SEMTECH CORPORATION

LoRa Devices

SMART AGRICUTURE REAL WORLD SOLUTIONS

LoRa®

SEMTECH

LoRa® Devices

AGRICULTURE USE CASE COLLECTION

Dear IoT Innovators,

Agriculture is by far the largest consumer of freshwater today, using up to 70 percent of the available supply*. Additionally, the world's population is predicted to increase 30 percent by 2050, and food production will need to increase up to 70 percent as a result*. Farmers and ranchers are preparing for the future, and tackling tomorrow's challenges head-on by integrating advanced smart agriculture solutions leveraging Internet of Things (IoT) applications.

The IoT paves the way for more productive and efficient operations, with over 75 million agricultural IoT devices predicted to be distributed by 2020, according to Business Insider Intelligence*. As a result, by 2050 the average farm will produce 4.1 million data points, and by 2024 there will be two million connected farms and 30 million connected cows*. IoT-based solutions in the agricultural space offer the potential to monitor data for a range of applications, from cattle health to water consumption in crop fields.

According to IoT Analytics, it is predicted that low-power wide-area networks (LPWANs) will be the fastest growing IoT connectivity technology in the next five years. The number of LPWAN connections is forecasted to grow 109 percent per year and should exceed the one billion mark in 2023**.

Semtech's LoRa devices and the LoRaWAN® protocol represents a leading choice for LPWAN-based IoT solutions, with more than 100 million end nodes deployed in over 140 countries today. LoRa devices have been integrated into leading solutions for a number of important vertical markets, including smart agriculture. With hundreds of known use cases (and growing) deployed on every inhabited continent and orbiting the globe via satellite, applications built on LoRa-based devices and LoRaWAN networks are proven, simple to use and quick to deploy.

Smart agriculture represents a major vertical market for LoRa devices due to the technology's unique advantages for battery-powered sensors. Leading companies across the Americas, Europe and Asia are taking advantage of the technology to create innovative applications that solve today's challenges. From measuring the environmental conditions influencing crop production to tracking livestock health indicators, LoRa devices and the LoRaWAN protocol create efficiencies reducing environmental impact, maximizing yield and minimizing expenses.

Regards,

Alistair Fulton
Vice President and General Manager
Semtech Wireless and Sensing Products Group
semtech.com/LoRa

*Enterprise IoT Insights – May 2019. ** IoT Analytics – October 2018. Information is not an endorsement of Semtech Corporation. Any reliance on these results is at the third party's own risk.*

WaterBit

WaterBit is a precision agriculture irrigation company that believes in helping growers be good stewards of the land through smart agriculture. The Company's Automated Irrigation Solution (AIS) lets growers measure soil moisture and apply irrigation remotely, at a level of granularity and accuracy that would otherwise not be possible. WaterBit translates technology into tangible value for growers by improving yields and crop consistency, and optimizing water and labor.

waterbit.com

Sensoterra

Sensoterra develops wireless soil and water optimization solutions, to help growers effectively irrigate plants and crops. Solutions operate on LoRa-based infrastructure and meet the most demanding customer specifications at the lowest possible total cost of ownership.

sensoterra.com

City of Calgary

Canada's third-largest city, Calgary has evolved over the past two decades into one of the most innovative cities in the country. The City built one of the first municipally owned LoRaWAN® networks in North America, which has fostered the growth of local IoT development and innovative use cases.

calgary.ca

itk

itk, Intelligence Technology Knowledge, aims to help farmers optimize the yield and quality of their crops and reduce risks on their farms through better management of inputs (irrigation, fertilizers, and plant protection products). In 2016, itk acquired Medria and expanded its expertise to the animal husbandry industry.

itk.fr/en

IMPROVING CROP YIELD

REAL USE CASE SOLUTION

WaterBit is a precision irrigation company committed to providing cost-effective tools that help farmers improve yield, optimize water usage and be good stewards of the land. WaterBit's Automated Irrigation Solution (AIS), leveraging Semtech's LoRa® devices and the LoRaWAN® protocol, is a complete irrigation planning and control solution. It enables microblock-level monitoring and control of local irrigation, and considers soil conditions, plant stage and weather at a level of granularity and accuracy not previously possible. Devine Organics, an organic agriculture business with operations in California and Mexico, first installed WaterBit's solutions on 40 acres of asparagus in December 2017. In their first season of use, they achieved a **five percent reduction in gas emissions** from pumping water and vehicle use, and a **six percent reduction in water use.** Their **750,000 gallons in water savings is equivalent to 43,000 Americans skipping a shower.** The farm also **nearly doubled its crop yield from 800 to 1,500 pounds per acre.**

LOW OPERATING COST

LoRa-enabled solutions offer minimal downtime and reduced maintenance cost due to the system's low power operation. Data collection is completed remotely, reducing labor costs and associated time for the farmer.

HIGH CAPACITY

Each LoRa-equipped gateway can handle millions of messages per day. This allows WaterBit's applications to support large growing areas with up to 1,000 sensors in a six-mile radius. Solutions are scalable by number of gateway and deploy simply and easily to cover even the largest grow operations.

SECURITY

LoRa devices secure all communications using end-to-end AES128 encryption, making WaterBit's crop data and management software highly resistant to attacks.

"WaterBit's soil probes tell us exactly where the crops need more or less water, all from the WaterBit dashboard app. It helps us monitor the soil and control the valves in the field, allowing us to apply the right amount of water at the right time and place."

Jose Garcia
Farm Manager, Devine Organics

2x
Farms nearly double crop yield with smarter management

750,000
Gallons of water saved, equivalent to 43,000 showers

5%
Reduction in gas emissions

EFFICIENT CROP IRRIGATION

REAL USE CASE SOLUTION

Sensoterra provides low-cost, wireless and remote systems that offer farmers detailed insight into the soil moisture levels in their fields. Soil is not homogenous, and holds moisture differently in various areas and depths. The company utilizes Semtech's LoRa® devices in its probes, and a LoRaWAN® network infrastructure provided by Senet, a leading provider of global connectivity and IoT network service provider, to collect detailed irrigation data for analysis. To date, Sensoterra has deployed over 5,000 LoRa-based sensors and achieved over 60 million data points in more than 30 countries worldwide. **In a recent deployment, an Idaho potato grower leveraged Sensoterra solutions to reduce water consumption up to 30 percent.**

SIMPLE INSTALLATION

A key feature of Sensoterra's soil moisture system, LoRa-enabled multi-depth probes install in a matter of minutes without external wiring or additional infrastructure.

WIRELESS INTERACTION

Within an hour after installation, data is viewable online with a downloadable application. Accessible on a laptop, tablet or mobile phone, the app offers users the ability to manage their installations through an easy to use dashboard and an open API for data integration.

INTELLIGENT MANAGEMENT

Optimized irrigation scheduling and farm management reduces water use while creating healthier crops and increased yields. **Due to increased yield, decreased field inputs and improved soil health, growers implementing Sensoterra's solutions typically see ROI in less than one growth season, no matter the crop.**

> "As water becomes increasingly scarce in many parts of the world, Sensoterra's LoRa-based solutions allow farmers to manage their irrigation systems more efficiently."
>
> *Jurriaan Ruys*
> *Chairman & Founder, Sensoterra*

30%
Sensors reduced farm water use up to 30 percent

5,000+
Sensors deployed to date

60 million+
Data points received for precision irrigation

INDOOR AGRICULTURE

REAL USE CASE SOLUTION

The Devonian Gardens is a three-acre exotic horticultural refuge on the top floor of The CORE Shopping Centre in Calgary, Alberta, Canada. The horticultural team at Devonian Gardens noticed some trees were exhibiting signs of light stress and other stressors. Devonian Gardens installed sensors built on Semtech's LoRa® devices throughout the gardens as part of a system to monitor various factors affecting plant health. Using the sensors to capture lighting data from different positions, specialists are able to quantify light spatially in the garden. A spatial representation provides insight for future species selection and placement, maintenance, and in future lifecycles of lighting for optimal plant health. **Temperature, humidity and barometric pressure sensors measure conditions accurately and in real time, and characterize this data for the horticultural team to further help plants thrive.**

CONSISTENT DATA COMMUNICATION

With LoRa-enabled photosynthetic active radiation (PAR) sensors readings from different positions throughout the gardens, specialists are able to leverage sensor data to quantify light spatially in the garden. A spatial representation helps in future species selection and placement, maintenance, lifecycle of lights for optimal plant health.

STANDARDS-BASED RELIABILITY

The LoRaWAN® networking protocol is designed to wirelessly connect sensors to the Cloud in regional, national or global networks. The specification provides seamless interoperability between devices in any deployment - anywhere. Many LoRa-based devices are LoRaWAN Certified[CM] by the LoRa Alliance®. Certification further ensures devices meet strenuous requirements on quality, security, reliability, and safe operation.

LOW POWER

In addition to the superior range and reliability of data transmission, LoRa devices feature extensive power-saving features that make it possible for a wireless sensor to last up to 10 years on a single battery. As a result, costly maintenance and replacement costs are effectively reduced or eliminated.

> "Now we have an opportunity to manage these precious gardens with science. We are understanding various light models and fitting them with the right species."
>
> *Nan Xie*
> *IT Senior Engineer, the City of Calgary*

HOW IT WORKS

Sensors measure conditions accurately and in real time, and characterize this data for the horticultural team to further help plants thrive.

CATTLE HEALTH MONITORING

REAL USE CASE SOLUTION

itk, a leading French supplier of IoT-based smart agriculture applications, developed a cattle health monitoring solution leveraging LoRa® devices and the LoRaWAN® protocol. The product, FarmLife®, is a smart agriculture service, and its LoRa-enabled sensors drive improved nutrition, predict the onset of disease and detect estrus and calving to help ranchers better monitor their herd. Unlike other solutions, the sensors deploy simply through a collar equipped to each animal. The collar is non-invasive and immediately begins reporting data on the cow's health. Services are available through itk's FarmLife Cloud platform. **In total, deploying itk's solution costs less than 30€ per animal annually. In addition to the 300,000 cows already monitored in Europe, approximately 20 ranches have deployed itk's platform in North America. Following this initial deployment, ranchers claimed they received an ROI in less than a year through an increase in ranch productivity and efficiency.**

EASE OF DEPLOYMENT

LoRa devices deploy quickly and simply with minimal additional infrastructure. itk's FarmLife solution deploys onto the cow itself, and transmits data consistently for years at a time without needing costly, frequent maintenance.

EXTENSIVE COVERAGE

A single LoRa-based gateway provides miles of network coverage. This enables consistent connectivity for the largest ranches, and real-time data on cow wellbeing and location on the property.

COST-EFFICIENT

Leveraging up-to-the-minute data on cattle health, ranchers detect changes in a cow's vitals, such as body temperature, to predict the onset of disease, estrus and other biological phenomena. The LoRa-based solutions drastically improve quality of life for the cattle, resulting in higher quality milk and meat, greater earnings for the rancher, and a quick ROI.

> "LoRa devices' flexibility in deployment makes a key difference for connecting animals and offers the potential for a significant ROI. Our unique solution provides ranchers with tangible, actionable data on the health of their herd to remove variables from ranching and create productive, efficient and profitable ranches."
>
> *Eric Jallas*
> *CEO at itk*

30€
itk's solution costs less than 30€ per animal annually

300,000+
More than 300,000 cows connected and increasing worldwide

<1 Year
Ranchers typically see a ROI in less than one year

LoRa®

A leading global ecosystem for the Internet of Things…

LoRa devices and the LoRaWAN® protocol are supported by a diverse group of over 500 manufacturers, software designers, network providers, and industry associations.

Visit the Semtech website today to explore the LoRa-based products catalog and learn more about the innovative sensor, gateway, network, and software solutions offered by the ecosystem.

semtech.com/LoRa/ecosystem

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