Intelligent Automation System in Asset Safety Using Household

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Abstract

This article describes the main stages of a project used in Home Automation (Home Automation), highlighting many general aspects about advantages and disadvantages of investing in this automation, costs and availability. The forms, propositions and compositions are also exposed for a Home Automation System to work in a pleasant way that can meet the needs and demand of a demanding emerging market. The illustrations in the course of the article proved to be not so simple to program. There is a need to find qualified professionals in the area of home automation for the complete fluidity of the project. A complete model is proposed where the main difficulties are highlighted and resolved.

Keywords: Buildings Automation; Intelligent domotics; Learning; Artificial Intelligence.

1. Introduction

Automation or automation, a concept that is not new, but in recent years it is very present. Innovating and facilitating in several aspects ranging from a simple operation to turn on a lamp, to more complex systems, such as telecommunications. Through market research we noticed a growing curve of automated homes, that is, a business that has an excellent expectation of market valuation. The project was designed to provide an automated system capable of providing a solution to optimize property security. And it is the result of research based on academic works, readings of articles and articles published on the internet about Domotics, Arduino and others.

2. Bibliographic Review

This chapter will address the content that served as a bibliographic review for the development of the project. Each of the elements, ranging from the analysis and systemic design to the physical components that integrate automation.

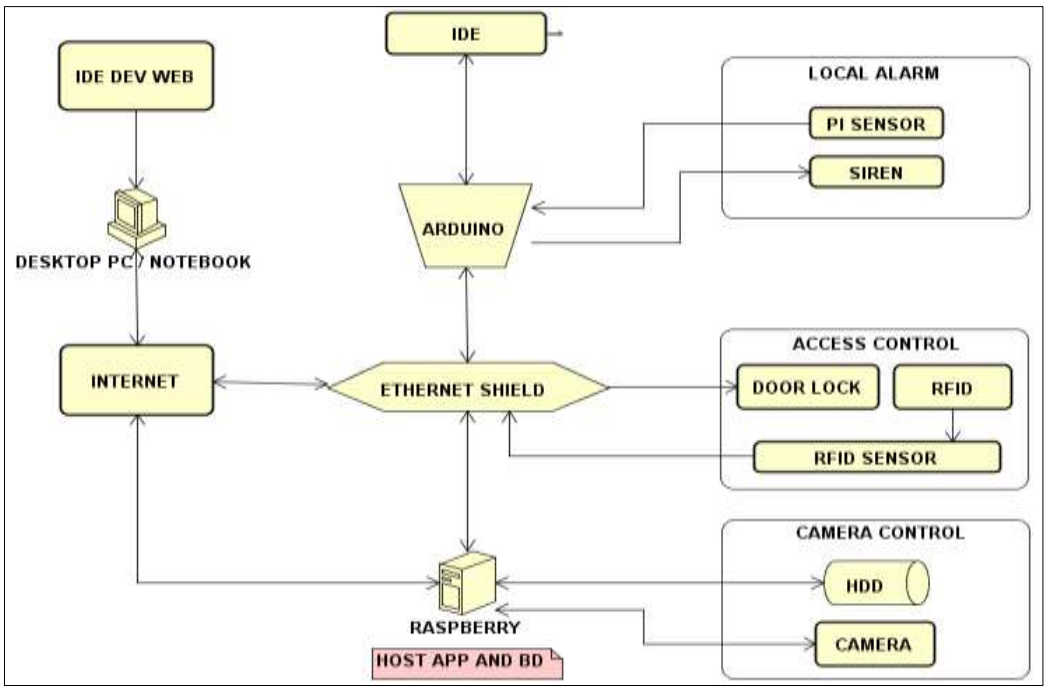

Figure 1. Project Overview.
Source: Authors, (2020).

2.1 Automation Histories

The emergence of automation is so old, that if there is a date that characterizes such an event. The act that automate will occur when we transform any common task into an auxiliary process for human beings, be they domestic, commercial or industrial. (TEZA, 2002).

In the 18th century, the industrial revolution began with the English creation, the steam engine, which boosted production. Thereafter, in the nineteenth century, the industry took the path of growth and on a large scale, with the emergence of new energy sources and steel replacing iron, one of the reasons that boosted the development of industries on the European continent and in the United States. And over the years, new devices were emerging, making the industrialization process even better. One of them was the relay, which in a short time took over the factories. In addition to all these events and others that followed, a new revolution is called. The II Industrial Revolution. (SILVEIRA and LIMA, 2003).

Second (TEZA, 2002) in the automation process electronic, intelligent and automatic devices are used. Therefore, we can automate:

- **Industries**. Applying the concepts of industrial automation, you can have control of productive machines;
- **Trade**. Applying the concepts of business automation, you can control and manage inventory and finance. With the use of resources, such as: barcode, QR CODE, RFID, these

tools promote agility in commercial operations.

- **Building**. Applying the concepts of building automation, you can control the daily operations of places such as condominiums, residential or commercial buildings. The controlled objects would be: lighting, elevators, internal TV circuit, electric fences and locks, etc.
- **Domestic**. Home automation allows us to manage and control domestic tasks, providing greater security and convenience at home.

In the timeline, when it comes to systems development, home automation comes right after its analogues in the industrial and commercial areas, for purely economic and productive reasons, both service providers and manufacturers focused on investments with greater speed of financial return. In terms of the Brazilian market, the situation was similar, in the 1970s, the first automated systems were created for specific purposes in the industrial sector.

After the consolidation of industrial automation, commerce was the next to adhere to the benefits of automation, which up to the present time remains in constant evolution due to the speed of advances in information technology, examples of which are smart tags and complex management and supervision. Several branches of commerce, supermarkets, hospitals, hotels, department stores, have their operations fully integrated, including sales, finance, logistics and so on. Even small businesses and service providers are not exempt from the benefits of automation. Intelligent Buildings are the culmination in the use of this concept, their systems automate practically everything inside the place and apply the newest technologies in the field of telecommunications, building security, access control, elevators, lighting and air conditioning.

For greater understanding, the automation process in homes, apartments and offices is called home automation, but it has other synonymous names, which would be: Home Automation, Home Automation or Home Automation.

The field of home automation or smart environments has a lot of potential. According to the extra website (GLOBO, 2017), our home can become a consumer dream, in terms of convenience. Examples, in the bedroom the bed may have a foot warmer. Water temperature in the shower is memorized according to your preference. Keys to open the door would no longer be necessary, a biometric reader attached to the lock. According to AURESIDE, the initial cost of a basic home automation project is from R $ 6,000.00.

According to Schneider Electric, a global company specializing in energy management and automation says there are endless variations and possibilities. With more than 20 billion devices connected worldwide and that will be 50 billion in a few more years. These systems allow to control through these devices from the lighting to the sound of the house. If it is possible, remotely, to program the air conditioning to turn on and off at certain times, the same applies to curtains to open at scheduled times.

In terms of numbers, according to AURESIDE, only 0.5% of homes in Brazil have some type of automation. This figure is very distant from the average in Europe and the USA, which is around 18%.

For Schneider Eletric, Brazil accounts for 60% of the company's business. Figures are not revealed, but revenues are estimated to be around 1 billion euros in 2016.

2.2 Automation and Home Automation

A concept that for some is still new, due to the lack of information or because it is, at times, a process

that is too expensive and outside the standards or even a subject that is not part of the current reality, but of the distant future. The futuristic look that automation gives us is that in a simple voice command or clapping hands the simple daily operations of a residential or corporate environment become even simpler and without any effort. As it is not so distant, as were some technological developments in years ago that today are essential and vital. The day will come when any resident or owner of a property will be able to enjoy its benefits. (TEZA, 2002)

Domotics, nomenclature associated with automation, being more focused on home automation. Second (ABREU and VALIM, 2011) it is a relatively recent field in the scope of science, lacking hardware standards and protocols, incorporating technologies from the industrial and building environments. But with the strong demand, competent entities have been organizing and intensifying efforts to standardize and foster technology. Due to this fact, developers when starting a project look for the technologies that allowed them greater flexibility in the integration between hardware and devices. And according to (BOLZANI, 2007) dividing the Domotics implementation process into three major sectors is good practice. Figure 2 illustrates this division.

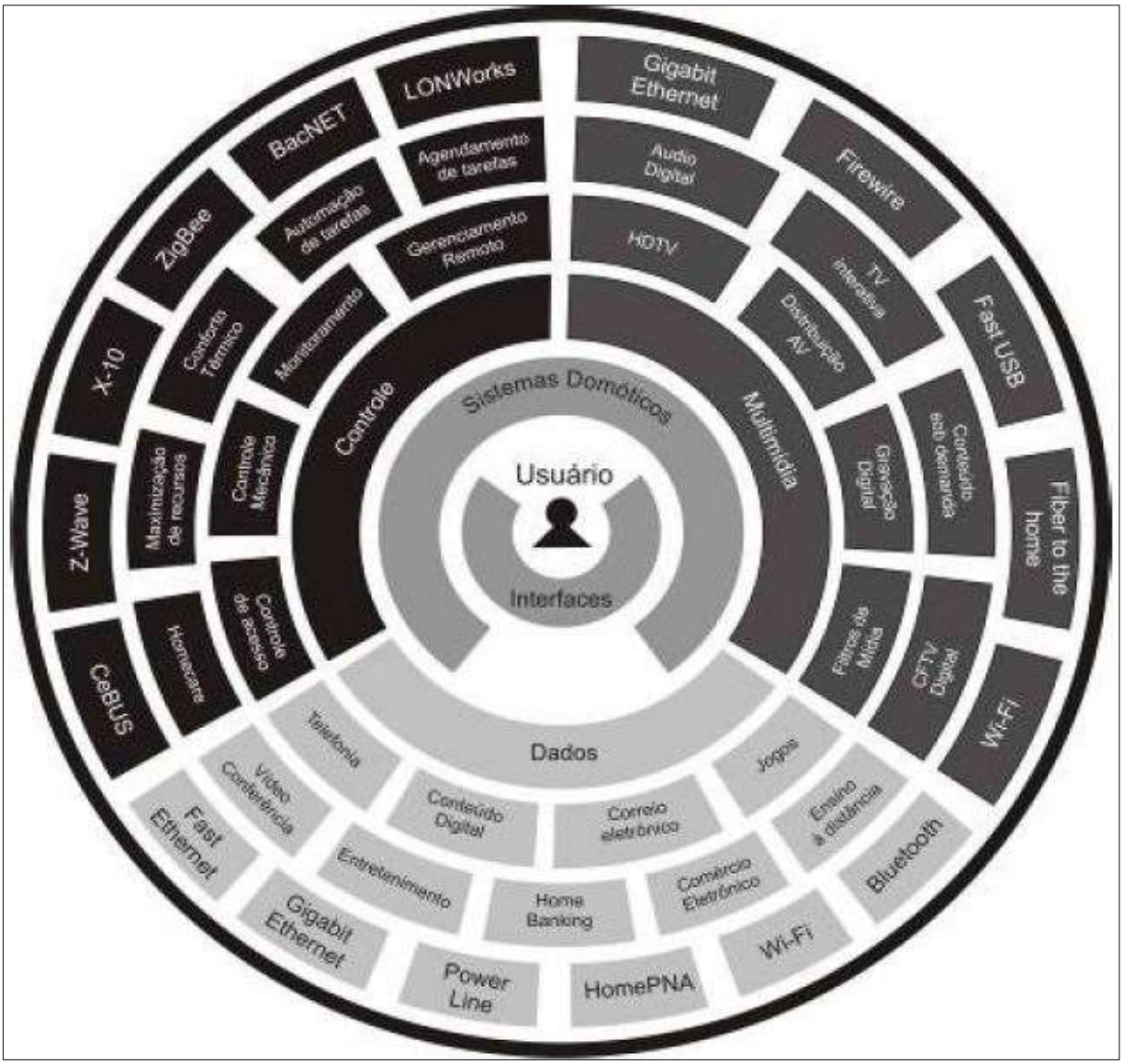

Figure 2. Planned Division of Responsibilities in Home Automation.
Source: Adapted from Bolzani, (2007).

3. Materials and Methods

According to (MOREIRA, 2012), the RUP has a development cycle that is divided into 4 parts, which are: Start, Elaboration, Construction and Transition. Each of the phases covers a specific circumstance included in the life cycle of a software engineering project, in this way, the focus between the disciplines is variable, therefore, it varies according to the needs of the project during its execution. Below the four phases:

- **Initiation**: in this phase the focus is on defining the purpose and analyzing the economic feasibility of the project. The requirements and business risks are assessed before proceeding with the project.
- **Elaboration**: in this phase the focus is related to technical and architectural risks. The purpose of the project should be reviewed and specified in detail. Functional and non-functional requirements are, for the most part, defined at this point. Non-functional requirements at this stage, characterize development risk, as they are considered a critical agent for the success of the project.
- **Construction**: in this phase, the focus is on addressing the logical risks involved in the preparation of the product. Compared to the manufacturing process, which highlights the management of resources, personnel and operations to improve costs, quality and coding.
- **Transition**: it is the final phase, in which the product will be delivered to the user, which can and must request training, as well as during the use of the new system, it will find errors to be corrected and pointed out improvements. In this phase, there will still be several iterations before the formal acceptance of the system is signed.

3.1 Software development processes through diagrams

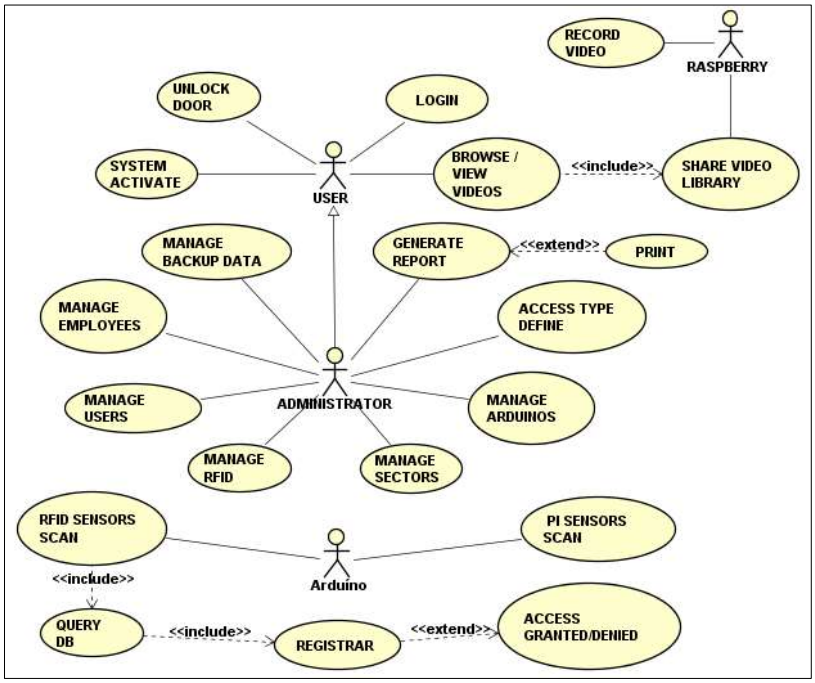

Figure 3. Use Case Diagram.
Source: Authors, (2020).

The Use-Case diagram is responsible for helping to survey the functional requirements of the system, specifying a set of system functionalities and their relationship with external and internal elements.

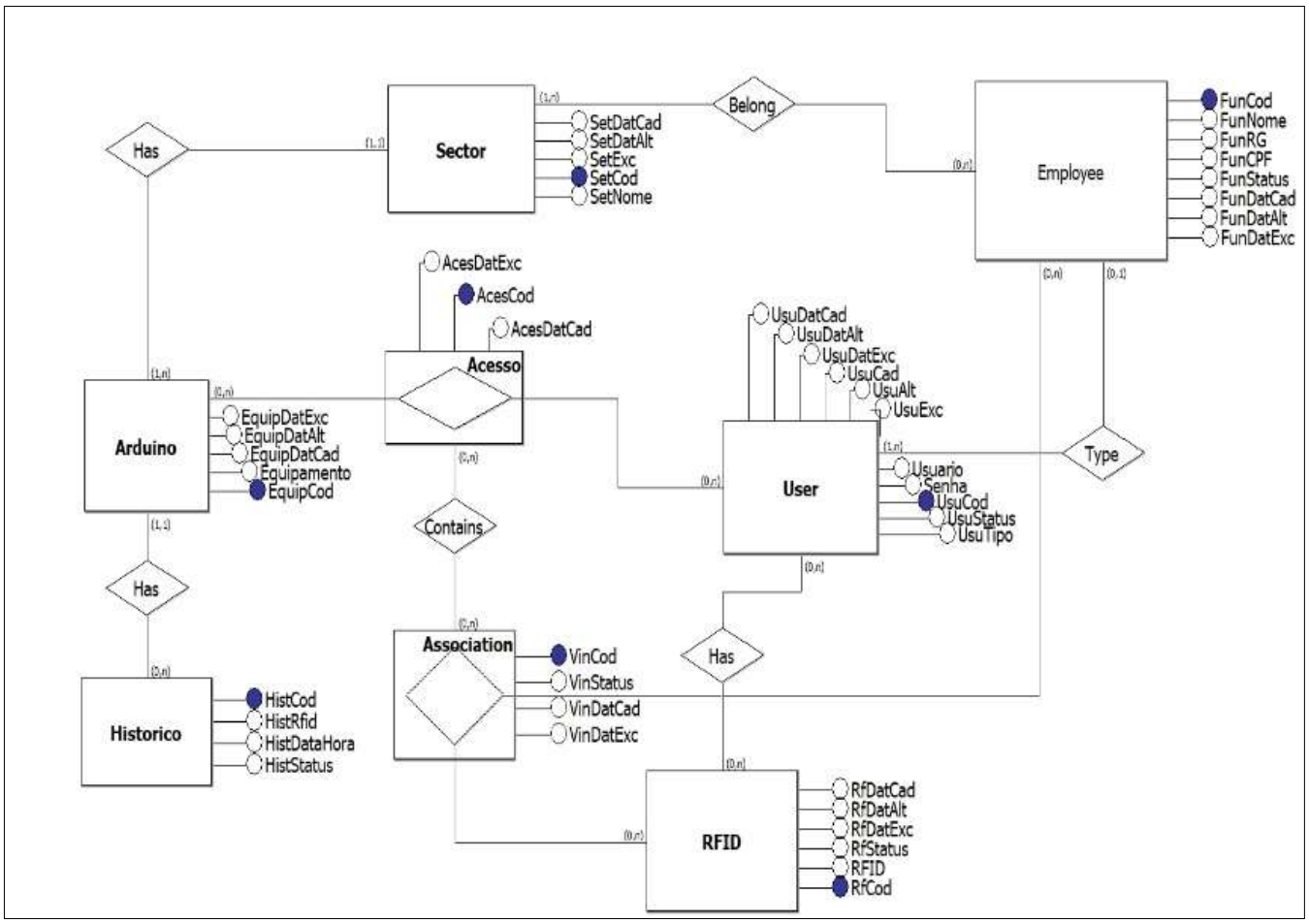

Figure 4. Relationship Entity Model.
Source: Authors, (2020).

An entity relationship model is a systematic way of commenting and defining a business process.

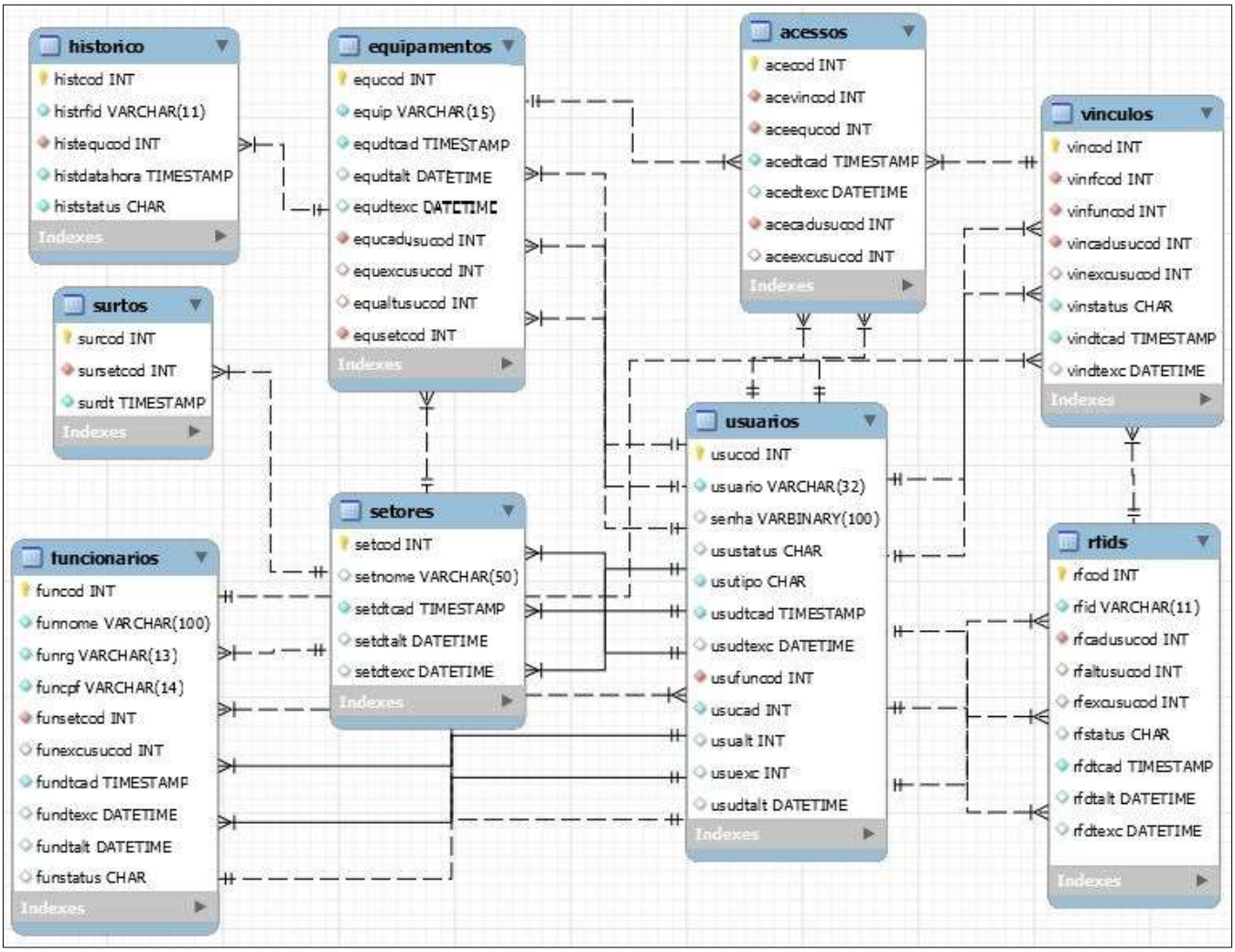

Figure 5. Relational object model.

Source: Authors, (2020).

It is a development technique and used to reduce the impedance of language or object-oriented programming using relational databases.

4. Results and Discussions

The world today is a true technological race, with more and more advances in new segments and it can make people's lives easier. One of the main techniques that has conquered space is home automation (Domotics). In addition to achieving more comfort and safety, it can generate added value to the price of the residence. However, this investment is high and is it worth it to invest in home automation in this delicate moment of our economy, where the real estate area suffers from the retraction caused by the crisis?

Figure 6. Home automation.
Source: Network Project, (2020).

The technological evolution of a home provided by automation systems to its users is unbelievable:

- Physical and patrimonial security (of people and goods);
- Systems integration and coordination.
- Flexibility (adaptation to changes);
- Remote monitoring;
- Environmental comfort (better productivity);
- Reliability;

If we were to live in a more stable economy period, automation would certainly help to enhance the property. Today, however, with declining sales, it is more complicated to be able to sell the automated home at a higher price. At least two years ago it would be worth making the investment, but today it is not feasible and maybe in two to three years it will be worth it again.

Specialist in the area says that it is more worth investing in what is essential to sell a property. "Today, hardly an investment in automation will increase the price of the home. When the used property is well maintained it has an intrinsic value. If you spend between R $ 35 thousand and R $ 45 thousand on automation, this value is unlikely to increase the price of the property. That is, today it is worth more to keep the property well maintained and in a pleasant state, with a good painting. This is not the time to invest in Domotics", reinforces the real estate agent Evangelista.

5. Conclusion

This project in article format aimed to present the model of intelligent automation system in property security, based on techniques known as home automation, which adapts and reshapes its rules according to the behavior of the inhabitant (user) of the system or through the interaction of the owner himself. The study shown since the beginning of the idealization through a methodology (RUP), a software engineering process that provides a disciplined approach to assume tasks and responsibilities within a development organization, widely used in the technological area. We tried to show stages of development in a simplified way, because the details would be something very grand to transcribe in this article, and difficult for readers of this article to understand if they were not experts in the field.

6. Acknowledgments

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