

IoT Case Study

Intelligent Vending Machines

The market for intelligent vending machines is projected to **grow at a 17% CAGR during 2019-2023**, driven by consumer demand for convenience coupled with the worldwide adoption of contactless e-payment systems¹. Unlike conventional machines of the past, intelligent vending machines provide smart features such as **inventory management, customer and transaction overview, usage analytics, software upgrade** management, and **digital advertising** systems which are remotely managed by a cloud platform over wired or wireless internet connections.

By directly collecting and analyzing usage data, product manufacturers can **gain real-time information about customer behavior** such as daily sales, product popularity by time and location, footfall data and product levels.

Machines can also be **monitored for service requirements**, and data collected used for **predictive maintenance**. This enables the most **efficient deployment of service staff** for replenishing product and servicing thousands of machines spread out of over large geographic areas.

Wanted: an end-to-end IoT solution

Although a remote IoT vending machine management system may seem straight-forward, the reality is that such a platform requires technology **that spans a wide range of complex disciplines**. This includes embedded hardware sensors, short- and long-range wireless modems, data collection and concentrator hardware and software, large-scale SIM card management, data encryption and secure device management, multiple wired and wireless communications standards and ultimately enterprise-grade cloud storage and analytics software.

Finding a vendor who supports all elements of an end-to-end IoT platform is rare: most firms focus on specific components of the system such as modem or data acquisition ICs, cellular services whose provider's primary interest is selling subscriptions, or on secure cloud

computing platforms such as Microsoft Azure or Amazon Web Services (AWS) for processing and hosting the data. A system integrator is often needed to “glue” the components of an IoT platform together, resulting in an expensive, walled-garden solution.

qiiio: providing an off-the-shelf IoT solution from sensor to cloud

Founded by engineers from the Swiss Federal Institute of Technology in Zürich ([ETH](#)), **qiiio's mission is to deliver end-to-end, standards-based solutions** that serve three core IoT sectors:



A bank of intelligent vending machines in Tokyo

logistics optimization, remote monitoring, and predictive maintenance. Based on the principle that 95% of IoT solutions rely on the same underlying architecture, **qiiio has developed an IoT core solution that requires only 5% customization to adapt to virtually any IoT system requirement.**

Based on proven hardware and software modules and a close partnership with Microsoft Azure and Switzerland's leading telecommunications provider Swisscom, **qiiio can deliver a complete, functioning hardware prototype and end-to-end IoT proof-of-concept platform from sensor to cloud in 4-8 weeks.** qiiio takes the complexity out of the IoT to provide complete end-to-end solutions that solve real-world problems quickly, securely, and cost-effectively.

Turn the page to read about **qiiio's remote beverage dispenser IoT solution!**

¹ Technavio: “Global Vending Machine Market 2019-2023”

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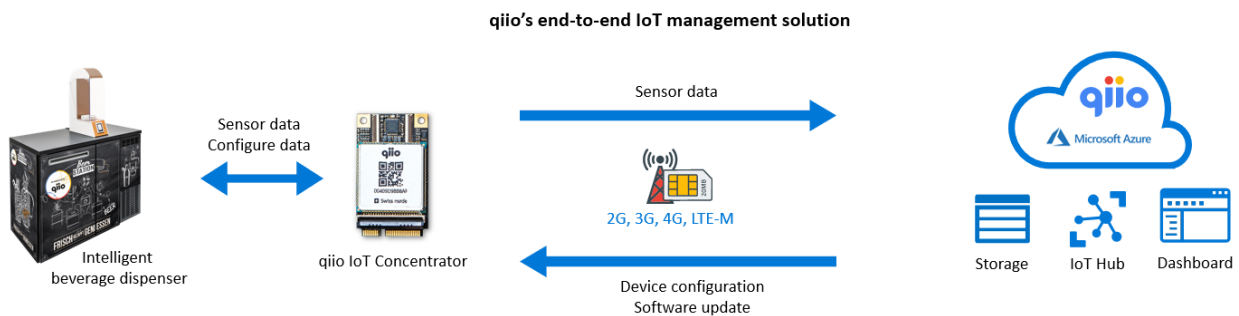
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Feldschlösschen: Remote Beverage Dispenser

In 2018, Switzerland's largest beer producer and beverage distributor, Feldschlösschen, decided to enter the consumer market directly with intelligent beer dispensing machines. The goal of the remote unmanned stations was to **connect their brand directly with end-consumers** by



and **wireless interfaces** to the various pressure, flow, temperature and alarm sensors embedded in the dispenser. The design supports wired interfaces such as USB, CAN-bus, I²C, SPI, UART etc. as well as Cellular (2G, 3G, 4G, LTE-M) and short-range radio interfaces such as Wi-Fi and Bluetooth Low Energy (BLE).



providing a zero-waste, self-service solution for dispensing their flagship as well as specialty beers with “fresh from the keg” quality.

The move allows Feldschlösschen to directly reach customers and **collect market data** about which products are most popular where and when, and allows them to **test-market new beers** without the complex logistics of creating new shelf space at third party retailers.

In order to remotely and securely manage their machines, **Feldschlösschen turned to qiqo² to provide an end-to-end IoT solution** that securely monitors product levels, temperature, CO₂ propellant pressure, machine location and service requests. The solution also **pushes data** to each machine such as software updates, flow speed configuration, as well as text and graphics to the machine's front-panel advertisement display, all from a web-based dashboard.

The qiqo IoT solution

qiqo quickly developed a hardware sensor prototype based on the firm's “IoT Concentrator” hardware and cloud monitoring platform. **The reference design includes all standard wired**

The IoT Concentrator **continuously monitors** machine sensors, collecting and concentrating system parameters and transmitting them via a TLS encrypted cellular TCP/IP data stream directly to a “digital twin” in qiqo's cloud hosted in a secure, Microsoft Azure redundant data center. **All machines are managed via certificate and monitored in real-time. Software and display updates are pushed** to machines directly from a web dashboard.

The result: a new, efficient route-to-market connecting Feldschlösschen directly with their customers allowing them to deliver a higher-quality, eco-friendly, cost-effective service while collecting valuable market and machine data remotely and securely from the cloud.

For more information about Feldschlösschen's beer station, visit www.beerstation.ch. For details about qiqo's IoT solutions, visit our website: www.qiqo.com.

² Pronounced “Kio”