Proof of Concept – Design and implement an embedded system

Design Report

Course	Embedded Systems: Architecture and Programming
Group n°	4
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Idea

So the concept that we want to implement during this project is to link an embedded system to a regular fan which will activate itself according to the ambient temperature.

To go more into the details, we are aiming to connect a fan to a Raspberry Pi card that will receive the value of the ambient temperature thanks to a Sensorbox connected to the system. According to the values received, the fan will turn with more or less speed.

The fan will be alimented by a power generator and the Raspberry will only have the role to regulate the power used. Finally, we have thought about using the Server Web specificity of the Raspberry Pi to send into it the temperature data noticed by our sensor. In this way, we can use them using HTML, Google Charts or other to do statistics graphs about temperature follow-up and other tendencies or send a message or mail to warn the user of the fan activation and to know the temperature in the room.

Material

In order to do that, the material required is :

- 1 Raspberry Pi + SD card + adapter
- 1 Low voltage Temperature Sensor TMP36
- 1 BreadBoard
- Electric wires male-female and male-male
- 1 Power Generator
- 1 Servo-motor 12volts
- 1 Computer

This list will possibly be modified according the project advancement and the needs that can appears in the process and that we hadn't thought of now.

Features

It was asked to divide the work of our project into 4 features, one by each member of our team of 4 members. That's why we have thought of a project with this demand in mind, and articulate the project around this 4 parts.

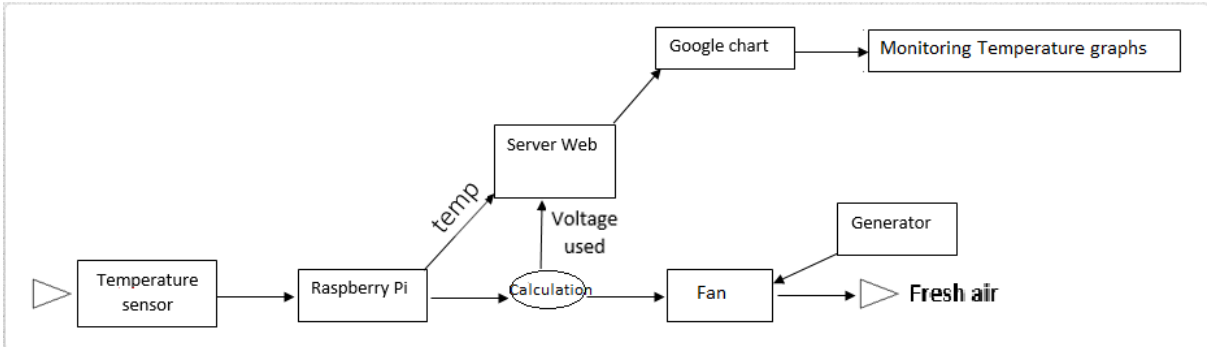
Part A : The task around the fan and his connection to the Raspberry Pi card, assembling steps, coding the card to allow to modify the turning speed of the fan according to the values measured by our Sensor.
This part is taken over by **André**.

Part B : The connection between the Temperature Sensor and the Raspberry Pi card, all the things about sending the values measured by the Sensor in the Raspberry Pi.
This part is taken over by **Frédéric**.

Part C : Web Treatment

1. Subdivided into 2 parts, the first one consists to send the temperature values received by the sensor into the Web Server associated to the card. It will allow us to send them in any devices and use them for the temperature follows-up for example.
   This part is taken over by **Kamel**.
2. The other part is to use the data accessible thanks to the Web Server and sent in our device to create a HTML page that will presents the curves of the temperature of the room on a daily or monthly basis.
   This part is taken over by **Alexandre**.

Design



Raspberry pi + sd card + adapter : We prefer to use a Raspberry pi rather than an Arduino because of the last part of our project, the server web.

- Already available so no need to purchase to us

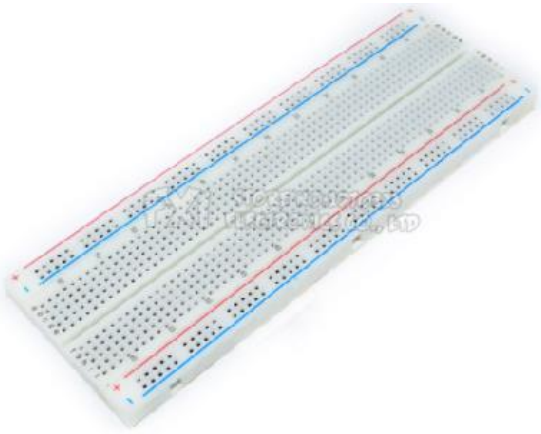
Temperature sensor : **TMP36** : via Analog-to-Digital Converter (ADC) we don't need to use a device communicating using i2c, we don't need so much speed. We prefer to use a digital readout since we're dealing with a temperature sensor which will need calibration.

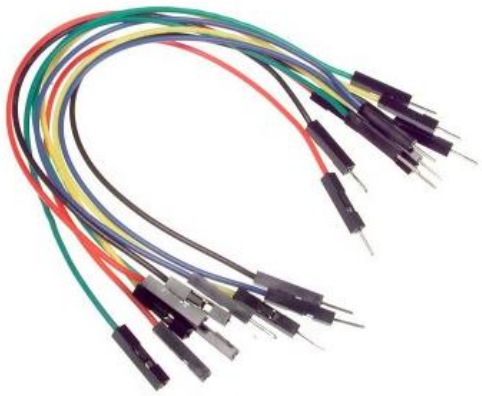
Measuring range : -40°c to +125°c

Référence SEN-10988

1,35 € HT **1,62 € TTC**

Breadboard + Wires: Thanks to this breadboard and some wires (male-demale/ male/male) we'll be able to connect the sensor to our raspberry pi.





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Power Generator : .We will need one to generate the power needed for the fan and the circuit to work, because the 5V alimentation from de the Raspberry Pi is not enough to sustain our needs.

Servo-motor : **L298N** : Cheap chip adapted to the use of an external power generator of 12v. Possibility to choose the direction of rotation and if we want , in the future, possibility to add a secondary fan to this chip.

puce: L298N
logique tension: 5 V
Drive tension: 5 V-35 V

Prix : **€ 1,31** / pièce