

THE HARD SIDE OF THE IOT

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Alicia Asin, CEO and co-founder, Libelium

Crowd funding platforms like [Kickstarter](#) or [Indiegogo](#) together with the [Maker movement](#) have helped to make hardware sexy again and created the illusion that making hardware is easy. But making commercial hardware is so much more than prototypes and 3D printers. Moreover, we are starting to see (sadly, I admit) the first big crashes with the closing of crowd-funded platforms like [Ninja Blocks](#).

Maybe this is contributing to the talk of **hardware commoditization**. People tend to talk about the high value of software Cloud services and applications. I realize that in all the conferences I attend people ask about commoditization without really understanding what is in a “sensor.” Do they mean a temperature sensor? A chemical or calibrated sensor? A sensor device with a wireless radio? A sensor gateway? I always use the metaphor that hardware is the infrastructure over which we will build many services. **We are literally at the beginning of a new railway age and we really do need to build the tracks first. Hardware is those tracks. How can we talk about commoditization in a still-emerging market?**

Hardware in the [IoT](#) is a vast group of different components, combining chipsets and semiconductor companies, radios with their wireless protocols, integrated devices and gateways to link the physical world – the sensors – and the virtual, Internet world. At Libelium, we see things from the gateway perspective, since one of our products is [Meshlium](#), an Internet gateway connecting sensor values to different Cloud solutions (Telefonica, ESRI, Thingworx, Microsoft and others). We also have a view from the device itself, since our Wasmote Sensor Platform is a mini sensor gateway capable of aggregating a half-dozen different sensors per device. For context’s sake, we integrate more than [80 different sensors](#) and the most important radio technologies.

So, we are constantly in contact with sensor and radio manufacturers. **A number of key factors show why the time has not come for the hardware commoditization phase of the IoT just yet:**

Lack of large-scale projects

Yes, there are many projects, and yes, some – especially [smart grid](#) projects – are huge. So far, we have not seen any of these projects replicated hundreds of times, which is crucial to drop prices in the semiconductor industry where components measure in millions of units. Instead, we are observing an extremely fragmented market full of opportunities in the pilot stage. **We need to go from project to system.**

Lack of a “winner” radio technology

Back in 2006, when we started Libelium, it looked like [ZigBee](#) was going to be the technology for IoT – the term then was wireless sensor networks. I remember that Wireless Hart and ISA100 were competing to become the de facto standard for industrial networks. Today, we see IoT projects communicating via cellular technology, Wi-Fi or ZigBee and through a new, growing group of long-range technologies like LoRa, Sigfox or Weightless and short-range wireless protocols like Bluetooth, BLE and even NFC. From a technology-agnostic point of view it is great, and absolutely necessary that so many options to implement IoT projects are available, but it also contributes to **market fragmentation: it extends the decision-making process and complicates the integration part of the projects.**

Increasing need of computing power in end-devices

We all thought that Cloud storage costs were negligible, but even tiny things became big when they are counted in gazillions. Twitter generates 80GB of data per day, which seems to be a lot, but nothing compared to a gas turbine engine, which generates 520GB per day, per blade. Note: there are 20 blades in each one! Can you imagine how much data we will generate with all those billions of things connected to the Internet? Data scientists and analytics solutions are in high demand but projects demand more data processing in the end sensor devices with decisions made at the gateway level or, even better, coordinated by groups of sensor devices. **The market requires smarter end-devices with more computation power.**

Market demand for more accuracy

Cities are a case in point. We have passed the first wave of [Smart Cities](#) that looked for “the more sensors the better,” and now we see that CIOs from cities are more educated and concerned about their needs. They are having those [cross-conversations](#) with the rest of the departments in the city council and realizing that sometimes, a gas sensor that provides range values like “low, medium, or high” is not sensitive enough. If sensor devices are to provide [quality information](#) to the city and even complement expensive equipment like water pollution stations or sonometers, there is a real need for calibration, which is a pricey process. We have detected this requirement for a long time and it guided the R&D for our new releases of [gas](#) and [water](#) calibrated sensors.

The IoT is the next great technological revolution with the power to affect every single market, and every single vertical. We can expect commoditization in some components as the market evolves, but sensor devices and gateways are following a trend more aligned with smartphones. (Just when nobody thought we would pay for a cell phone ever again, I am buying an iPhone 6 for 800€). **After all, we are talking about the Internet of THINGS.**

50 Sensor Applications for a Smarter World

Alicia Asín



Alicia Asín is the CEO and co-founder of Libelium, the wireless sensor hardware provider, creators of Waspote, a modular sensor platform for the Internet of Things (IoT). Alicia is a computer engineer focused on how the IoT can change our world, starting with Smart Cities and smart agriculture. She is a frequent speaker at international conferences on issues related to Smart Cities, wireless sensor networks and the IoT. Alicia is recognized for achievements in business and technology: she was named best business manager in Foreign Trade (ADEA 2011); she was awarded the highest recognition for her paper on Computer Architecture (WCAE 2007, San Diego). Alicia is the first woman to receive the National Young Entrepreneur Award at the 2014 meeting of the Spanish Confederation of Young Entrepreneurs (CEAJE). Alicia holds a master's degree in computer engineering from the Polytechnic Center, University of Zaragoza, and is a graduate of the Cambridge Judge Business School and ESADE. She is a guest author to the Bosch ConnectedWorld Blog.