

What is the Internet of Things?

The Internet of Things (IoT) is a concept where internet-connected devices generate data without human input, using sensors and other electronics. The Internet connection enables devices to talk to us and each other.

- The world has come a long way from 1992, when the number of computers was roughly equivalent to the population of Birmingham. Today, there are **more connected devices** out there than there are human beings.
- The Internet developed significantly in the last decades allowing people access data from any site at any time. Connecting devices via the Internet allows not only accessing data but also capturing and generating new data enabling new functionality that people can benefit from.
- By 2020, there will be over **50 billion connected devices** generating continuous data.
- IoT can be seen in industrial as well as personal application affecting people's everyday life including **travel, finances and health**.
- Popular devices used enabling use of the Internet of Things include smartphones, sports wearables, home heating and air conditioning systems, and more.

How does the Internet of Things work?

Traditionally, internet-connected devices gather data that is later stored in the cloud. Data is collected using sensors (for instance measuring heartbeat), that are small enough to be embedded in clothing or electronic devices.

Internet of Things devices are pre-programmed to collect, analyse and either present the results or trigger an action. Data generated by sensors is processed, analysed and presented in a understandable format to a user. For instance, information about your jogging speed, distance and heartbeat is collected by sensors in your wristband, analysed and fed back to your phone app to be presented as a simple chart or a number. In other cases, the data is collected, analysed and based on results, another action is triggered - For example, sensors in a house measure room temperature and when it drops below specified level it triggers the smart heater to turn on until the room's temperature goes up.

There are many ways how the IoT helps people today and the possibilities are growing as the technology is developed and spread. Today the Internet of Things makes everyday activities easier, and helps us make better decisions based on information we wouldn't be able to access and understand otherwise.

Cognitive Computing: programs that learn

Cognitive computing obtains various data and brings it together to make sense out of it. For example, cognitive computing can look at your heartbeat information over time (gathered by sensors), learn your lifestyle to spot out any anomalies and notify you whether or not you should see a doctor.

Cognitive computing is building on the Internet of Things by not only collecting and analysing data but also learning from data and interactions with humans. Because of that, the technology can help us make better decisions by providing answers or recommendations to complex questions. Cognitive computing can also access, analyse and understand more types of data than traditional Internet of Things technology which is limited to interacting with structured data (numbers). Cognitive computing makes sense of multimedia and text (unstructured data) so can analyse photographs or even food recipes!

IBM Watson

In 2011 the world was introduced to Watson, IBM's cognitive computing system. The system took part in *Jeopardy!*, an American competition TV show where participants receive clues as answers and competitors need to respond as questions. The computer played against world's best Jeopardy! champions- Brad Rutter and Ken Jennings. Watson received the first place prize of \$1 million! It was a great example how cognitive computing can absorb and analyse vast quantities of data and make sense of it. See the video from the episode [here!](#)

Key facts about Watson:

- With Watson, you can analyse and interpret all of your data, including unstructured text, images, audio and video.
- With Watson, you can provide personalised recommendations by understanding a user's personality, tone, and emotion.

The finalists of the Longitude Explorer Prize will be supported to use Watson in development of their ideas!

Examples

Cancer diagnosis

In 2016 Watson showed its real potential save a patient's live in Japan. Originally doctors presented a wrong diagnosis and, unsurprisingly, the treatment didn't work. After months of being stumped by the case, they turned to Watson for advice.



In 10 minutes Watson analysed 20 million cancer research papers, patient's genetic profile and medical data and matched it with a rare form of leukaemia. Watson correctly determined the disease and recommended new treatment which proved to be more effective!



Watson Chef

The Chef Watson app allows you to choose a few ingredients and suggests how you can put them together to create an amazing dish! Watson draws on vast databases: one containing existing recipes online, second providing data on flavour compounds in ingredients and third with psychological data about how humans perceive different flavours!

Useful videos about the Internet of Things and IBM Watson:

Duration	Video
3:38 mins	What is IoT
1:30 mins	Potential of Watson
7:53 mins	How Watson works
4:03 mins	How Watson Health works
2:46 mins	Watson Pharmacy
3:37 mins	Smart hospital rooms - case study
3:52 mins	Preview of Watson & Jeopardy