Humidifier with Web Interface

Group two:

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Summary

- Construction of Humidifier
- Control with Arduino
- Web Aplication
- Container

Problem

- Low humidity: Electrostatic discharge

Objectives

The goal is to develop a humidifier with a Web interface for a server room of 80 m³.

The final product must:

- maintain of a relative humidity between 40 % and 70 % (+- 5);
- have two days of autonomy;
- be placed on the floor of the room;
- include a life-cycle analysis;
- have on-off switch;
- be compliant with the EU Directives 2006/42/CE 2006-05-17 and 2006/95/CE 2006-12-12;
- Team work.

State of the Art - Humidifier

- Type of humidifier:
  - Steam
  - Fan
  - High water pressure
  - Ultrasound method
  - Compressed air

State of the Art - Control

This fase we found two differents options:

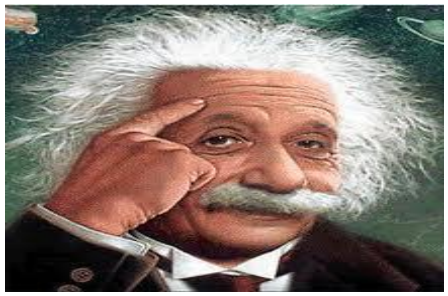
PLC-(Programmable Logic Control)

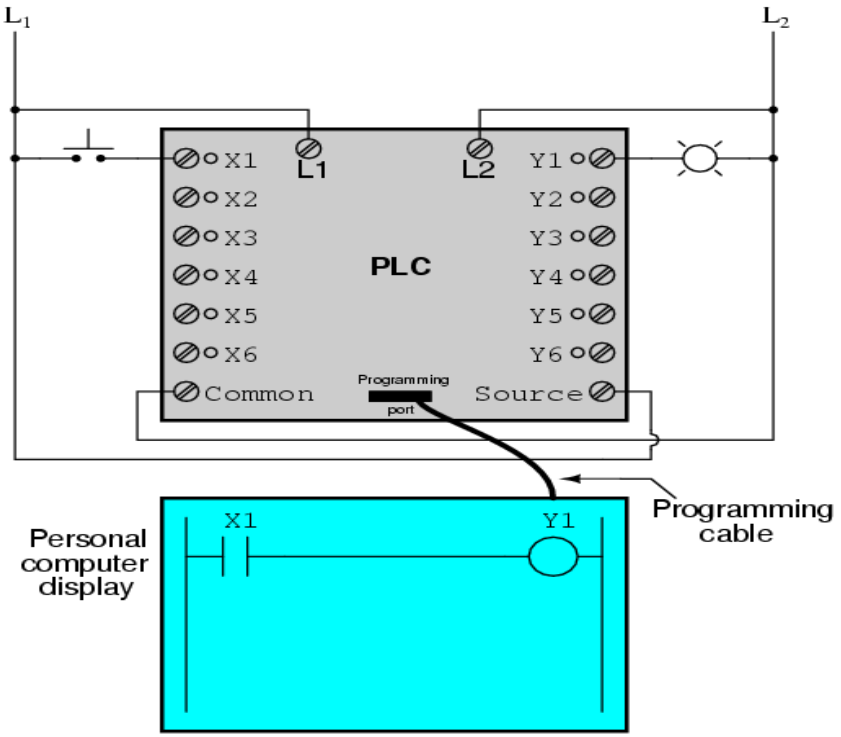
Microcontroller with Arduino

State of the Art - PLC (Programmable Logic Control)

Applications and features

- Large industrial applications
- More durability
- More expensive
- Programming in Ladder

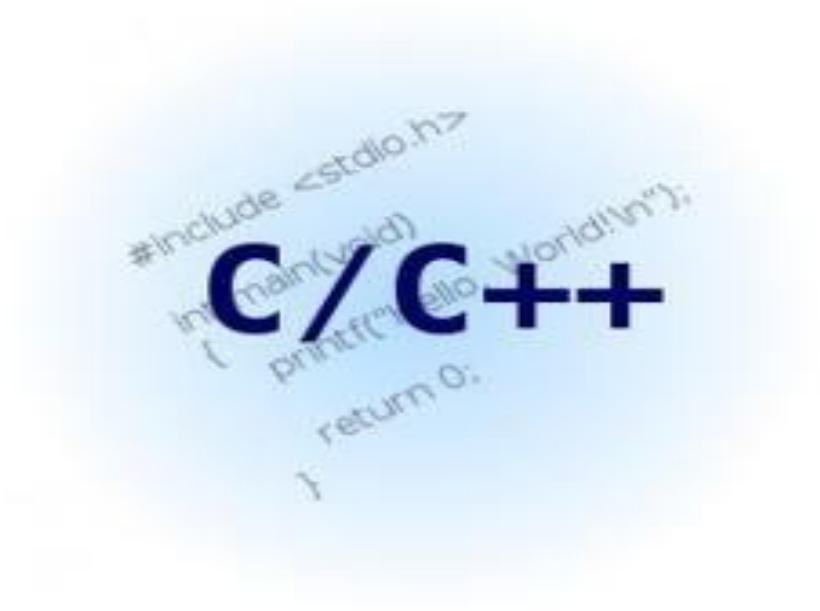




State of the Art – Microcontroller - Arduino

Applications and features

- Small applications
- Cheaper
- Programming in C/C++



The our choise was: Arduino!

State of the Art – Web Interface

Features:

- Identify the sensors
- Life-cycle analysis
- Control humidifier

Programming language:

Java

State of the Art – Web Interface

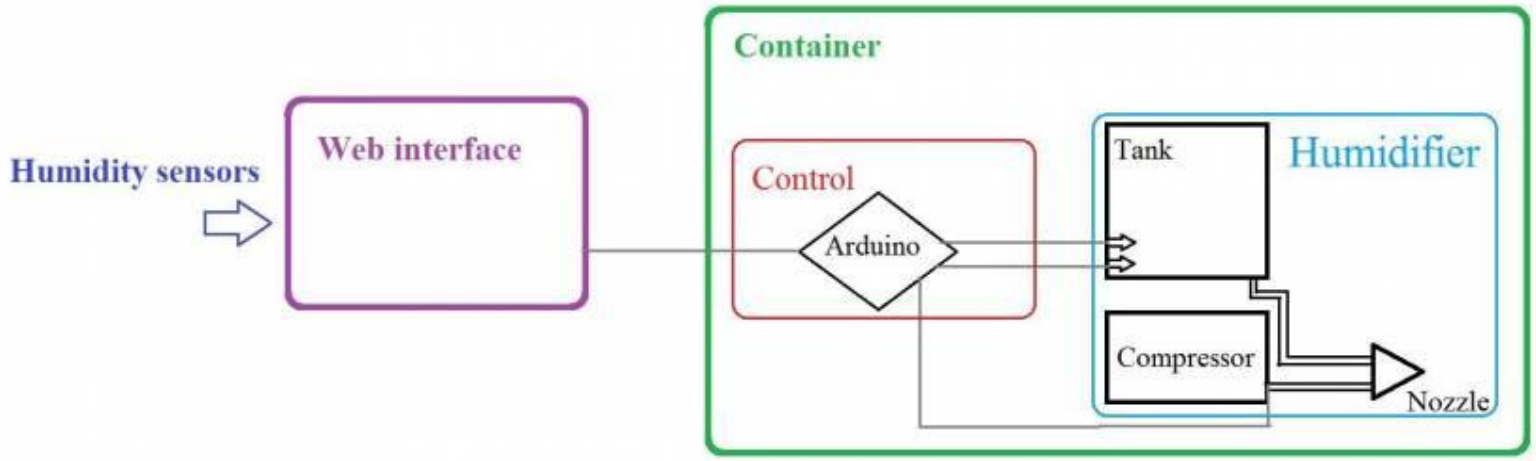
Software:

Notepad++

TomCat

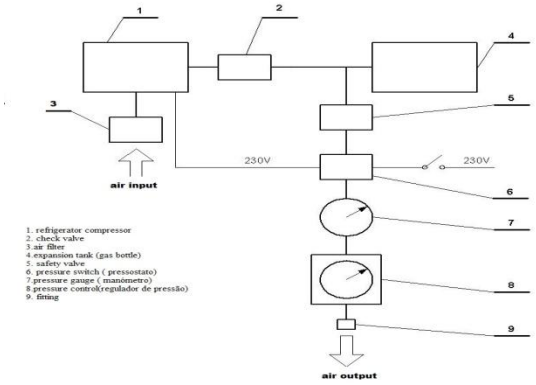
MySQL

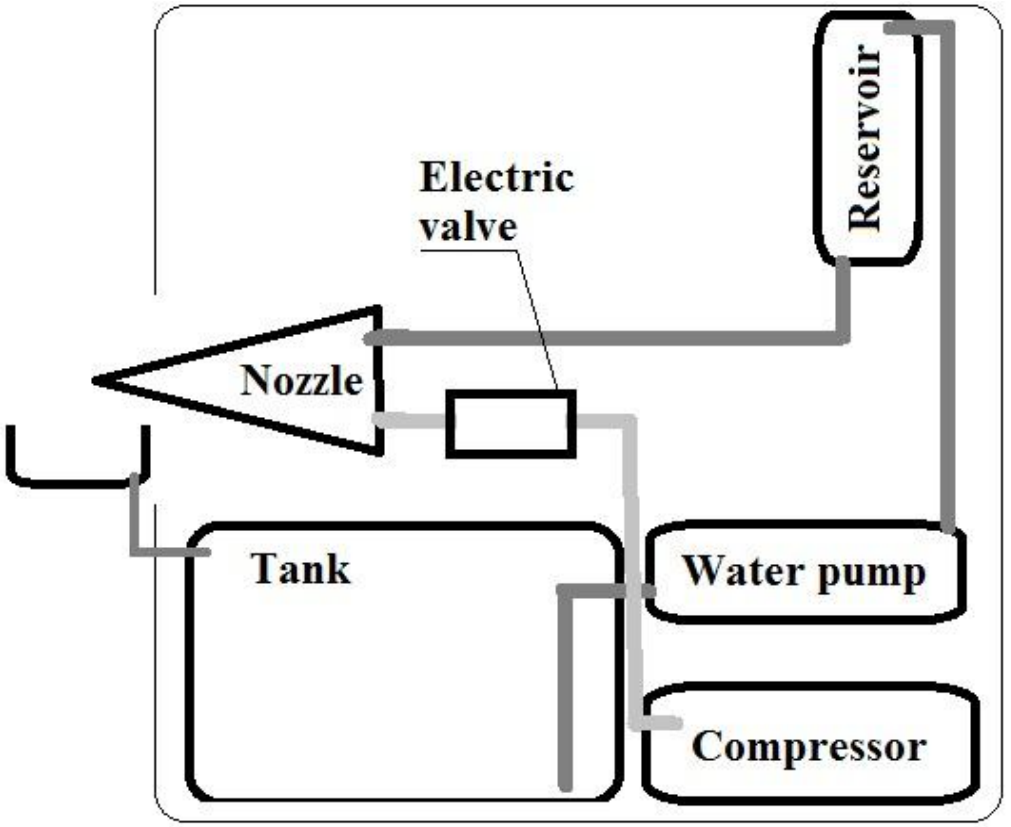
Development - Architecture



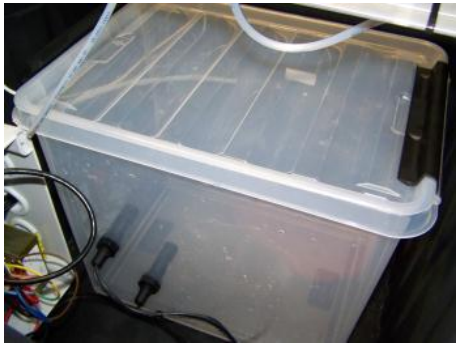
Development - Humidifier

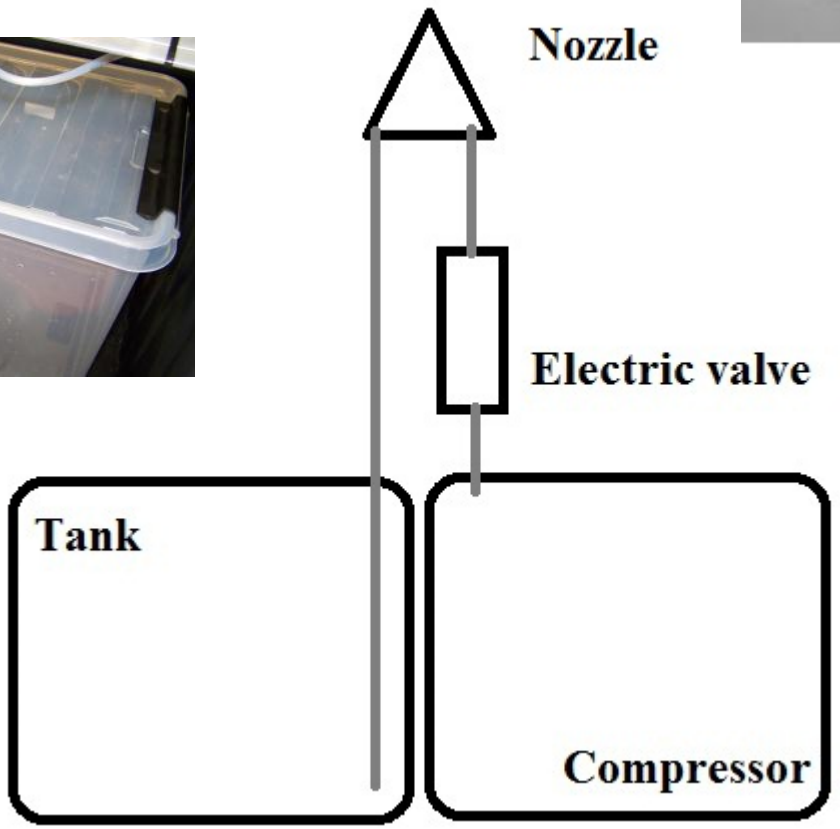
- Previous compressor solution



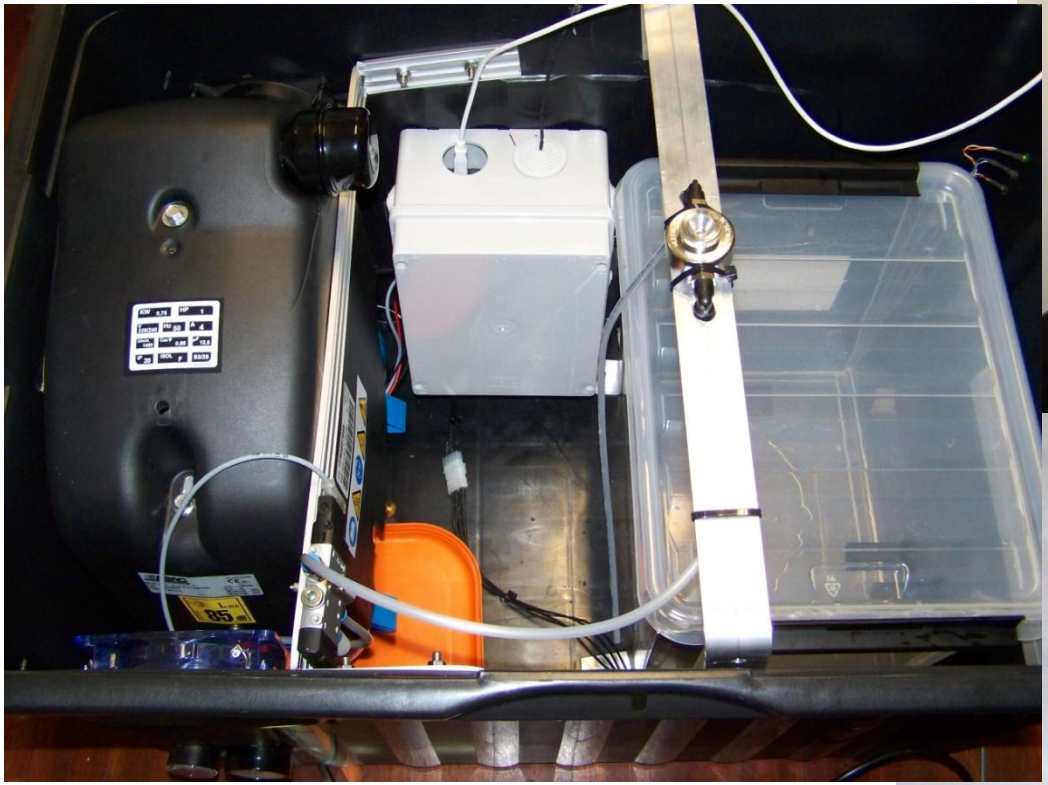


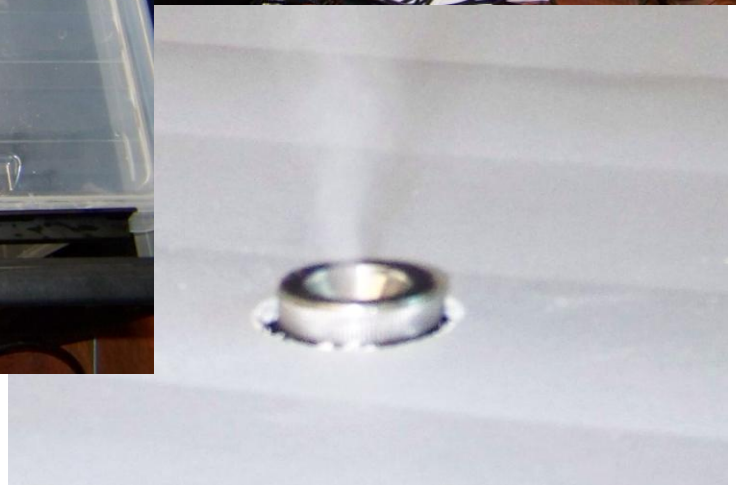
Development -Humidifier





Development -Humidifier



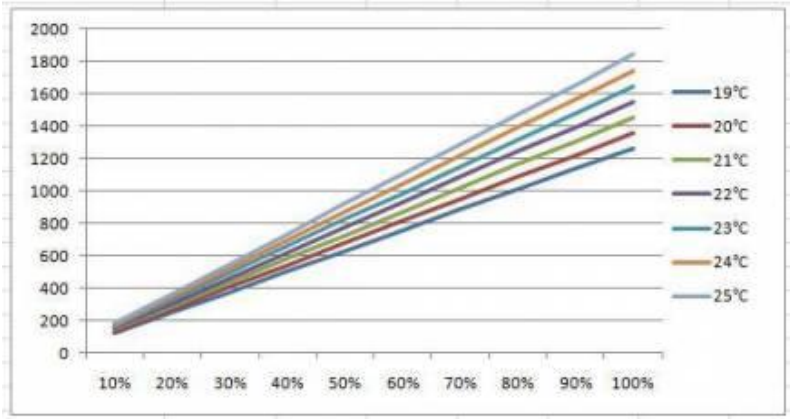


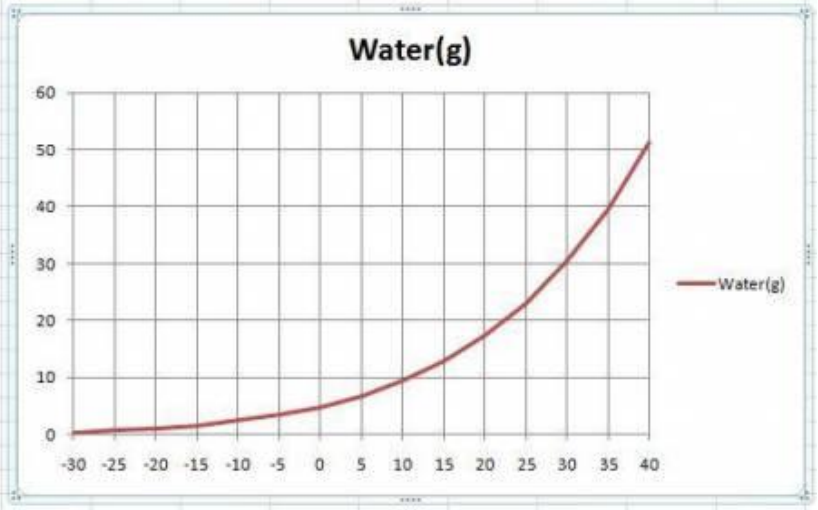
Development – Water tank

- Calculation that the 80m3 air how much water the air contains in the same temperature but in different percentage.

For $80m^3$							
Relativ humidity	19°C	20°C	21°C	22°C	23°C	24°C	25°C
10%	126,4	136	145,6	155,2	164,8	174,4	184
20%	252,8	272	291,2	310,4	329,6	348,8	368
30%	379,2	408	436,8	465,6	494,4	523,2	552
40%	505,6	544	582,4	620,8	659,2	697,6	736
50%	632	680	728	776	824	872	920
60%	758,4	816	873,6	931,2	988,8	1046,4	1104
70%	884,8	952	1019,2	1086,4	1153,6	1220,8	1288
80%	1011,2	1088	1164,8	1241,6	1318,4	1395,2	1472
90%	1137,6	1224	1310,4	1396,8	1483,2	1569,6	1656
100%	1264	1360	1456	1552	1648	1744	1848

Development – Water tank

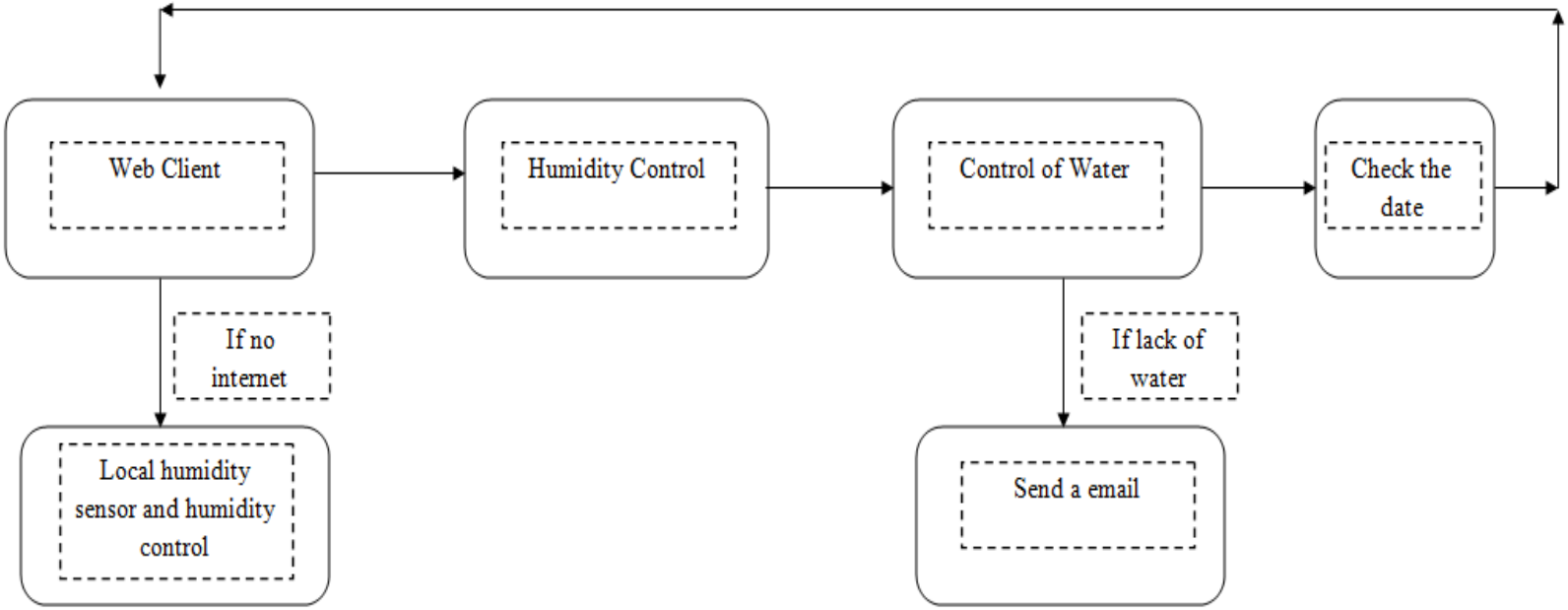




The datacenters measurements has not enough changes ,so we couldn't calculate the exact amount what we need for 2 days. Than we chose the tank to be enough for the worst case for two days.

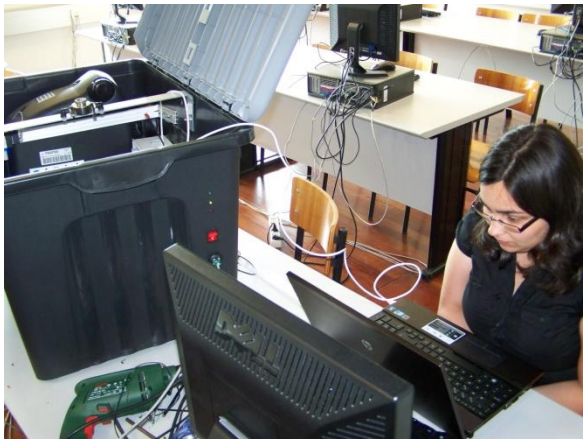
Development – Control

- Organize ideas



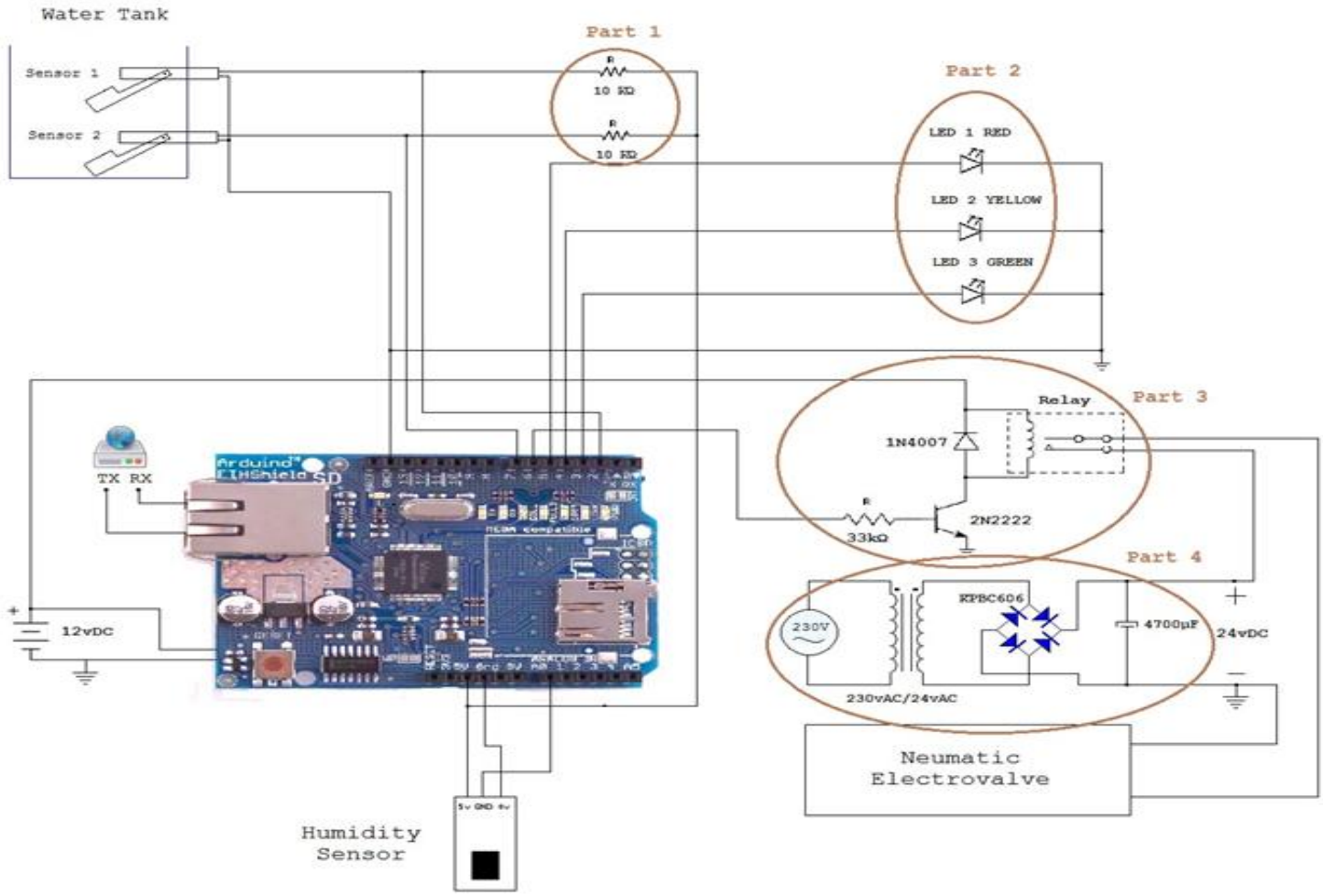
Development – Control

- Flowchart



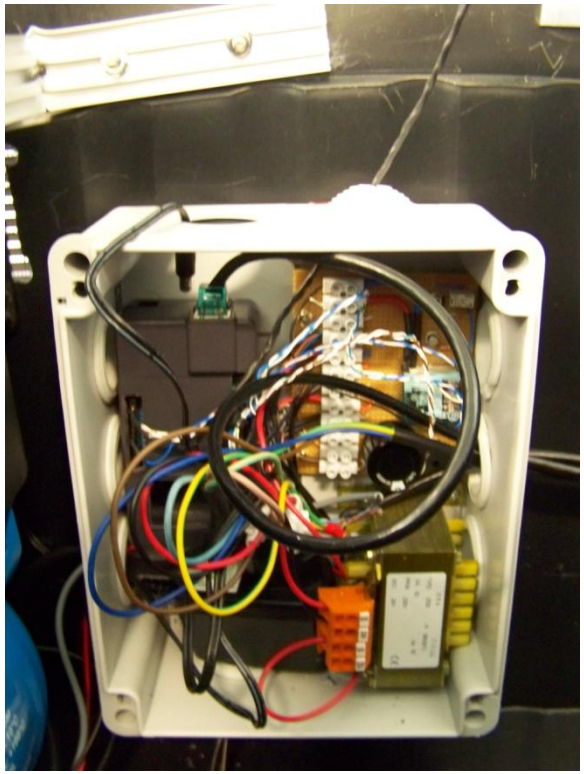
- Construction Code
  - Control Water
  - Control humidity
  - Connection with Tomcat server
  - Validity of data
  - Connection with Email server (to send email with humidifier information)
  - Submit information to database with water level (life-cycle analysis)

Development – Control – Electric circuit

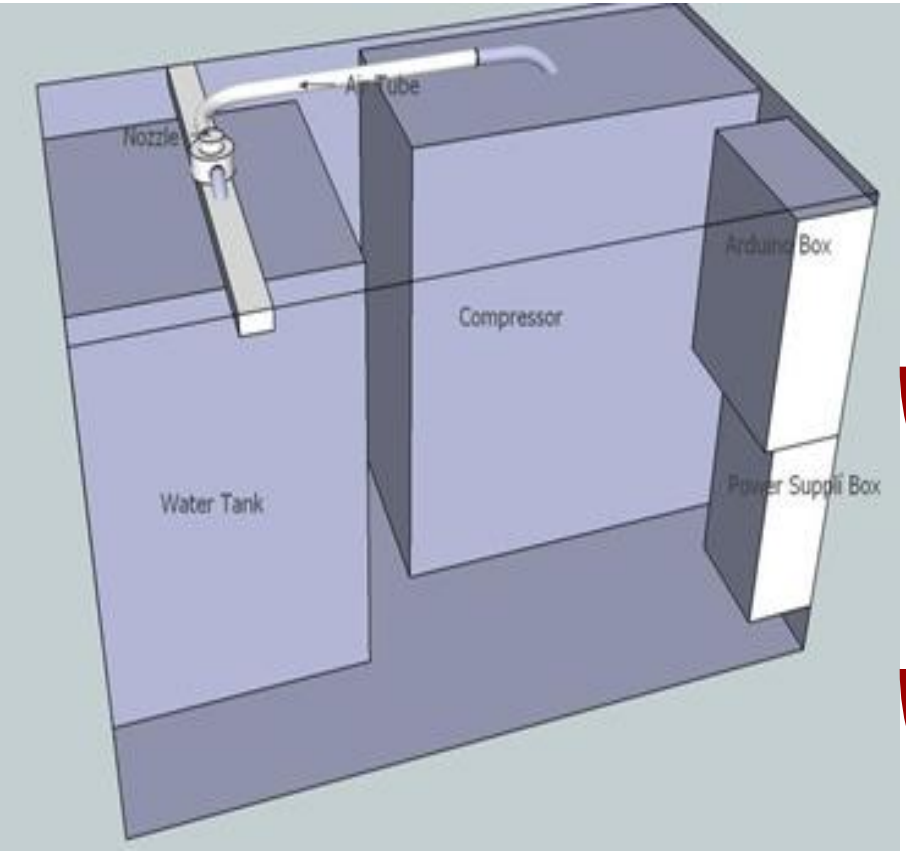


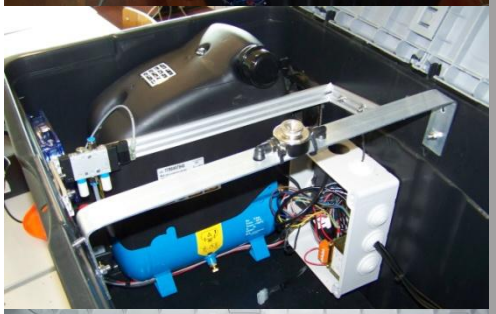
Development – Control – Electric circuit

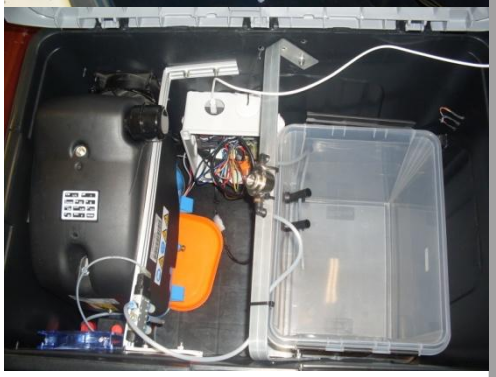
- Part 1 – Water sensors
- Part 2 – Leds
- Part 3 – Control electricvalve with relay
- Part 4– Conversion AC to DC



Development – Container



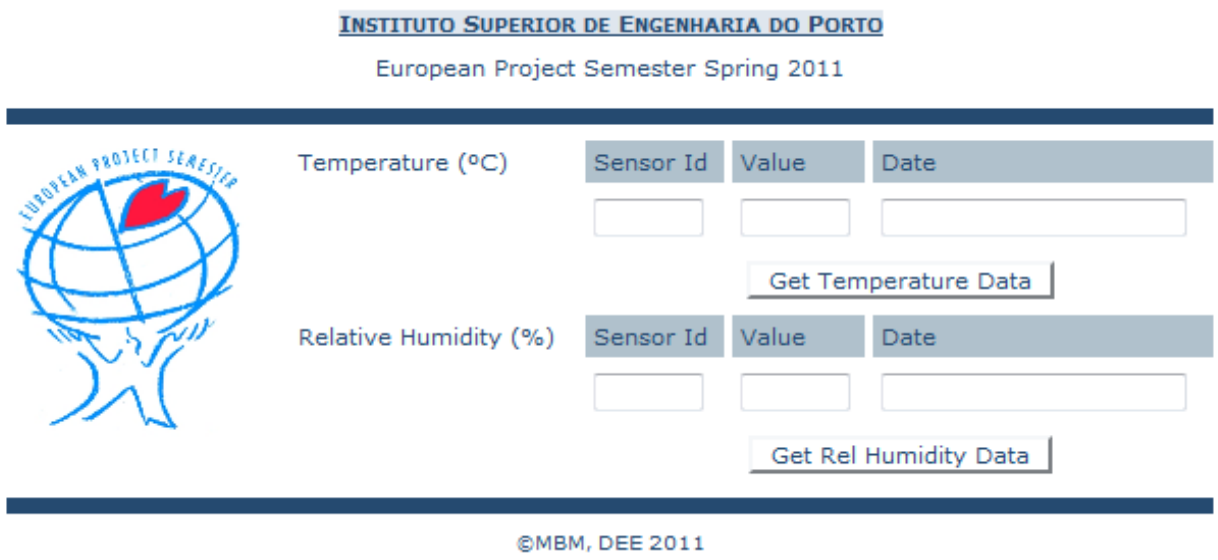




Development – Web interface

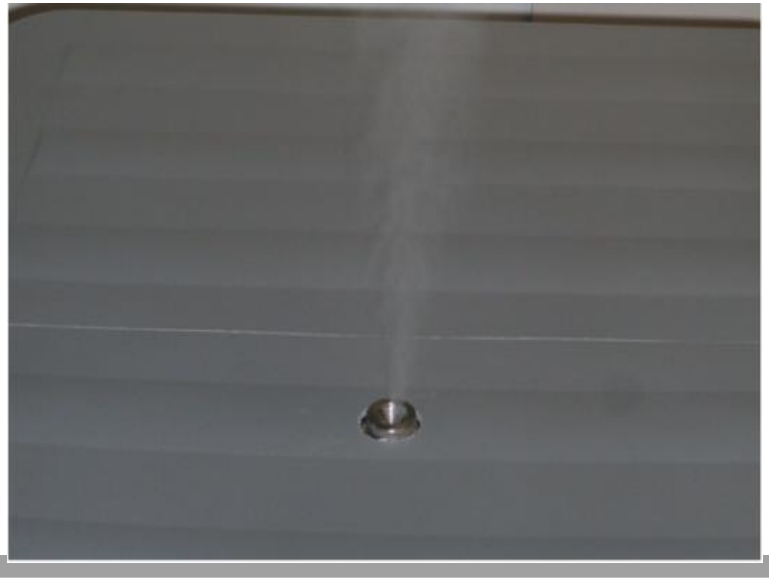
- Consult Temperature;
- Consult Humidity;
- Consult Water Level

Life-Cycle Analysis



Results

Humidifier Group two



Advantage and disadvantages

Advantages

- Good performance
- Cold vapor
- Quite easy control
- Fast humidification

Disadvantages

- Noise - 66 dB
- Some vibration
- Size

Futures developments

- System to remove water pollution. It could be chemical compound or UV lamp.

- Composite material structure.
- The mail box where will be sent with information of water level of the humidifier tank should be consulted frequently.
- Purge the compressor

FUTURE DEVELOPMENTS

Conclusions

- **Achievements:**
  - We learned to work better in team
  - Improve communication
  - Apply our knowledge in real life situations
  - We can make humidifiers
  - We can organize a project and ourselves better

Important Recommendations

  - The mail box where will be sent with information of water level of the humidifier tank should be consulted frequently

References & Bibliography

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Thanks for your attention