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Sensor Design to Measure the Ambient Temperature with Arduino and Raspberry Pi

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ABSTRACT

Environmental pollution is a problem that is increasing gradually, this affects citizens worldwide, by various substances or massive components that damage the fresh air, this can be reflected in respiratory diseases that increase by these gases or mixtures That affect our health. In the methods to be used we implement a series of steps to follow with the Arduino and Raspberry Pi tools, what we are looking to implement is the design of sensors to measure the temperature of the environment in different parts of Peru. The results were improvements where the sensors that measure the ambient temperature are applied with the determination of being able to help reduce environmental pollution in that part of Peru. The data collected can open new research on possible solutions that are given to environmental pollution or global warming.

Key words : Data collected, Environmental pollution, Research.

1. INTRODUCTION

Environmental pollution is a social problem since it is increasingly attentive to the health of living beings. Now last we have many diseases due to environmental pollution such as respiratory diseases, etc. Peru has one of the most polluted environments especially in the Center of Lima, where we can see a completely gray sky caused by air pollution that occurs in surrounding areas [1]. We also have pollution in CO2 transport that vote without fear that this is ending with the pure air we have, as well as cutting down trees, etc. All this leads to damage in the air that all the citizens of the world breathe in order to live [2].

In the methodology we use this SCRUM because it has a more complete life cycle and with a better approach to prototypes, being one of the best development processes having four important faces: Requirements, analysis, evaluation and tests [3]. As tools we have the Arduino which is a device that allows to have different micros controllers to be able to perform tests of various prototypes [4]. We also have the Raspberry Pi which is a small board that serves as a computer and has a good association with the Arduino [5].

The objective of the work is to make sensors that measure the environmental temperature, in order to analyze the degree of contamination in various parts of Peru. And so fight against environmental pollution that is increasing every day.

The project starts in chapter I which is the introduction where the problem is narrated, chapter II where we will talk about the methodology to be used, chapter III we have the application where the creation of the prototype will be narrated, in chapter IV we have the results where we will know if the investigation is positive or negative and finally in chapter V the conclusions taking a project approach seeing that it can be improved for future research.

2. METHODOLOGY

2.1 Structure of the methodology

For the methodology we will use the SCRUM methodology, to make the necessary changes in a short time, apart from helping us to have modules in each interaction created.

The life cycle of the SCRUM methodology for the creation of projects will serve to define, from beginning to end, the tasks that will be carried out and with each progress, review and acceptance deliverables will be presented [6]. The important thing is teamwork to implement a good prototype design is what derives from using the SCRUM methodology [7].

We will rely on a compilation of the following waterfall methodologies, XP, among others. Each of them helping in the implementation process to reach the expected prototype.

2.2 Tools to implement

A. Arduino

A board that provides us with a large amount of available hardware to use, serving as an open electronic platform, which one can handle flexibly, easily and freely. The arduino board is ATMEI micro controller all integrated so you can record certain instructions you want; with several ports or peripherals useful for sending or giving data, including cameras and keyboards [8].

Arduinos receive or send instruction sets, at present thousands of projects have been carried out, having a very large community of developers, programmers, students among

others. The arduino board was born as an idea thus giving a quick and easy handling tool, aimed at students who dedicate themselves to electronics and programming [9]. In Figure 1 we can see the arduino board that will be used for the construction of the temperature sensor.

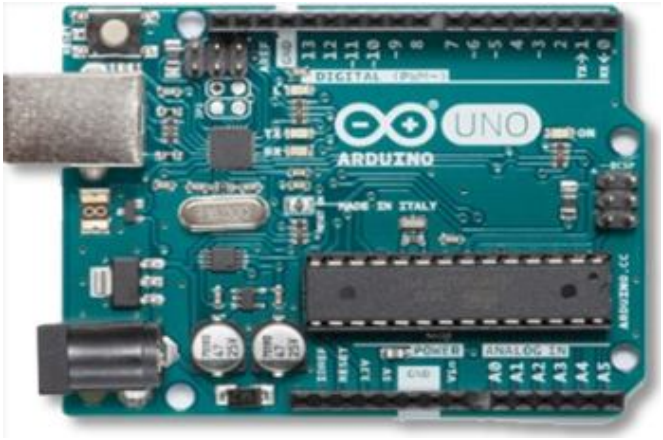

Figure 1: Arduino plate.

B. Raspberry Pi

A very small computer but capable of achieving many things like desktop computers, with this we can create spreadsheets, game processors among others. It is the size of a credit card where we can connect keyboard, televisions, among other devices. Within its content this computer has several input stations, an Ethernet port, one HDMI output and two USB inputs [10]. The Raspberry Pi is a modern technology with a completely different experience from other boards and most of all because of the advantage that can be merged with other boards to fortify certain features. Among its advantages we have that it is silent and does not consume much energy unlike computers, its internet connection can be smoothly connected to both wired and wireless connections, improving its USB ports and its RAM memory that helps speed [11]. Figure 2 shows the Raspberry Pi plate that will be used for the elaboration of the temperature sensor.

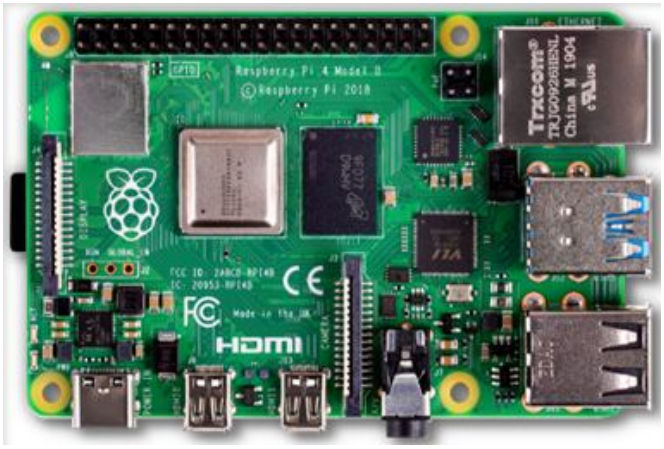

Figure 2: Raspberry Pi Plate.

3. APPLICATION

3.1 Structure of the methodology

In the methodology we must first separate or recognize the requirements we request for the creation of the prototype to be developed, as well as make the necessary listings and make the records of the documents for the implementation and construction of the sensors. This part details all the implements to be used so that you have a list of objects to buy and make the necessary sketches to know where each entrance and exit door is connected.

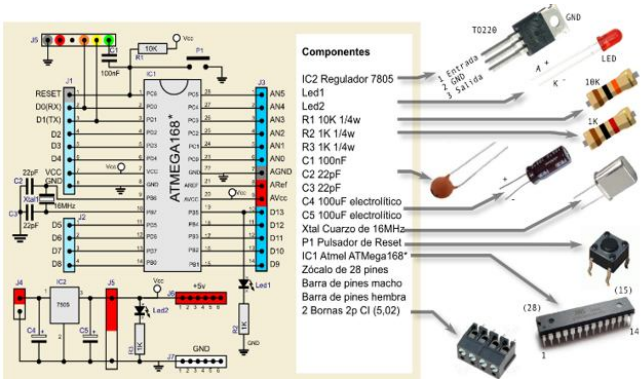

Figure 3: Separation of implements to be used for the construction of the Ambient Temperature Sensor.

3.2 Tools to implement

For the implementation of this sensor project, we first need to manage an outline of how each part of the sensor will be implemented, obtaining a clear view of each component that will be attached to the respective inputs and outputs of the plates to be used, once In the form of architecture, the second step would be to buy the part of the hardware that we will need to build the sensor, including cables, soldering iron, etc. As we can see, Figure 4 shows some components for the creation of the ambient temperature sensor.

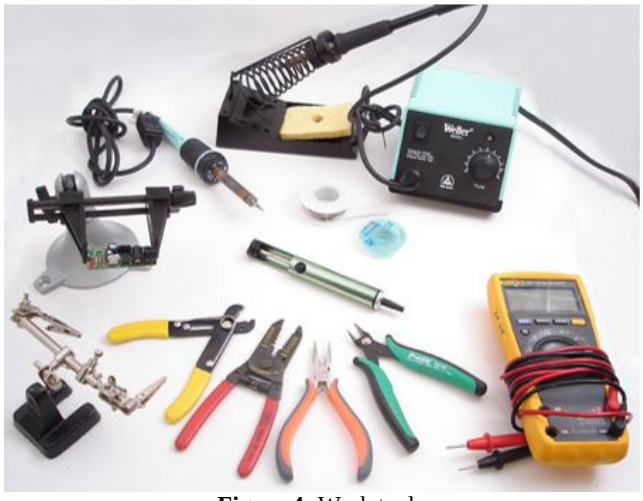

Figure 4: Work tools.

We have two important parts for the work to implement each recognition part, one would be the construction and the second the prototype tests. In the construction of the prototype, we mainly focus on assembling the parts where they correspond, stopping to get the sensor to recognize

certain characteristics, as well as joining the arduino and Raspberry Pi to program it according to what we need to recognize in this case so that it can measure the environmental temperature. As we see in Figure 5 the installation of the necessary parts with the components that we will use.

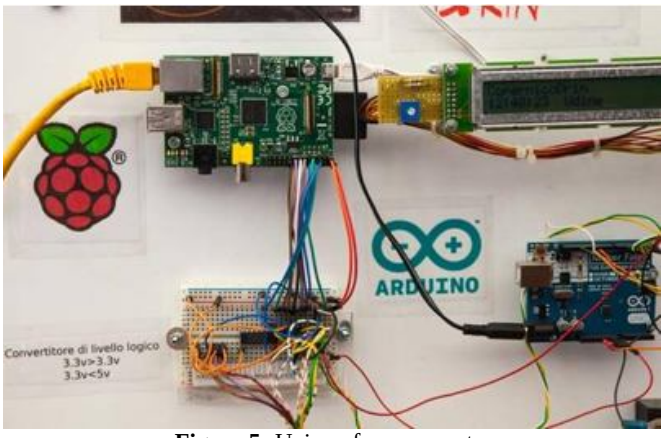

Figure 5: Union of components.

The LM35 Module, an analog sensor that is calibrated in degrees Celsius, is determined by the variation of its electrical resistance, provides a voltage output proportional to the temperature [12]. In this way we achieve that the sensor manages to recognize certain characteristics that we want to detect. In Figure 6, Module LM35 is appreciated, which will be used for the elaboration of the temperature sensor. In the part of the prototype we made the first sensor and we checked that failures occur, as well as see how it works with everything assembled and prepared to recognize.

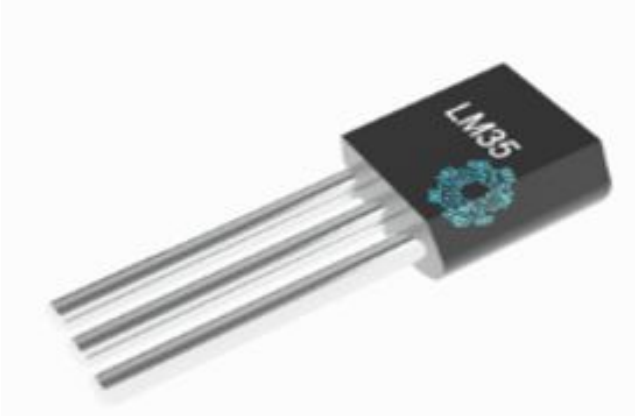

Figure 6: Module LM35.

4. RESULTS AND DISCUSSION

4.1 On the Case of study

Advantages: The sensors could be created with the best tools known today.

Disadvantages: There is no special methodology for prototypes, so we collect a bit of other methodologies.

4.2 Structure of the methodology

For the use of the methodology it was possible to identify the necessary things to develop the air sensors, in that way the construction was carried out in the best possible way [13]. The methodology helps us to carry out good practices in the construction of any prototype and organizes the necessary times [14][15][16].

5. CONCLUSION

The objective could be solved, with the sensor that measures the temperature of the environment so that pollution can be lowered in certain areas of Peru for the improvement of citizens.

Many investigations on environmental pollution in later years are released, having an updated data and a solution tool that could be better complemented with new ideas or complements that can be carried out by sensor.

The applied methodology helps us to have a better conviction to develop the objective of the design of ambient temperature sensors, with a good segmentation of each module and the way we will create it.

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