Senstornet ThingSpy

Remote Monitoring and Predictive Maintenance for Industries

Overview

Senstornet ThingSpy is an IoT sensor that uses Edge Computing (EC) and Machine Learning (ML) to detect anomalies in industrial machinery, thereby helps to implement predictive maintenance and reduce unplanned downtime.

Senstornet ThingSpy provides three different monitoring and anomaly detection algorithms depending upon the level of monitoring required by the industrial assets such as machines, water pumps, gearboxes, thermal plants, power generators and engines.

Raw Sensing

This is the basic type where in the critical parameters of the industrial machineries are monitored continuously by collecting information from number of installed ThingSpy Sensors and checked for any anomalies. The processed information will be transferred to cloud through Senstornet ThingSpy Gateway for Monitoring. Few examples for such parameters are temperature, pressure, humidity, vibration, geomagnetic and proximity.

Edge Computing

EC is considered as one of the enabling technologies to unveil the full potential of the smart factory concepts. With this approach, ThingSpy Sensor information collected from number of installed nodes are processed and the computational part is performed locally, therefore enabling ultra-low latency and high data rate communication.

Benefits of EC

The main benefit of EC is that it provides a means for controlling and limiting the propagation of sensitive data through air.

The processing of sensor data, at least some degree of the decision-making logic (and the control of actuators), is beneficial to manage locally on site, because the connection with the access network may occasionally become unreliable or low in performance.

Machine Learning

ML is an application of AI that provides a system the ability to automatically learn and adapt to the environment through experience. ML algorithms are based on the processing of large amounts of data. In this method, raw or processed data from ThingSpy Sensors are sent to cloud through Senstornet ThingSpy Gateway for ML to act upon the data. This methodology is useful where heavy monitoring and modelling are required for predictive maintenance.

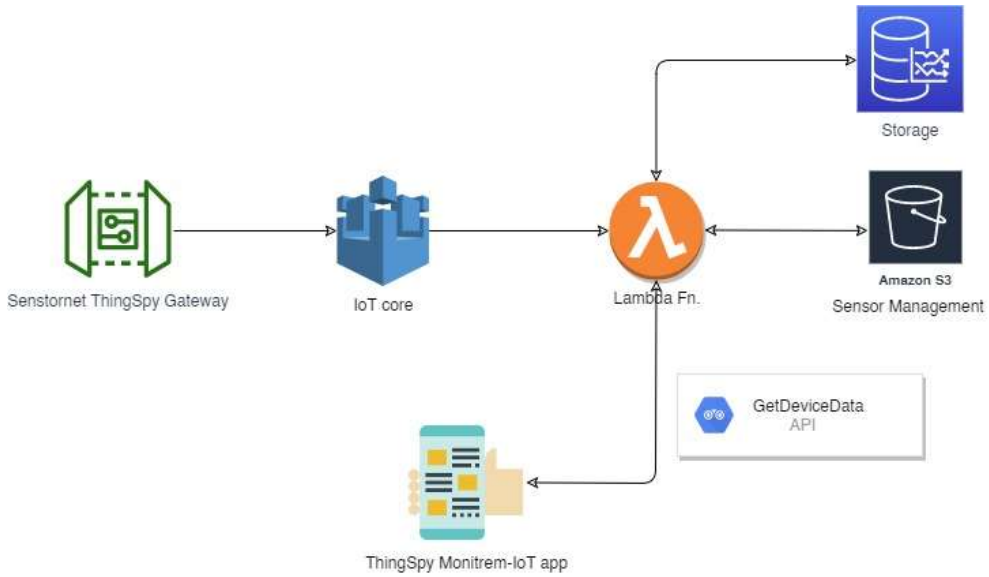

Figure 1: Cloud architecure for Senstornet ThingSpy

Senstornet Monitrem Mobile App

Customer can install wireless Senstornet ThingSpy Sensors on the industrial assets and securely transfer the data to the AWS cloud using Senstornet ThingSpy Gateways. Data from Senstornet ThingSpy Sensors are automatically and securely transferred to AWS using Senstornet ThingSpy Gateways.

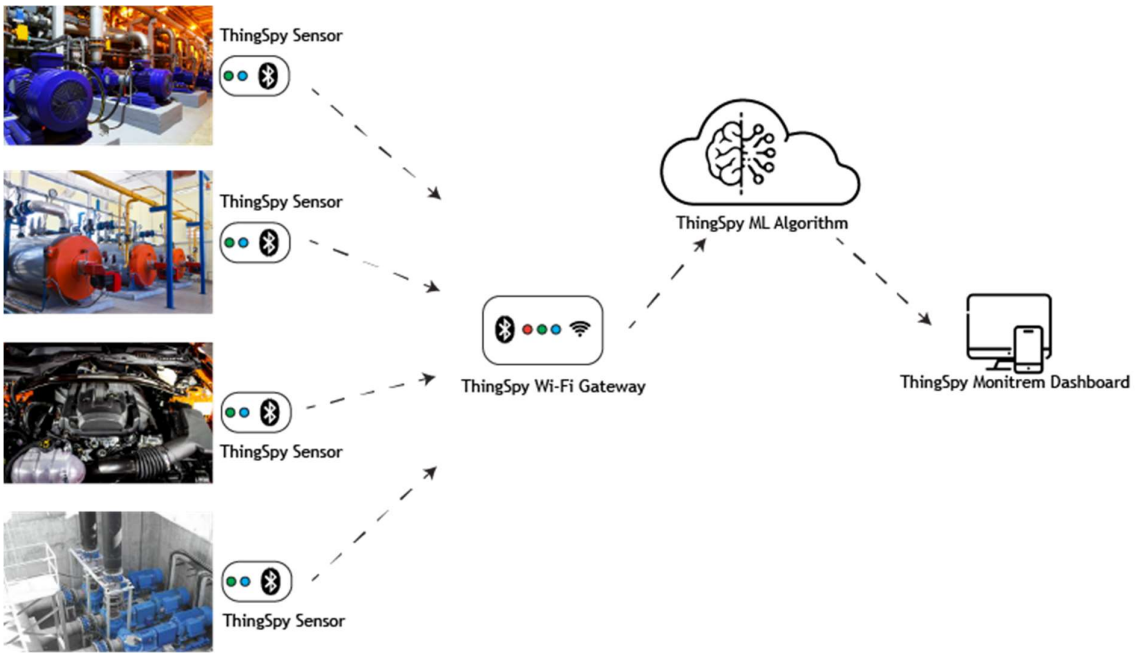

Figure 2: Functional setup

Senstornet ThingSpy Gateways connect with the sensors over Bluetooth Low Energy (BLE) and with AWS over Wi-Fi.

Users of Senstornet ThingSpy Sensors can remotely monitor the status of the industrial asset easily on the Senstornet Monitrem mobile app.

Features

	ThingSPY Sensor	ThingSPY Gateway
Power supply	Non-rechargeable Lithium battery	External power supply 5V
Replaceable batteries	Yes	Not Applicable
Battery life time	1.5+ years	Not Applicable
Local storage[3]	No	Micro SD card
Magnetic base[1]	*Optional	*Optional
PCB Dimension (width x length x height) approx.	33x75x20 mm	50x65x22 mm
Remote Firmware upgrade	No	OTA[2]
Connectivity	BLE	BLE, Wi-Fi
Enclosure type	ABS IP54[4]	ABS IP54[4]
Cloud service	Not Applicable	AWS IoT

1 – Magnetic base helps installing the sensor or gateway anywhere on the machine or industrial asset.

2 – Over-the-Air. Feature coming soon.

3 – Data logging for advanced offline analysis.

4 - For custom enclosure and Ingress protection (IP) requirements, contact sales.

Benefits of using Senstornet ThingSpy

- Scalability. Users can add or remove any number of Senstornet ThingSpy Sensors easily
- No limitation on number of Senstornet ThingSpy Sensors attached to a Senstornet ThingSpy Gateway.
- User modifiable data transfer rate as per the complexity of the asset monitoring.
- Smaller form factor.
- Long battery life.
- Ease of Battery replacement.

Getting Started

Customers are required to purchase a minimum of one Senstornet ThingSpy Sensor and one Senstornet ThingSpy Gateway in order to collect sensor data and send the processed information to cloud for remote monitoring.

In general, in order to make predictive maintenance or just monitoring work, companies have historically needed skilled technicians and data scientists to develop a complex solution from scratch. This includes identifying and procuring the right type of sensors for their use cases and connecting them together with an IoT gateway.

Senstornet ThingSpy Sensors are packed with on-board primary sensors needed for any kind of asset monitoring. They are capable to capture temperature, humidity, ambient pressure, acceleration (vibration), equipment activity, proximity and orientation. The sensor data collected from Senstornet ThingSpy sensors are then securely transferred to AWS IoT core through Senstornet ThingSpy Gateways.

Based on the algorithm chosen, the data arrived at the cloud would be either re-routed to Senstornet Monitrem mobile app without any further processing or applied to ML algorithm for predictive maintenance computation and then re-directed to Senstornet Monitrem mobile app.

Setup and installation procedure

Senstornet ThingSpy Sensors can be attached to the equipment using Magnets or Mounting Screws. Our Technical Sales team will walk-through a checklist, a portion of which covers the installation requirements.

Senstornet ThingSpy Sensors and Gateways and their use with the AWS cloud service rely on the connectivity over internet to the AWS region. We recommend that the customers have a highly reliable internet connection in their premises.

Pricing

Please contact sales contact@senstornet.com

FAQ

Q: Can a Senstornet ThingSpy Sensor without a Gateway monitor the assets?

A: No. For monitoring to work, at least one Senstornet ThingSpy Sensor and one Gateway is required. Gateways are responsible for transferring the data to cloud for further actions.

Q: What is the minimum number of Senstornet ThingSpy Sensors and Gateways needed for Monitoring?

A: At least one Senstornet ThingSpy Sensor and one Senstornet ThingSpy Gateway needed for monitoring.

Q: Can I add additional Senstornet ThingSpy Sensors to the existing setup?

A: Yes, installing additional Senstornet ThingSpy Sensors is easy. Once powered on, it'll be auto detected by Gateway and data transfer session starts after few hand-shake communication.

Q: What if I want to decommission the Senstornet ThingSpy Sensor?

A: Power off the Sensor and detach it from the equipment.

Q: Is the mobile app available for both Android and IOS platforms?

A: Available on Android platform. IOS platform will be supported soon.

Q: Is web-based monitoring application available?

A: Under development. Will be available soon. Please contact sales for latest update.

Q: How the pricing works?

A: For any setup, the total pricing is sum of

Price of a Senstornet ThingSpy Sensor
+
Monthly subscription fee for Sensor
+
Price of a Senstornet ThingSpy Gateway

Q: How monthly subscription fee works?

A: Monthly subscription fee per sensor is the sum of AWS subscription fee and the fee for device management cum maintenance in the cloud.

Data payload to cloud:

```
Payload =   {
            gid = xxxxxxxxxxxx, //12-digit Gateway ID
            sid = yyyyyyyyyyy, //12-digit Sensor ID
            batt = 98, //battery level in ' %'
            temp = 25.5, // temperature in 'deg C'
            press = 1003, // pressure in 'hPa'
            humid = 48, // humidity in '%'
            name = "Asset021", // Sensor dashboard display name
            proxim = 100, // proximity level in 'mm'
            acc_rms = 1.00 // vibration RMS
            }
```

Duty-cycle of the transmission: 1 data payload transfer once in 30-minutes
Payload format: JSON
Data retention: 1 month
Dashboard display refresh period: 15minutes

For the above case,

AWS subscription fee: $ 1.00/sensor/month
Sensor management and maintenance: $ 2.00/month (for max. 8 sensors)

So, for a customer having 5 sensors installed, the monthly subscription fee will be calculated as follows:

AWS subscription fee: $ 1.00/sensor/month
Sensor management and maintenance fee: $2.00/month

Total = 5 x $1.00 + $2.00 = $7.00/month

AWS subscription fee solely depends on the quantity of the data transferred and the duty-cycle of the transmission.

Sensor management and maintenance fee structure:

No. of sensors	***Fee per month***
Up to 8 sensors	*$ 2.00*
Up to 16 sensors	*$ 3.50*
Up to 32 sensors	*$ 4.00*

Q: Do I need to pay the monthly subscription fee every month?

A: Not needed. Flexible pre-paid subscription plans are available to cater different industry types. For example, a customer can opt for quarterly or half-yearly subscription plans.

Q: What if I decommission a Sensor before its subscription end date?

A: Monthly subscription fee will be charged only till the month you used.

Q: As a company, do I need to have an AWS account?

A: No, not recommended. Senstornet ThingSpy algorithms runs on AWS cloud service maintained by Senstornet.

Q: What are the default primary sensor types supported?

A: Senstornet ThingSpy Sensor integrates a 6-axis IMU with Fusion core, relative humidity, barometric pressure and ambient temperature, Time-of-Flight ranging and gesture detection.

Q: What is the technical specification of the Vibration sensor?

A: 3-Axis Accelerometer Output Data Rate: 12.5 to 1600Hz
Acceleration Range: +/-16g
3-Axis Gyroscope Range: 2000 degrees per second (°/s)

Q: I don't need the default sensors. Is it possible to customize sensor types?

A: Based on the business opportunity, we provide hardware and firmware customization.

Q: How does the Battery level indication works on LiPo version?

A: Senstornet ThingSpy Sensors integrates a Smart Battery Fuel Gauge.

Q: What if my facility's Wi-Fi network connectivity is not good?

A: We recommend that the customers have a highly reliable internet connection in their facility.
In case of connectivity issues, Senstornet ThingSpy Gateway attempts to transfer the data in the next periodic cycle.

Q: How can I attach Senstornet ThingSpy Sensors to my equipment?
A: Senstornet ThingSpy Sensors can be attached to the equipment using Magnets or Mounting Screws

Q: How many Senstornet ThingSpy Sensors can one Senstornet ThingSpy Gateway connect with?

A: As many Senstornet ThingSpy Sensors as possible can be linked to a single Senstornet ThingSpy Gateway. It is limited by the Bluetooth LE range.

Q: Are there any prerequisites for installing Senstornet ThingSpy Sensors and Gateways at my location?

A: Your facility must support the basic power supply and a reliable public secure Wi-Fi connection to install Senstornet ThingSpy Sensors and Gateways.

Q: Is there any visual indicators available to show the on/off, data transfer, connectivity status?

A: Senstornet ThingSpy Sensors and Gateways has colour LED indicators to show the connectivity status. One can easily identify the BLE, Wi-Fi and Cloud connectivity status from the LED indication.

Q: Any demo or trial provided to the customers?

A: Yes, demo will be provided to the customers on request. Please contact sales contact@senstornet.com

Q: Can I get technical support post installation?

A: Yes, we provide onsite or offsite technical support depending on the severity of the support request.