

THE WEB IS NOW  
UBIQUITOUS, IN OUR  
HOMES, IN OUR BUSINESS

# INTERNET OF THINGS

01 The role of payments in  
the Internet of Things

02 The Internet of  
Things, booming  
business models

03 Four reasons to put  
the Internet of Things  
in your life

04 INFOGRAPHIC  
Internet of Things

05 INTERVIEW  
ANTONIO SAINZ

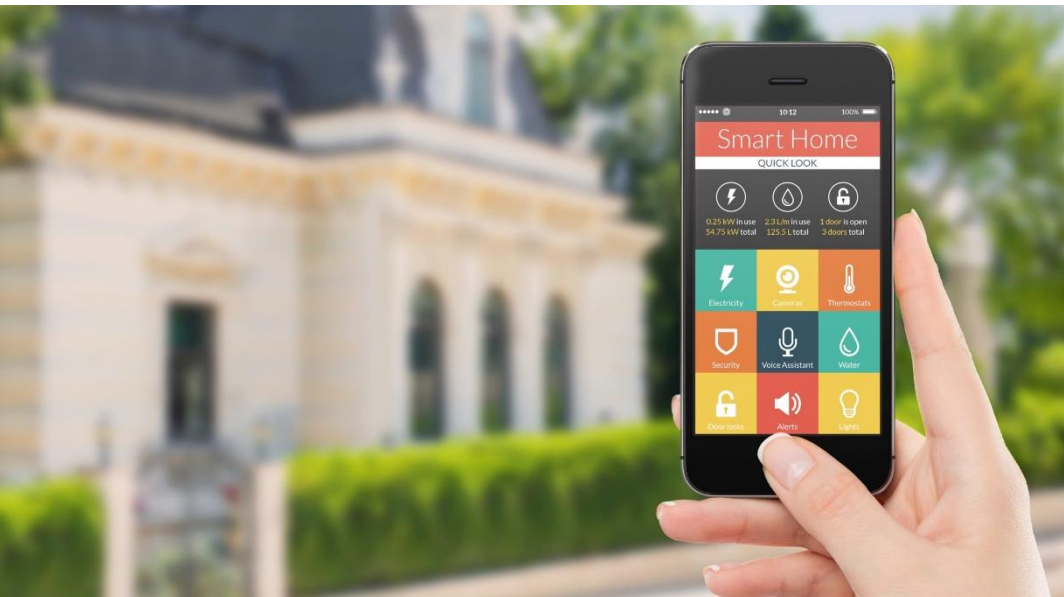
06 Wolfram  
Data DroP

## 01

# The role of payments in the Internet of Things

The rapid rise of the 'Internet of Things' has opened up spectacularly the possibility of everyday devices, such as like refrigerators, going beyond their traditional functions to become payment platforms. But, is it realistic to imagine an ['Internet of Payment through Things'? \(🐦\)](#)

The arrival of such devices en masse in our daily lives could be just the first step toward the development of **connected houses**, with a wide range of coordinated devices equipped with sensors, allowing them to detect our daily activities and anticipate our needs based on this information. And this, obviously, is where **payments 2.0** comes in. The growth of the Internet of Things makes it urgent to table a series of questions:

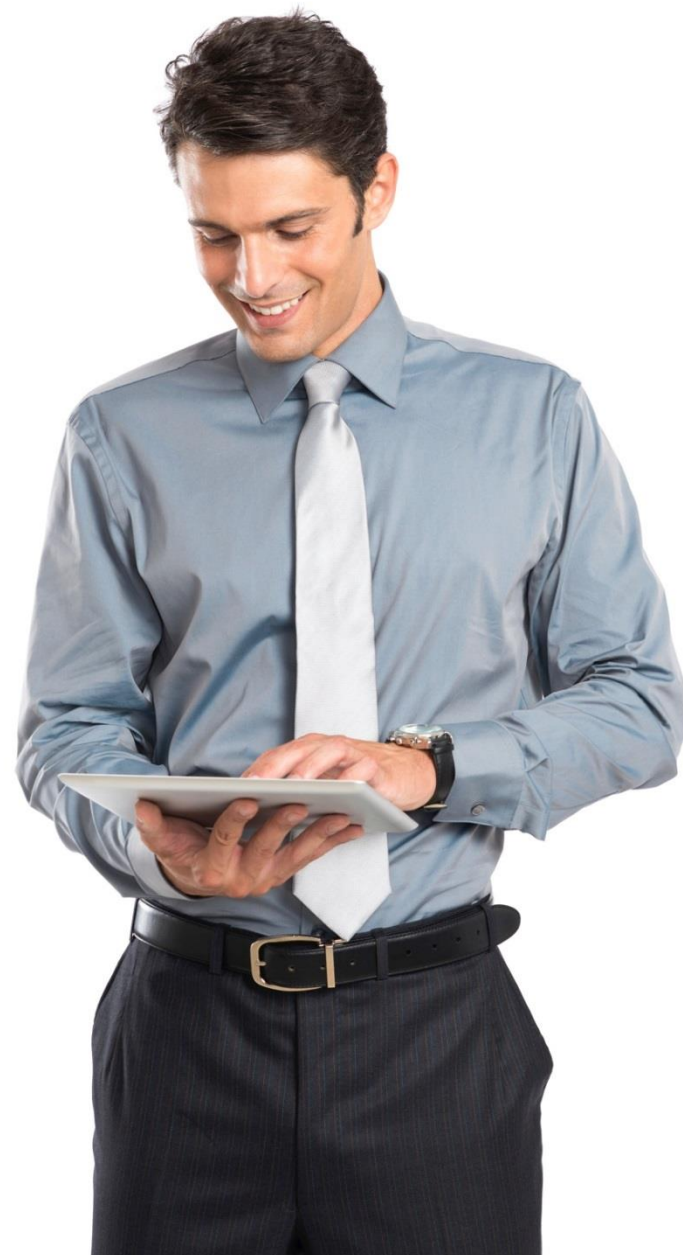


## The opportunity for new business models

The possibility of new offers and services is now opening up, especially in relation to data stored as the result of monitoring our daily activities. For example, we will be able to link financial benefits or penalties with the monitoring of user activities (for example, intelligent scales can allow health insurance providers to reward their customers for meeting monthly weight loss targets).

## Thinking about changes in the user experience

Obviously, our experience as users will not be the same if our refrigerator depends on an external device (such as our smartphone) to make payments compared to it hosting our credit card or [Paypal](#) account data and thus permitting automatic payments. As [explained by Mickey Ristroph, CEO of Mutual Mobile](#), a team of designers and engineers helping companies to develop devices, the trick is for the user not to have to think about payment processes or the type of technology that makes them possible in the course of their daily activities. In the Internet of Things payments should be invisible and transparent.





## The need for new financial information security systems ( f )

One of the major problems that payments in an Internet of Things will have to face is that **we do not use these 'things' in the same way we use other devices connected to the internet up to now** (PC, tablet, smartphone, etc): they are

purchased, installed and started up, and they can operate indefinitely without requiring our attention, making it less likely that we will notice if they not operate normally.

However, many studies have detected high percentages of smart appliances running and connected to the Internet **without their users having taken the trouble to change their default settings (with no password or an insecure password)**. In some cases, this was found when investigating avalanches of *spam* coming out of such devices.


If the time comes when payments are a key element in the Internet of Things, **we will**

have a problem if manufacturers, developers and users do not place greater emphasis on security than they have up to now. And the problem is compounded when we have to take account of aspects such as devices being used by multiple users, who in many cases will not share a family nucleus (as is the case for vehicles).

In this context of serious risk to our financial data, **banks, thanks to their position as trusted institutions, could play a significant role in protecting such data**, since they already have their own [technological infrastructure \( in \)](#).

# 02

## The Internet of Things, booming business models

The Internet of things has been considered for some years as one of the biggest trends, and it looks like 2015 will be its great year. We already know what it offers, although there are major challenges ahead. What changes will it bring? Many, and these are the sectors that will drive [its growth and expansion](#) (  ).

The **Internet of things** (IoT) is a concept that dates back to the end of last century and is related to connecting everyday objects to the Internet, but as technology continues to advance, it becomes more important in the disruptive innovation segment.

This [object-to-object \(in\)](#) or multiobject connection using different communication protocols opens up a vast field of applications in everyday life and a new action-reaction approach in events in which **human beings are not always involved**.



The concept is simple: taking any everyday object and connecting it to the Net, with its utilities and the multiple uses that can be given to that object in the interconnection with communication with third parties. From transfers or interconnections via WiFi, to **much more complex communication protocols**, we can find from smart sneakers that monitor our running to biomedicine applications that control the proper operation of a pacemaker and anticipate critical situations for the patient according to the data extracted. This is the future, and these are the key business models:

### Domotics, key in the Internet of things ( f )

Did I switch off the light when I left? Did I turn off all the faucets? Could the heating be turned on based on the outside and room temperature? All these questions that we have asked ourselves many times outside our home **will have an answer in the very short term**

with the boom in domotics and the interconnection of our home's appliances.

Tasks as complex as planning our home's energy efficiency, checking damage to our installations or adapting the use of our household appliances will become key innovation niches and business models in 2015.



## Biotechnology and health, monitoring our lives

The implementation of biometric [control systems](#) for our body, the control of our vital signs, nutrition, sleep and physical activity, is the best way of

preventing problems and applying corrective methods on our health. IoT is combined with **global information processing** and subsequent decision-making using systems as simple as having interconnected clothes, physical exercise control

systems in the sneakers or the use of multiple wearables that obtain all the information we can provide. Health and personal care is an emerging sector where the development of new business models is already present in cases like [Zentox](#) and Xtintia Corp.



## Microtargeting, a key niche for the Internet of things

Microtargeting refers to advanced market segmentation at individual level and its expansion could be key in fashion and accessories if we are capable of monitoring and identifying the usage trends of consumers. For example, a runner who lacks the right sneakers or the use of clothing better suited to the usual environments opens up a new horizon for marketing products

and services with much greater segmentation than the usual marketing techniques.

## The motor industry and the future of smartcars


Can we imagine a vehicle that is capable of detecting the best route in a city in real time to avoid traffic jams or traffic lights? This is possible as long as we have an [interconnection between the car](#) or auxiliary device and the existing traffic in real time.






# 03

## Four reasons to put the Internet of Things in your life

One in four users recognizes that he or she has Internet of Things devices because of the savings it generates, while 19% opt for these devices for their convenience and 16% for reasons of security, according to the GSMA study conducted by [KRC Research](#) (  ).

### In order to save

When we talk about the Internet of Things we are talking about a home or office that are connected: with an intelligent electrical system where lighting, temperature and appliances such as the washing machine or fridge [are connected to the Internet](#) (  )

and programmed to **improve not only well-being in the home but also to achieve a reduction in electrical bills.**

In fact, home automation is implemented in one in four homes in Germany, the UK, Japan, and the US. Twenty-three

percent of those already have a security system connected; 24% boast a lighting system; another 24% say their washing machine is connected to the Internet; and another 24% say their thermostat is connected, according to the GSMA study conducted by KRC Research,

*The Impact of the Internet of Things. The Connected Home.*  
In the current market, with a connected energy system consumers can save about 20% per month, which can result in savings of up to 250 euros per year. With these ownership statistics in mind, the

data concerning user intentions should be highlighted, given that eight out of ten respondents want to have thermostats and lighting connected; and over six of 10 their vacuum cleaner, the lawn mower, the oven, or the fridge, among other home devices.

### **For security and protection**

Demand for security systems connected in the home or office is increasing and the main reason is the protection they offer. According to the study, the main benefit of this connection is to be able to warn the head of the family when some danger occurs or the normal routine is altered. Therefore, **eight out of ten respondents say they want a connected security system.**

These systems use [sensors to control \(in\)](#) when doors or windows open and when there is movement inside a property, whether it is a home or business. In addition, they make it possible to control these functions remotely, using a smartphone. For instance, if you are on a trip and want to give



the impression that someone is in the house, you can activate automatic switching of lights at a specific time, or turn on the radio from time to time.

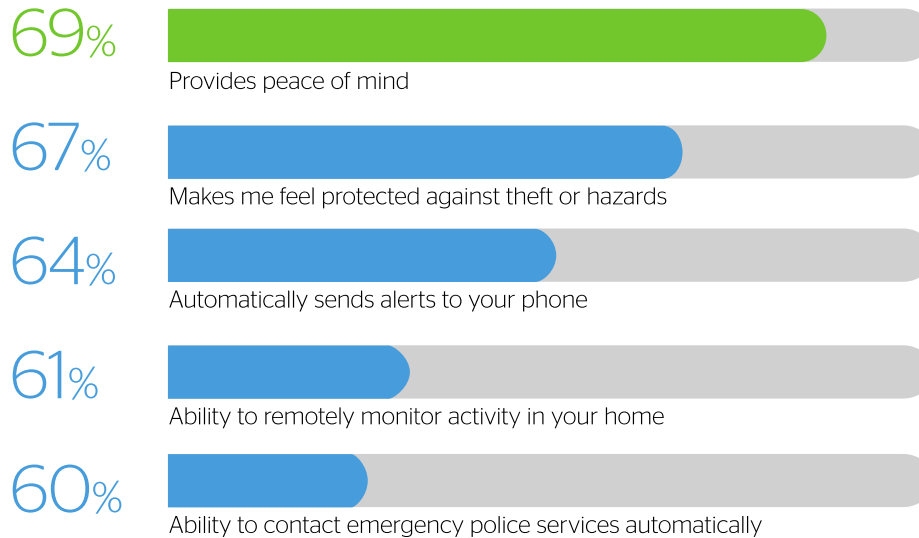
The increase in security provided by these systems receives almost unanimous approval: **fifty-seven percent of those who already have it**

**highlight a "significant increase in their feeling of security"**, while another 42% said that their security sensation had increased a little".

These two first advantages, savings and security, are two of the most valued by consumers, who prioritize

connected energy and security. As a matter of fact, following computers, video consoles, smartphones, and tablet PCs, intelligent meters appear to be the most frequently owned connected devices in the home, according to the GSMA study.

## Ranking Connected Security System Benefits



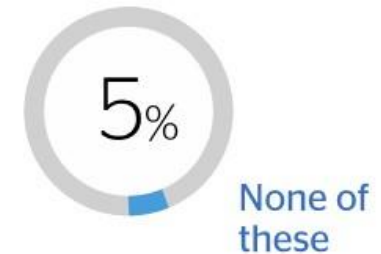
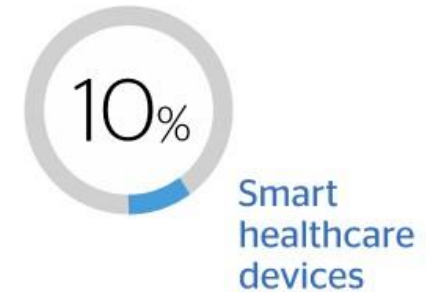
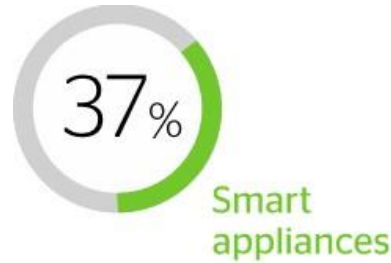
### For convenience

To be able to remotely control the objects in your home is no longer science fiction.

It is the ability to be able to remotely check on an apparatus, its operation, to turn it on or off... we now live in a world in which one no longer has to return to the office to check whether a door has been left unlocked or a machine left on.

To relieve the anxiety that occurs when one cannot double-check something is a priceless convenience.

Which **connected device** are you most likely to use in the next five years?



### For information

The **exchange of information** that can be relevant for a specific activity is another factor motivating users to have various devices connected.

For instance, a connected car can detect that its owner and family are travelling and, using a mobile device, automatically switch off light of heating and activate the security system.

Almost all respondents highlight that it is useful for all appliances **to be able to communicate and exchange information at all times and without glitches**, to generate a specific "lifestyle" in our connected home. Forty-four percent say they are very interested and 45% somewhat

interested in this aspect. As we have seen in this example, the connected car remains one of the most important amount Internet of Things devices. Almost half of the respondents (43%) say they have a connected car, i.e. using satellite navigation, and proof of this growing interest is the space devoted to this in the Mobile World Congress 2015, where many intelligent technology novelties in the automotive world were introduced.

Still, **interest for other connected objects** is also growing considerably, such as health monitors (68% report they are interested in these devices); activity monitors (63%); and elderly persons' monitors (61%).

Among activity monitors, for instance, respondents highlight the connectivity of the different electrical devices that can determine the probability of a defect or breakdown by **sharing their use information**. These data may be used to perform a diagnostics and detect the failure with more precision and to offer the manufacturer improvement options for future devices.



WORLD

E-MAIL

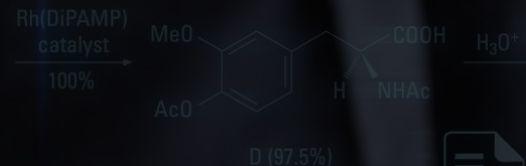


The monitoring of health devices also offers key information of the patient for his or her doctor. For instance, a person with diabetes can use a connected blood sugar monitor to conduct regular readings to control his or her sugar and insulin intake. This type of monitoring is also very useful to care for elderly people and babies, to follow their activity and be able to protect them.

**Savings, security, convenience, and access to information.**

There are four main reasons for you to consider entering the world of the Internet of Things.


CONNECTION



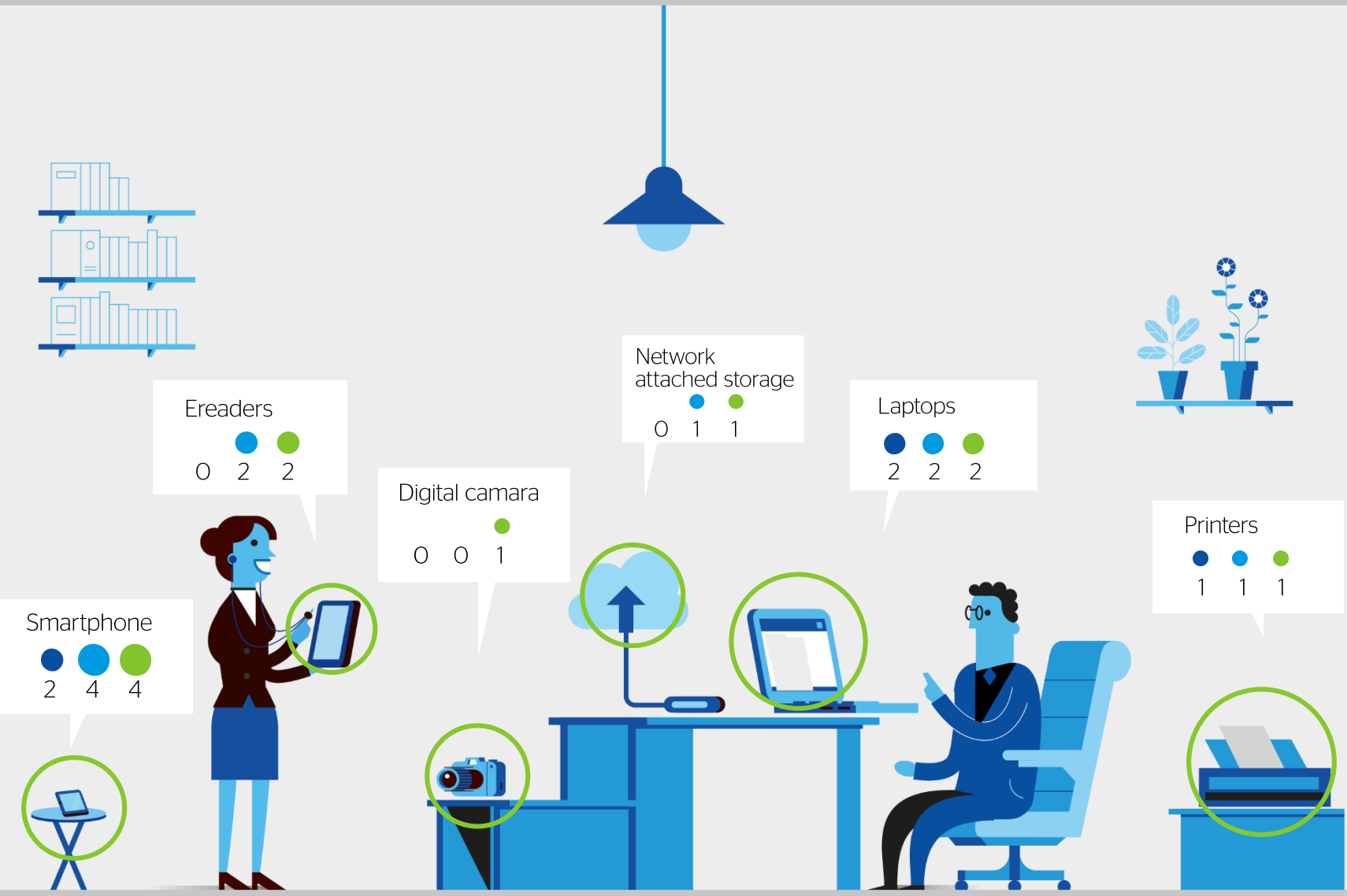
# 04/INFOGRAPHIC

## Internet of Things

OECD has analyzed a typical family of four in a developed country to know how many connected devices are on a home. They had 10 devices connected in 2012, they are likely to have 25 in 2017, and up to 50 in 2022.

 [Share on Pinterest](#)



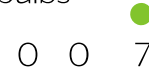




Home automation sensors



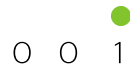
Smart light bulbs



Connected TV



eHealth device



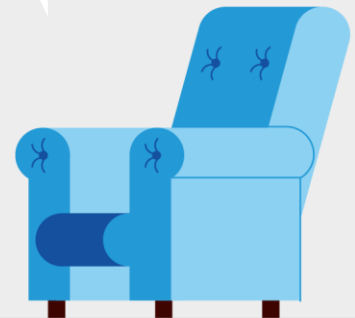
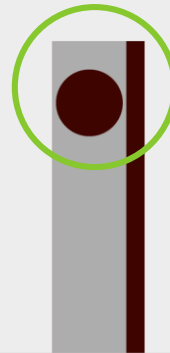
Connected stereo systems



Wifi Modem



Connected sport devices





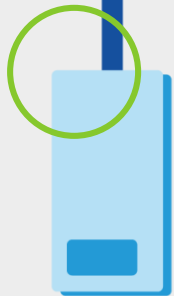
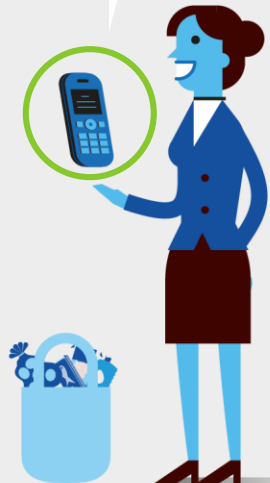
Smart metre  
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0 1 1

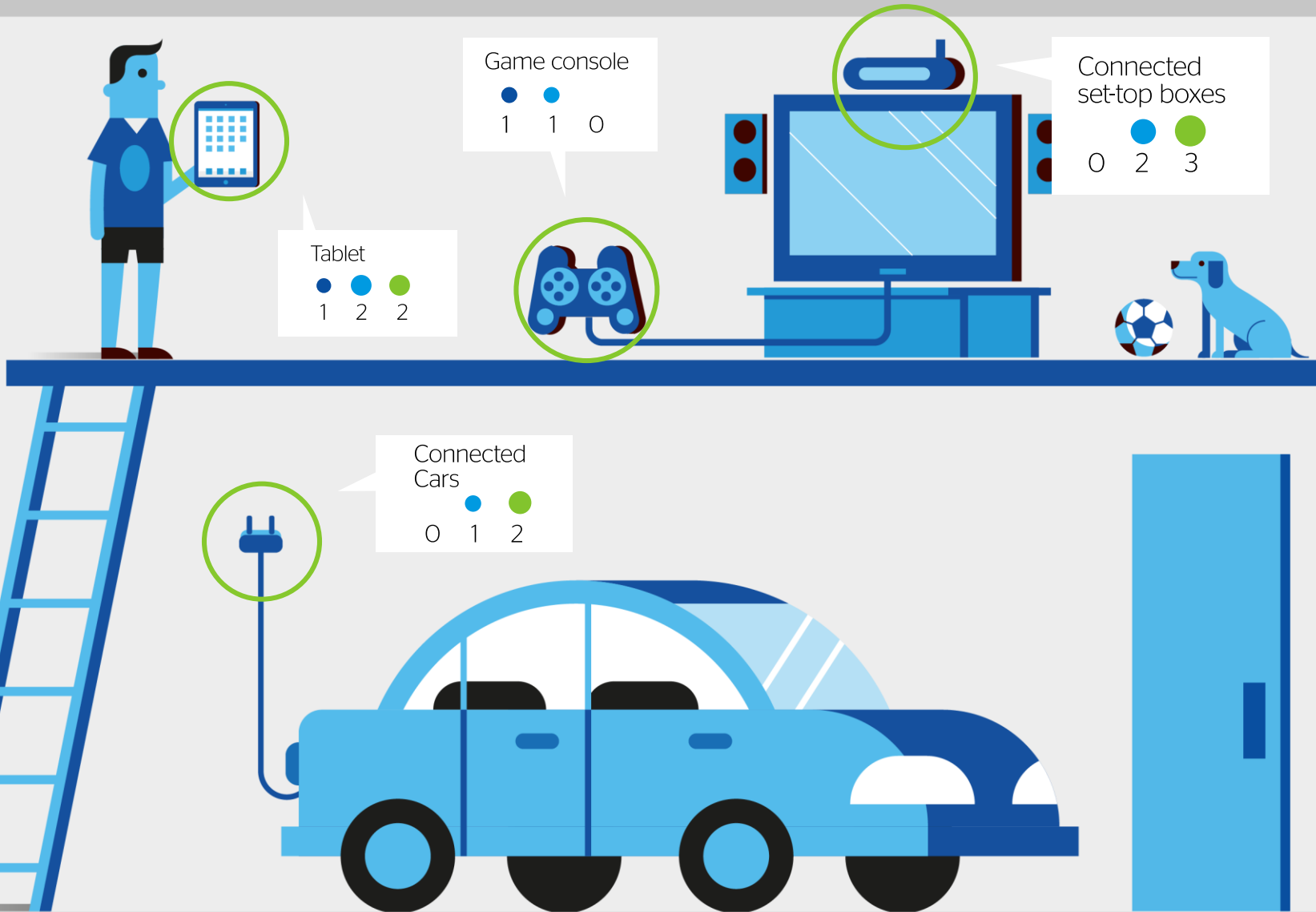
Energy consumption display  
● ●  
0 1 1

Pay as you drive devices  
● ●  
0 1 2

Weight scale  
●  
0 0 1

Intelligent thermostat  
●  
0 0 1






# 05/INTERVIEW

## **“The Internet of Things revolution enables us to access real-time information about our surrounding environment”**

- ANTONIO SAINZ

An increasing number of everyday objects are being incorporated into the so-called [Internet of Things](#) (  ): they connect to the net and interact between themselves and with people. It is a new generation of technology that requires professionals who specialize in the development and application of these new techniques. So we spoke to Antonio Sainz, one of the people behind the new post-graduate degree in the Internet of Things at Isabel I University.



**According to Cisco, over 99% of things in the physical world are not yet connected to the Internet but, by 2020, 37 billion “smart” things will be connected up. Are we taking about the next industrial revolution?**

The Internet revolution brought with it the streamlining of multiple processes and the spread of ubiquitous, accessible communication while laying the foundations for an enormous source of knowledge and data storage.

The breaking down of barriers between user and machine, combined with machine-to-machine communication, represents yet another step forward in this revolution, a fresh impetus in which systems

cooperate with each other, processes are self-sustaining and evolve proactively, and control over our surrounding environment becomes ever more effective.

This will all give rise to a new [technology wave \( f \)](#) which, once embodied in new services and inventions, will drive technological development and socioeconomic growth over the coming decades.

### **In what ways can the Internet of Things change our everyday lives?**

Thanks to IoT (Internet of Things) technology, we are seeing an explosion of new devices that connect both to each other and to the net. This, in turn, is creating a situation

whereby huge amounts of real-time information about our surrounding environment is now readily available to us. So much information about our surrounding environment can enrich our experience and simplify our day-to-day activities by way of new services ranging from an optimized use of energy (with the corresponding savings), through to an added sense of security and confidence when going out or leaving our pet alone at home.

The combination of new interconnectivity technologies, information-sharing paradigms and user-centered services forms the foundations of this revolution, which is already upon us and is bringing new opportunities every day.

**Smart Home, Smart City,  
Energy efficiency... in which  
ambits are connected objects  
going to be most useful to the  
user?**

[The Internet of Things](#) ([in](#)) is applicable to many ambits and will have an important role to play in all of them. The advantages will be seen from many perspectives. For instance, a domestic user will have greater control over their home and be able to regulate the conditions of comfort by measuring different parameters such as temperature and humidity and, based upon these measurement, adjust the air conditioning systems accordingly, leading to significant energy savings.

Being able to connect up everyday objects, such as a plant or an aquarium, will enable users to monitor them and then act accordingly based on the measured parameters. We will have access to previously unavailable data.

Through these connected objects, **cities will become smarter**, creating an ecosystem that can be used by third parties to develop applications that will improve the typical processes within a city and offer citizens real-time information, such as whether there are any parking spaces available in the area.

The ability to control and monitor street lighting will lead to major savings on energy by



reducing consumption as well as CO2 emissions.

In short, **the Internet of Things offers innumerable applications in highly heterogeneous sectors** and being familiar with the technologies involved will provide a huge competitive edge when confronting new professional challenges.

**On an economic and professional level, are new specializations going to be required of both companies and their employees?**

The increasing maturity of the *Internet of Things* market is causing companies to start thinking about new projects, whereby they are seeking new profiles and developing long-

term activities that allow them to quickly adapt to the issue of device interconnection.

**Creating IoT-related job titles is one of the tasks** that large companies, such as Texas Instruments or Microsoft, are beginning to take into account when recruiting specialists with vast IoT knowledge capacity.

Today, the most in-demand roles for such activities call for in-depth knowledge of wireless networks, ICT, M2M, sensors, firmware, etc., without being specifically specialized in IoT.

Therefore, the creation of and search for more IoT-specific roles will mean that companies do not focus solely on working with in-house devices or

technologies, but rather, due to the incorporation of specialist professionals, are able to work with different ecosystems in a more global manner, adapting each company's needs in order to **reduce the time-to-market of their products onto the IoT market.**



## How and to what extent could the application of IoT improve a company's productivity?

Whatever can be measured can be improved. The IoT revolution brings with it the emergence of a huge number of devices that provide real-time information about everyday objects. All this information can be processed and analyzed to obtain highly detailed knowledge of our surrounding environment.

The benefits of having all this information available to us within a business environment can be directly focused on improving productivity at various levels: improving the supply chain, improving maintenance processes, increasing the energy efficiency of processes, increasing efficiency by having all the information available in real time, etc.



### **Antonio Sainz**

is a lecturer for the University Expert in Internet of Things post-graduate course at Isabel I University.



# 06

## Wolfram Data Drop, the universal data system for the Internet of Things?

Stephen Wolfram is one of those smart Internet guys. Born in London in 1959, this scientist has been exploring for some time now the limits of technological innovation in areas such as online searches. Founder and CEO of [Wolfram Research](#), he is the creator of the [software Mathematica](#) and the [search engine Wolfram Alpha](#). His personal ambition is to revolutionize completely the Internet of Things... and it seems that with his latest invention he might do it!



The Internet of Things has long pursued the idea of a world of devices fully interconnected through the Internet. In this connected universe, a day could come when there would be more devices than people 'plugged' into the virtual world. But what's really crucial about this technological future is what to do with the data accumulated in all these devices and how to use it. [Wolfram Data Drop](#), Wolfram's latest project, might be the solution.

## What is Wolfram Data Drop?

The idea of Wolfram Data Drop is to build a large repository with data accumulated by all the Internet of Things devices, and use the Wolfram Language to **interpret, visualize, analyze and consult all that reusable information** by other devices and also by other persons. Stephen Wolfram's system allows any user to connect a device to a cloud service, accumulate his data there and open it.

"When I first started thinking about the Data Drop, I viewed it mainly as a convenience—a means to get data from here to there," [explains the scientist](#) in his blog, "but now that we've built it (...) it's a universal accumulator of data, set up to

get—and organize—data coming from sensors, devices, programs, or for that matter, humans or anything else, and to store this data in the cloud."

## What does Wolfram pursue with this project?

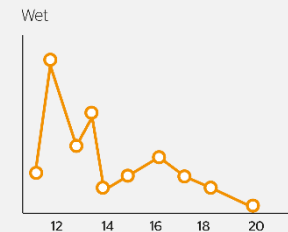
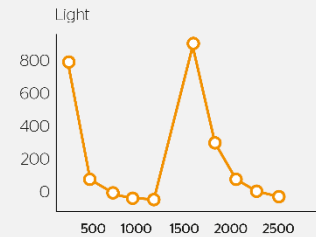
The idea of the mathematician is to turn Wolfram Drop Data into a great universal data center, where any software and hardware can connect and use its information. An API, an email, a service like Twitter, a device with Arduino hardware, a Raspberry Pi device... the possibilities are huge. "We're going to be progressively adding more and more ways to connect to other data collection systems," he explains.

But what is it that makes Data Drop so special? The way in which it stores [data in the cloud](#) using a standardization protocol through what they call a 'databin', which is associated with a unique alphanumeric identification. Each of these 'databins' has its own url on the Wolfram Data Drop website, containing the [details of the device and the accumulated data](#).

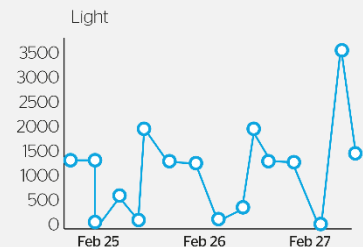
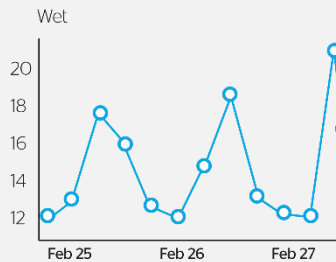
This allows any user to download raw data from any device connected to this data center, but with one


particularity: the information accumulated in Wolfram Data Drop has all the advantages of the [Wolfram Language](#), i.e. it's **sorted data and represented in and understandable way**. For instance, Wolfram explains in his blog post the collection process, and shows the environmental information gathered by a sensor placed in his desktop: data on temperature, humidity, pressure and light. The information is stored in the cloud in a way that can be used directly, without prior treatment, because it manages a universal protocol:

## Histogram



## Date List Plot





But almost no one had yet created an **effective way to collect and process data neatly**

In addition, any search for a particular databin in the Wolfram Alpha engine generates an answer with all the information about the device and the accumulated data. Therefore, we would be talking about a kind of **'Google for the Internet of Things'**.

Many companies related to the Internet of Things, wearables and Big Data are launching new devices which are constantly

connected. But almost no one had yet created an **effective way to collect and process data neatly**, without substantial cost increases in infrastructure and applications and dashboards to analyze that information. Wolfram Data Drop tries to offer a universal system that solves the use of data from the Internet of Things.

“Part of the reason we created the Wolfram Data Drop is to give such companies a better solution,” says Wolfram. “They deal with getting the data—then they just drop it into the Data Drop, and it goes into our cloud (or their own private version of it), where it’s easy to analyze, visualize, query, and distribute through web pages, apps, APIs, or whatever.”

## Some important features of Wolfram Data Drop

Wolfram Data Drop allows to **upload data publicly or privately**. Any user who wants to upload data to the Wolfram Cloud can open or close the access to his information through authentication. Due to the recent launch of the project, Wolfram Research hopes to gradually be able to increase the upload speed of data. Moreover, the idea is that companies or organizations wanting to use Data Drop to store private information in the cloud can access their databins directly from their own infrastructure.

Each of these databins can contain information of a single device or mix information

collected from several sources simultaneously. This doesn't generate problems, as the information collected always contains metadata which lets us know its specific origin. Once the data is stored in the cloud, you can access it from desktop systems or mobile devices.

If you are a developer who wants to access data in order to implement your projects, you can do so via the Wolfram Cloud. And if you are a company that produces wearables, for example, you can access the information by creating your own private site within Wolfram Data Drop or create your own private Wolfram Cloud.

Moreover, you can also access the information through an app that works with the

Wolfram Language, either yours or from third parties.

Drop Data wants to end with "lots of messiness that's been associated with collecting and processing actual data from real-world sources." "I'm excited about all the things I'm going to be able to do with the Wolfram Data Drop, and I'm looking forward to seeing what other people do with it," says Wolfram in his post. This universal system can be the ultimate driver of the Internet of Things and another asset within the world of Big Data.



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