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Internet of Things

Sarath T.V

History

- Coined by Kevin Ashton in 1999
- in 1926, Nikola Tesla

"When wireless is perfectly applied the whole earth will be converted into a huge brain, which in fact it is, all things being particles of a real and rhythmic whole.....and the instruments through which we shall be able to do this will be amazingly simple compared with our present telephone. A man will be able to carry one in his vest pocket."-smart planet.

- In 1969, Alan Turing stated that *"...It can also be maintained that it is best to provide the machine with the best sense organs that money can buy, and then teach it to understand and speak English. This process could follow the normal teaching of a child."* - smart machines communicating with each other.

The First Connected Devices

- In 1989 we saw the first 'House of the Future' built in The Netherlands.
- This house was meant to give the consumer a view how the future might look like. The house focused on the interaction between man and machine. Voice recognition was an important aspect of the house.
- In 1990 the first toaster was connected to the Internet. This toaster was developed by **John Romkey and Simon Hacket**. The only thing that could be done was turning it on and off, but in 1991 they added an automatic crane to also insert a slice of bread automatically.
- The first Machine-to-Machine protocol developed by IBM, called MQ Telemetry Transport (MQTT)- *facilitates "connections with remote locations where a small code footprint is required and/or network bandwidth is at a premium"*
- In 2000 The Smart Refrigerator made its entry. developed by LG. It had an LCD screen that was capable of showing information such as inside temperature, the freshness of stored foods, nutrition information and recipes.

- In 2004, Walmart started to deploy RFID tags at large scale to improve their inventory.
- In 2005, the United Nations first took notice of the Internet of Things when it was mentioned in a Telecom Union report. The first conference on the Internet of Things took place in Zurich in 2008.
- In 2010 Google launched their self-driving car concept, taking a huge leap forward in the development of connected and autonomous cars.
- Also in 2010, two former Apple engineers started Nest Labs, the company that produces smart thermostats and smoke detectors.
- In 2014, Google acquired Nest Labs for \$ 3,2 billion to speed up their Internet of Things division.
- In 2014, Apple launched HomeKit, which is a framework in iOS 8 for communicating with and controlling connected accessories in a user's home, resulting probably in a lot more connected devices in the coming year.

Launch of IPV6

- But the biggest enabler of the Internet of Things is the launch of IPV6 in 2011. Where IPV4 had only approximately **4 billion addresses**,
- IPV6 has a total of **340 undecillion** IP addresses, which is the equivalent of **3,4 with 38 zeros**.
- This is more than enough to cope with the expanding Internet of Things in the coming years, even if projection are correct that predict that by 2030 we will have 100 trillion connected devices in the world.
- **Arduino** and other hardware **platforms** mature and make the IoT accessible to DIY'ers taking interest in the topic. –**Rapid Prototyping boards**

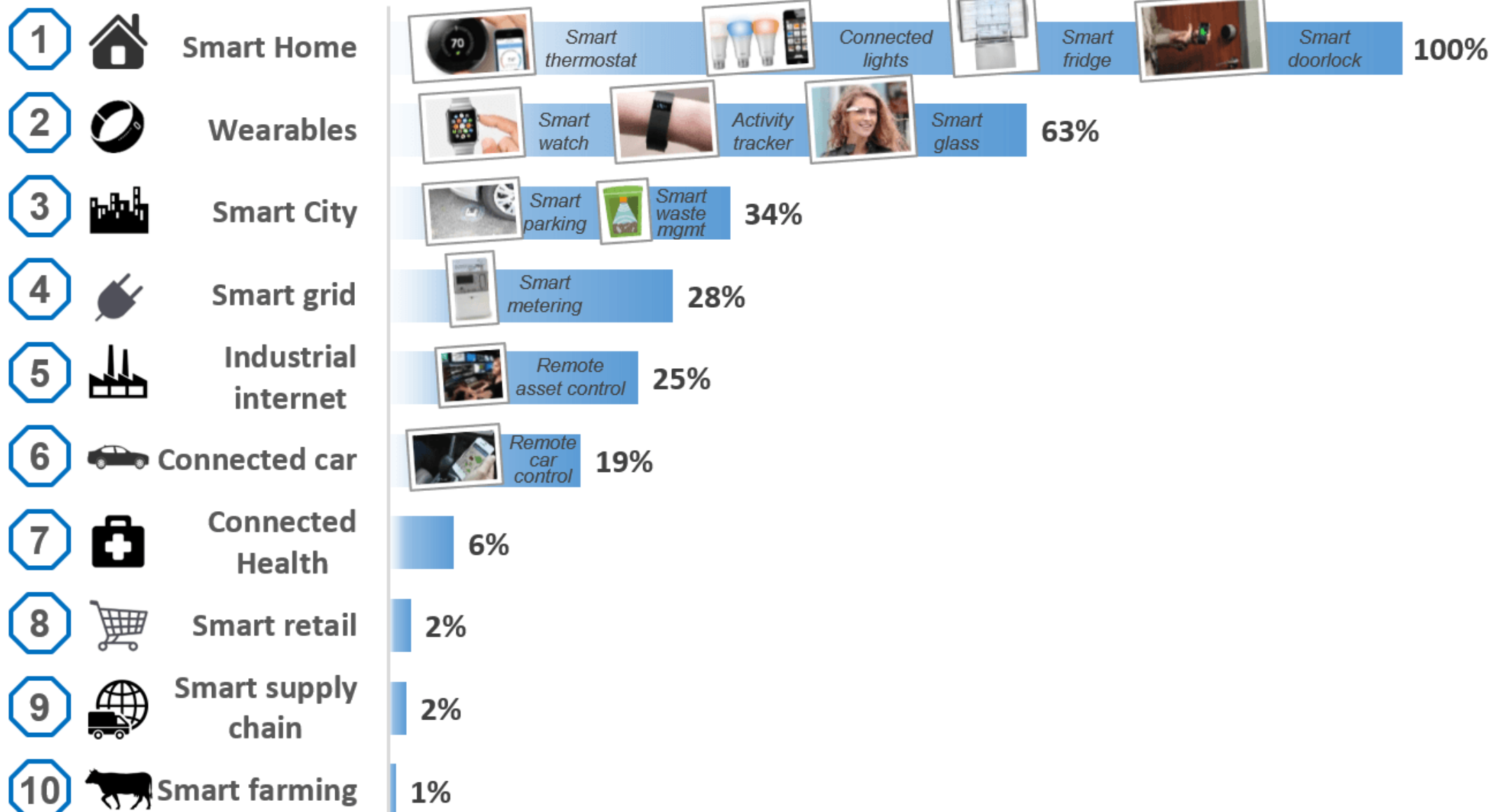
The Internet of Thing: Overview



- “Internet of Things”
- “Ubiquitous computing”

Applications

Overall popularity (and selected examples)



Smart Home



Smart Home

- Aka Home automation: control and automation of
 - lighting,
 - heating,
 - ventilation, air conditioning, etc.
 - Appliances: washing machine, dishwasher, refrigerators, etc.
- Very old (geek) dream, but a limited market
 - too expensive: restricted to very costly installation
 - too complex to install and operate (KNX, etc.)