
VEREATABLE
Indoor Garden

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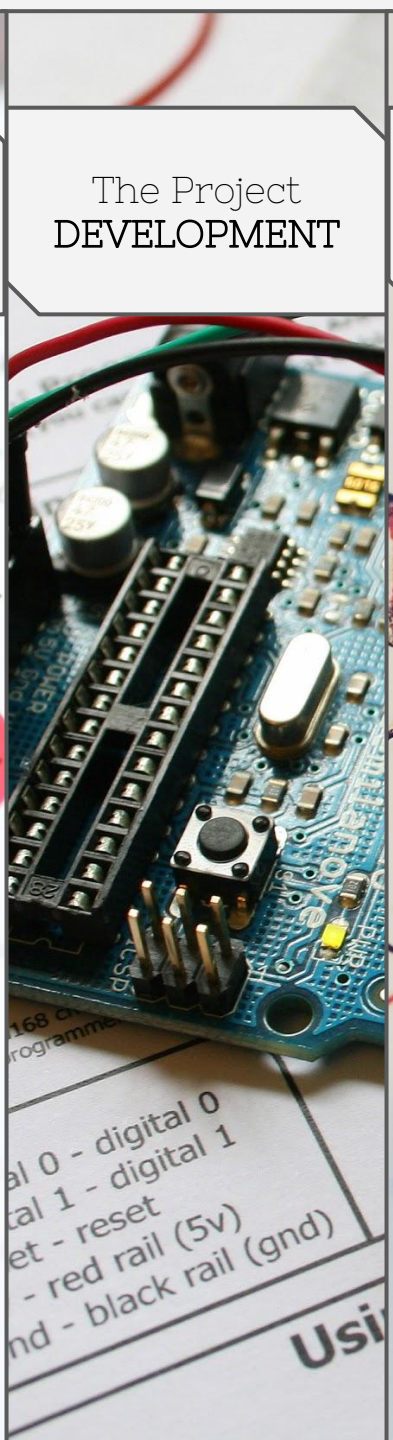
The Problem
DEFINITION & RESEARCH

The Project
MANAGEMENT

The Project
DEVELOPMENT

The Future
IMPROVEMENTS

The Final
CONCLUSIONS




The Problem
DEFINITION &
RESEARCH

The Problem
DEFINITION & RESEARCH

Vertical ~~Farming~~ Garden

Requirements

Given by the project

- Modular
- Adaptable to different size areas
- Use low cost hardware solutions
- Comply with relevant EU Directives
- Use open source software and technologies

The Problem
DEFINITION & RESEARCH

State of the Art
Key research outcomes

- End-user oriented home-scaled solution
- Advanced growing techniques the way to go
- Facing well developed, competitive market

CLICK AND GROW™

minigarden®

ZIPGROW™

The Problem
DEFINITION & RESEARCH

Marketing & Communication

Key research outcomes

VEREATABLE
Indoor Garden

The Problem
DEFINITION & RESEARCH

Sustainability & Ethics
Key research outcomes

- The Vereatable device is made by MDF panels and recyclable food-safe PVC and has longevity of service
- Water & electricity conservation due to the aeroponic closed system.
- An interactive device that provides bio produce and an eco friendly lifestyle
- Low cost for high quality

- NSPE code of ethics.
- ICC/ESOMAR International Code on Market and Social Research
- European Union's requirements of Machinery Legislation
- The Vertical Farming Association


The Project
MANAGEMENT

The Project
MANAGEMENT

Monthly work summary

February	Introduction, Team building, Brainstorming
March	Research, Gantt chart, Sketches
April	Drawings, Materials, Interim
May	Deliverables, Refining, Prototyping
June	Developing, Designing, Testing, Final

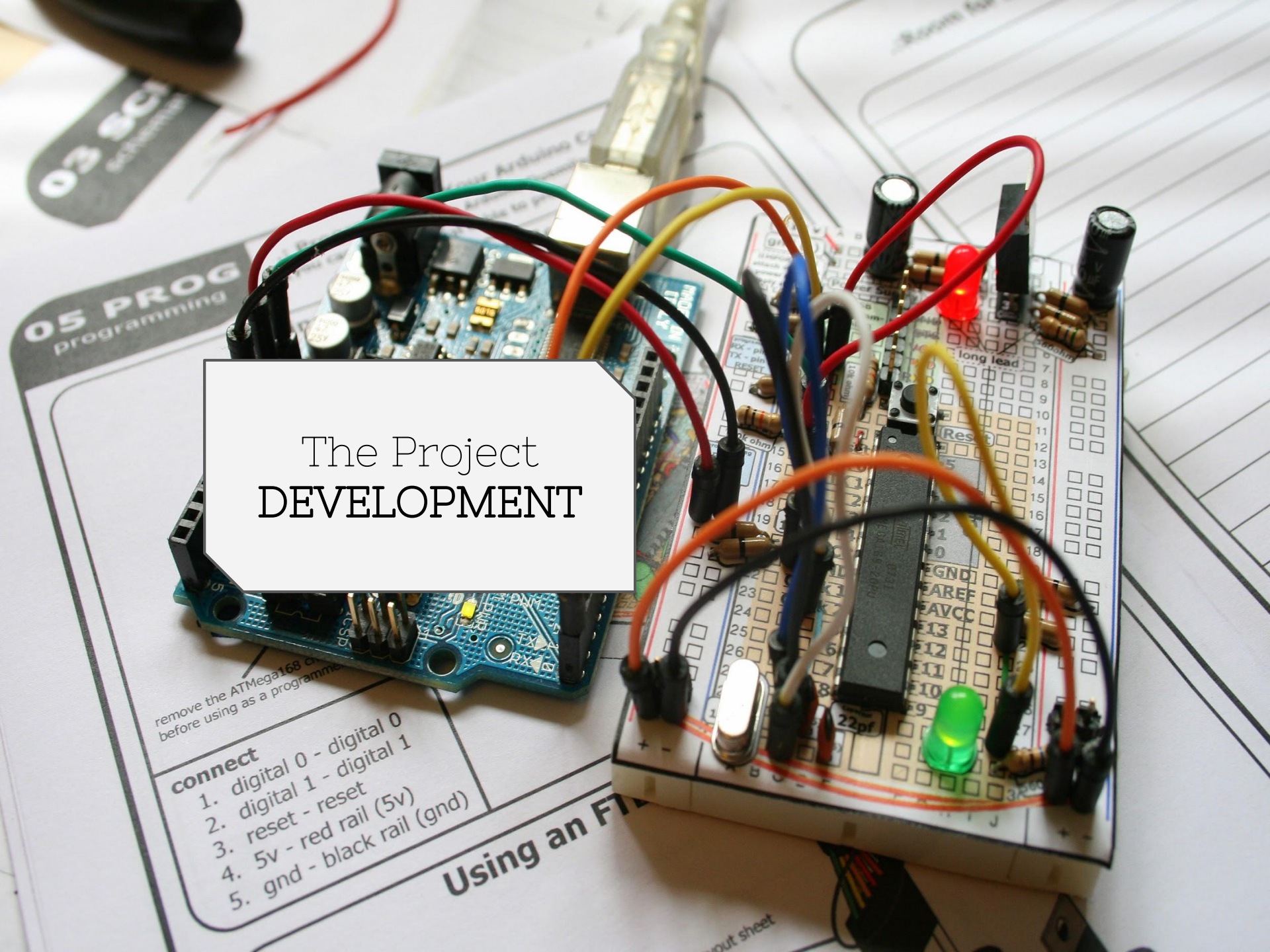
The Project
MANAGEMENT

Risks

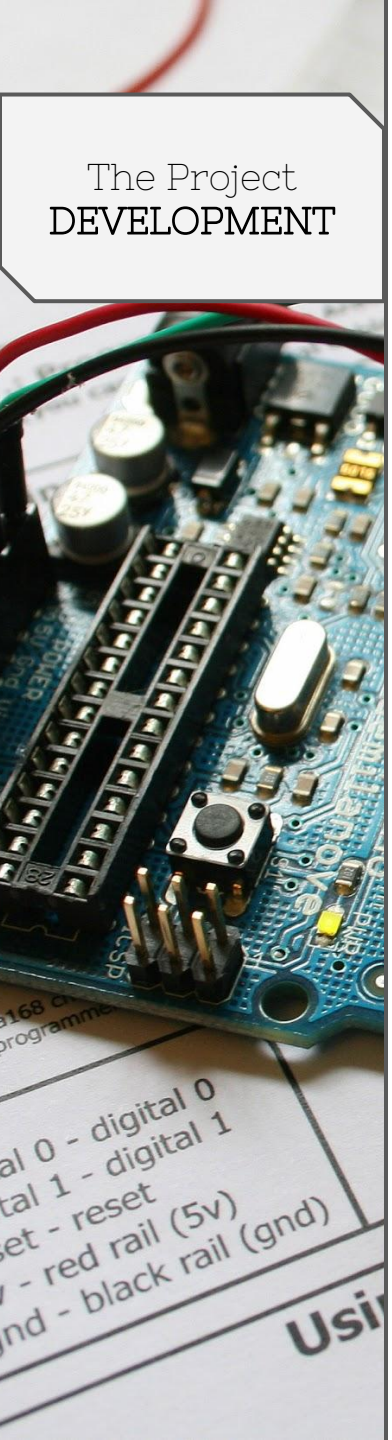
Improper treatment

Lack of safety measures

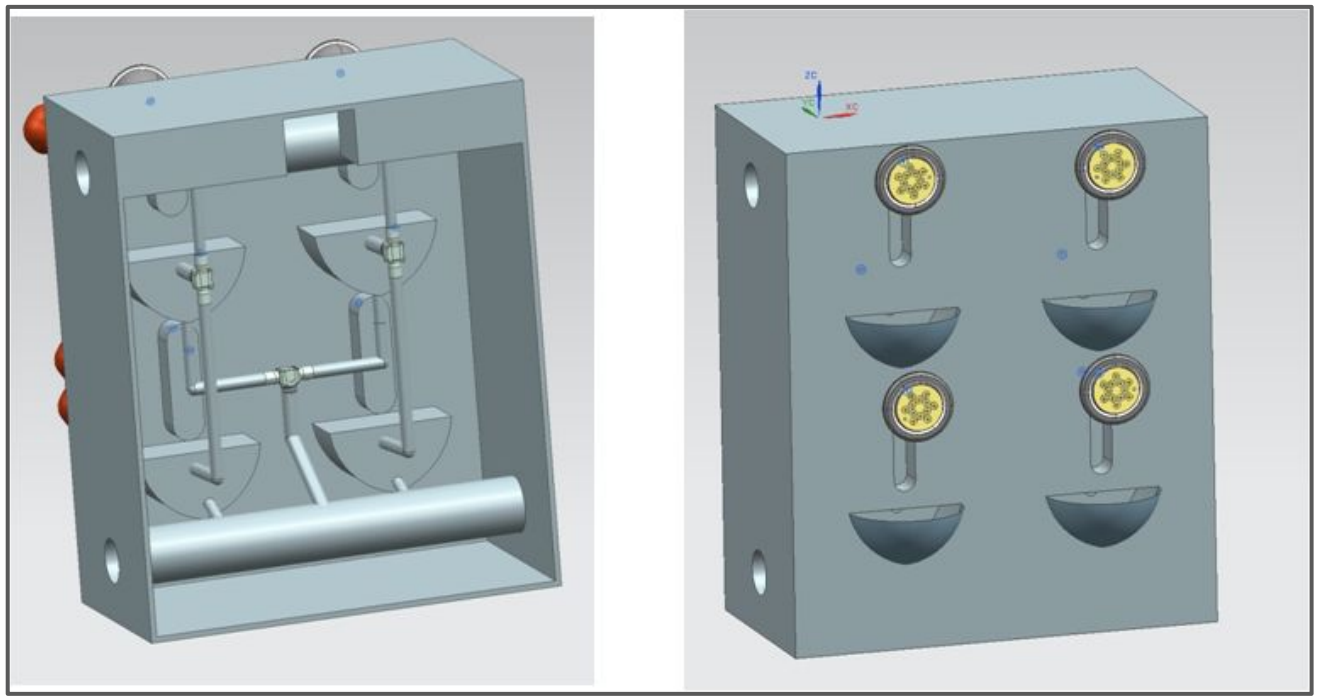
Quarrels


05 PROG
programming
The Project
DEVELOPMENT
connect
1. digital 0 - digital 0
2. digital 1 - digital 1
3. reset - reset
4. 5v - red rail (5v)
5. gnd - black rail (gnd)
Using an FT
long lead
22pf

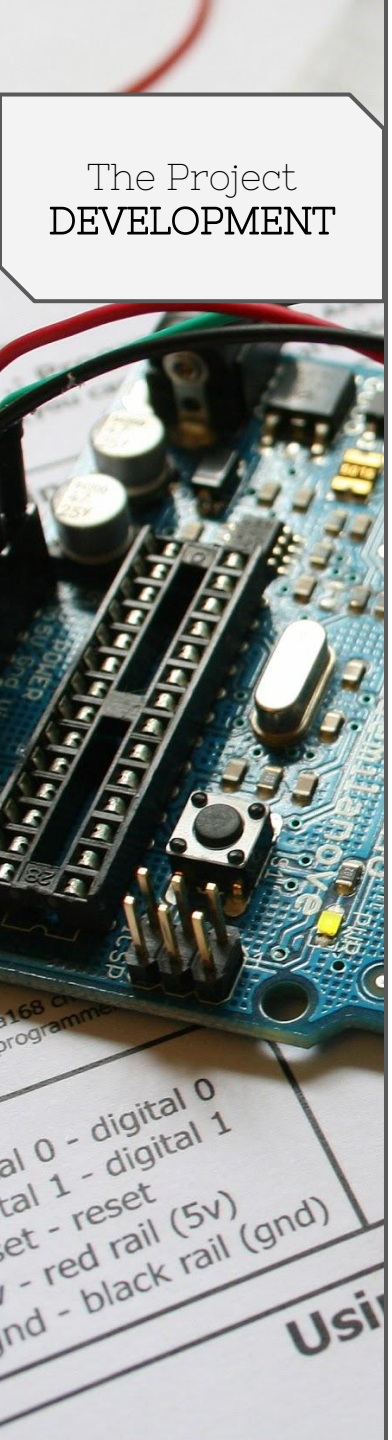
The Project
DEVELOPMENT



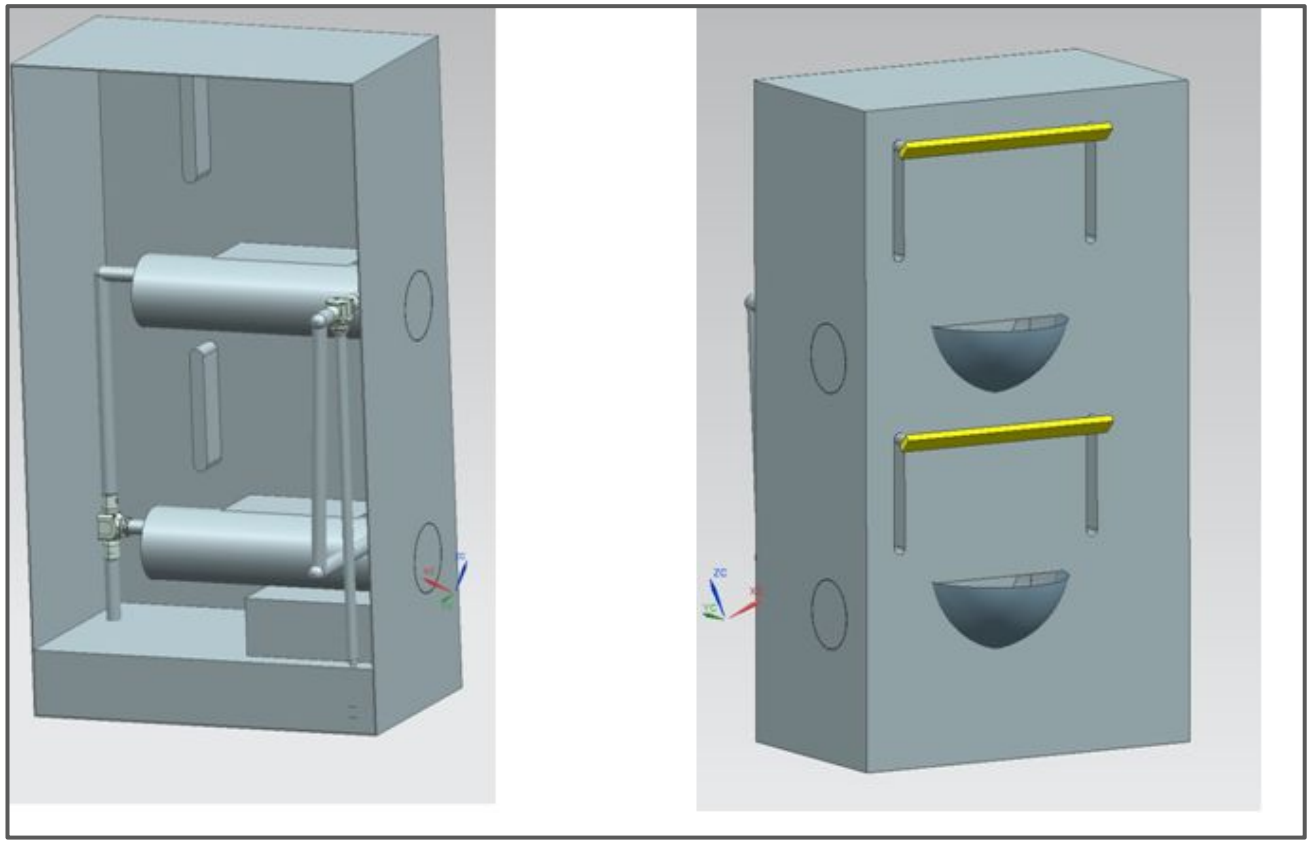
Design and prototype
(Evolution design 1st)



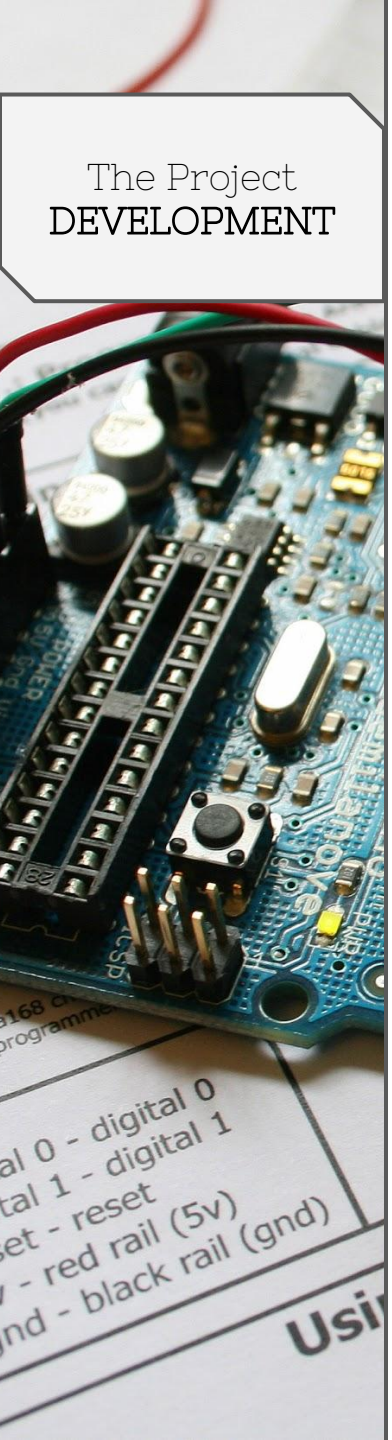
The Project
DEVELOPMENT



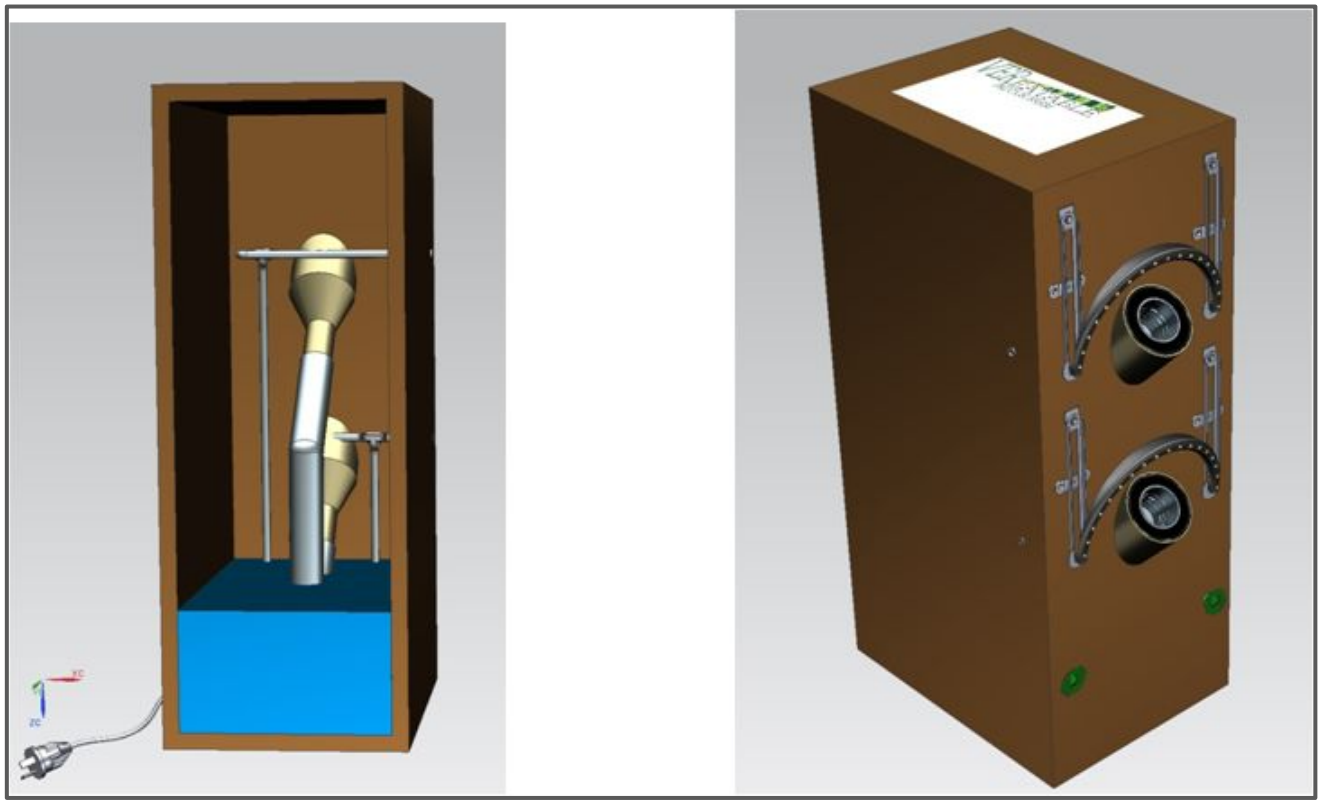
Design and prototype
(Evolution design 2nd)



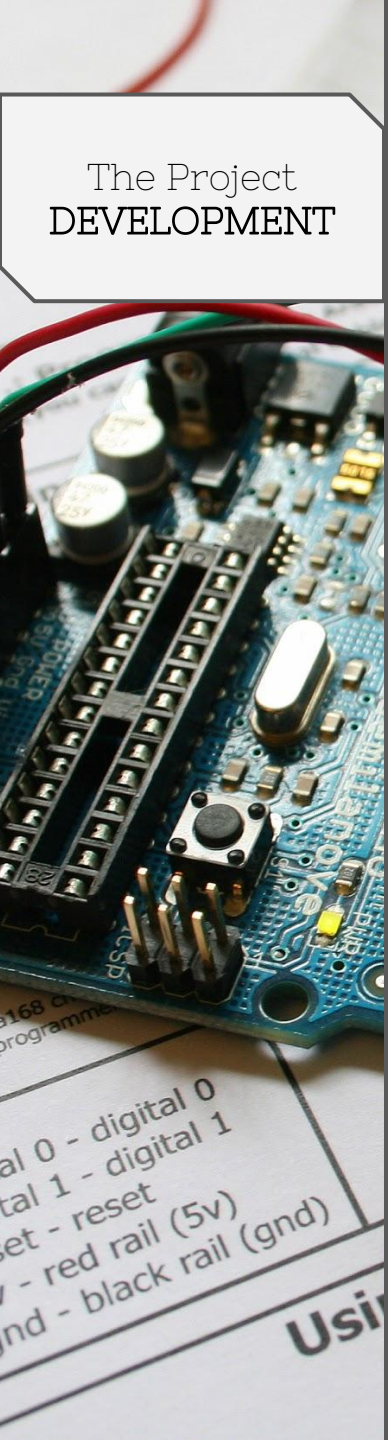
The Project
DEVELOPMENT



Design and prototype
(Evolution design 3rd)

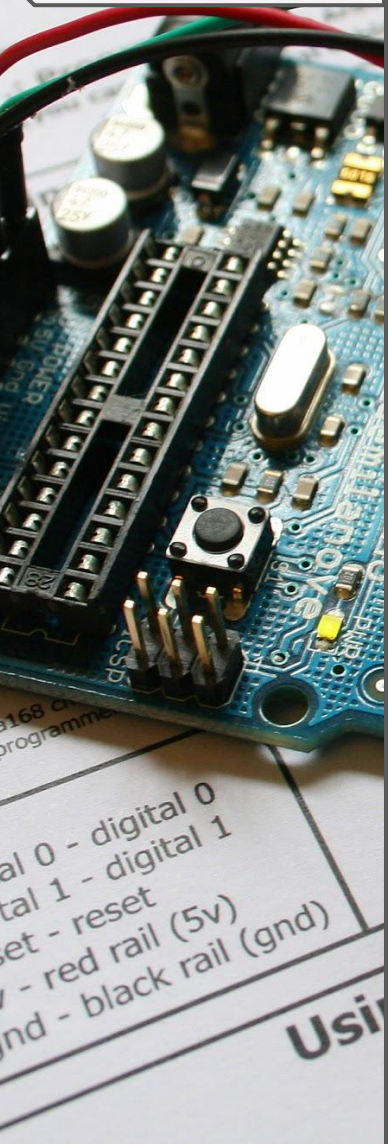


The Project
DEVELOPMENT

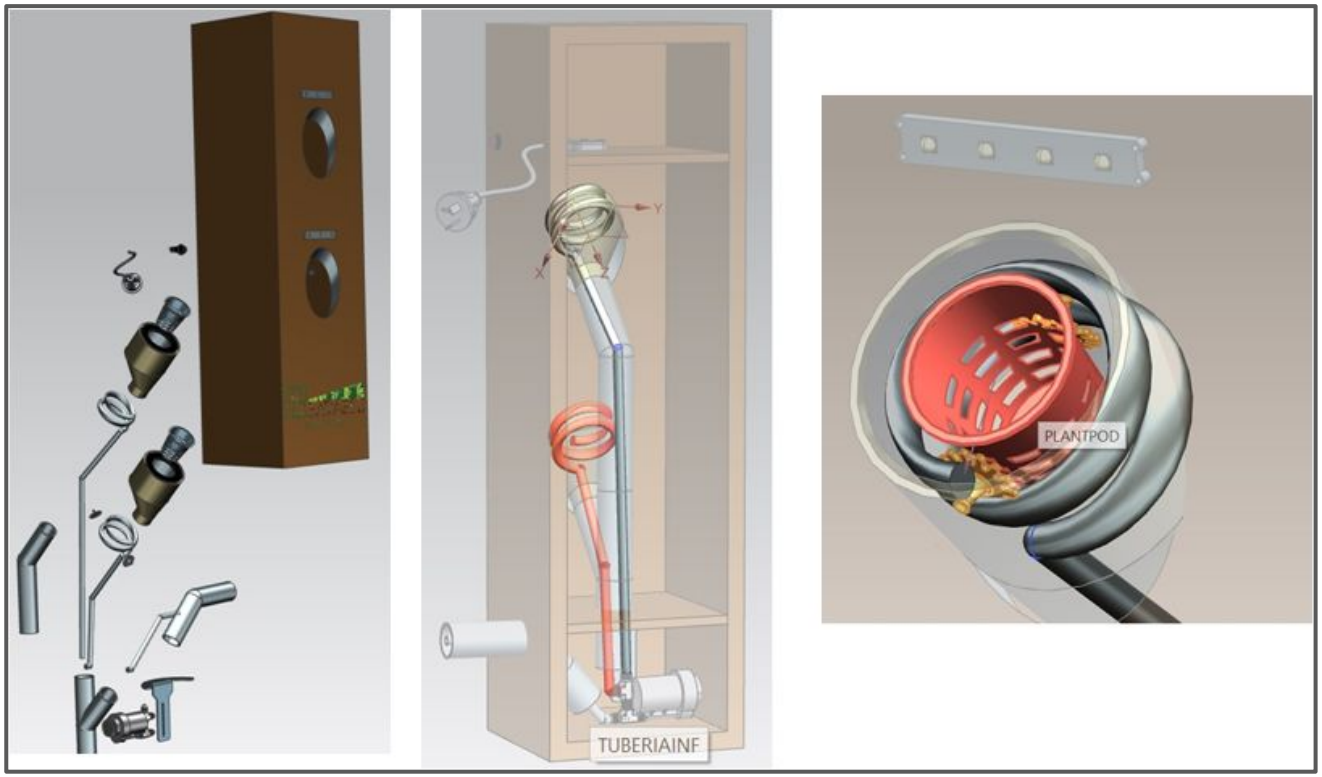


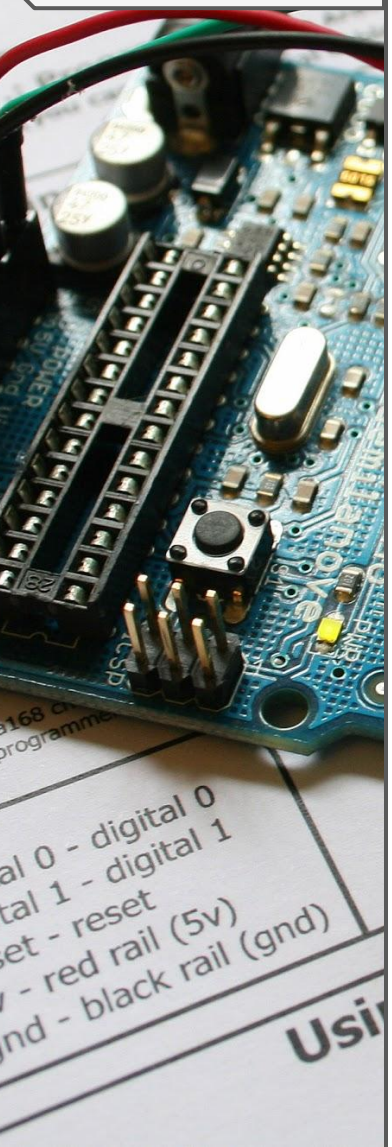
Design and prototype
(Evolution design 4th)

The Project
DEVELOPMENT



Design and prototype
(FINAL 3D)





Mechanical assembly
At the ISEP workshop

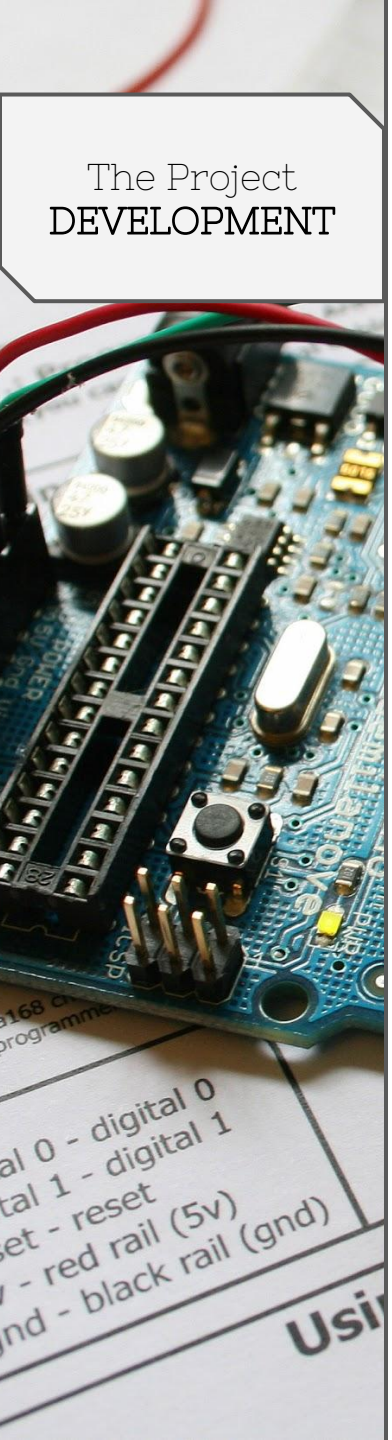
1st day

- Cut wooden pieces
- Make holes

2nd day

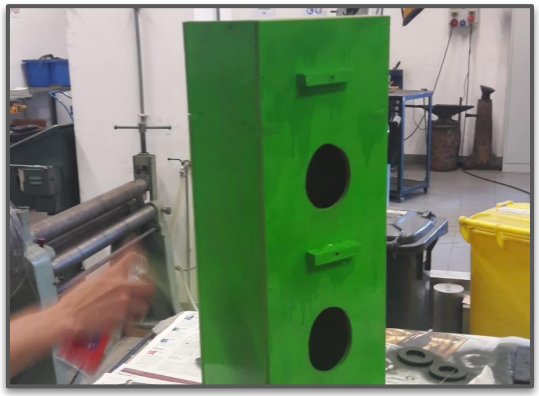
- Sand the pieces
- Join the structure with screws

The Project
DEVELOPMENT



3rd day

- Build the water system
- Add water system to the structure

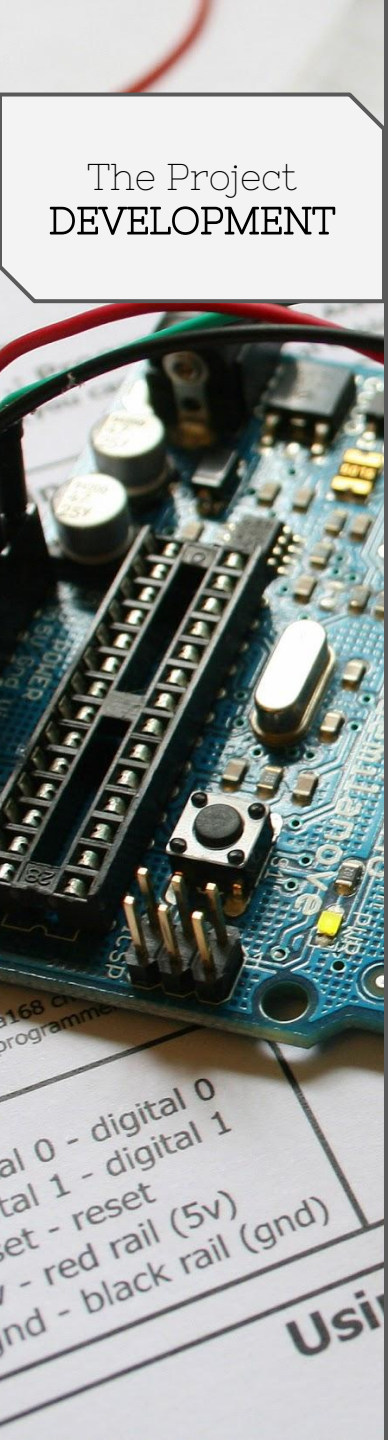


4th day

- Paint the pieces

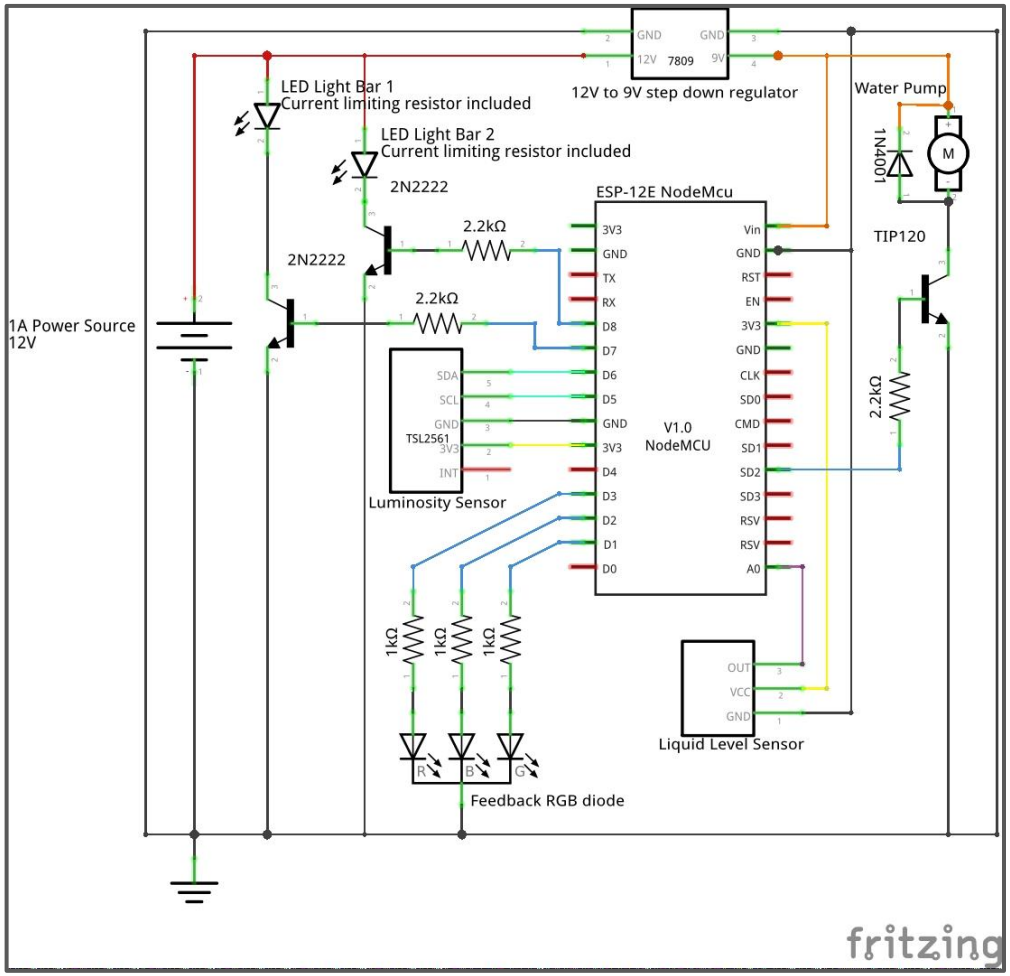
5th day

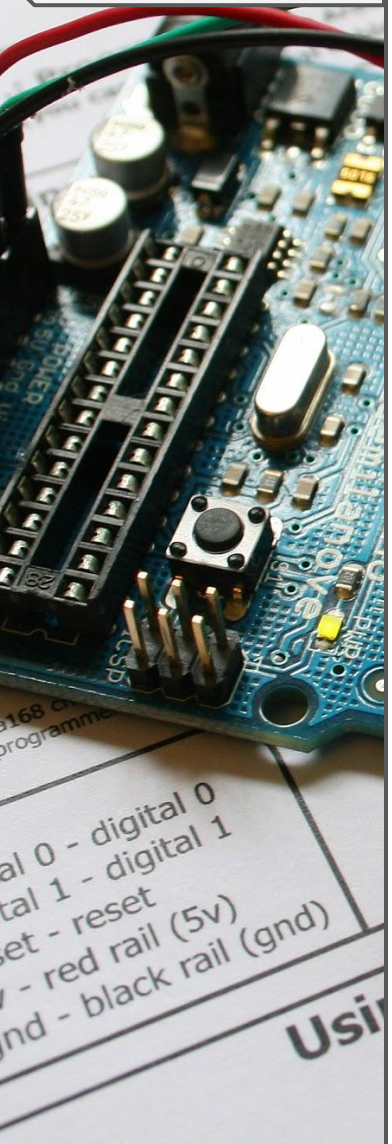
- Add electrical components to the structure

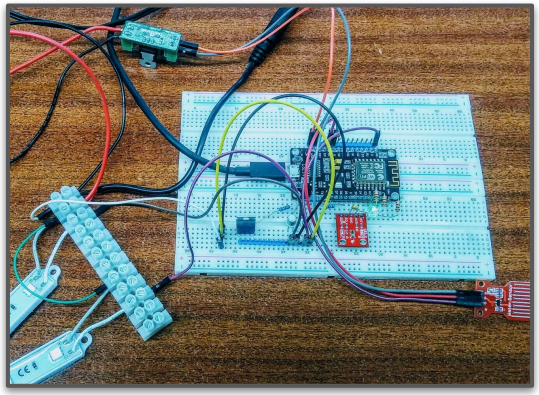


Electric Schematics

ESP-type microcontroller offers connectivity, but lacks in pins

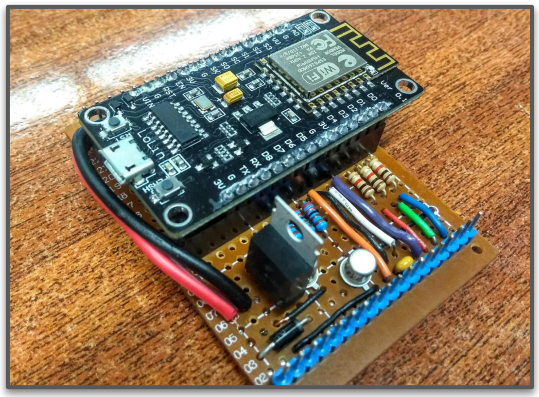






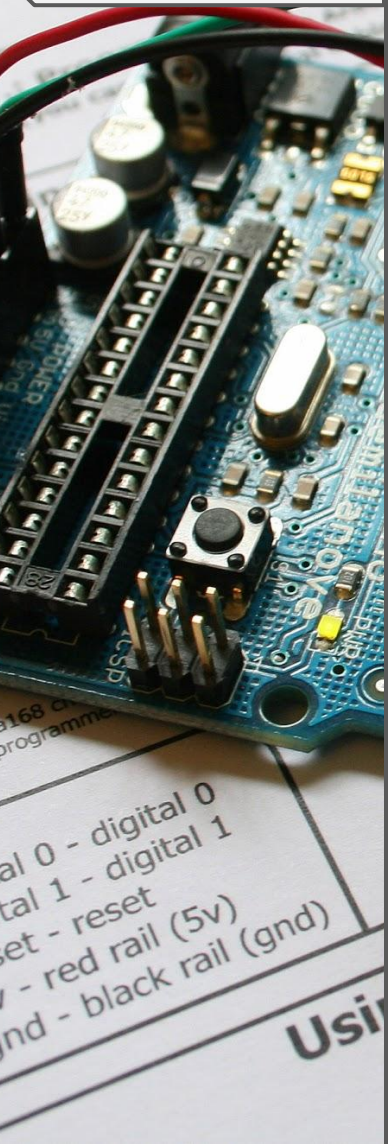
Breadboard prototype

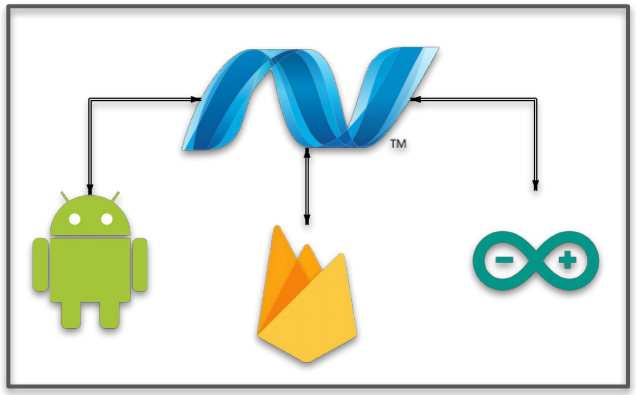
Temporary connections to avoid hard-to-repair mistakes and improve the design



Soldered component

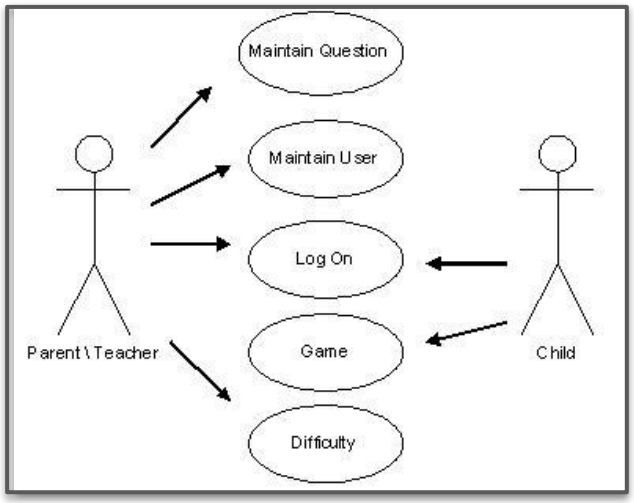
Only once everything has been tried out, compact, permanent assembly is done





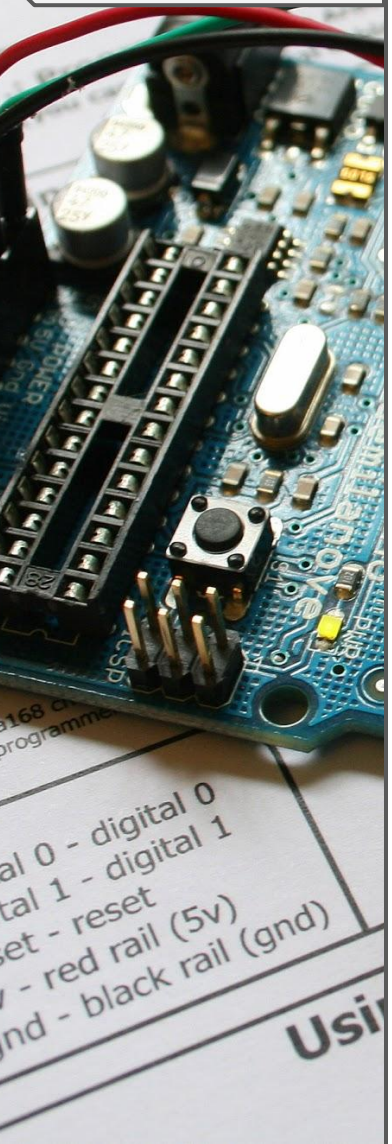
The system

Software working on many platforms cooperating



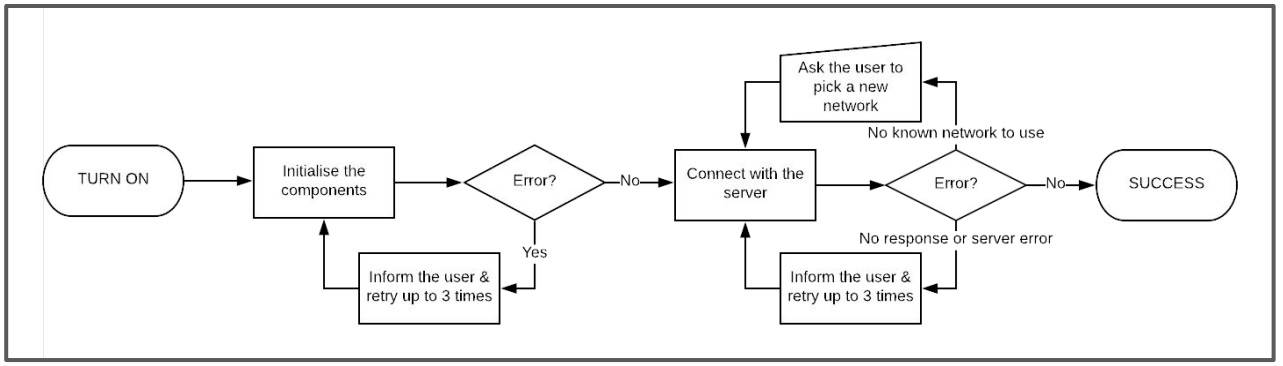
Use cases

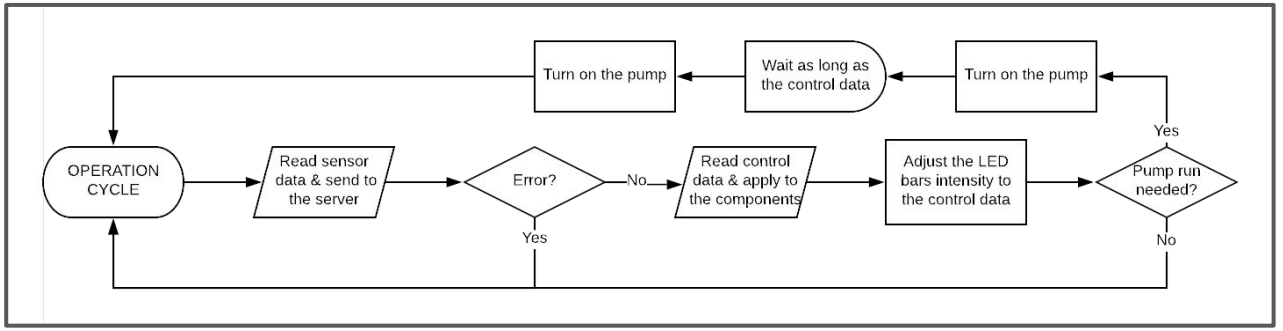
- Register / Login
- Monitor plants
- View sensor data
- Change settings

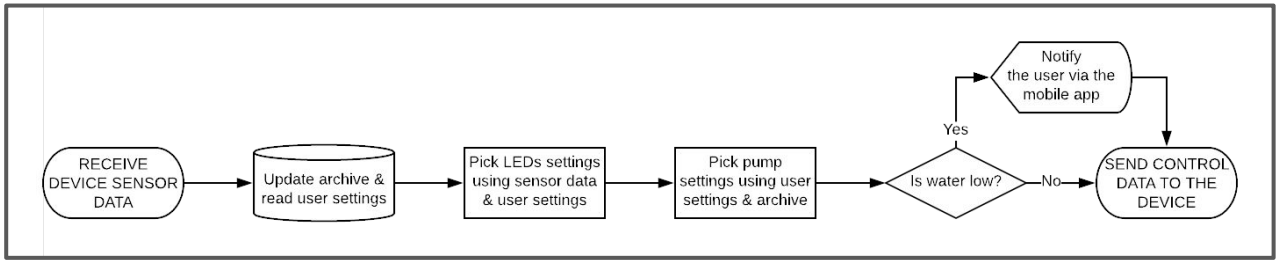


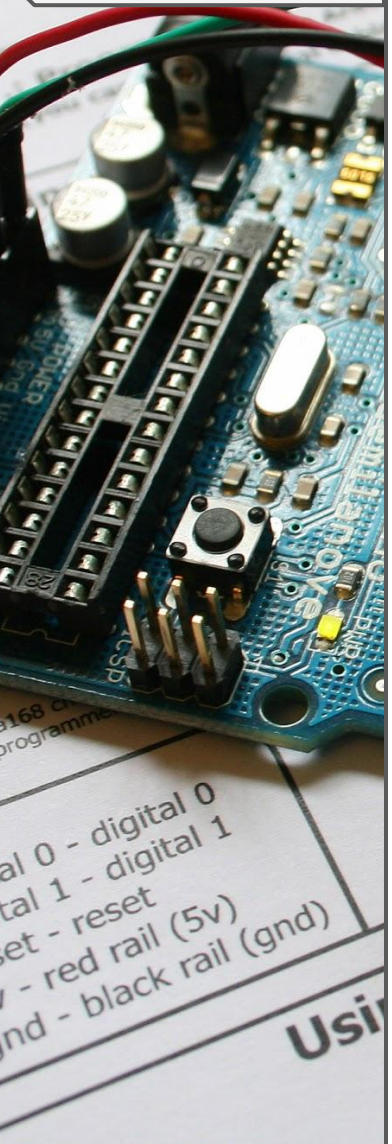
Control Logic

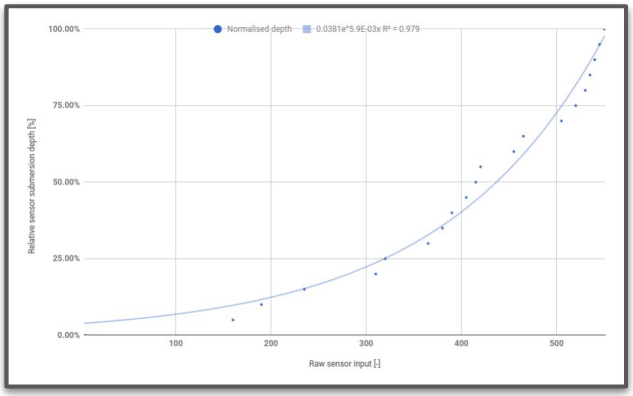
Exchanging sensor data for control calls by server









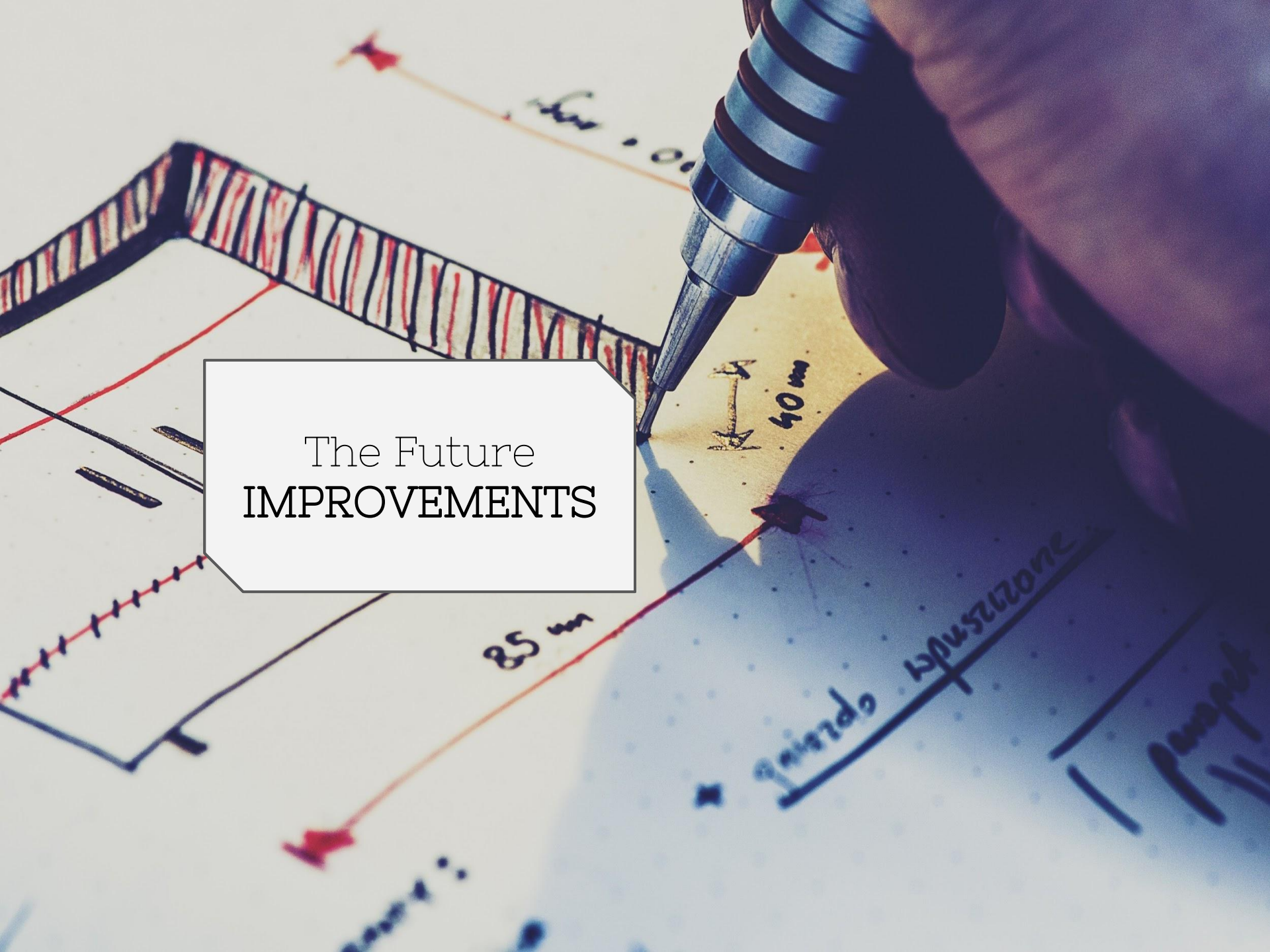


Unit testing of the components

Step by step, the elements have been tested independently

General test of the prototype

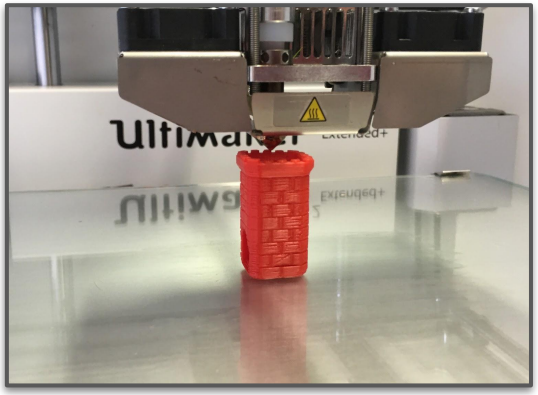
Once all the elements were combined, general test has been done


The Future
IMPROVEMENTS

The Future
IMPROVEMENTS

Finish the Android App and do an iOS App

Support both systems to be taken seriously in the IoT world.



Improve the components used

Use 3D printed parts, more precise sensors, faster CPU, specialised LED lights for plants.

The Future
IMPROVEMENTS

Implement the true modularity solutions

Create multiple, more advanced prototypes working with each other.

Improve sustainability

Add water quality control – test samples and conditions. Eliminate toxic chemicals, adjust nutritions.

Impact the society

Inspire new ideas for the vertical farming technology and change the agriculture's impact on the environment


The Final
CONCLUSIONS

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The upsides...

- ✔ Developed a fully working prototype device
- ✔ Managed to cooperate as a team of six people
- ✔ Improved our teamwork skills and competences
- ✔ Gain respect for people from different cultures, countries, mindsets
- ✔ Enjoyed our first Erasmus experience

The Final
CONCLUSIONS

And the downsides...

- ✘ Failed to meet some of the deadlines
- ✘ Could not finish part of the software
- ✘ Not all of the ideas fit into the appointed budget
- ✘ Simplified prototype

The Final
CONCLUSIONS

Video
(or a humorous accent)

The Final
CONCLUSIONS

Muito obrigado!

P.PORTO

isep

Instituto Superior de
Engenharia do Porto

EUROPEAN PROJECT SEMESTER