrieb und Bautendienst GmbH recorded its employees' on-site working hours by hand on paper time sheets. The details were then transferred—also by hand—to an Excel spreadsheet. The company was on the lookout for an uncomplicated digital solution for this process, partly because time sheets were incomplete or after a while could simply no longer be found.

The Solution

Using ZMI tools, Dekora has automated and digitized time recording. On larger construction sites its workers log in or out of time recording at a terminal in the firm's site container. The terminal incorporates a Telekom M2M SIM with an IoT data tariff. Via the cellular network it relays hours worked to the time recording solution, which processes the data and sends it via a DATEV interface to the payroll department. Each terminal assigns the time to an on-site job. On smaller sites or for one-off jobs, employees use a smartphone app to register their working times.

Customer Benefit

Missing or incomplete time sheets are a thing of the past. Hours worked are recorded precisely and booked automatically. That saves time and prevents booking errors. On larger construction sites hours worked can also be assigned to a specific job. That makes it possible to transfer time worked automatically to an ERP system, including payroll. Exact data compiled on a daily basis enables construction site work to be recalculated precisely. And the team leader always knows exactly where and on which site his team is currently working.

> "ZMI time recording tools provide us with a precise overview of where and for how long our employees are working."
>
> **Tobias Luckner**, Managing Director, Dekora

dekora

Construction

IoT Technology for More Energy Efficiency in Elevator Shafts

Enterprises and facility managers rely on D+H Mechatronic AG's smart BlueKit Lift Vision box to find out how much energy is lost via their elevator shafts.

Manufacturing

The Challenge

Elevator shafts are to blame for increased energy usage in many buildings. Conditioned air often escapes unchecked through vents and apertures into the open air. D+H offers customers a box that measures airflows and temperatures in elevator shafts, enabling them to identify weak points. The system was not very efficient.
A D+H engineer installed on-site a box that was complicated, none too reliable and not user-friendly. The process was elaborate,
time-consuming and maintenance-intensive, and the data was evaluated by a tool that was far from user-friendly.

The Solution

Telekom equipped the boxes with IoT technology and implemented a cloud platform. Depending on the network technology available at the customer's premises, the box sends the data collected by 2G, 4G or 5G via a gateway to the Cloud of Things. There the system uses a special D+H formula to calculate energy losses and costs and visualizes this information.

Customer Benefit

The new solution – BlueKit Lift Vision – is easier to use. D+H can use unskilled operatives to install it all over Europe. It is highly reliable, which saves effort and expense. The Cloud of Things provides a see-at-a-glance dashboard on which both D+H and its customers can read the energy usage data. Measures can then be undertaken to improve lift shaft insulation and make lift shafts more energy-efficient.

> "Telekom's IoT technology makes our product much more user-friendly and efficient. Our customers can evaluate their energy losses in detail on the see-at-a-glance Cloud of Things platform and by using D+H BlueKit they can save thousands of euros a year in heating costs."

Martin Müller, Leiter Business Development und Innovation,
D+H Mechatronic AG

BlueKit D+H Group

OSRAM uses mobile robots to increase speed and flexibility in production

The light manufacturer uses automated guided vehicles in its production processes to deliver components where they are required.

The Challenge
Large quantities of components are transported to the production facilities on the site of the lighting manufacturer. The company hoped to increase the efficiency of this process by deploying self-driving, wirelessly connected vehicles. However, LAN connections are unsuitable for mobile IoT scenarios, while WLAN does not provide the requisite transmission quality.

The Solution
OSRAM selected a 4G/5G campus network which combines a local edge cloud and an operator edge cloud in a mobile network. **Edge clouds** ensure the required **minimal latencies** and guarantee the smooth deployment of the automated guided vehicles, while the campus network ensures **quick communication** with the local computing resources.

Customer Benefit
The self-driving vehicles increase speed and flexibility in production. OSRAM has built up important knowledge that will aid the company in further optimising its production processes through new technologies. The highly flexible, mobile, secure and powerful network and IT infrastructure will be available as a basis for establishing smarter factories in the future.

> “Fast and flexible devices and machines are vital for efficient production processes. The integrated campus solution project has given us the opportunity to examine how we can expand and optimise this approach in the future using new technologies.“
>
> **Hans-Joachim Schwabe**, CEO OSRAM Automotive

Manufacturing

OSRAM

Efficient container and well management with IoT

The Internet of Things (IoT) has allowed Sensoneo to create an intelligent waste management system and design innovative solutions for public infrastructure.

The Challenge
Extreme weather conditions such as floods are becoming an ever increasing threat to public infrastructure and safety. Water is not drained away and roads quickly become flooded. Maintaining wells on-site involves risks and is very time-consuming. Waste disposal for public garbage cans is just as inefficient. Drivers start their routes without even knowing when trash cans actually need to be emptied.

The Solution
Intelligent sensors measure the fill level of wells up to a water depth of 25 meters and send an alert once the predefined limits are reached. The networked sensors can also be used to measure the fill level in trash containers. Displaying this data in the IoT portal allows for more efficient route planning when it comes to emptying and/or maintaining the containers. This is made possible by Narrowband IoT radio technology which can transmit radio signals even in deep wells and at remote locations thanks to its low frequency.

Customer Benefit
Sensoneo now has access to an overview of all fill levels anywhere and at any time of day thanks to its fully networked sensors. These sensors also save costs when it comes to maintaining and emptying the containers and guarantee safety for staff and the public.

Benefits of NB-IoT

- High coverage in buildings
- Low energy consumption
- Available in over 20 countries

((SENSONEO))

Connectivity

Uncomplicated reading thanks to Narrowband IoT

Deep building penetration and longer battery life optimise Ista communication units. This helps the provider and the consumers.

The Challenge
Especially in larger residential buildings, it is tedious to read each electricity meter manually. Tenants often have to schedule the whole day to allow access to the meter.

The Solution
Within the properties, the readings of water, heat and electricity meters collected by ista on the basis of modern wireless technology converge locally in a battery-powered communication unit and are transmitted from there in bundled form to ista's data centre via Telekom's high-availability mobile network. With battery-powered NB-IoT modules, the provider can read the meters remotely without the customer having to be at home. NB-IoT is based on LTE mobile radio and combines low energy consumption with deep building penetration at low module costs. NB-IoT is the perfect product update for ista's communication unit.

Customer Benefit
The reading and transmission of the metering data is fully automated. This eliminates the need for manual readout on site; no tenant has to be at home on the day of the reading. Remote reading also forms the basis for new services such as ista energy data management.

Founded in 1957

5.800 employees

Headquarters in Essen

Utility companies

Transport & Logistics

Predictive Maintenance: Helicopters Always at the Ready

Connected via the cloud, DRF Air Rescue's helicopters can be maintained predictively, reducing downtimes and costs.

The Challenge

Sixty DRF air rescue helicopters are in use around the clock in Germany, Austria and Liechtenstein to help emergency patients as quickly as possible and fly them to the nearest hospital. Eighty engineers maintain and repair the airborne emergency rooms at 35 locations. In the past service engineers read the sensor data from the memory card manually every 50 flying hours. In addition a team of technicians was sent out to check the 'copter as soon as a pilot reported unusual flight behavior.

The Solution

Equipped with the Health and Usage Monitoring System (HUMS) and connected with a Telekom IoT solution, each helicopter now continuously collects sensor data about the condition and performance of important components and sends it to the DRF's servers. The technicians keep an eye on the condition of all components on the web portal. If the data for a helicopter exceeds a defined limit the technicians schedule it for the next service as soon as possible.

Customer Benefit

On the basis of the IoT data DRF optimizes the engine settings so that the helicopters use less fuel, which is a substantial saving with over 40,000 missions a year. The helicopters also spend much less time on the ground for maintenance and DRF engineers only make unscheduled visits to air rescue bases in exceptional cases. Crews and patients can always rely on the helicopters running safely and reliably.

DRF Luftrettung

Founded 1972

over 1,100 employees

60 helicopters in use

35 locations

around 40.000 missions a year

Digital Beach Chair Rental with IoT and nuSIM Technology

Tourism

The startup Strandbutler is modernizing beach chair rental on the North and Baltic Sea coast by using Telekom's IoT and nuSIM technology. Both vacationers and rental operators benefit.

The Challenge
Traditional beach chair rental is often complicated and inefficient. Vacationers stand in line at the booking hut. If the hut is closed they can forget about hiring a chair. Renting off the cuff outside of the opening hours is seldom possible. And rental operators lack swift access to the capacity utilization of their beach chairs.

The Solution
Strandbutler has developed a digital beach chair rental system. It uses a smart lock attached to the chair that incorporates Telekom's nuSIM technology, which provides a reliable cellular connection. Vacationers can use an app to book and pay for a beach chair and unlock it on the spot with their cellphone. Beach chair rental operators use Telekom's cellphone network to manage their business. If there is a problem with the lock they can open it remotely. The nuSIM is built into the communication chip, making it more compact, with a longer battery life and improved resistance to harsh weather conditions. Locks can also be located precisely by means of GPS satellite positioning.

The Customer Benefit
The Strandbutler digital solution optimizes the rental process for all concerned. Vacationers benefit from 24/7 off the cuff bookings and cashless payment. Rental operators profit from efficient beach chair management with a real-time overview and lower personnel costs. Remote maintenance and location increase the quality of service and flexibility. Beach chair utilization is improved, customers are more satisfied and letting runs more efficiently.

> "Close collaboration with Telekom enables us to offer a customized solution."

Bernhard Sourdeau, Founder and CEO, Strand & Mehr GmbH, Operator of Strandbutler

STRAND BUTLER

Health & Safety

Early detection and alerting via IoT have great potential to increase our well-being and improve social welfare.

Medical devices

Biotronik I Smart implant

How IoT medical devices save patient’s lives

Biotronik, manufacturer of medical devices, uses IoT technology to help cardiovascular patients in medical emergencies way faster. With success: The smart Home Monitoring system can increase the chances of survival by 60 percent – enormous potential of digitization in the healthcare sector.

The Challenge

Cardiovascular diseases were the most common cause of death in Germany in 2020 – as reported by the Federal Statistical Office also in previous years. The number even rose slightly to around 338.000. The amount represents a good third of all deaths. How can digitization tackle this challenge in healthcare? The Berlin-based company Biotronik asked itself this question.

The Solution

Biotronik, a world leading manufacturer of medical devices, offers a Home Monitoring system with connected implants for patients with cardiovascular diseases. The intelligent IoT technology allows to transmit health disturbances in a minimum of time from the implant to the medical staff. The important interface is a M2M SIM card in the so-called CardioMessenger, which sends the data of the implant to Biotronik's Home Monitoring platform via the Telekom IoT mobile network LTE-M.

Customer Benefit

By transmitting data to the hospital securely and on a regular basis, medical professionals can monitor the patient's health condition remotely. They can also check whether the implant is functioning properly. Since 2003, Biotronik has installed a total of 1.4 million SIM cards in cooperation with Deutsche Telekom. Studies show that monitoring solutions like Biotronik’s Home Monitoring system reduce the risk of death for cardiovascular patients by 60 percent. The solution works globally. More than 5,000 clinics are connected to the Telekom’s and T-Mobile US’ 4G mobile network. In the U.S., one of the largest markets of Biotronik, around 180,000 SIM cards are in use today. Worldwide, there are now around 800,000.

BIOTRONIK
excellence for life

> “With the Home Monitoring system, there is a 60 percent chance to save a life – a true impact for patients with cardiovascular diseases.”
>
> **Volker Lang**, Senior Vice President Research and Development / Biotronik

Smart Drinking Cup Makes Care More Efficient

The German startup LAQA, with assistance from Telekom, has developed a connected drinking cup that reminds care patients that they need a regular liquid intake, records their drinking behavior digitally and eases the work burden of their carers.

The Challenge

Care workers regularly devote over 30 per cent of their working time to administrative activity such as keeping records of patients' drinking behavior. The Munich-based startup LAQA has devised an innovative solution that helps care workers to prevent patients from suffering from dehydration.

The Solution

LAQA designed a connected drinking cup with sensors that record the user's drinking behavior and remind him or her by means of light, sound or vibration to drink regularly and to drink enough. To connect the SmartCup reliably, Telekom provided the support of its TechBoost startup program and IoT Solution Optimizer in choosing the right wireless technology and hardware. A wireless module in the base of the cup transmits sensor data and other information from the SmartCup to the Open Telekom Cloud for documentation and evaluation using the NarrowBand IoT (NB-IoT) mobile communications standard.

Customer Benefit

Carers no longer need to keep and check paper records of the quantity and regularity of liquid intake and if need be to personally encourage the user to drink more. That saves time from which patients benefit in other ways. Automatic and data protection compliant records kept in the Cloud provide the care facility with a continuous overview of users' drinking behavior. They in turn benefit from the health adcantages of regular liquid intake. LAQA drinking cups should in future also be able to register the hand tremor of Parkinson's patients or to document the progress of an Alzheimer's condition. Thanks to networking provided by Telekom LAQA is thereby able to offer customers an increasingly wide range of services.

> "By connecting our innovative SmartCups we can offer carers significant support in their daily work, enabling them to concentrate on their care work proper for the wellbeing of those with whose care they are entrusted and to spend less time on time-consuming documentation. In addition, our aim is by means of our connected product to achieve a positive effect on the health of care recipients and reduce significantly the incidence of dehydration in old age."

Bernd Hoffmann, Managing Director, LAQA GmbH

LAQA
Hydration-Management. Made smart.

Healthcare

Communicate securely in the case of an emergency

The personal safety alarm watches of Smartwatcher Technologies have excellent connectivity with Telekom's eSIMs.

Healthcare

The Challenge

Swiss company Smartwatcher Technologies has developed personal safety alarm watches with subscriptions for older people to use at home and when out and about. To ensure that the device always has the best possible reception to start an alarm call, Smartwatcher was looking for the provider with the largest possible reliable network coverage.

The Solution

Deutsche Telekom equipped the watches with an eSIM. When the wearer presses the alarm button on their watch, a call goes out to a pre-registered contacts, e.g. a family member, caregiver or to an emergency call center via mobile radio. The wearer can talk to the contacts who answer the call via the watch's microphone and loudspeaker. As long as the alarm is active, the device automatically transmits its GPS position. This makes it possible for the contact persons to see the geolocation of the device in the optional and free Smartwatcher app. In addition, the device settings can be customized to the wearer's needs via an easy-to-use online platform.

Customer Benefit

Thanks to IoT connectivity via mobile network, the personal safety alarm watches from Smartwatcher have excellent reception. The Telekom network also enables secure and reliable voice and data transmission. Deutsche Telekom guarantees cross-border use of the devices via global roaming agreements.

> "Working with Telekom allows us to offer customers the highest level of excellence when it comes to mobile network connectivity. Wearers can rely on their personal safety alarm watch to establish a secure voice connection whenever they need help. A wonderful feeling, making it easier to live more confidently and independently."
>
> **Jill Allemang**, CEO of Smartwatcher Technologies

SmartWatcher®

Connectivity

AkkuFischer | NB-IoT

IoT from the basement to the roof

Green and white light boxes show the way to the nearest emergency exit in schools, preschools, companies, retail, and other public buildings. Using Narrowband IoT, Fischer Akkumulatorentechnik GmbH can now control the functionality of these signs.

The Challenge
The security boxes get their power from a single battery. To prevent these batteries from draining completely, the lights must actually be 'idle' during idle periods (e.g., school breaks). A standard regulation now requests that building operators monitor the operational readiness of these emergency lights from a central location. Wiring each individual light, however, is not very cost-effective.

The Solution
Fischer Easy-NB now meets this new standard using Telekom's NB-IoT network: the operating status of the lights and the built-in batteries is now displayed on one central website. The website also shows all previous test results and error messages. This data can now be easily accessed at any time using a mobile device or in the office via the PC. The low power wide area technology guarantees unlimited connectivity in all parts of the building.

Customer Benefit
Thanks to the Narrowband IoT mobile radio solution, there is no need to set up local networks or gateways. The NB-IoT also boasts deep, reliable building penetration, enabling AkkuFischer to comply with the specified standards and guarantee the safe function of the emergency lights in all parts of the building with no effort at all.

Benefits of IoT

- DIN standard requirements are met
- Easy installation without wiring
- Monitoring is possible any time, any place

FISCHER SICHERHEITSTECHNIK seit 1976

Sustainability

To solve the challenges of climate change, business and civil society must tackle ambitious targets. With IoT, companies can make a decisive contribution – and also save precious raw materials.

Embedded Connectivity – Using Water Sustainably

Hidroconta is a manufacturer of water meters and irrigation systems. Its customers include both facility management companies and agricultural enterprises. Its customers include water utility companies, facility management companies, and agricultural enterprises.

The Challenge
Hidroconta wanted to connect its water meters and irrigation systems with the cloud and to manage them globally. Customers were to be enabled to check their water consumption on the Internet and to set irrigation schedules on plantations remotely. Worldwide connectivity was indispensable for Hidroconta to expand.

The Solution
Hidroconta embeds Telekom SIMs in its devices. They send data – water consumption data, for example – by NB-IoT to the cloud, where a management platform manages the cards for both the manufacturer and its customers. Telekom provides a global cellular network along with international roaming agreements.

Customer Benefit
Embedded connectivity optimizes product design because it does not require a separate SIM card slot. Hidroconta can manage the SIMs globally via a cloud platform and set up regional tariffs. Customers can monitor their water consumption remotely and make its use more sustainable.

Facility Management

Founded 1983

60 employees

Headquarter in Murcia (Spanien)

hidroconta metering technology

IoT warns about extreme weather

Extreme weather events are increasing due to climate change. The IoT solution of the start-up divirod collects water data and warns of risks at an early stage.

The Challenge
Water masses that penetrate several kilometres inland from the coast; heavy rain that washes out cellars and roads; buildings that collapse under the weight of masses of snow. Such man-made disasters are occurring with increasing frequency. Those affected are usually taken by surprise and are completely unprepared.

The Solution
Sensors from divirod continuously collect water data such as water level, tides, snow, ice and precipitation worldwide. divirod's customers receive this local and individual information in real time. Radio modules with Telekom SIM cards in divirod's sensors ensure fast data transmission. The modules send the data to the cloud via Telekom's worldwide LTE-M network.

Customer Benefit
With the digital solution from divirod and Telekom, water levels can be tracked continuously, accurately and completely automatically. The data obtained can be used to visualise the long-term effects of climate change. The technology helps to think and act with foresight in order to avoid disasters in the best case or to mitigate the consequences.

> “We achieve resilience when we can respond intelligently and sustainably to the challenges of climate change.“
>
> **Dr. Javier Marti**, CEO divirod

divirod

Smart City

Connected Containers for Clean Drinking Water

SIWAtec Wassertechnik manufactures and sells water treatment plants to water utilities around the world. Its mobile facilities are connected on the Internet of Things.

Water Supply

The Challenge

For mobile use SIWAtec has developed a modular drinking water treatment container. Operation and maintenance of these containers required a high level of personnel and time input, including cost-intensive service callouts. SIWAtec was looking for a networking solution to manage the container technology and read measurements such as flow rates and pH values remotely.

The Solution

For mobile use SIWAtec has developed a modular drinking water treatment container. Operation and maintenance of these containers required a high level of personnel and time input, including cost-intensive service callouts. SIWAtec was looking for a networking solution to manage the container technology and read measurements such as flow rates and pH values remotely.

Operators and suppliers can monitor drinking water treatment continuously and are notified automatically if specified levels such as temperature, flow rate, or pH value are exceeded. Service recommendations and predictive maintenance are further benefits. If a service is required SIWAtec technicians can access the facility remotely and change a setting by, for instance, opening or shutting a valve. Remote access makes regular service callouts unnecessary, which saves time, personnel input, and fuel. It also reduces the CO_2 emissions of vehicles that the service provider can put to demand-oriented and more efficient use. Connecting containers on the Internet of Things thereby makes a sustainable local water supply possible. In addition, SIWAtec can offer its customers a more efficient service and keep an eye on its mobile containers throughout their service life.

Customer Benefit

> “Water provision is one of the challenges of our time that we can solve jointly.“
>
> **Frank Schlichtherle**, CEO und Gründer SIWAtec

Transport

DB Call a Bike | LTE-M Connectivity

Bike Sharing Made Easier and More Energy-Efficient with T Connect

Telekom Connect: Thanks to LTE-M, DB Call a Bike's bikes are easier to hire. Hiring is faster, the bikes are more energy-efficient, and that makes sustainable mobility easier to use and more cost-efficient.

The Challenge

Call a Bike is Deutsche Bahn's bike sharing service. Hiring a bike used to involve generating a code on your smartphone. The code was then entered on the bike. It was a **multistage process**, due in part to the less than optimal network technology used by the bikes.

The Solution

Die Telekom unterstützte DB Call a Bike dabei, das Zusammenspiel der Komponenten – neue elektronische Schlösser und Backend-Lösung sowie Vernetzung – zu optimieren. Sie stattet nun die Flotte von DB Call a Bike mit LTE-M-fähigen SIM-Karten aus und stellt das entsprechende Netz bereit. DB Call a Bike nutzt künftig auch den Telekom IoT Solution Optimizer.

Customer Benefit

End customers can unlock the bikes in next to no time by scanning the QR code on the lock. Thanks to LTE-M's higher energy efficiency and other factors such as solar panels on the bikes DB Call a Bike no longer needs to collect its bikes and recharge them so often. Longer deployment availability boosts value creation. The IoT Solution Optimizer enables the company first to test new developments on digital twins of its bikes. That saves both time and resources.

> "Telekom's IoT technology enables us to offer our customers a state-of-the-art user experience that does justice to the high quality of our bikes. In addition, we can now make our service more economical and more efficient."
>
> **Cornelius Kiermasch**, Head of Shared Mobility bei DB Call a Bike

DB Call a Bike

POC

Find Somewhere to Park Faster in Tulln Thanks to IoT

Thanks to smart parking sensors, drivers in Tulln can now find a parking space faster. The smart parking solution shows how the parking supply in Tulln can be optimized in the future.

The Challenge

Tulln in Lower Austria is internationally renowned for its wide range of art and culture. Thus, the city attracts around three million guests annually and is also considered an important hub for the entire region. Despite numerous means of public transport, residents and tourists also frequently use the car. The city was therefore looking for a solution to make it easier for drivers to find a parking space.

The Solution

Magenta Telekom installed networked parking sensors on 27 asphalt parking spaces as part of a smart parking pilot project with the city of Tulln. The sensors use infrared laser technology to detect whether parking spaces are free or occupied. The integrated radio modules send the occupancy data to a cloud platform via NarrowBand IoT (NB-IoT). Solar-powered LED displays at the parking lot entrances show whether and how many parking spaces are still available.

Customer Benefit

Thanks to the smart parking pilot project, the city of Tulln can now determine how it can align the parking offer even more efficiently with the needs of its residents and guests in the future. The smart parking solution can also be expanded to include additional services and further information. In the future, for instance, drivers will be able to use an app to see where parking spaces are available or when a parking ticket expires.

Smart City

TULLN/DONAU

Embedded connectivity for sustainable smart metering

With smart ultrasonic water meters, Deutsche Telekom and Heitland enable water suppliers to precisely detect water losses in pipelines at an early stage and to extend meter use – at lower overall costs.

Challenge
Water suppliers must detect water losses due to damaged pipes at an early stage. This is time-consuming and expensive and often not efficient. Localization is often done at night. The already small number of staff is then missing during the day and other work remains undone.
In addition, water meters should measure accurately for as long as possible so that an accurate billing of the amount of water consumed per household can be billed.
Consumption data is only received once a year today, so this cannot be solved.

Solution
Heitland has developed a high-end ultrasonic water meter with energy-optimized premium embedded SIM (eSIM). It transmits the encrypted measurement data on water consumption automatically and daily via NarrowBand IoT (NB-IoT). This is something special, there is no comparable product in Germany yet. At present, the ultrasonic counter is made of composite material, and soon there will also be a brass version.

Customer benefit
Deutsche Telekom offers a worldwide mobile network and cross-border roaming agreements. Thanks to this global NB-IoT coverage, the water meters are connected even in remote locations without a power supply. Thanks to the existing network infrastructure, the customer can get started right away and can rely on Deutsche Telekom in terms of availability, maintenance and protection of the networks.

> With our high-end ultrasonic water meters and Deutsche Telekom's NB-IoT network, we offer our customers a holistic solution that not only absorbs the effects of the shortage of skilled workers in the industry but also enables a more sustainable use of water as a resource.

Jan Bangert, Deputy Managing Director, Ernst Heitland GmbH & Co. KG

HEITLAND

Smart metering

Your Partner for the IoT

Finding the Right IoT Partner

Digitization and the Internet of Things offer companies wide-ranging opportunities. But where do you start with your IoT project?

A shortage of in-house digital experts or a complex IoT market are but two of the obstacles that companies face. No provider can cover all aspects of an IoT project alone. What is needed is a partner ecosystem of sensor manufacturers, connectivity providers, cloud operators, software developers, system integrators – and and a project manager to ensure that all parts fit and that the right IoT strategy lies behind it all. The target: We are your IoT project manager so you can focus on your business.

Telekom IoT Solutions for All Sectors

We are the global IoT connector. Building on the leading transatlantic network we develop tomorrow's connectivity and offer platform-based solutions to simplify and accelerate your business wherever you are.

Network Technology of the Future
We deliver the optimal networking solution for every use case, customized for your company: 5G for campus networks and intralogistics, NB-IoT for your smart factory, roaming for multi-country transportation, satellite connectivity for maritime transportation, iSIM or a management platform for your M2M SIM cards.

Global Seamless Availability
Our own mobile networks in the U.S., Germany and ten other European countries along with over 600 selected roaming partners around the world ensure global connectivity for your applications and vehicles. Local connectivity solutions for country-specific regulations round off the offering.

All-round Care Package
We offer platform-based IoT solutions that interconnect seamlessly and amount to much more than a pure networking service. And we set the highest standards, providing security "Made in Germany": EU GDPR-compliant data security and data protection and highly available, highly secure data centers in Germany.

Expertise & Advice
Trust our experts. We have many years of experience on all digital topics around new technologies, networking and device management, integration and cloud ecosystems, security and analytics.

Would You Like to Know More?

Are you looking for IoT solutions for your business model? Would you like to achieve transparency in your supply chain? Do you want to digitize processes in your production? Contact us without commitment and let us work together on a solution that is the perfect fit for your business case!

Sounds interesting? Here you can find more information

- How Does IoT Networking Work?
- The Right Tariff for Every IoT Idea
- IoT Solutions for All Industries
- IoT Connectivity Guide
- Embedded vs Retrofit - How to Connect Your Product Successfully

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