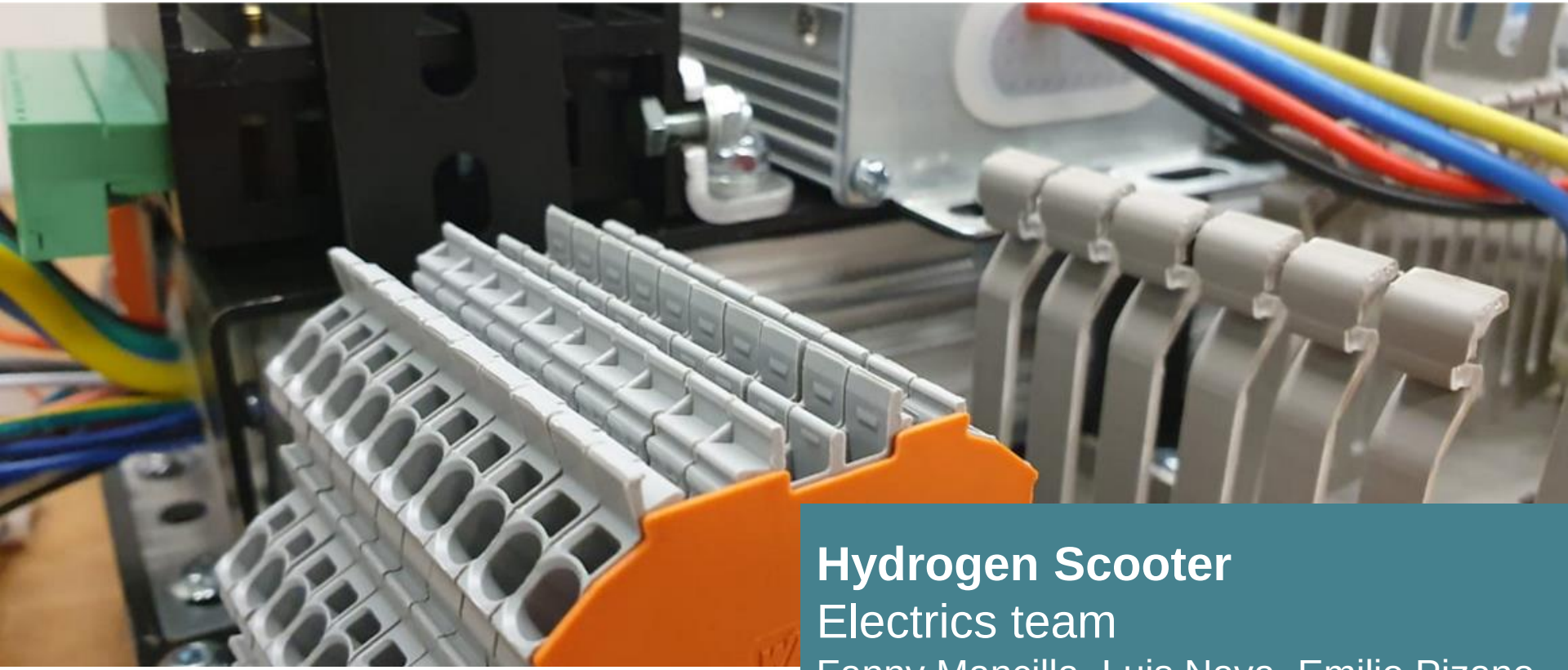
Hochschule Zittau/Görlitz
UNIVERSITY OF APPLIED SCIENCES

Fraunhofer IWU



Hydrogen Scooter

Electrics team

Fanny Mancilla, Luis Nava, Emilio Pizano

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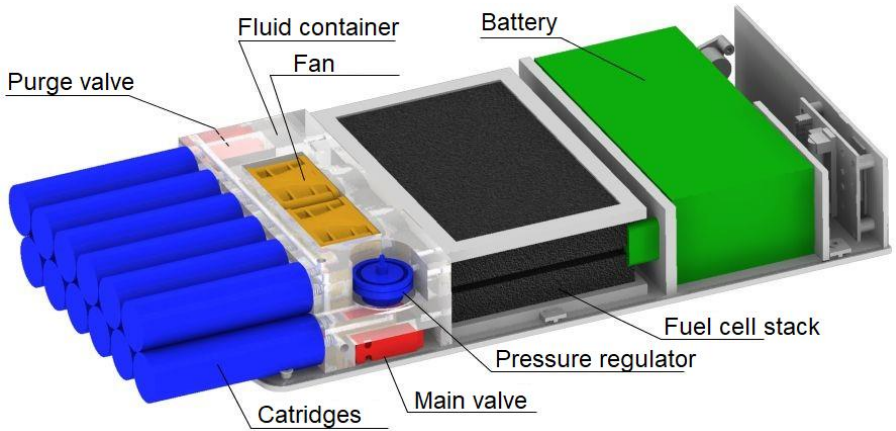
1. Objectives

- Development of a hybrid powered Hydrogen scooter by means of a hydrogen cell.
- Design of a motherboard for the intersection circuit.
- Design of the external case for the user information panel and electronics.
- Design of an autonomous driving mechanism.

Contents

2. Important concepts

- E-Mobility
- Need of Transportation
- Concerning amount of waste
- Innovation Hydrogen Fuel Cells
- Efficiency of 50 % against 30-35%



[Fig. 1] Hydrogen cell

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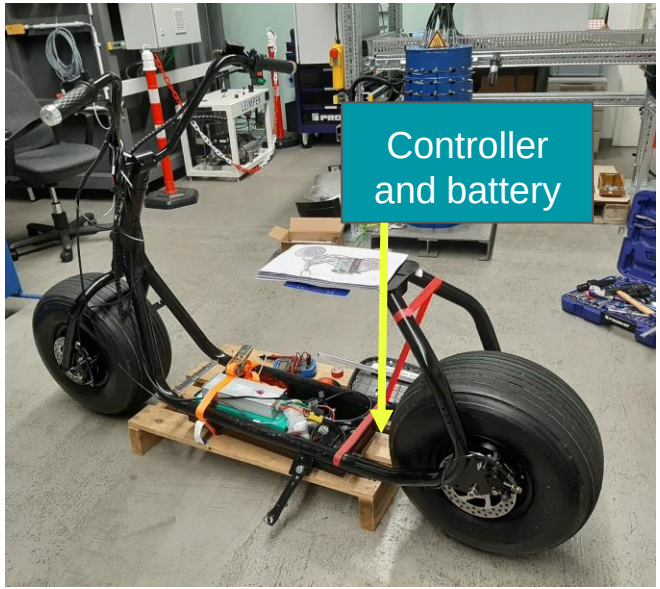
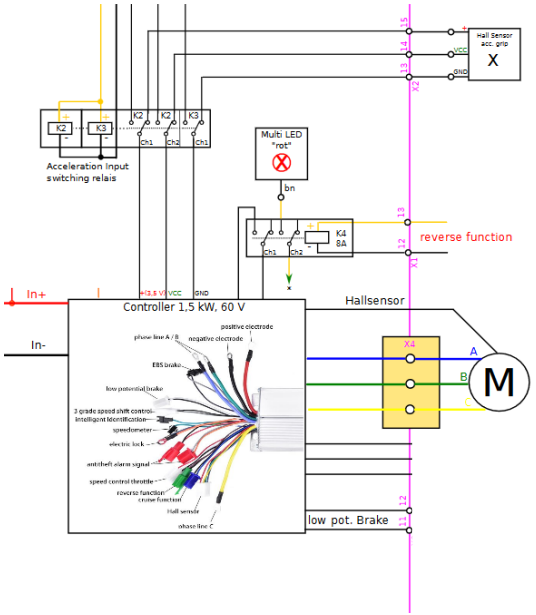
3. Original state of the scooter



[Fig. 2] Original frame and electronics location



[Fig. 3] Original controller circuit

Contents

4. Development
a) Intersection circuit

1. Components research
2. Pre-selection and approval
3. Design of the circuit

[Fig. 4] Switch

[Fig. 5] Key-Switch

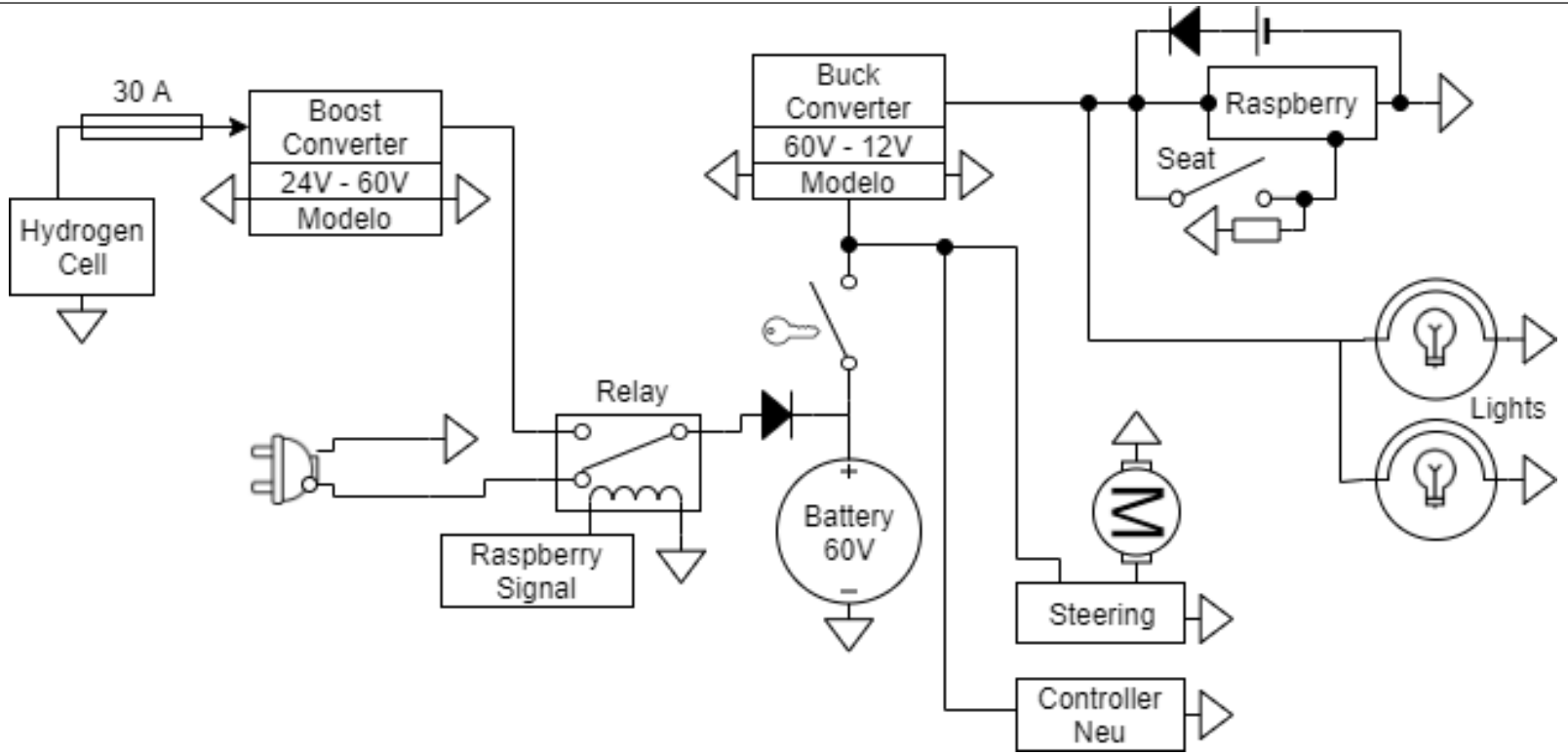
[Fig. 6] Relay

[Fig. 7] 400W DC-DC Boost Converter

[Fig. 8] DC-DC Step-Down Converter 48V-96V to 12V

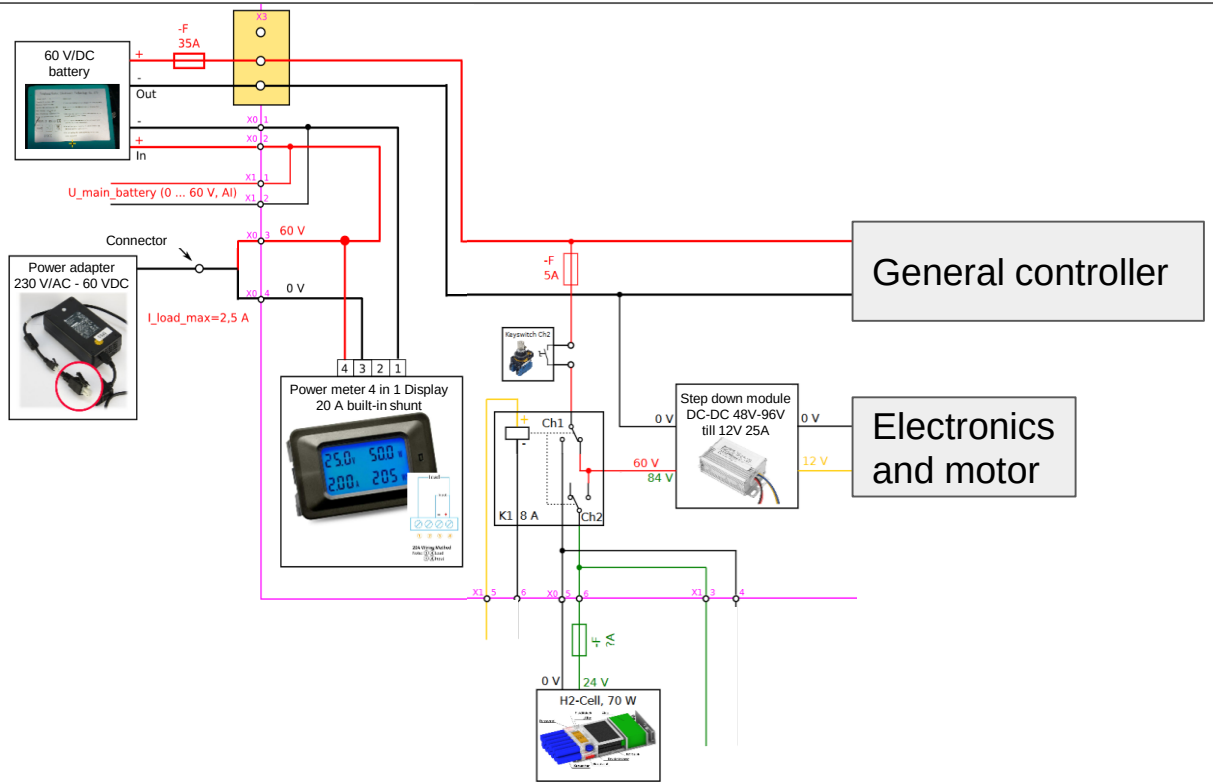
[Fig. 9] Display

4. Development
a) Intersection circuit



[Fig. 10] Circuit diagram first draft

4. Development
b) Intersection circuit



[Fig. 11] Final intersection circuit diagram

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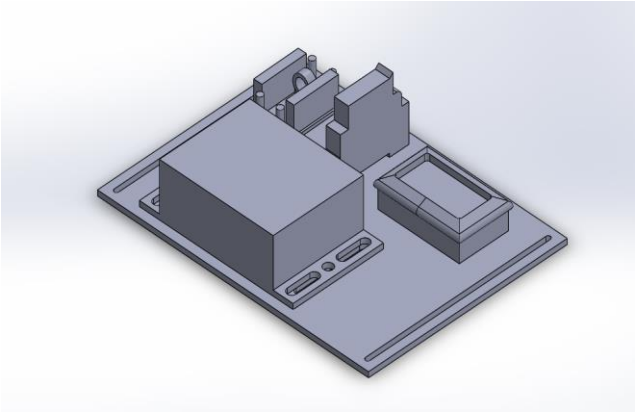
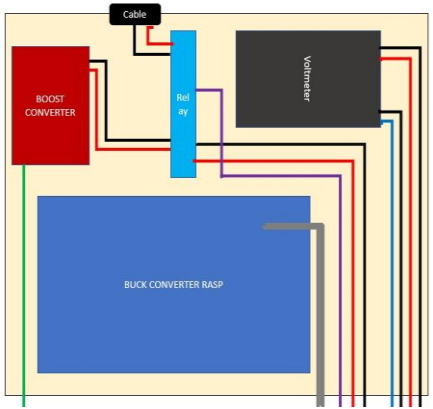
4. Development
b) Motherboard

First rough design of the motherboard



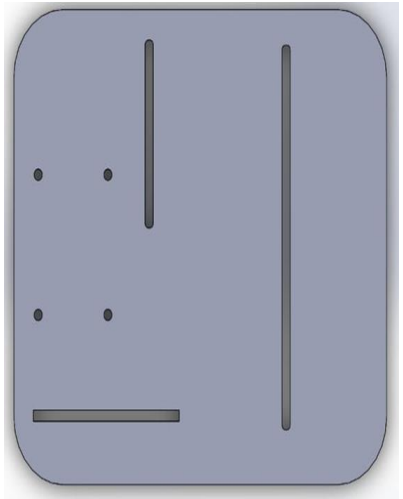
[Fig. 12] 3D model in Solidworks



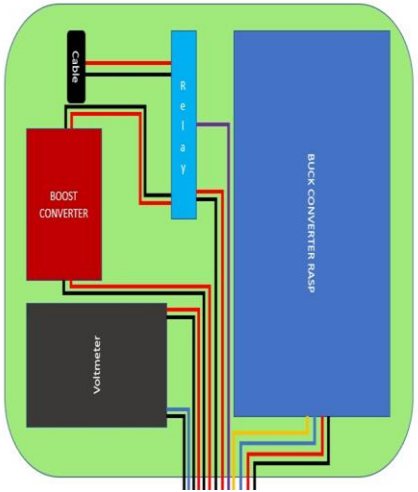
[Fig. 13] 2D diagram

4. Development
b) Motherboard

Second rough design of the motherboard

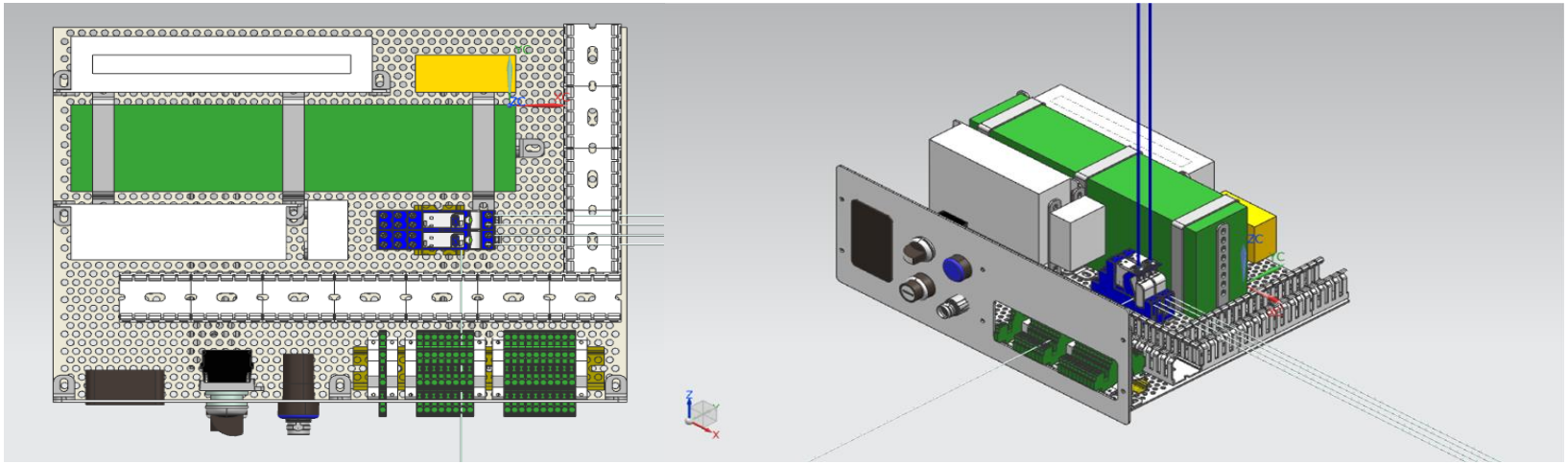


[Fig. 14] 3D model in Solidworks



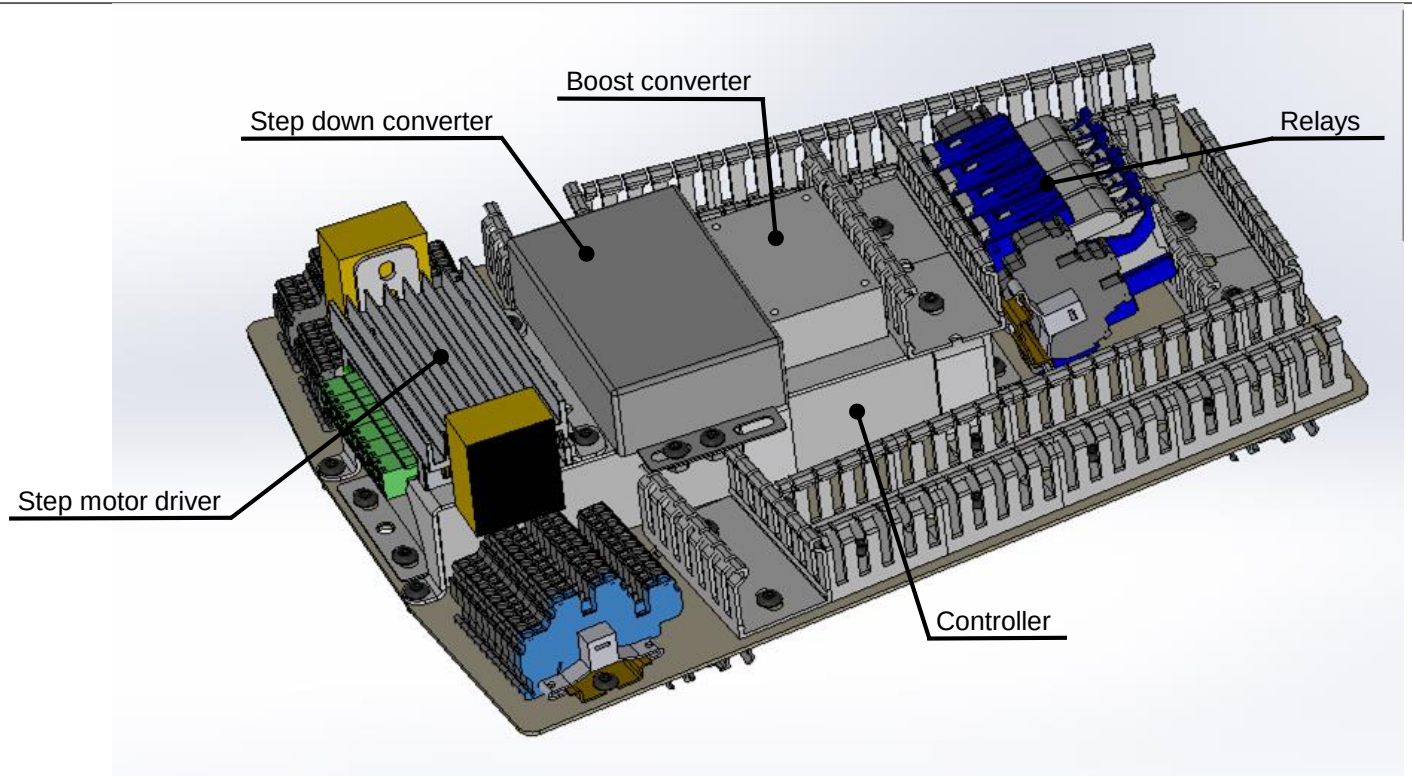
[Fig. 15] 2D diagram

4. Development
b) Motherboard



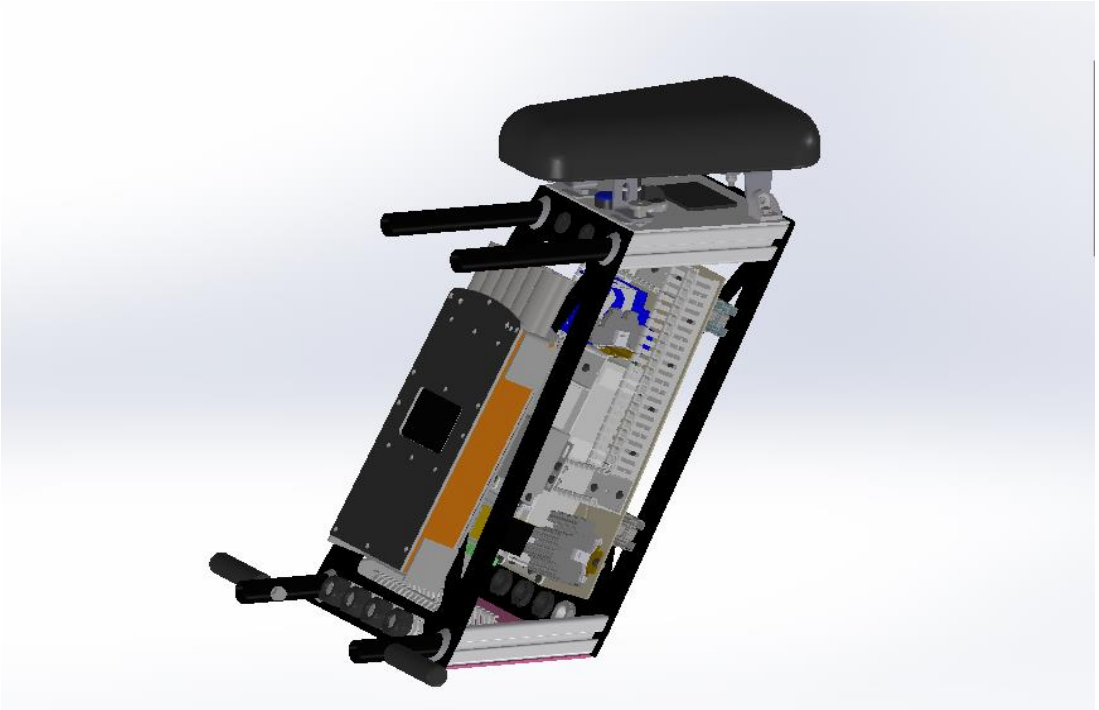
[Fig. 16] Third design of the motherboard

4. Development
b) Motherboard



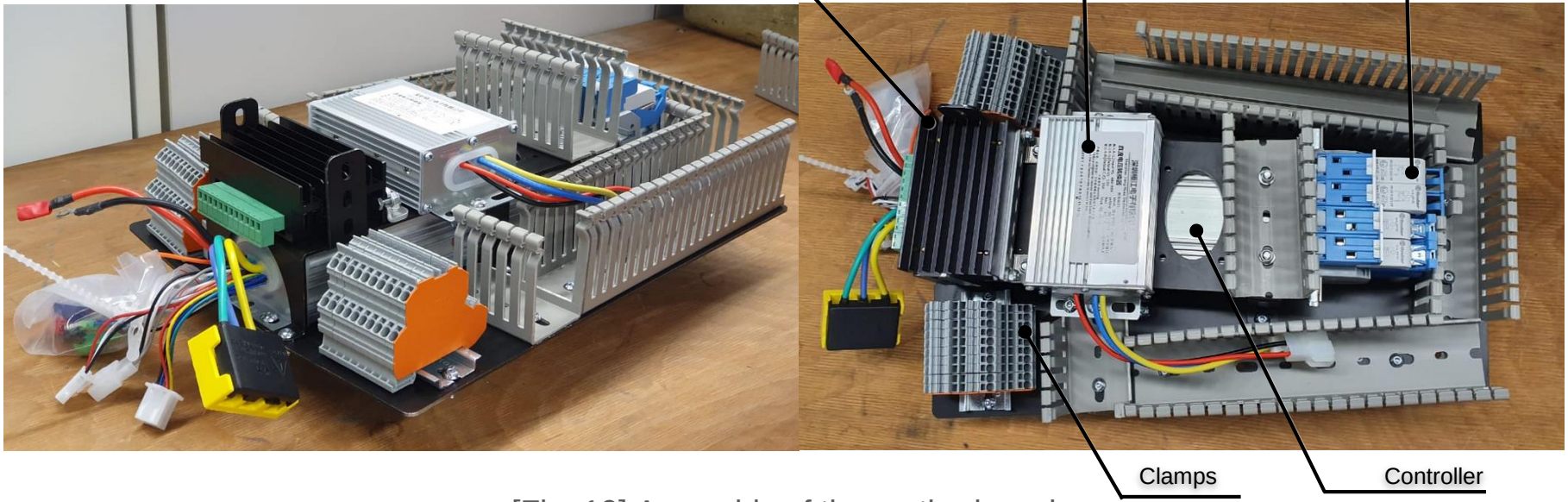
[Fig. 17] 3D model of final motherboard

4. Development
b) Motherboard



[Fig. 18] 3D model of motherboard attached to final frame

4. Development
b) Motherboard



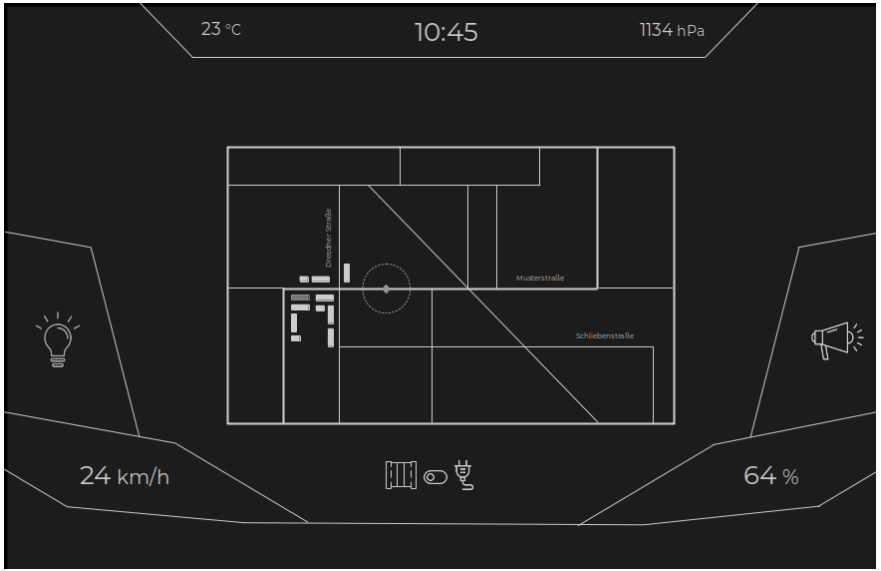
[Fig. 19] Assembly of the motherboard

Contents

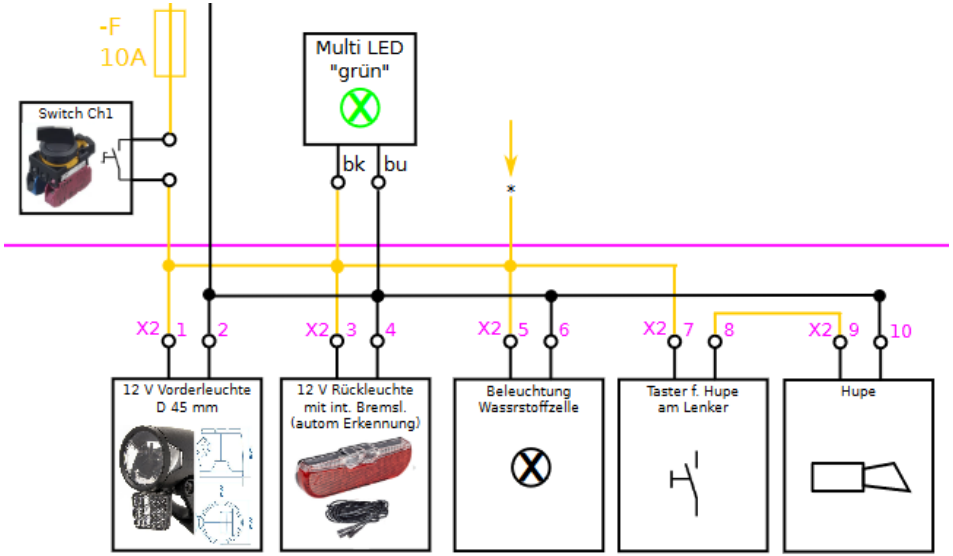
4. Development
c) Electronics and controllers case

- Raspberry
- Raspberry display
- Sensors
  - Light sensor
  - Humidity and temperature sensor
  - Atmospheric pressure sensor
- Antenna
- Buck converter and level shifters (x2)
- Arduino board
- Additional circuit board
- Analog-Digital Converter
- Speakers
- Camera

4. Development
c) Electronics collaboration

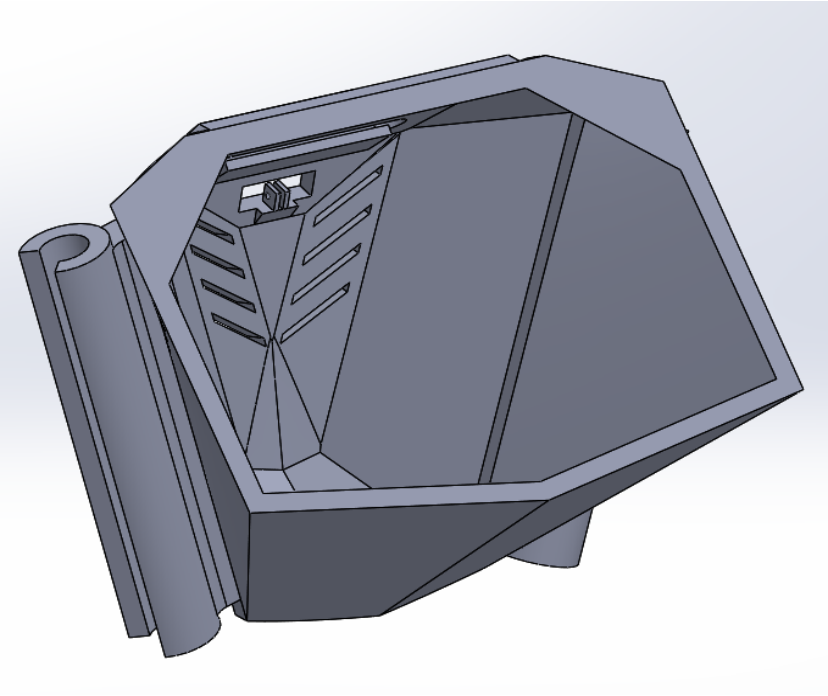


[Fig. 20] Electronics team GUI

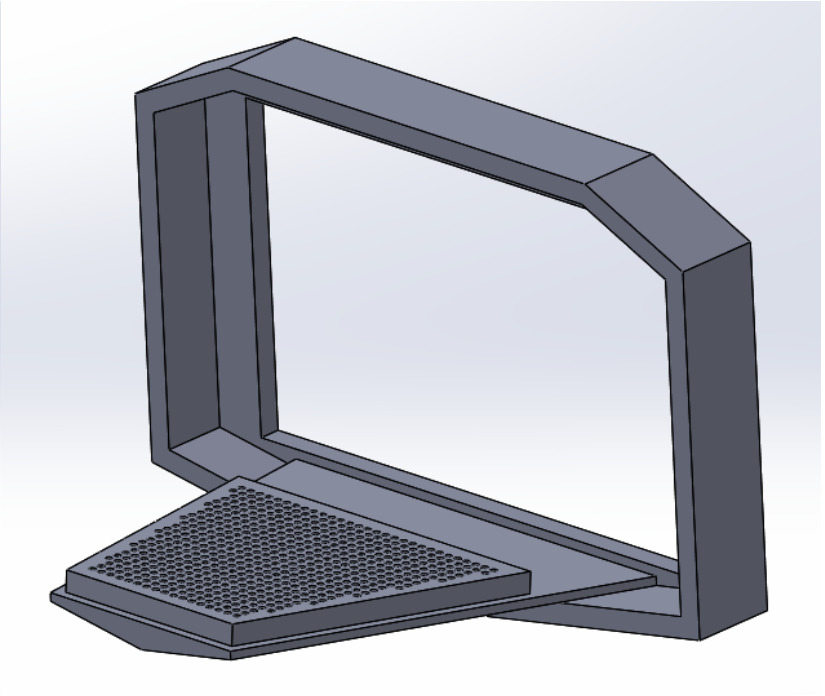


[Fig. 21]Electronics team diagram

4. Development
c) Electronics and controllers case

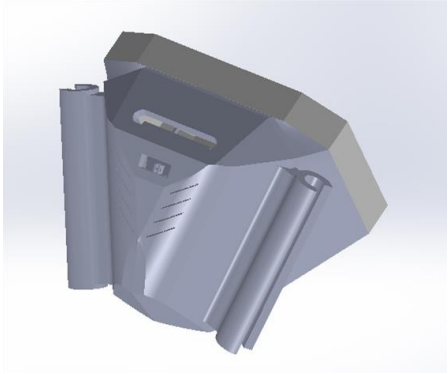


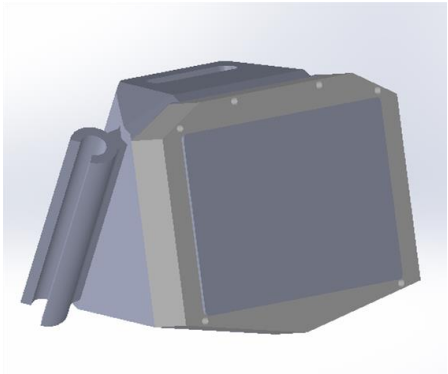
[Fig. 22] 3D model of front case



[Fig. 23] 3D model of back case

4. Development
c) Electronics and controllers case





[Figures 24, 25 & 26] 3D Assembly of the electronics case

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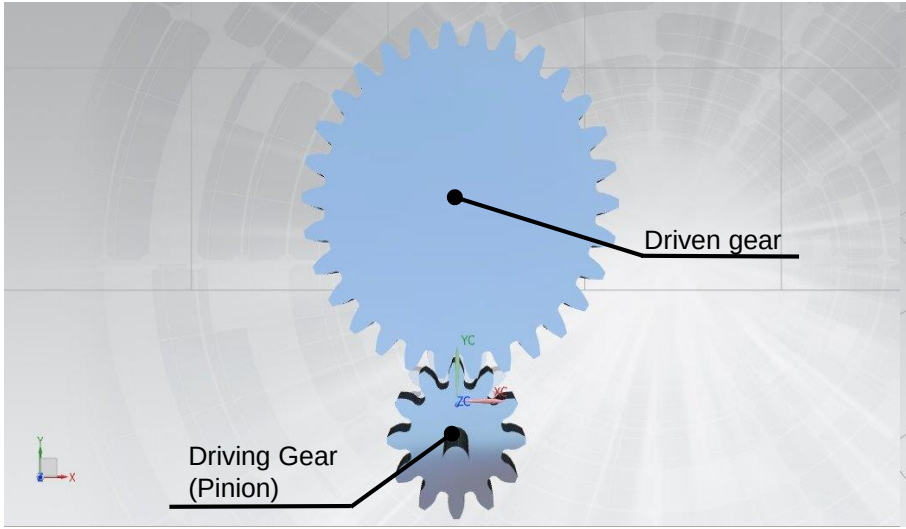
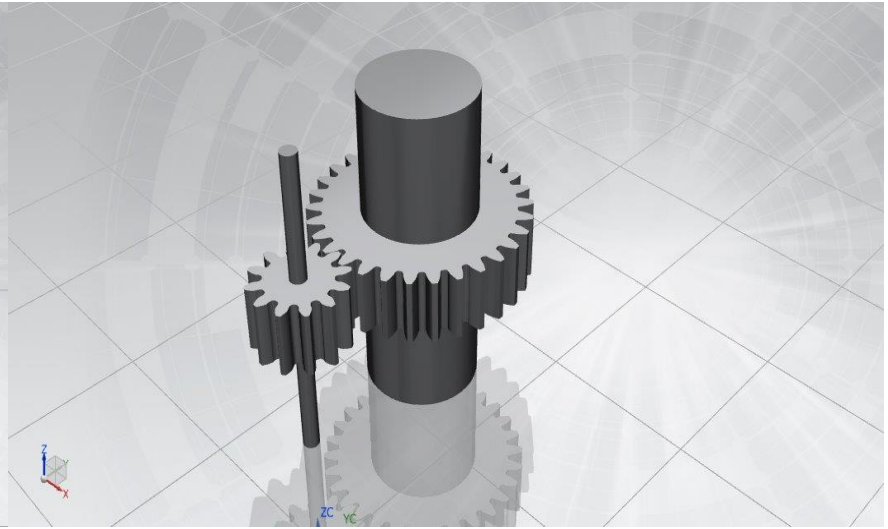
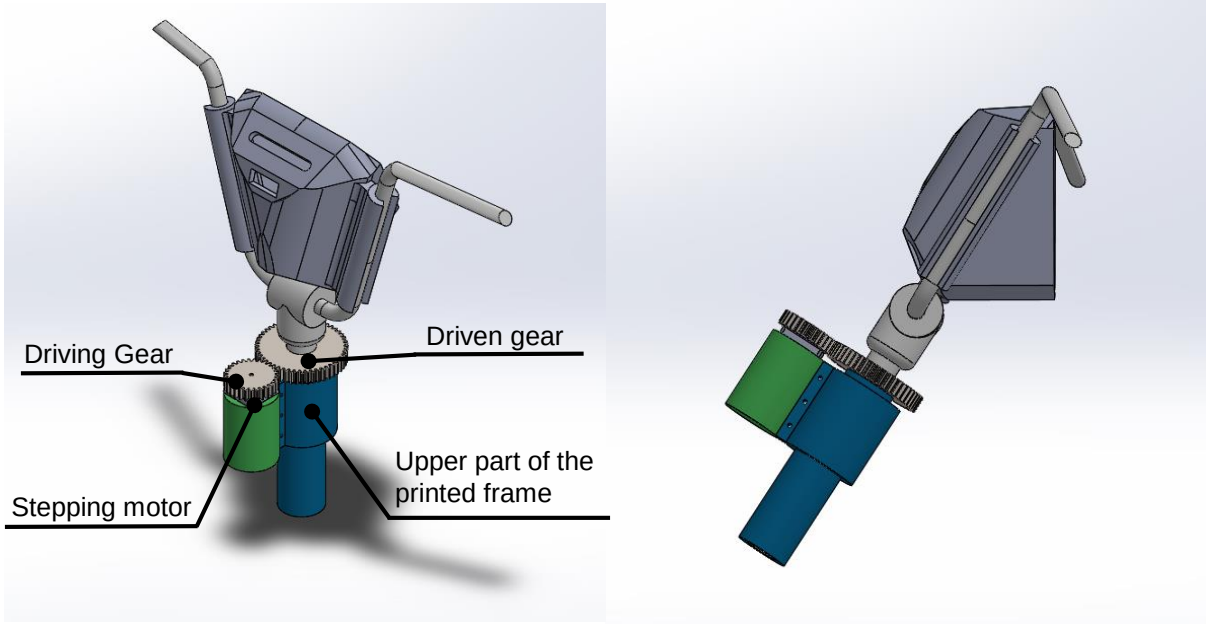
4. Development
d) Steering mechanism



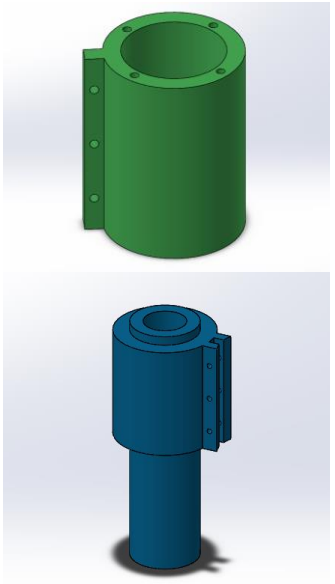


[Figures 27 & 28] Steering gears concept for the first design

4. Development
d) Steering mechanism

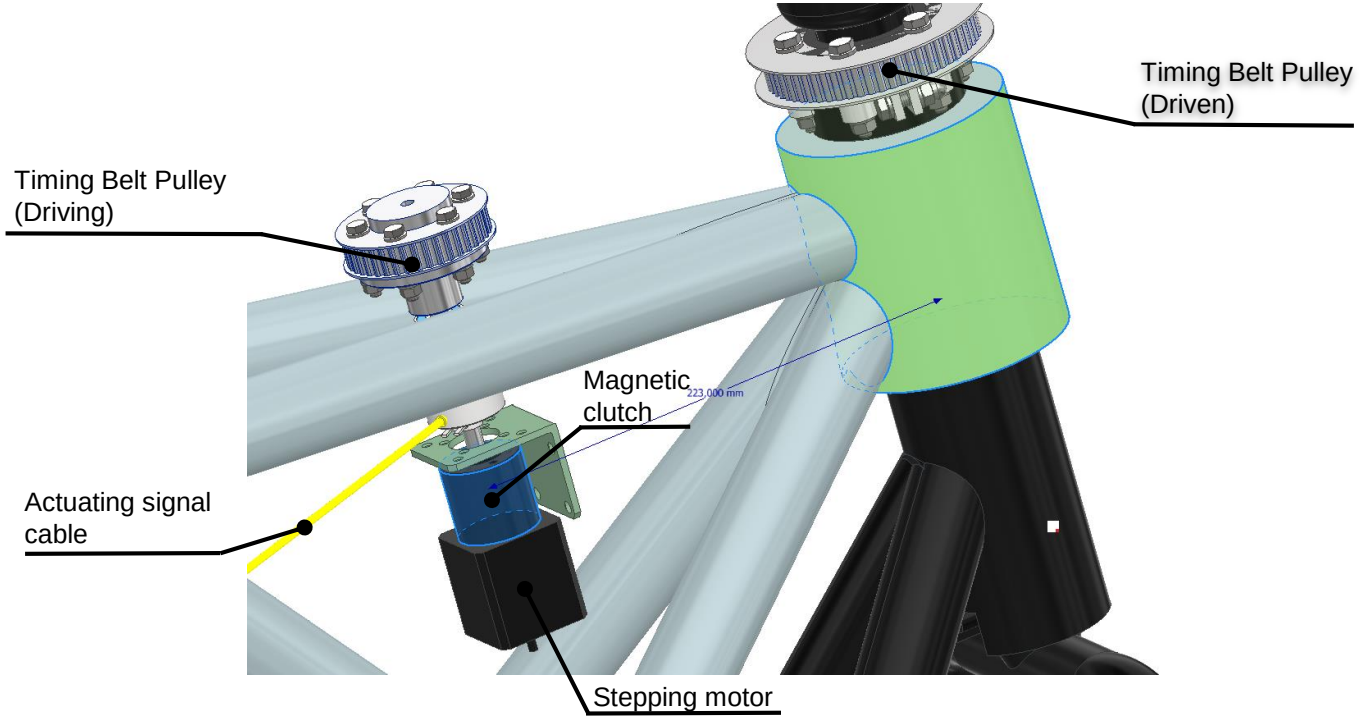


[Figures 29 & 30] 3D Model of steering mechanism first design



[Fig. 31] Attachments

4. Development
d) Steering mechanism

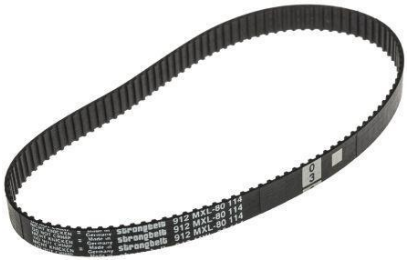


[Fig. 32] Steering mechanism second design

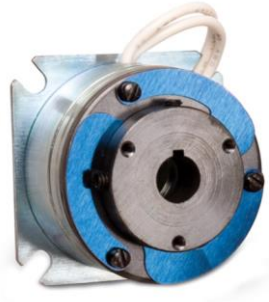
4. Development
d) Steering mechanism

[Fig. 33] Step-motor

[Fig. 34] Timing Belt Pulley

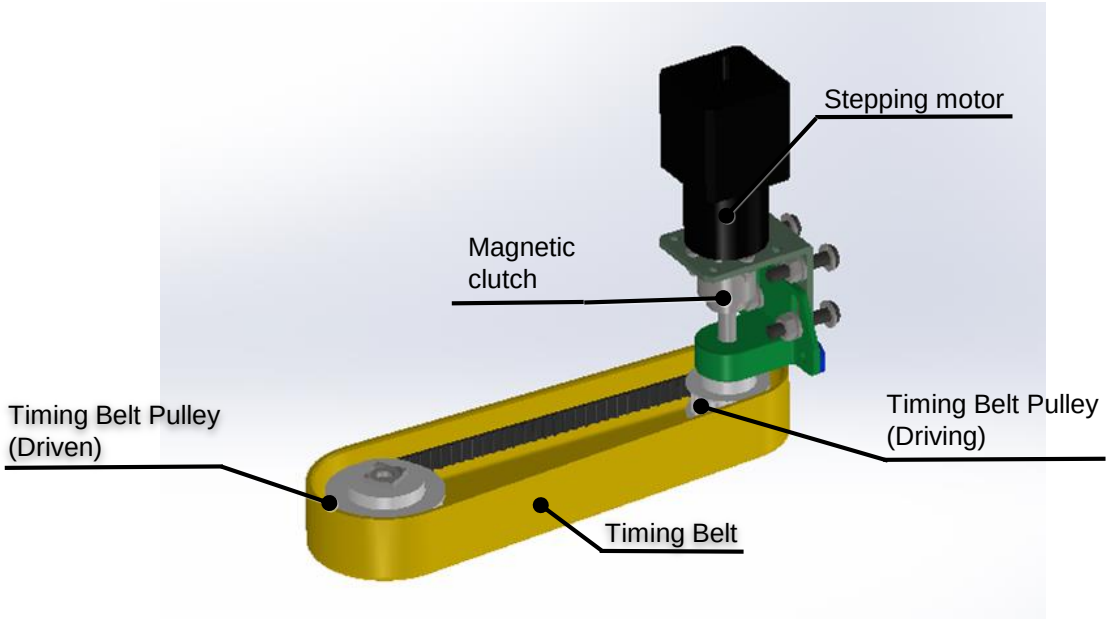


[Fig. 35] Timing Belt



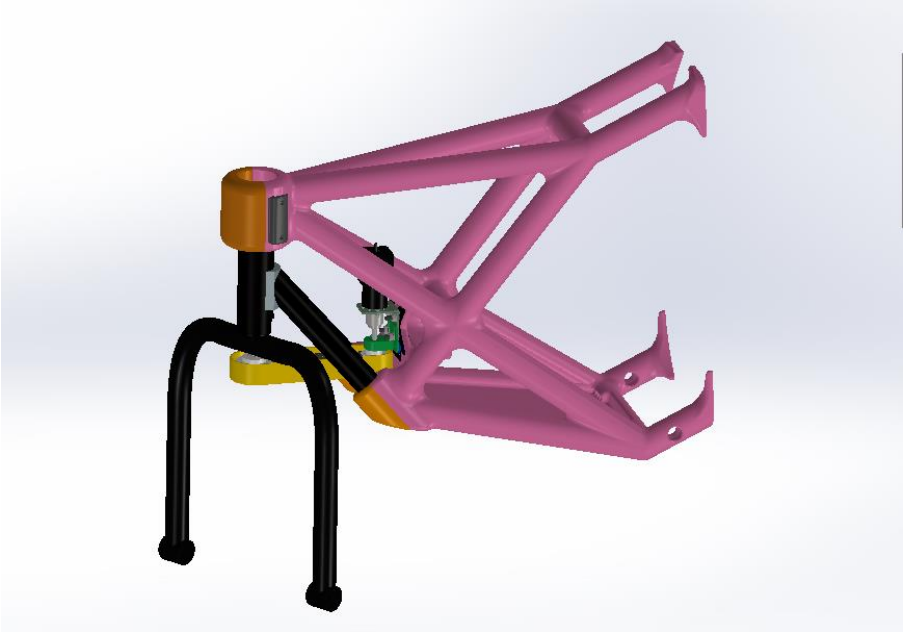
[Fig. 36] Magnetic clutch

4. Development
d) Steering mechanism



[Fig. 37] Steering mechanism final design

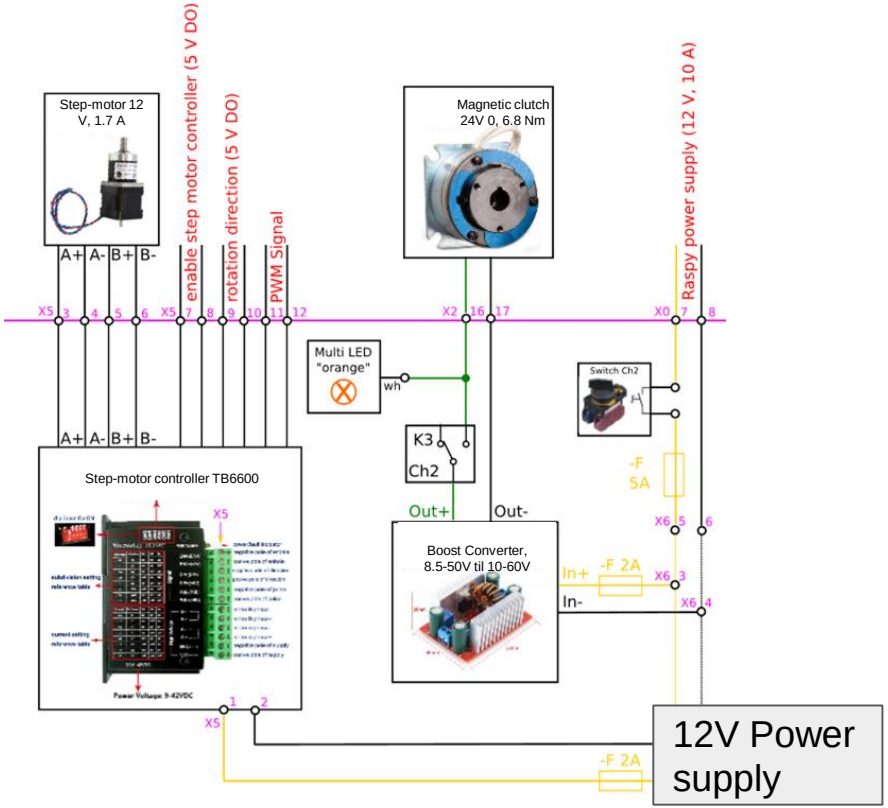
4. Development
d) Steering mechanism



[Fig. 38] Location of steering mechanism

4. Development
d) Steering mechanism

[Fig. 39] Steering mechanism connection diagram



Contents

5. What is left to be done

- Implementation of electronic components and connection
- Manufacture of steering mechanism
- Testing the Hydrogen cell
- Printing of Raspberry case

Contents

6. Conclusion

After finishing the assigned tasks, we can say that there has been a huge advance in the development of this project.

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Questions