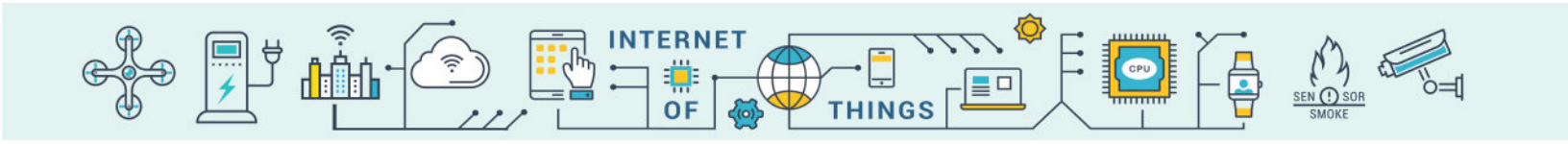
telchemy

Embiot®
Embedded Device Analytics®



The true potential of IoT is only beginning to be realized, as industries across the board explore new ways to leverage data analytics to improve safety, efficiency and profitability. As the number of connected devices continues to grow exponentially, so does the inherent challenge: how can industries manage, and get the most benefit from, the vast volumes of data being collected?

Limitations of Cloud-based IoT Analytics

In a typical Cloud-based IoT architecture, raw data from sensors / devices is collected in bulk and sent to an external analytics system or application in the Cloud. This often means massive amounts of data being continuously transmitted across a network to be filtered, stored, analyzed and reported.

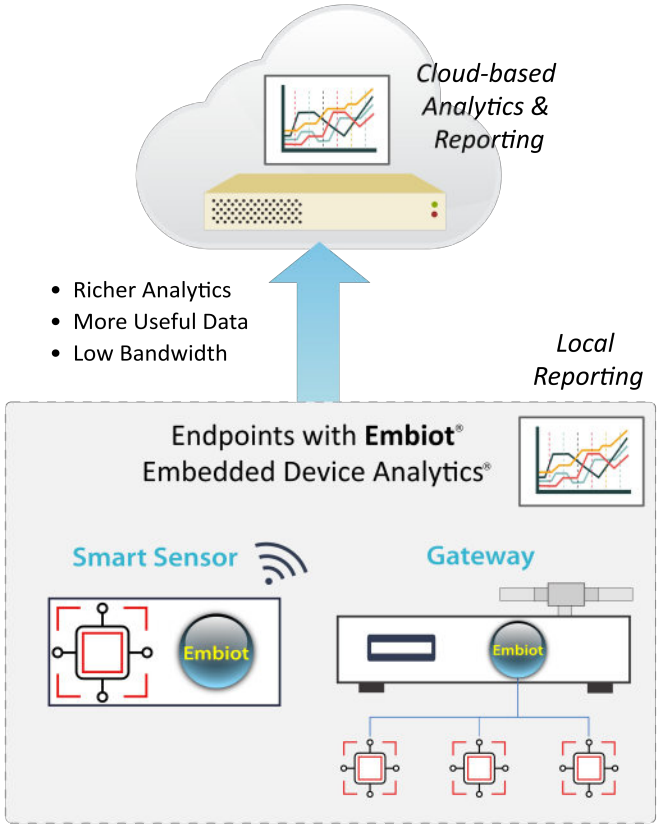
This approach has obvious vulnerabilities. If devices can't connect to the Internet, or if the connection is bottlenecked or dropped, data isn't being sent, and devices that rely on feedback from the Cloud may be unable to function.

Even with connectivity, latency may occur in the Cloud application itself due to the sheer volume of raw data being received and processed. Even a brief interruption could have a major impact on things like patient surveillance, bridge health monitoring, hazardous gas detection and other time-critical applications.

Solution: Embedded Device Analytics

Embedded Device Analytics applies data analytics intelligence at the source, giving IoT devices the ability to filter and transform raw sensor data into meaningful metrics locally. Devices become smarter and more independent, able to make more intelligent decisions and continue to function even when network / Cloud connectivity is lost.

Computing analytics locally dramatically reduces the amount of data being sent to the Cloud, conserving bandwidth and storage. IoT devices can take frequent samples of time-varying parameters, apply mathematical and logical functions to turn the raw data into useful metrics, and send fewer, less frequent reports without losing granularity.



What Makes
Embedded Device Analytics
Better Than Cloud-Dependent Analytics?

- Integrates local analytics within the device or system, enabling it to make faster, more intelligent decisions
- Scales more easily to very large numbers of sensors / devices
- Calculates analytics more efficiently in systems where performance depends on multiple time-varying factors
- Reduces Cloud storage requirements and computational load
- Lowers network bandwidth costs

Embiot® Embedded Device Analytics Agent

Embiot is a software agent that enables devices and systems to compute sophisticated analytics without the need for specialized software. It can be used for IoT, server, and system analytics in a broad range of industrial and residential applications.

Small footprint. Embiot is extremely resource-efficient, ideal for direct integration into IoT sensors, devices, gateways and small appliances up to larger systems. It can process hundreds of samples per second of any type of data from almost any source, typically using only about 300 Kbytes of memory.

No software development is needed to use Embiot—just a text configuration file that can be set up in a few minutes. Simply define the metrics and mathematical operations you need, and Embiot does the rest.

Stream processing. Embiot uses a *flow computing* or *dataflow* model for analytics, translating your description of the metrics into a series of interconnected nodes that can continuously accept, compute and report metric values. This model allows for input values to arrive asynchronously at at differing rates, and automatically updates calculated values as soon as the required inputs are available.

Applications

Embiot *provides critical analytics for a broad array of industrial IoT applications. Here are just a few:*

Smart City

- Air Quality Index calculation
- Monitoring vibration/strain in bridges and other structures

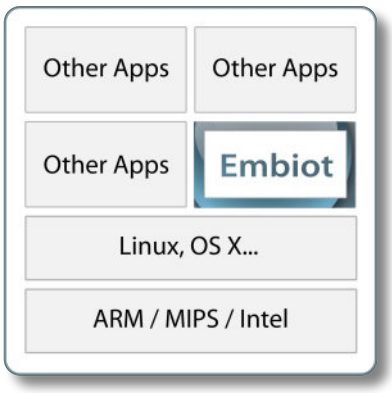
Smart Building

- Detecting anomalies in heating/cooling systems
- Occupancy monitoring/ people counting

Fuel Storage Monitoring

- Volume reporting for any tank geometry
- Idle time leak detection

Embiot Integrated Into a Device or Sensor



Embiot *embeds directly into IoT devices and transforms raw sensor data into meaningful metrics.*

With Embiot, devices generate actionable insights while sending much less data and fewer reports.

EMBIOT® SPECIFICATIONS

Host Requirements

- 32- or 64-bit processor (Intel / ARM / MIPS)
- Code size: ~300 Kbytes
- OS: Linux family, Windows 10

Inputs

- UDP and TCP connections
- Encoded as text, HTTP POST / PUT / GET, MQTT, MODBUS

Reporting

- HTTP / HTTPS REST
- MQTT
- User-definable template
- CSV
- Text

Security

- TLS authentication / encryption on any input or output
- HTTP basic authentication
- MQTT Authentication

Capabilities and Analytics

- Algebraic equations
- Math functions - log, sqr, sqrt, sin, cos, tan, limit, polynomial, filter, weighted sum
- Statistics functions - avg, min, max, rate, counter, standard deviation, histograms, predict
- Logic/probability - AND, OR, majority
- Bit manipulation - get, set, shift
- Thresholding - threshold, alert
- Input conditioning - normalization, rate, sample
- AI functions - neuron, fuzzify, probabilistic AND / OR
- Signal processing - FFT, ACF, filter

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Email: info@telchemy.com
Web: www.telchemy.com

Telchemy, Incorporated
105 Nobel Ct
Suite 100
Alpharetta, GA 30005
USA

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