

IoT Case Study

Smart Buildings

“Smart Buildings” refers to automatic, centralized monitoring and control of a building's heating, ventilation, air conditioning, lighting, access control and other systems. The objectives are to improve occupant security and comfort, ensure efficient operation of building systems, reduce energy consumption and operating costs.

The Smart Building market consists of sub-segments such as Energy Management, Intelligent Security Systems, Infrastructure Management, and Lighting Control. The Energy Management segment generates the highest revenues, worth USD 2.7 billion USD in 2017. The dominance of the Energy Management sector is forecast to continue, achieving the fastest CAGR of 33.58% during 2018 – 2023¹.

To facilitate remote management of Smart Buildings, IoT sensors are deployed throughout a building's infrastructure. Sensor readings are sent to a hub which concentrates the data and relays it via TCP/IP over a cellular or short-range wireless link to a centralized management system. Traffic is bi-directional; upstream to transmit sensor data for processing, and downstream to control environmental, infrastructure and security systems, as well as update digital signage and software in building control systems.

Need for a standards-based IoT Smart Building solution

With the proliferation of new and retrofitted Smart Buildings, a standards-based solution is ideal as it allows seamless interoperability of sensors and hardware developed by numerous third-party manufacturers.

An IoT Smart Building management system typically implements multiple technologies and communication protocols. This includes a wide range of sensors, short- and long-range wireless modems, data collectors, concentrator hardware and software, large-scale SIM card management and encryption. Enterprise-grade cloud storage, secure device management and analytics software complete the system. Given the size and complexity of a Smart Building solution,

leveraging standard, published interfaces and protocols ensures interoperability between hardware of different vendors and avoids compatibility issues as wireless standards are upgraded over time.

qiiio: providing an off-the-shelf Smart Building IoT solution

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: logistics optimization, remote monitoring, and predictive maintenance.



Smart Buildings: an integral part of “Industry 4.0”

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.

Our proven hardware and software modules operate seamlessly with Switzerland's leading telecom service provider Swisscom and Microsoft Azure cloud services. Together with these partners, qiiio can deliver a complete, functioning hardware prototype and end-to-end IoT proof-of-concept Smart Building platform from sensor to cloud in 4-8 weeks.

We take 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 end-to-end Smart Building IoT solution!

¹ Market Research Future: “Smart Building Market Research Report - Forecast to 2023”

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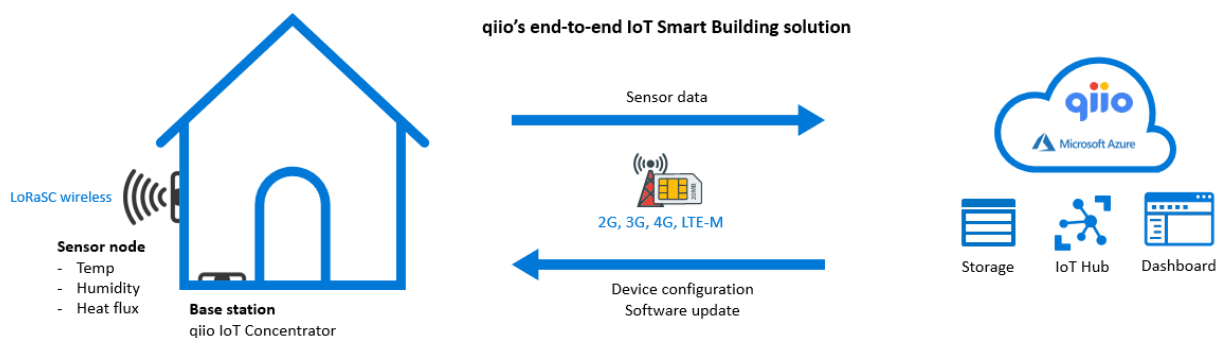
Smart Buildings

Minergie: ensuring compliance

Developed in 1994 by Swiss researchers Heinz Uebersax and Ruedi Kriesi, the Minergie® building standard specifies high-grade, air-tight building insulation and continuous renewal of air using an energy-efficient ventilation system. Minergie is now a registered Swiss quality label for new and refurbished low-energy consumption buildings.

An end-to-end IoT building monitoring system

In the past, sensors were installed using cumbersome cabling requiring holes drilled through walls. Data was manually collected by technicians who drove out to each location which wasted time when they arrived before sufficient data was ready, or if sensors had malfunctioned.



Certifying Minergie Compliance

Construction of Minergie buildings is done based on planning specifications: there is no guarantee that these values are actually met once the building is completed. As Minergie buildings are more expensive to construct, certifying compliance is important to buyers who pay the extra price for energy efficiency.

To ensure compliance with the standard, a Swiss sensor company teamed up with qii² to develop an end-to-end IoT monitoring system that measures and processes temperature, humidity and heat flux readings along walls and windows throughout Minergie buildings.

Collection and processing of sensor data from inside and outside indicates whether walls and windows are in compliance with Minergie specifications. Sensors run on a 7-day battery pack and transmit data every 2 minutes. Readings are collected over 5 days to ensure that good, ISO-compliant data is collected and relayed via Swisscom cellular network to qii's cloud platform for real-time storage and analysis.

To solve these problems and lower costs, qii developed a modular, remote sensor monitoring system based on qii's "IoT Concentrator" hardware, LoRaSC (868/915MHz) concrete-penetrating wireless link to connect sensor clusters, and cellular connectivity to qii's cloud-based management platform.

Based on qii's IoT reference design which includes all standard wired and wireless interfaces, an end-to-end prototype solution was created. The reference design supports popular wired interfaces such as USB, CAN-bus, I²C, SPI, UART etc. as well as Cellular (2G, 3G, 4G, LTE-M), short- and mid-range radio interfaces such as Wi-Fi, LoRa and Bluetooth Low Energy (BLE).

The result: a low-cost, portable, robust cloud-based measurement solution enabling the Swiss sensor company to deliver an end-to-end, remotely managed Minergie certification system from sensor to cloud.

For details about qii's IoT solutions, visit our website: www.qii.com.

² Pronounced "Kio"