

SOLUTION BRIEF

Intel® IoT Gateways
Public Sector/Smart Cities



Unlock the full potential of the Internet of Things (IoT) through a highly customizable, intelligent and robust end-to-end IoT solution

Intel and Toy's Myth help connected devices interoperate seamlessly while efficiently gathering, filtering and converting raw data into highly valuable and actionable, real-time insights



Executive Summary

From business to our everyday lives, we are all impacted by the Internet of Things (IoT) one way or another. Whether it is through wearable technologies like smart watches that monitor our heart rate and movements, or office laser printers that automatically notify us through mobile apps when low on toner, IoT's ability to massively transform industries and change the way we live delivers immense value across verticals, with McKinsey estimating the value generated from IoT to reach \$11.1 trillion a year globally. ¹

Through IoT, which refer to living or animate objects that gather and transmit data via the internet through embedded electronic sensors, software and network capabilities; IoT-transformed landscapes and businesses are made smarter and more connected while key decision makers across businesses and the government sector are able to make better informed decisions, quicker, through real-time, data-driven insights.

However, growth within the IoT industry has been much slower than expected. Although Cisco estimates that 50 billion objects will be connected by 2020, the fact of the matter is this – as of now, over 99 percent of physical objects still remain unconnected. ²

Challenges

It's not about how much data you have but what you do with it that matters

Although IoT has become one of the most talked about technologies over the last few years, much ambiguity remains around the provisioning of resources, security, IT infrastructure and data mining. There may be billions of IoT things, generating massive amounts of data. But not many solution implementers are adequately equipped with the proper data mining, analytics tools and technical expertise needed to efficiently extract and filter through heaps of data to retrieve relevant insights.

Few solution providers with the expertise in designing industry-specific, end-to-end IoT solutions

Managing the endless permutation of IoT devices is an emerging challenge businesses and governments looking to adopt IoT will inevitably face, without a secure and robust IoT ecosystem integrated with the proper gateways to connect devices, aggregate, filter and transmit data from device to database.

Many existing devices and sensors use different protocols to connect to their individual control environments. These protocols are typically designed with different models to adhere to specific management and security requirements. As these devices, protocols and their user requirements proliferate, managing the massive streams of data and monitoring data transmission speeds across devices will only become increasingly challenging.

In order to truly unleash the value IoT offers, it is critical for sensors, devices, actuator controls and service solutions to operate within a single platform. From a technical and economic standpoint, the hybridization of hardware and services makes the most economical sense with the ability to drastically improve manageability, cost-savings, security and interoperability.

However, finding vendors that are capable of designing end-to-end solutions that can translate data from devices designed by other vendors is no walk in the park, as most vendors either only design the hardware, software or are unable to develop industry-specific IoT solutions.

Solution

A Smart IoT gateway with the capability to connect numerous devices, filter through data and support diverse application requirements

Through Toy's Myth Smart IoT gateway, powered by The Intel® Quark™ SE Microcontroller C1000, those looking to adopt a IoT-based infrastructure will be able to effectively tackle the obstacles that are preventing them from shifting to a IoT-based platform.

Smart IoT gateway provides an end-to-end platform that is capable of connecting numerous devices, gathering and processing consolidated raw data through its gateway and internet functionality, which supports a host of customized sensors, actuators and solutions.

On top of that, Toy's Myth also offers personalized, Wi-Fi positioning and wireless streaming solutions with location and facial recognition capabilities, which can be easily implemented without developing an app. This is done by deploying an innovative floating population solution that delivers 150 percent greater accuracy, customer pattern analysis and categorization in comparison to vendors that leverage on BLE beacons or Wi-Fi active scanners.

“To design IoT services, service providers need to know who their customers are and where they are.

This is where Toy's Myth comes into the picture with our unique positioning and wireless streaming solutions that are able to locate and identify users.

By integrating hardware, software and services into a highly consolidated platform called the Smart IoT Gateway, we are able to gather open information of users based on their position and movement. Analyze the data and incorporate them into the design of innovative, user-specific services.”

Hyung Jun Seo
Chief Executive Officer, Toy's Myth

Use Cases

Toy's Myth Smart IoT Gateway deployments have transformed cities, schools and shopping malls in Korea. Learn about them below:

Deokpyeong Eco Service Area, Korea

Vertical: Retail

Companies involved: Intel, Toy's Myth, Kolon NatureBridge

Malls now know their peak periods and best-selling products

In Korea, smart shopping malls like Deokpyeong Eco-Service Area, which receives an average of 60,000 visitors a day (up to 110,000 a day), are able to monitor and track the movement of shoppers and retail goods, while gathering valuable data for retailers to create more targeted and effective marketing campaigns. This was done by deploying over 180 devices that connected over 100 stores.

The deployment helped retailers at Deokpyeong gain visibility into shopper footfall, develop a deeper understanding of the demographics of shoppers and their buying habits, which enabled them to create more effective retail strategies and alter the mall's layout to generate greater sales conversions.

Overall, this solution is expected to help increase retail sales by up to 30 percent. In the next phase of this project, expected to be completed by end march 2017, Toy's Myth will expand the IoT ecosystem by deploying an additional 150 devices to connect over 40 stores.

Bukchon Traditional Village, Seoul, Korea

Vertical: Smart Cities

Companies involved: Intel, Toy's Myth, Seoul Metropolitan Government

Cities are now able to track and connect with visitors and residents

Bukchon traditional village, a popular tourist attraction located in Seoul, Korea, sees up to 45,000 visitors a day but was unable to capture any data on its visitors.

To address this, Toy's Myth developed and deployed an extensive IoT ecosystem with The Intel® Quark™ SE Microcontroller C1000. This solution was custom-built to provide city flow data, asset tracking and enable data connections through an integrated sensor platform. Sensors were deployed to capture information on the environment plus people to improve the quality of life for residents and visitors alike while reducing the city's energy and resource consumption.

The deployed IoT ecosystem provided useful city flow data, enabled data connections through an integrated sensor platform.

Key Features:

- City environment analysis: supports micro unit measure and big data analysis, detects disasters (fire, gas leak) and activates alarm through sensors, analyses route of dust based on temperature, humidity, direction and speed of wind

- IoT service infrastructure: provides position-based service, supports Online 2 Offline services, offers services based on floating population and analysis
- Gateway for IoT and ICT devices: Supports direct connection of IoT and ICT devices plus additional sensors and actuators
- Big data analysis: Provides environmental, traffic and O2O analysis with big data & machine learning, customized services based on behavior

Other Deployments

Smart School, Korea

Objective: To improve the study environments of classrooms through technology

This solution allows individual classroom environments to be analyzed through a IoT ecosystem comprising a Smart IoT gateway, a monitoring multi-screen, big data server, positioning server, and wearable IoT technologies – supported by a customized mobile app. Through these technologies, classroom data can be gathered and then incorporated in the creation of personalized, IoT services to enhance study environments of classrooms nation-wide.

Key Features:

- School environment analysis and alarm
- Automatic attending system
- Study, posture, exercise and sleep measurement
- Ability to link to Smart City IoT gateway for extended services

Solution Architecture: Smart IoT Gateway

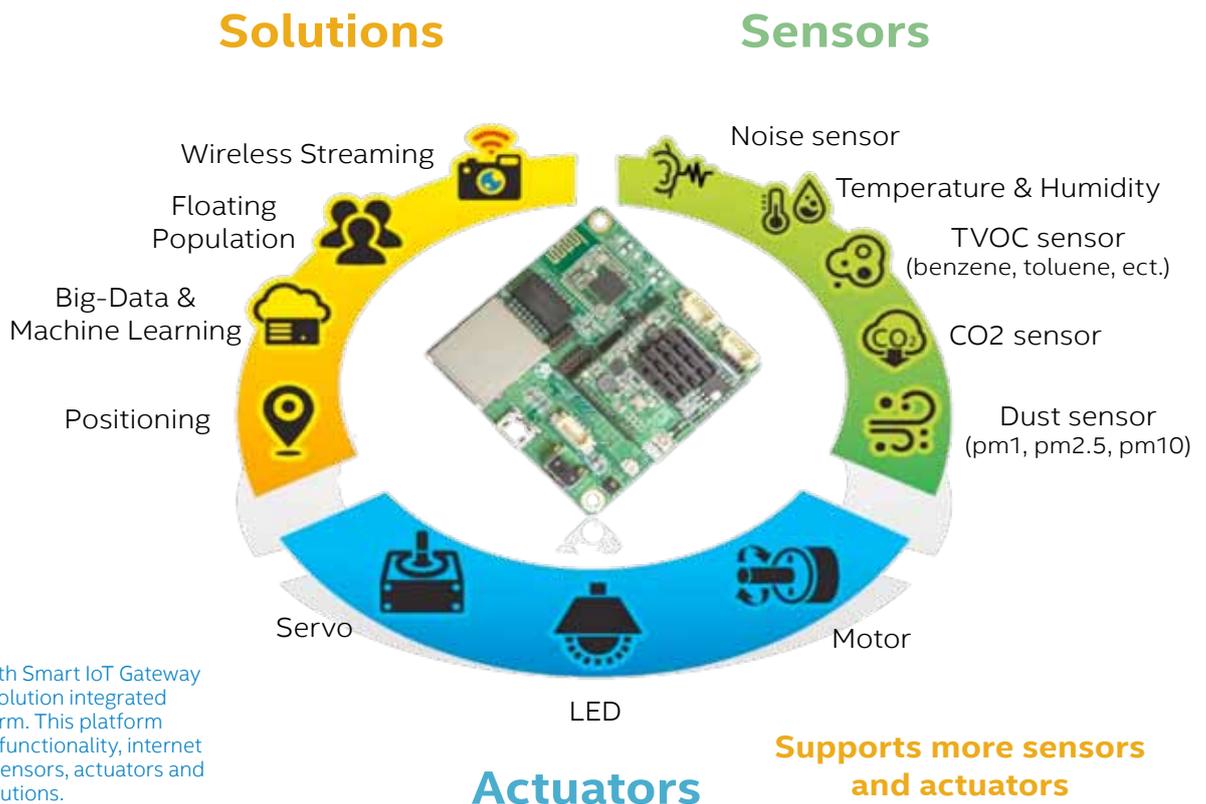


Figure 1. Toy's Myth Smart IoT Gateway is an end-to-end solution integrated into a single platform. This platform supports gateway functionality, internet connectivity plus sensors, actuators and customized IoT solutions.

The Intel® Quark™ SE Microcontroller C1000 and Smart IoT Gateway

The Intel® Quark™ SE Microcontroller C1000 features an ultra low power 32-bit architecture that offers scalable, secure and energy-efficient performance to power a wide scope of industry-specific IoT solutions while Toy's Myth Smart IoT Gateway offers an easy-to-develop, energy-efficient and highly extendable solution in an ultra-compact form (50mm x 50mm).

Integrated with Toy's Myth IoT gateway, this solution interoperates seamlessly across connected devices. Delivers excellent savings on integration and energy and offers flexible provisioning and customizable features.

Key benefits of Smart IoT Gateway:

- Extensibility for various sensors
- Capable of supporting extensive applications
- Hassle-free wireless firmware updates & easy configuration
- Low cost, easy to build IoT service
- Supports multi-platforms
- Supports Big Data & Machine learning

Conclusion

The Internet of Things (IoT) is a powerful tool that can massively transform businesses and our everyday lives. Given its potential to connect vast landscapes and infrastructures, automate operations, services and deliver valuable insights, it is only a matter of time before IoT becomes ubiquitous across verticals.

Businesses must therefore, carefully strategize a comprehensive IoT strategy that can effectively offset the business and technical challenges the transition may bring, while enabling them to fully unlock the potential of IoT.

Leveraging on an end-to-end IoT solutions provider henceforth, may prove ideal for those seeking a highly customized IoT infrastructure yet, are looking to maximize their cost-savings, efficiency, manageability across the entire IoT ecosystem in the long-run.

About Toy's Myth

Based in Korea, Toy's Myth is a hardware and solutions provider specializing in developing end-to-end Internet of Things (IoT) solutions.

For more information, please visit:
<http://www.toysmyth.com/>

Learn more about IoT

For more information about Intel IoT technologies, visit intel.com/iot

Learn more about Intel® Quark™ Microcontrollers

To learn more about Intel® Quark™ Microcontrollers, visit <http://www.intel.sg/content/www/xa/en/embedded/products/quark/overview.html>

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References:

¹ <http://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/an-executives-guide-to-the-internet-of-things>

² <http://www.smartbuildingsmagazine.com/news/99-per-cent-of-things-in-the-physical-world-still-unconnected>

³ <http://www.networkworld.com/article/3051041/internet-of-things/4-major-iot-challenges-that-stand-in-the-way-of-success.html>

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