IoT Research Paper

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**Abstract**

A refrigerator that registers automatically when the milk runs out and autonomously orders new ones. A toaster is refusing to toast another slice of bread before we went jogging. This information he receives from our socks, which incidentally also recognized the onset of the ever-recurring nail fungus and already long ago ordered a tincture against it at the pharmacy. Something like this could look like just a small part of our future life. This life has always been accompanied by technological developments. Starting with the invention of the stone tool millions of years ago, the first use of steam engines for the industrial production of goods or the use of computers, which at the beginning of their development still filled entire rooms, but now have enormous computing power in the smallest space. Through every past progress, people's lives have changed significantly. Since then, new technological projects have been introduced at ever shorter intervals, so that we are once again faced with such a decisive development, the "Internet of Things" (IoT in the following).

**Research methodology**

Due to the level of interest and the relevance of this topic, my interest in the development of the Internet of Things has been aroused. Therefore, it was easy for me to decide in the context of my housework for this topic. The hypothesis of my work focuses on the impact of the internet of things on day to day life. I will only cover the key points of these aspects and focus on history, current state, and future trends on this topic. At the beginning of my work, I will go into the history and development of the Internet until today. This also includes the beginnings of the Internet of Things, which I will briefly explain in more detail. Under the following paragraph, I will introduce next to a definition also the goals of the Internet of Things. Then I will discuss the technical and safety-critical prerequisites for the further progress of the IoT. The conclusion of this chapter is a presentation of various examples of the Internet of Things from our private lives, the last chapter contains a conclusion that emphasizes important statements in my work and gives an assessment of the future.

**Internet of Things**

The development of the Internet

In the meantime, most people can no longer imagine life without the "World Wide Web". For a long time now, the Internet has no longer only supported us in our private lives. Even the daily work is much easier with its help. And yet the Internet, as we know it today, is just twenty-three years old. The beginnings of the Internet can be found in the 1960s. Joseph Carl Robnett Licklider developed one of the first time-sharing systems at that time (Leiner et al., 1997). With these systems, it is possible to have multiple users working on one computer at the same time, without a user feels he has to share the computing power with the others. Licklider developed a so-called multi-user system. This system allowed him for the first time to change the definition of the computer as a calculating machine to the computer as a communication device. In particular, the US Department of Defense was interested in this development, so that in 1962 Licklider changed from the American arms supplier "Bolt Beranek and Newman" (BBN) to the military department "Advanced Research Projects Agency" (ARPA).

In 1966, for the first time, four US universities researching the Department of Defense were connected to a decentralized network, the ARPAnet (Foote, 2019). This system, developed by Licklider and his department, combined other universities and research institutions in the next few years and the term "Internet" emerged, consisting of the prefix "inter" for "between, middle" and "net," the short form for “Network." In 1971, the US Department of Defense commissioned defense contractor BBN to develop a new feature. As a result, Ray Tomlinson, the company's employee, wrote an electronic message to his colleague for the first time and constructed the probably most important application of the Internet, the e-mail. Not quite twenty years later, in 1989, the Internet's most important function was invented by Tim Berners-Lee, the "World Wide Web." His goal was for researchers around the world to be able to share their findings, at first only in text form. Unlike many colloquially used, this is not the same as the Internet. It is a retrievable system of hypertext documents, so-called websites, which are linked to each other by hyperlinks. In 1991, Mark Weiser published an essay titled "The Computer for the 21st Century," and for the first time published the term "Ubiquitous Computing," the first vision of the "Internet of Things." "The third wave of computing is that of ubiquitous computing, who’s crossover point with personal. In 1993 Marc Andreessen introduced the first graphical browser.

Due to the rapid computerization, more and more households were connected to the Internet more and more, and soon it was as good as every human being possible to use the Internet. Nevertheless, the Internet initially established itself primarily in the economy. Starting in 1994, companies began to set up their websites and for the first time to handle business processes via the World Wide Web. Start-up companies sprang up and went public with unrealistically high earnings expectations. Then in March 2000, when the bubble burst, prices dropped, and the market collapsed, it became clear that the digital revolution could not lift the rules of the economy. During this "new beginning," developers became aware that now is the best time for new technologies and projects, and they entered a new age of the Internet called Web 2.0. Another name for this form of the Internet is also the "interactive internet." The user changed in this context from the consumer to the producer. He was now able to independently upload content in the form of photos, videos, or profiles and share them with other users. Social networks like Facebook are becoming popular and allowing people around the world to get in touch. In the course of Web 2.0, but also, new applications are designed (Morrow, 2019). Application software such as mail programs or image processing can now be used increasingly over the Internet and are thus detached from their computer and their workplace. The Internet no longer consists of new technologies and programs but has also become the basis for a social movement of self-expression. The Internet has thus become more democratic and is shaped by its users "with all the positive and negative consequences of this development."

Definition and goals

Today we know that Weiser's view of living with ubiquitous computing was by no means just wishful thinking. What was ridiculed at the time is already a reality today? For us, the technological developments of UC, now the "Internet of Things," are no longer twenty years away, but are already in widespread use (Peiris, 2019). But what is this "Internet of Things," which in recent years has repeatedly dominated the innovation and digitization fairs from Cebit to IFA?

The term "Internet of Things," IoT (Internet of Things), describes the dissolution of the connection between the Internet and computer. The computer will disappear in the future more and more and be replaced by "smart devices" (Martis, 2019). Such a thing or "thing" can ultimately do everything. In addition to smartphones and tablets, this can also be everyday items such as toasters or umbrellas, which are equipped with processors, sensors, and network technology. With this equipment, it is possible for them to autonomously measure, navigate, calculate, control, regulate or communicate with each other. An example of today's time would be the "wearables" (Lueth, 2019). This term includes fitness trackers, which can be worn comfortably on the arm and measure while running the heart rate and running speed. Such values ​​are interesting not only for the trainee but also for the trainer or the health insurance company. Particularly active members have the opportunity to reduce their contribution to a few health insurances by passing on the tracker data. Another example, which is now widespread, are printers that independently reorder cartridges when a certain level is exceeded. But these are only the beginnings of the IoT so far. It is planned that in the future all objects of everyday life are networked and communicate with each other. But what exactly is this supposed to do for us?

The overarching goal is to provide data from the real world to the network. This means that smart items make their state ("milk is empty," "printer toner is full") available to the network for further processing. In this way, a need for maintenance or replacement could be detected early, or even a person's situation could be improved by having the network control things in a household. Applications would be in the construction industry, for example. Sensors could spark information about the statics of a bridge to the relevant authorities or register cracks before they are even visible. However, smart appliances and sensors could also help older people stay longer in their own homes. These sensors detect if a person is behaving normally and can alert nurses, relatives, or authorities if problems occur. In sum, the Internet of Things aims to make our everyday life easier, to support us in it, and to provide assistance in critical situations.

As progressive and convenient as our future life may sound in theory, the implementation of the Internet of Things is as complex as it is in practice. Because unfortunately there is not one technique that ensures a smooth use. In addition to the various requirements for networks or "smart devices," it is also necessary to deal with topics relating to the storage and security of the collected data. The main task of the IoT is the creation and storage of data. For this data to be created, the smart things need to be equipped with sensors. A sensor is a component that recognizes physical properties such as temperature, brightness, or movement and converts them into an electrical voltage. Today, they are known to anyone who owns a smartphone. When tilting, the user interface can be switched from vertical to horizontal and vice versa.

**Conclusion**

In principle, the central issue in the development of the Internet of Things must be the extent to which the new technological application possibilities are profitable for individuals and society. The evolution of the Internet of Things and the increasing ease-of-use of these devices are associated with an increased risk of further threats and previously unknown situations appearing on the scene. So far consisting the best safety measure in it, always about everything worth knowing in connection with your internet-enabled Devices to stay informed, it is expected that billions of Internet-enabled IoT devices will make life easier for us. The Internet of Things provides real-time information that enables us to monitor our homes, apartments, and businesses remotely. With nothing more than an internet connection, devices will work independently. The resulting time and resource savings enable better results.

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