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PERCEPTIONS AND EXPECTATIONS OF COLLEGE STUDENTS ABOUT THE INTERNET OF THINGS?

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Abstract

The Internet is increasingly used as a means of communication of excellence. With the increasing ease and access to virtual communication, namely through social networks, it is verified that the relationships between people have assumed new forms of expression and higher levels of importance in society. In addition to communication between people, there is also an increasing possibility of any object communicating and connecting to other objects, with a unique way of identifying, anywhere, with devices connected to the Internet, this being the essential concept of Internet of Things (IoT).

In this paper, our main goal is understand how college students represent IoT and what are their perceptions and expectations about it. From their point of view, is important to verify what is the impact that IoT may have on their personal lives, academic performance and in society. According to the methodology adopted we performed individual interviews with a population of college students.

Data were treated through context analyses, after being transcribed and analyzed, using a typical software - Leximancer. Our findings showed that, in general, participants have an accurate perception about the Internet of Things, and how it works, and that they also have positive expectations in relation to it, considering it can be useful to our day-to-day life. Although, at the same time, they highlight the importance of being careful in terms of privacy, threats, vulnerabilities and risks associated to the internet.

Keywords: Internet of Things (IoT), college students, perceptions, expectations, vulnerabilities.

1 INTRODUCTION

The main goal of this research is based on analyzing the perceptions and expectations that college students have about the Internet of Things (IoT) and, from their point of view, what impact it may have on their personal lives, academic performance and in society.

The Internet is more and more used for the most different purposes, and this has caused a very large growth of the devices connected to it. In an initial phase, the growth of the connected entities was made by the increase of the use, more human connected results in more computers, as in more servers [1].

According to Li [2], the Internet of Things is a paradigm that rapidly gaining ground in the scenario of wireless telecommunications. The idea of this concept is the pervasive presence around us of a variety of things or objects – such as Radio-Frequency IDentification (RFID) tags, sensors, actuators, mobile phones – which, through unique addressing schemes, can interact with each other and cooperate with their neighbors to reach common goals.

The technological revolution of the mobile devices, through smartphones and tablets, resulted in an additional growth in the number of devices, because it also allowed the growth among the public that already used the Internet in computers, connecting other new devices [1].

The IoT will create a world where physical objects are integrated into information networks in order to provide advanced and intelligent services to humans. Trust management performs an important role in IoT for the fusion of reliable data, skilled services with context awareness, and greater privacy and security of user information. This helps people overcome their perceived uncertainty and risk and involves user acceptance and consumption in IoT services and applications [3].

The IoT, with his vision of objects connected to the Internet, could promote the role of ICTs as facilitators of innovation in a variety of areas and applications. In terms of application and market sectors in which IoT solutions can offer competitive advantages over current solutions, the following are identified: environmental monitoring; smart cities; smart houses/intelligent building management; health-care; security and surveillance [4].

Currently with IoT it is possible to connect all kinds of objects in the network, resulting in an exponential increase of connected objects.

A few years ago, this concept was not very common in organizations and international institutions, but that did not undermine that more and more devices were becoming connected through the network. According to some manufacturers, in 2009 there was an increase in Internet connected devices in relation to people (in 2010 there were a total of 12.500 million objects connected to the Internet, almost twice the world population). The global trend is that more and more devices are networked. These devices fulfill different functions, such as monitoring, sensing, warning, interaction or distribution of processing. This leads analysts, consultants and manufacturers to agree: in 2020 the number of connected devices will exceed 26.000 million with an exponential growth (in 2009 the number of devices connected to the network was approximately 900 million). And this represents a very important share of IT and communications revenues in the very near future [1].

The devices connected through the wireless network exceeded 16 billion in 2014, a 20% increase compared to 2013. With this trend, the number of devices will be more than double the current, with 40.9 billion expected by 2020. The growth between now and the end of the decade will come from devices like sensors and other accessories [5].

According to the Intel organization, IoT is a robust network of devices, all integrated with software and sensors that allow them to exchange and analyze data. The IoT has been transforming the way we have lived for nearly two decades, paving a new way for innovative solutions, innovative products, efficient manufacturing, and ultimately, new and even more incredible ways to do business [6].

The IoT represents a solution with the potential to improve people's lives. Besides the exchange of data between machines, facilitating access to information, there is still the possibility of saving energy, safety, health, education and other aspects of everyday life.

2 METHODOLOGY

The present research aims, mainly, to understand the perceptions of college students about the Internet of Things (IoT), and what are their expectations about this technology.

In this phase, a qualitative study was carried out, based on five interviews with specialists in this field - 1 female element and 4 male elements - following a previously elaborated guide to make a survey of the core dimensions concerning the IoT. The main questions for the interviews were:

- a) What is the Internet of Things for you? What perceptions do you have about this?
- b) How do you feel about IoT's reliability?
- c) What expectations do you have about IoT?
- d) What advantages / disadvantages can IoT have in society?
- e) What threats and risks do you envision using IoT?
- f) In your opinion, what is the importance of IoT in society?

In the context of this paper, data were gathered from the answers to the questions a) and c) and analyzed through Leximancer, which is a text mining software used to analyze the content of textual documents.

This raising of indicators was fundamental for the construction of a questionnaire, to be used in the next phase of our current research project – being the inferential phase.

3 RESULTS

Based on the context analysis, we distinguished two types of groups. The first group is called perceptions, that consists of analyzing if college students know the meaning of Internet of Things. The second group has to meet the expectations students have about this technology. The two groups join in the importance of seeing what impact IoT can have on their personal lives, academic performance and society.

We used the Leximancer software to analyze the content of participants textual answers. Leximancer processes the text and find all the possible concepts, and themes. Then, we analyze and remove the ones that are not significant for these groups.

3.1 Perceptions about Internet of Things

Figure 1 shows the conceptual map elaborated by Leximancer, where the themes are presented in circles that group concepts. It is verified that the most relevant concepts are the Devices and IoT, followed by Internet, Data, Areas, Network and Equipment.

Highlighted is the term devices, it is one of the major themes that has more concepts associated. The devices are connected to the concepts Internet, data, areas, sensors which in turn to the network concept. The network sphere is linked to IoT concepts and equipment.

In this way, the perceptions that they have about IoT are: IoT is a network of equipment, which through sensors connect to devices with internet connection in order to communicate with each other. The devices are connected to the Internet, being able to identify themselves in the network through sensors. The devices have ability to gather information through data. They are present in several areas. Devices can be controlled from a single equipment, provided it is connected to a network.

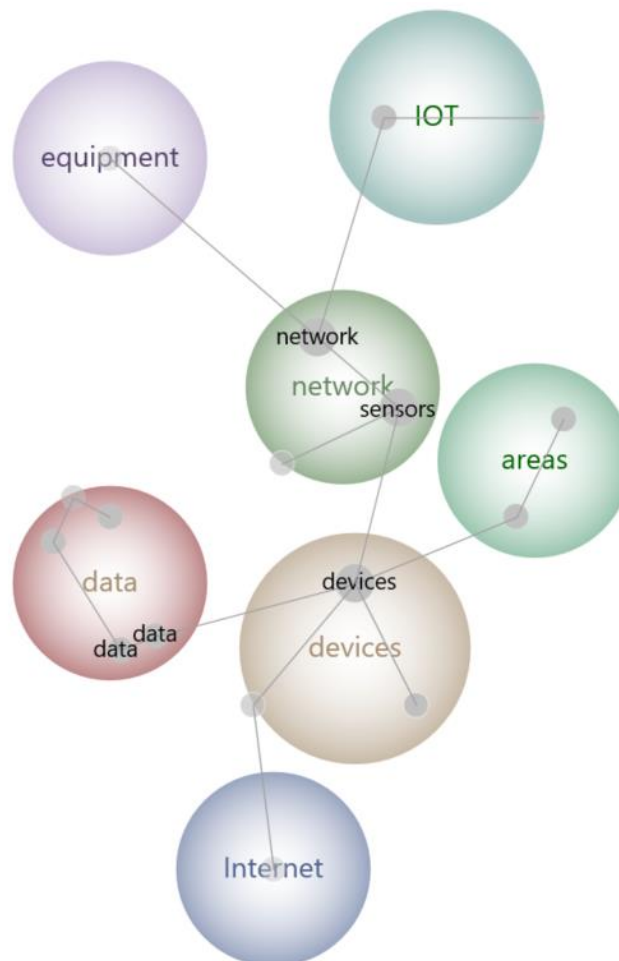


Figure 1. Perceptions about IoT

3.2 Expectations about Internet of Things

Figure 2 shows that nuclear spheres focus on devices, life and technology themes, followed by home, allows, interesting things.

Highlighted is the term devices, as the biggest theme is the subject with more associated concepts. Devices is a concept that is connected to problems which in turn to IoT. The sphere devices intersects with the sphere life, this means that they are interrelated. The devices are also connected to people, which in turn connected to the house. They are connected to technology and the sphere allows.

The technology is linked to the interesting sphere which in turn to things.

So, expectations about IoT are that: Devices are important because they can allow people at home to have a better quality of life, use technology to do interesting things. But on the other hand, IoT may have problems with these devices that have vulnerabilities.

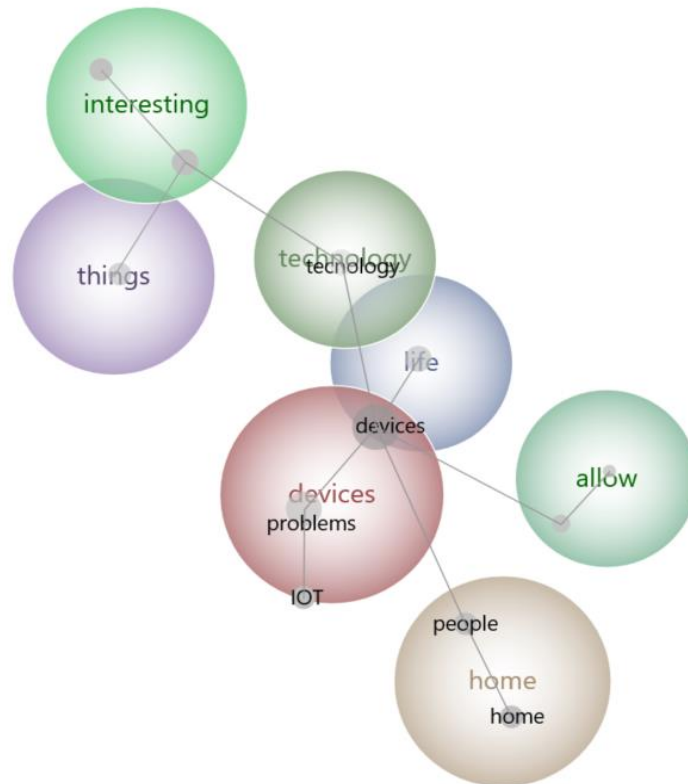


Figure 2. Expectations about IoT

4 CONCLUSIONS

For Albert Einstein, "The mind that opens to a new idea will never return to its original size", this translates what technology can bring to the world [7].

For Miragliotta [8] there are several definitions about the Internet of Things, demonstrating that there is a great interest in this subject. However, through the literature, there is a significant complexity in understanding the real meaning of Internet of Things and the social, economic and technical implications of IoT's implementation.

According to our results, regarding the objective to determinate the perceptions about Internet of Things, now, it is clear this knowledge (see Figure 1), because it can tell us that the Internet of Things are all connected devices in a network in which it is possible to collect information/data, in the most different areas.

The author Ali [9] refers that the Internet of Things is part of the group of the disruptive technologies and it has been adopted in many areas of everyday life.

According to Miorandi [4], from a conceptual point of view, the IoT is based on three pillars, related to the capability of intelligent objects to: be identifiable (anything identifies), communicate (anything communicates), and interact (anything interacts), between each other, building networks of interconnected objects, with end users or other entities in the network.

The term Internet of Things generally refers to scenarios in which network connectivity and computing capacity extend to objects, sensors, and common items that normally not considered as computers, allowing these devices to manage, exchange, and consume data with minimal human intervention. However, there is no single universal definition [10].

Regarding the expectations about IoT (see Figure 2), it is evident that it is an interesting technology in people's lives because this kind of devices at home allows to do interesting things. But IoT can also bring problems with these devices to the level of security and privacy, exposing system vulnerabilities.

For Sicari [11], the dissemination of IoT services requires levels of security and privacy that must be guaranteed. But there is still a unified view of how to ensure this because the environment is so heterogeneous, involving different technologies and communication patterns. Solutions must be designed to ensure: confidentiality, access control and privacy for users and things, reliability between devices and users, as well as compliance with defined security and privacy policies.

The Internet of Things will revolutionize people's lives in general, from the moment everyone understands this technology and bet on global solutions for the market that will make life easier for all people and organizations.

This study was important to understand the definition and expectations that one has about the Internet of Things. From here on, other avenues are open to be discovered and analyzed, such as the benefits and impact that this technology has on people's lives and in society.

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