



## The Internet of Things – the next Internet revolution

We are all starting to get familiar with the world of Internet as a world on its own, even to the point that you may wonder how the world was organized without it?

Still, despite the advances in technology people understand that we just embarked on a revolution that is still in its early phases, and the high rate of change and progress of Internet functions and applications indicates that we still can expect a lot in the coming years, despite the fact that it all is quite difficult to predict as well.

One area of progress that is difficult to predict and that is seriously lagging – almost just waiting in hiding to come out – is the integration of the Internet with our physical world. Where today the world of the Internet and our physical world are almost two standalone worlds with humans being the interface between the two, the expectation of the future is that these two worlds will get significantly more intertwined, and this intertwining will become a sort of revolution in its own.

Let's take a practical example. You are driving home, it's a cold day, and you want to already turn your heating on (– or reversely, you have left home, and you wonder whether the heating was turned off). Despite all our technology sophistication you probably best off by calling your neighbor (who has a reserve key of your house) to go inside and do the job. This is an interesting example because most likely you have a little control network at home controlling your heater with a thermostat and you probably also have Internet access at home. Still, the lack of integration of these networks will leave you no other option than calling your neighbor. This is clearly not only the case for checking our heating, but also for checking whether the door was locked, the windows were closed, etc. Wouldn't it be great if you could control your house with a few buttons on your cell phone? Interestingly: it does not require real technology breakthroughs to make this happen!

Looking at this situation one step more remotely: we are using the Internet today for communication and reading the news (with blogging as an interesting new phenomenon filling the hole between the two). We are also using the Internet for shopping, where every brand or store nowadays has a point of access to the Internet. What has not been connected to the Internet are all the functions that could be useful for making our lives comfortable and saving energy: the Internet is like a big nerve center that still has to build a hair nerve system getting into all the supporting functions of our lives. Actually our view of the Internet so far has been quite "human-centric", but that is going to change. It is quite likely that sooner or later the majority of items connected to the Internet are not humans, but things: heating/cooling systems, security systems, central door/window locking systems, remote controls, etc.

It is here where wireless will start to play a role again. There are many more "things" than "people" and to physically "wire" all things to the Internet is just not feasible. The good news is that recently the communication standards (like IEEE 802.15.4 and on top of that ZigBee) have been ratified to make this possible. But it will not only be wireless that is required: also "energy harvesting" from the environment will be an essential element, because it is necessary not only to get rid of the data communication cable, but also to eliminate the power cable to avoid introducing a huge battery maintenance job. Energy harvesting is the technology that pulls energy out of the environment (like for instance a solar cell on a pocket calculator) and can support the energy needed for the "thing" to have it connected and controlled over the Internet.





Also the development of energy harvesting devices is making big steps forward, but here is still a way to go, in particular in getting the cost of the harvesting devices to reduce.

Looking into the future the "Internet of Things" could very well be the next revolution on the Internet where integration of our physical and virtual worlds will be the main driver and that will enable applications that make our lives more comfortable and that will help us to reduce our waste of energy.

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