

# Humidifier with a web interface control

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## Why humidifying a data center so important?

- relative humidity < 40% →
- excess of static electricity →
- sparks →
- damage servers and IT equipment



# Guidelines

- humidifier to server room of 80 m<sup>3</sup>
- relative humidity between 40 % and 70 % ( $\pm 5$ )
- two days of autonomy
- on-off switch
- water and humidity alarms



# Guidelines

- compliance with the EU Directives 2006/42/CE 2006-05-17 and 2006/95/CE 2006-12-12
- include a life-cycle analysis
- use open source technologies
- distribution of water vapour



**GUIDELINES**

## Types of humidifiers

- Evaporative Humidifiers
- Impeller Humidifiers
- Ultrasonic Humidifiers
- Humidifier with air compressor
- Warm Mist Humidifiers

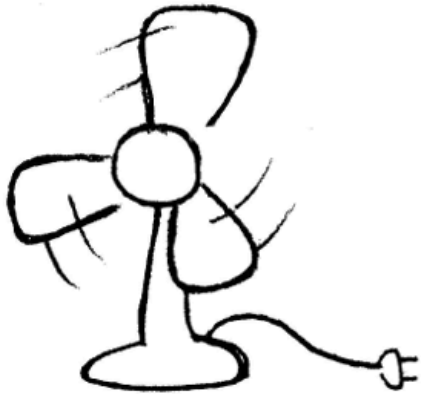


# Our Decision

- Evaporative humidifier:
  - Ensures a pure and clean mineral-free moisture output
  - Low costs of building and maintaining
  - Powerful enough to cover large area
  - Low energy consumption

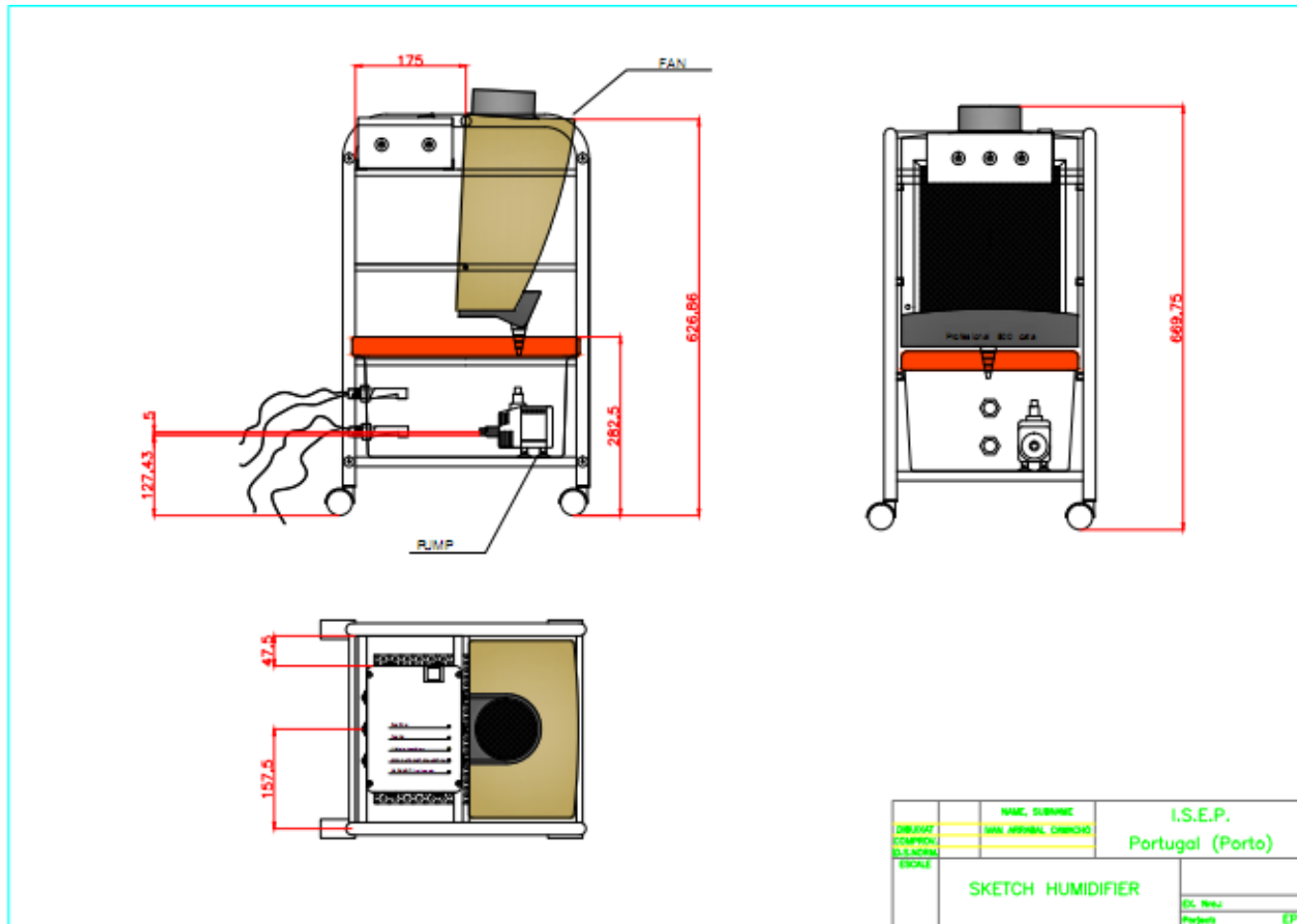


# What we needed



# Humidifier

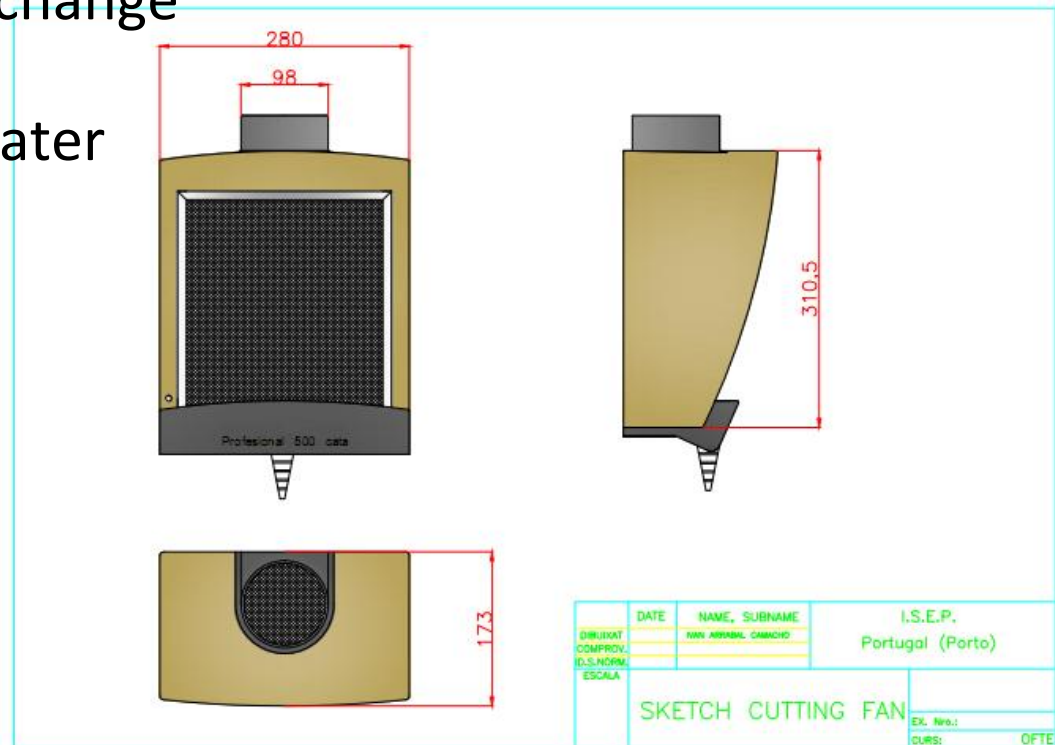
# Sketch of humidifier





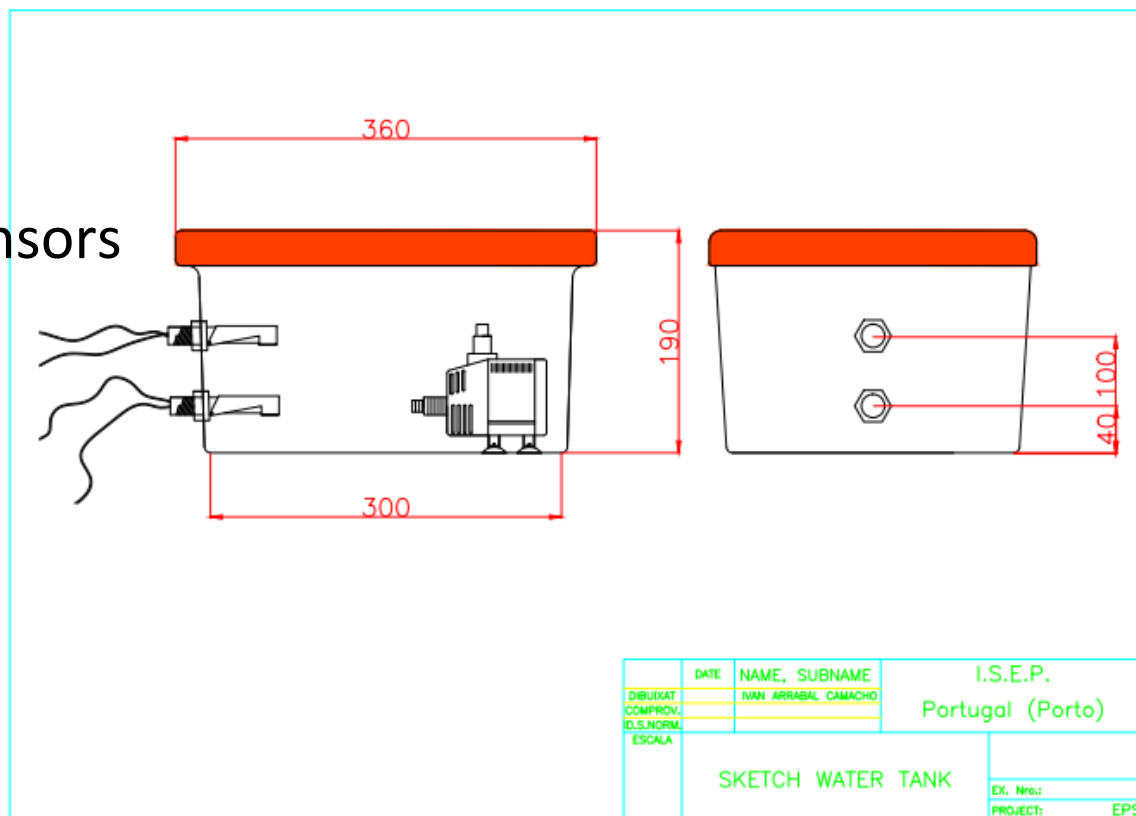
# Fan

- Kitchen extractor
- Metal filter easy to change
- Tray for excess of water



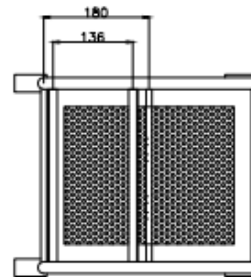
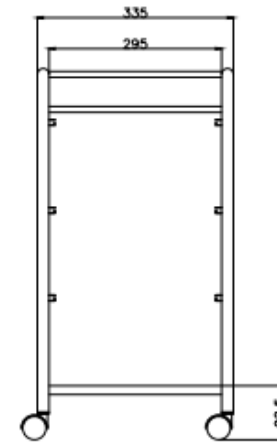
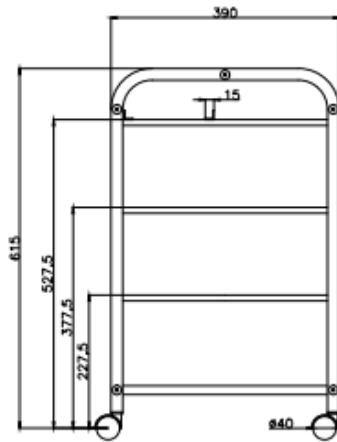
# Water Tank

- Volume of 10 liters
- Thigh cover
- 2 water level sensors



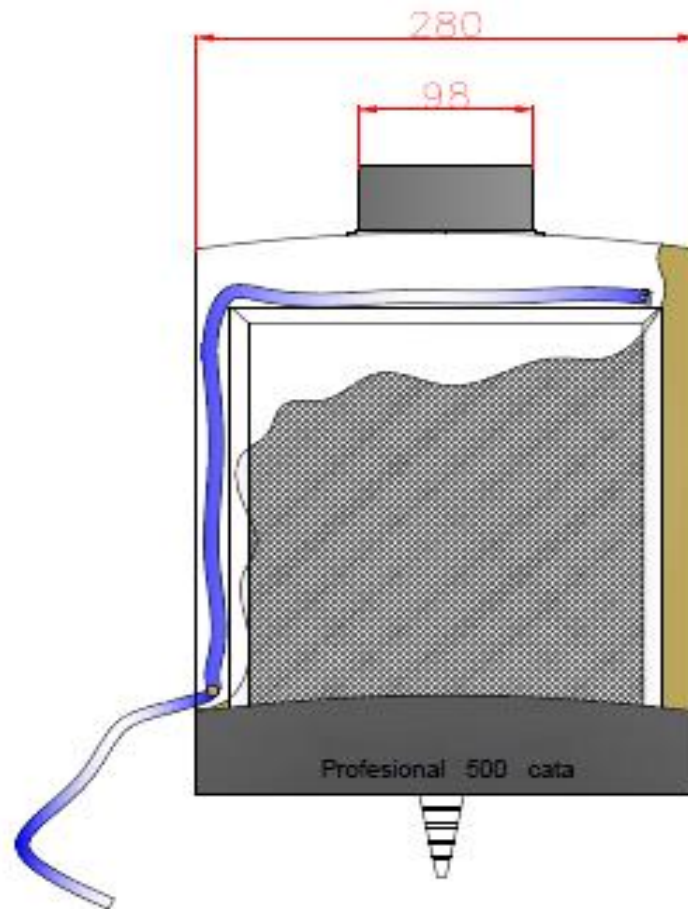
# Aluminum Structure

- Structure to organize all equipment



DATE	NAME	I.S.E.P. Portugal (Porto)
DESIGN	PROF. ASSIMIL. GARCIA	
SCALE	SKETCH CUTTING STRUCTURE	
		Proj. EPS

# Modified Fan



# Filter

- Professional filter
- Cloth towel

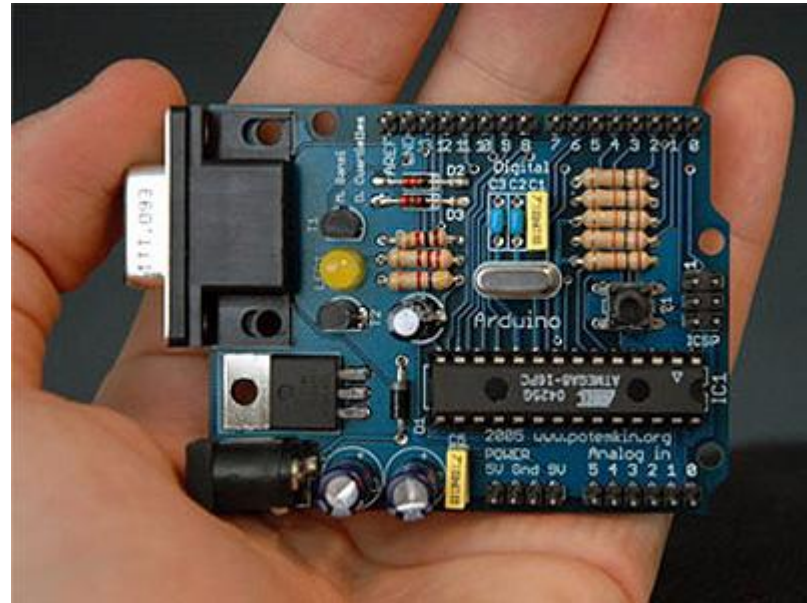


# Controlling System

There are two basic way to solve the controlling. Our objective to choose one from these tools what is the best to realize the controlled humidity-level in a server room

Two options :

- PLC
- Microcontroller



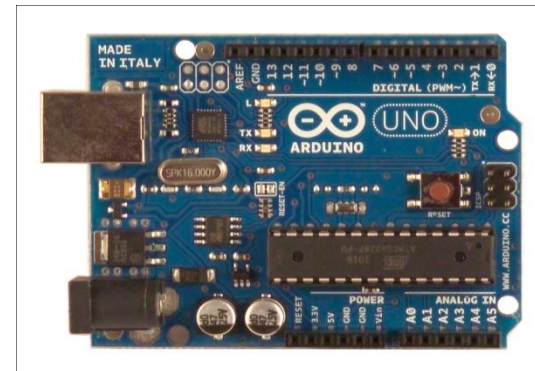
# Our Decision

- Microcontroller
  - Low energy consumption
  - Low price
  - Small size



# Arduino Uno

- Microcontroller board
- 14 digital inputs/outputs pins (2; 5)
- 6 analog inputs
- USB connection (easily to connect to PC)
- AC-DC adapter





# Ethernet Board

- Communicate with Data server
  - 3 later 8 humidity sensor values
  - Server date
  - Sensor dates
  - Send 2 water level switcher state
- Email server
  - Send water warning



# Inputs

- Built-in humidity sensor (analog pin 0)
- Water level switcher 1 (digital pin 7)
- Water level switcher 2 (digital pin 8)

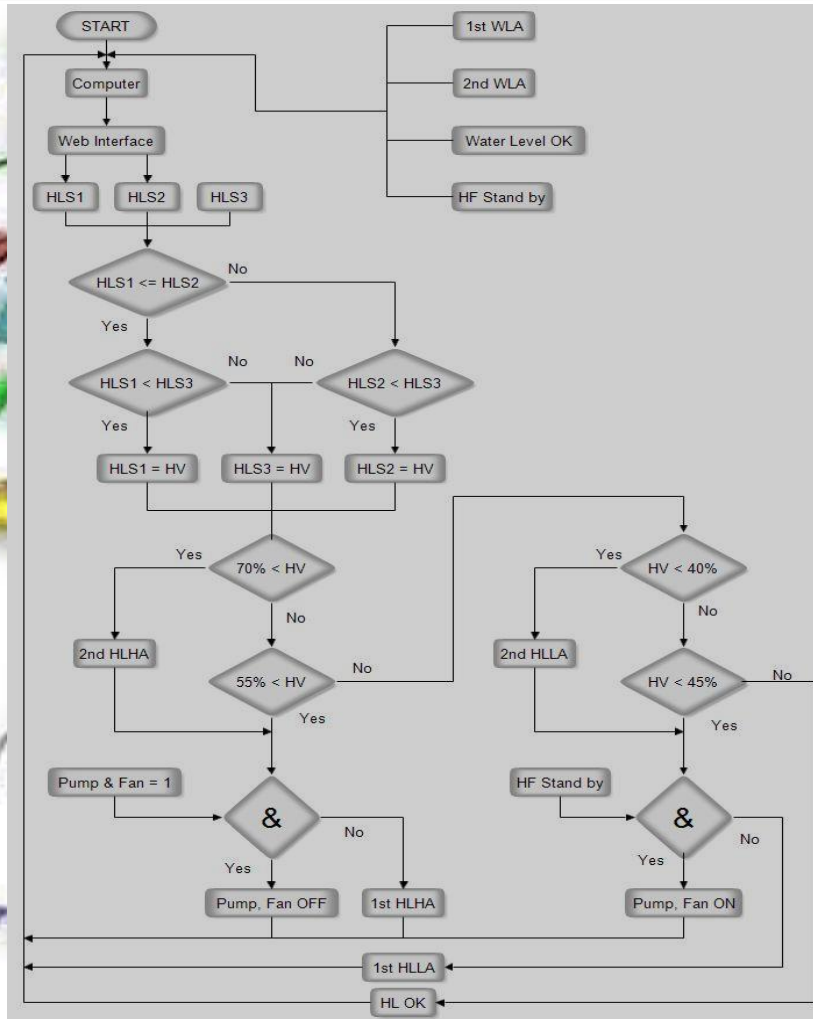
```
pinMode(2, OUTPUT); //FAN
pinMode(4, OUTPUT); //PUMP
pinMode(9, OUTPUT); //Connection LED 1 (disconnecting)
pinMode(7, INPUT); //WLS 1
pinMode(5, OUTPUT); // WLS 1-LED
pinMode(8, INPUT); //WLS 2
pinMode(3, OUTPUT); //WLS 2-LED
```

# Outputs

- Kitchen extractor (digital pin 2)
- Aquarium pump (pin 4)
- LEDs
  - Water level sensor 1 state (pin 5)
  - Water level switcer 2 state (pin 3)
  - Ethernet connection state (pin 9)



# Programming – Basic idea



# Programming - Objectives

- Keep the humidity level on 55%

```
void Humidity_Control()
```

- Based on the 8 (3) cabin sensors

```
float getValue(String reply)
```

```
void getHumidity()
```

- Check the sensor dates and value propriety

```
void getDate()
```

# Programming - Objectives

- Use local sensor (no connection)

```
void Local_Humidity()
```

- Send water warning

```
void SendMail()
```

- Ban the run without water

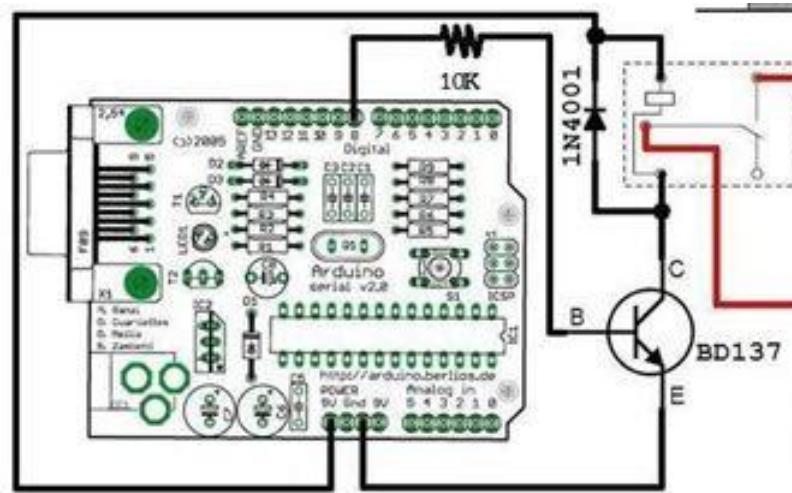
```
void Water_Control()
```

# Electric and electronic Part

## Pump and fan control

Control with two relays finder 40.31 6V DC

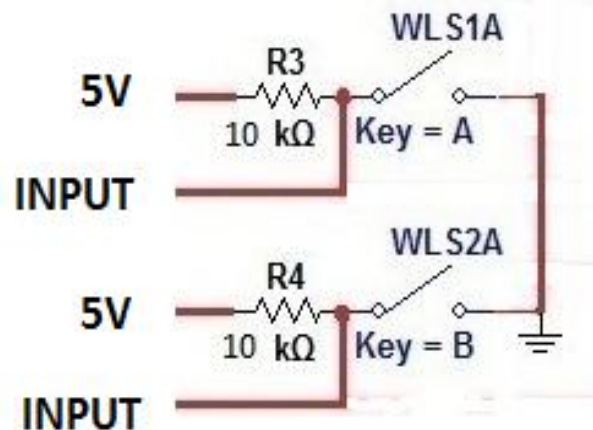
## Additional electronic circuit



## Water level sensor

Water level sensors switch RSF40 Series

## Additional electronic circuit





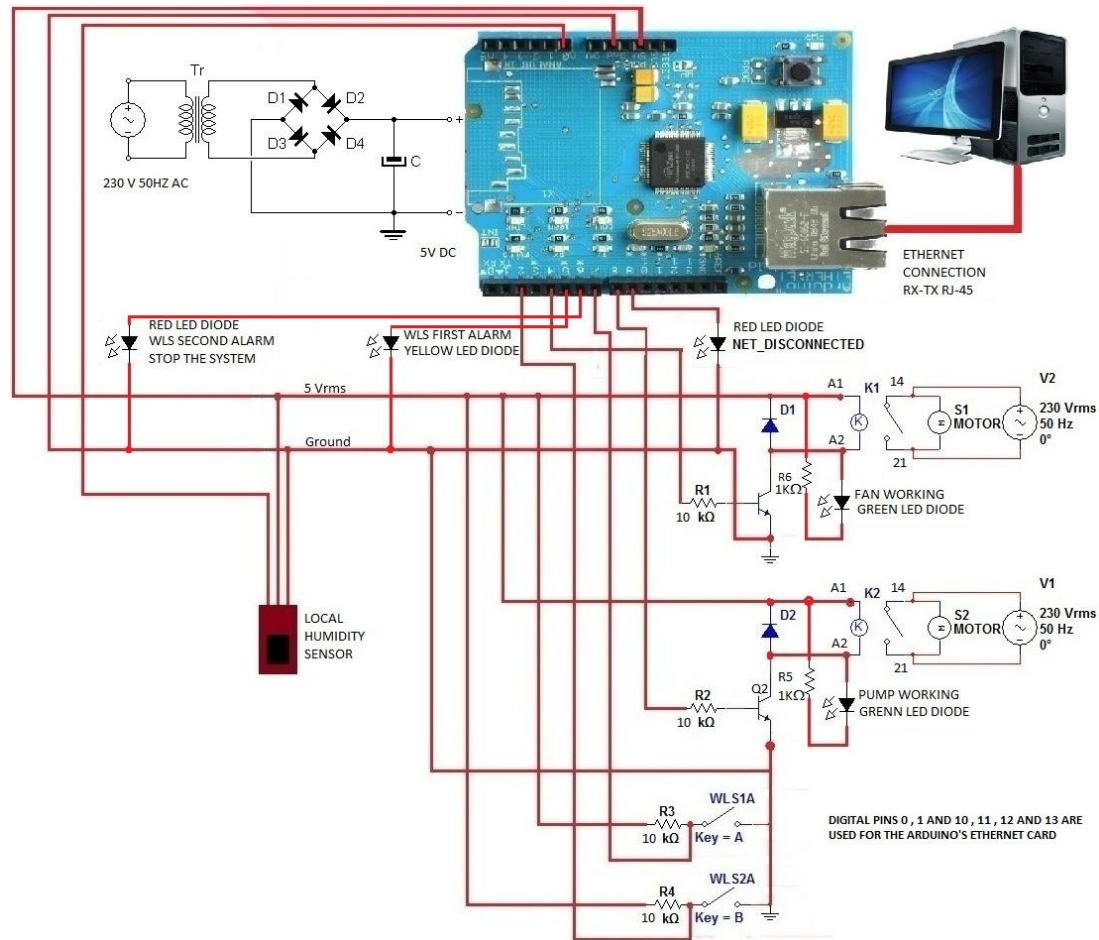
# Electric and electronic Part

## Arduino power

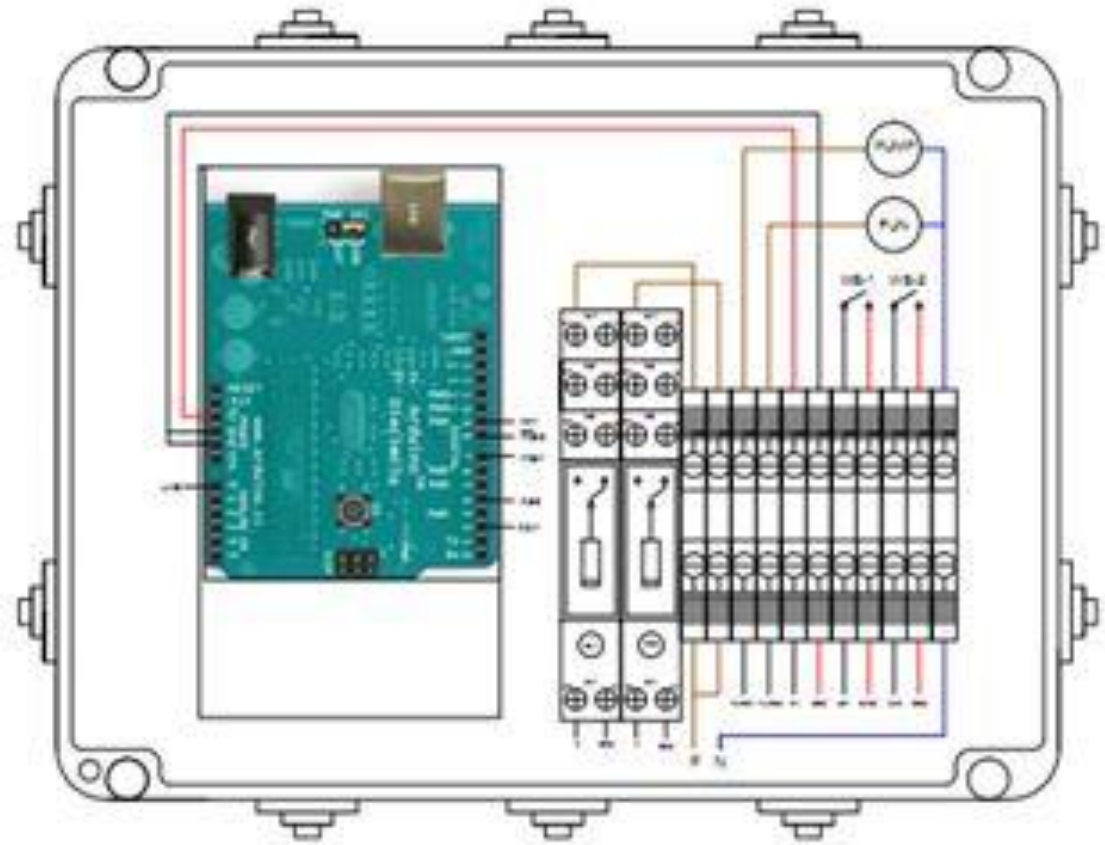
Power supply 230V AC / 12V DC



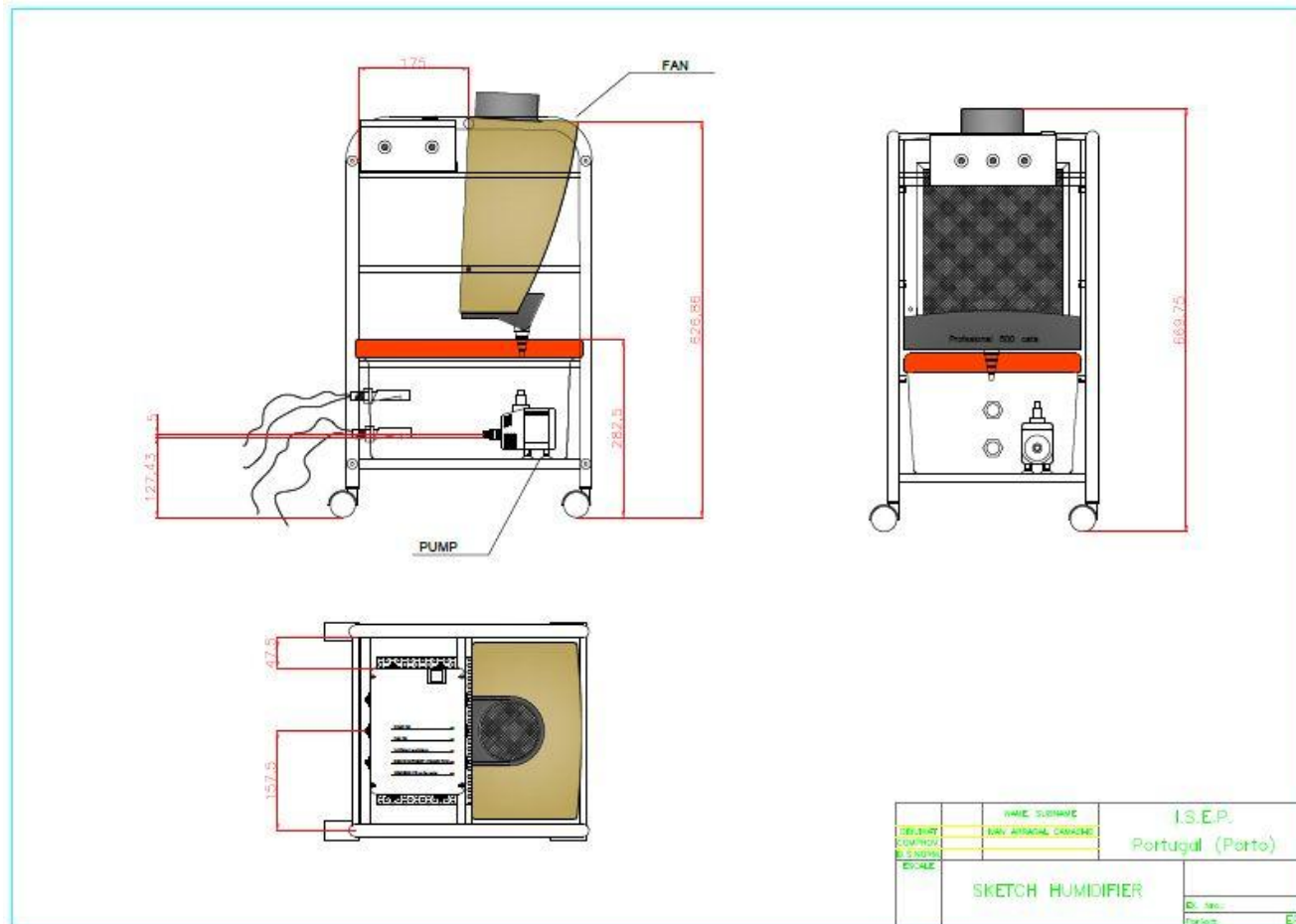
# Electric and electronic Part



## Electrical Box



# Final model of humidifier



# Final model of humidifier



# References & Bibliography

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**Thank you for your attention**

