SAY HELLO TO SAILO!

TEAM 1
NARCISA BACAU, CHRISTOPHER BEER,
LEVENTE KÁDÁR, KARL JUHANDI, ANA ZHU
AND MARKO ORLOV

EPS@ISEP 2019

isep Instituto Superior de **Engenharia** do Porto

THE TEAM

Logistics

Mechanical engineering

Electrical engineering

Product management

Engineering and management

PRESENTATION OUTLINE

- Problem Statement & Research
- The Project Management
- Project Development
- Conclusion

PROBLEM STATEMENT & RESEARCH

THE PROBLEM

“I can’t change the direction of the wind, but I can adjust my sails to always reach my destination.”

JIMMY DEAN

What thrives us?

- Earth's natural resources are limited
- Promote the use of wind as the main resource

What do we want to achieve?

- Contributing to a better world
- Raise awareness about a green sport and leisure activity

RESEARCH

What we wanted to implement from others?

- Three wheeled
- Light frame
- Dissassembable

- Rigid sail with a tail
- Self-correcting system

MARKETING

How we got from the technical idea to user perspective?

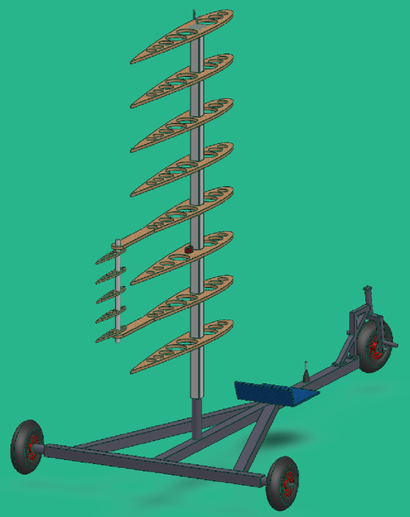
Requirements ⟷ **Features** ⟷ **Functionalities**

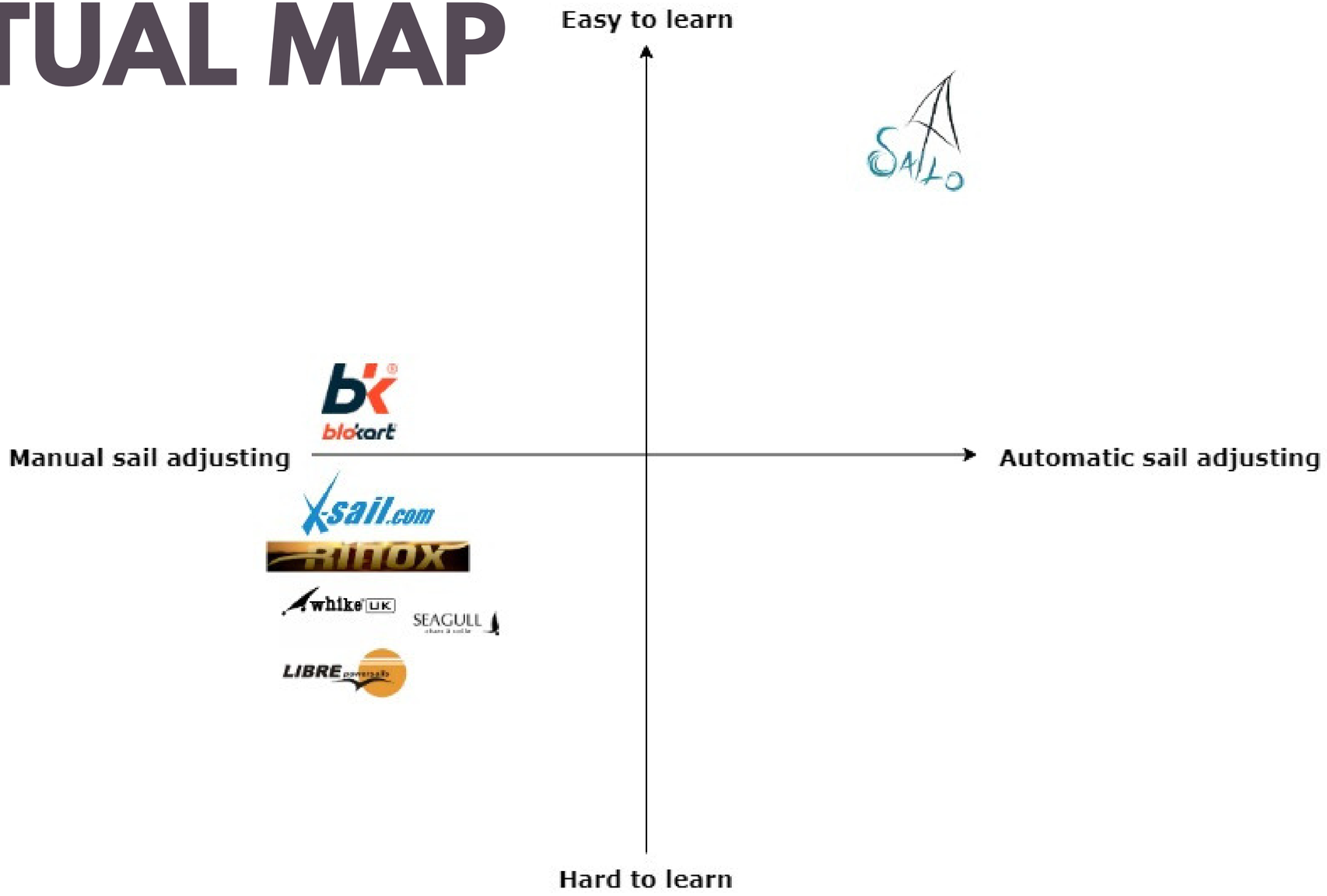
(What we knew in the beginning) — (Technical research) — (Marketing research)

Prototype

Selling product

PERCEPTUAL MAP





PROJECT MANAGEMENT

SCRUM

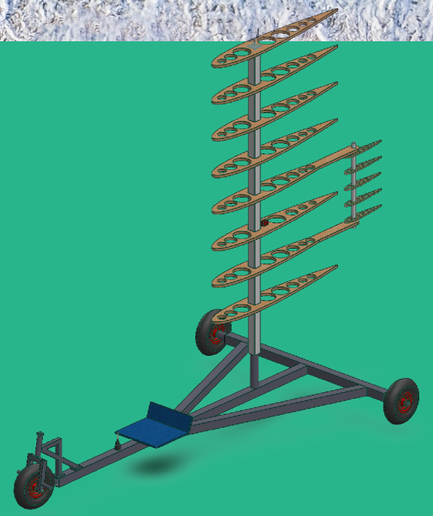
Initial plan:

- Sprint based planning
- 1 week sprints, Thu-Wed
- Project backlog
- Daily standups
- Retrospective

Reality:

- First half of the semester was perfect
- Building planning less organized
- Missing members
- Third parties
- Changing the sprint length

SUSTAINABILITY AND ETHICS



Currently:

- Power source - wind
- Mast - sustainable material
- Seat - recycled
- Electronics - lead-free

In the future:

- Frame - aluminium
- Wing - recycled wood or composite
- Wing cover - biodegradable plastics

PROJECT DEVELOPMENT

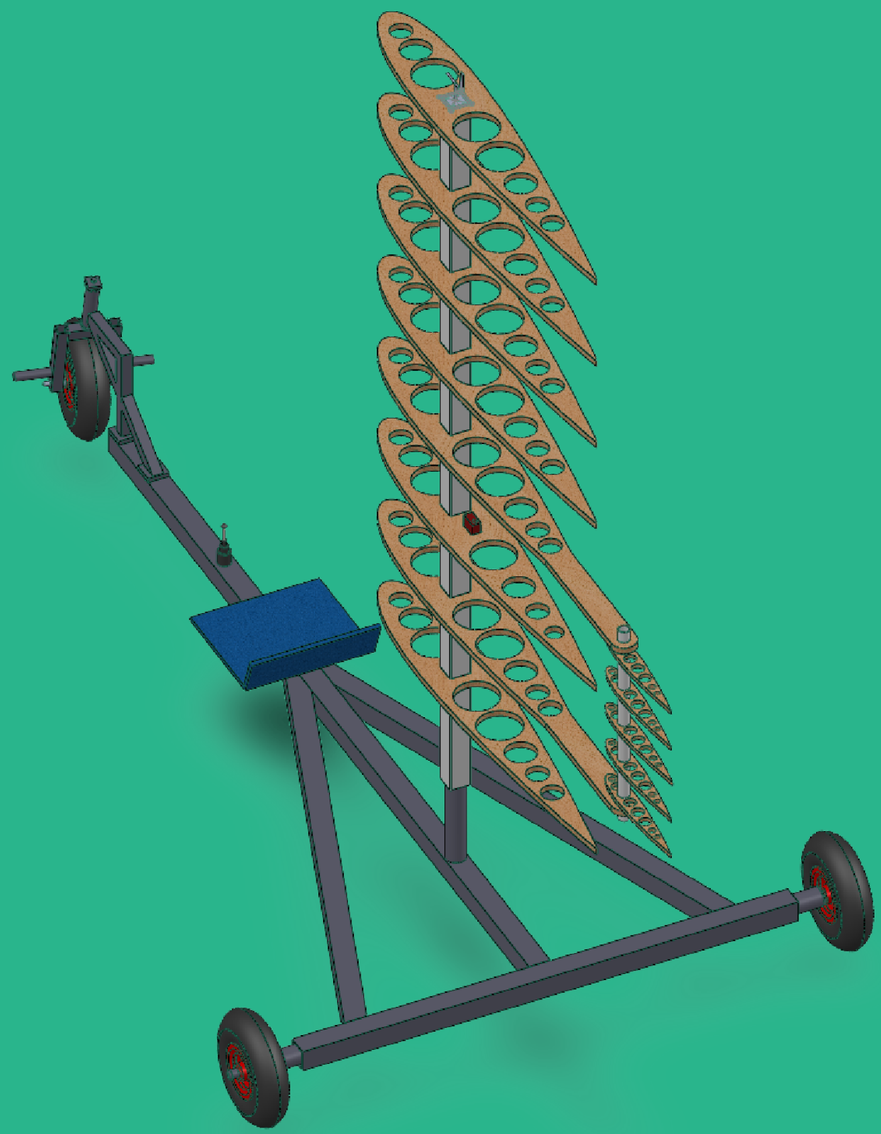
DESIGN

Mechanical functions:

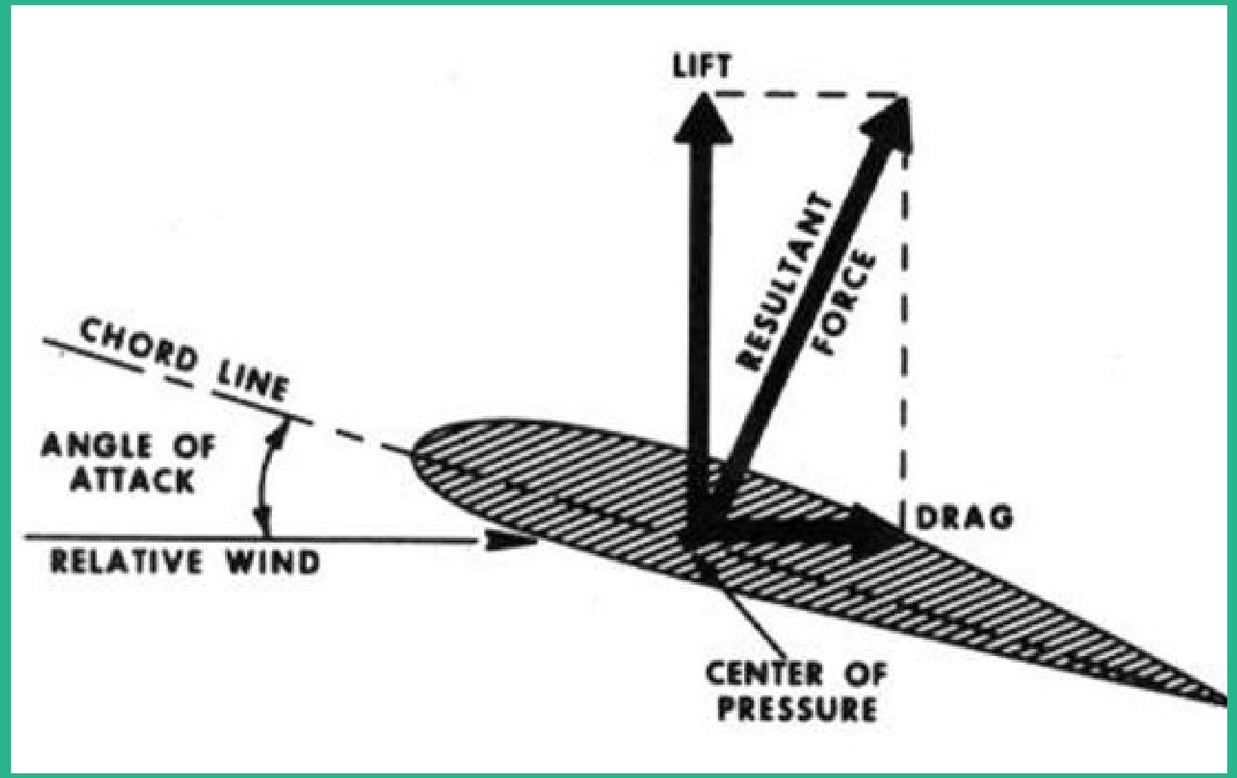
- Wing and tail
- Frame
- Other components

Electrical functions:

- Servo motor
- Wind sensor
- Joystick



FUNCTION OF THE WING



- Symmetric shape – in all directions
- Lift – perpendicular to apparent wind
- Drag – same direction as the apparent wind
- Resultant force – sum of Lift and Drag
- NACA 0015 – calculated the most Lift

α= 14°

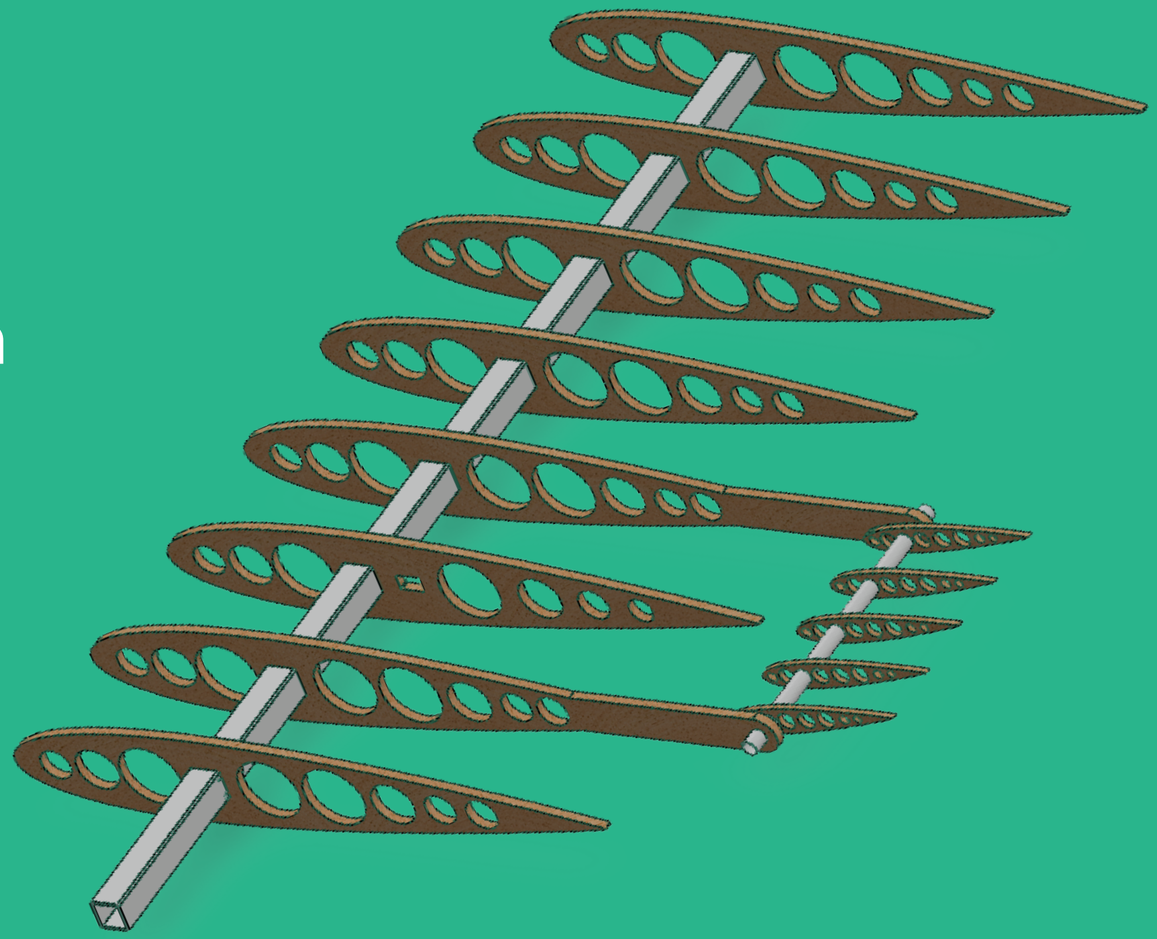
most lift

α= 6.25°

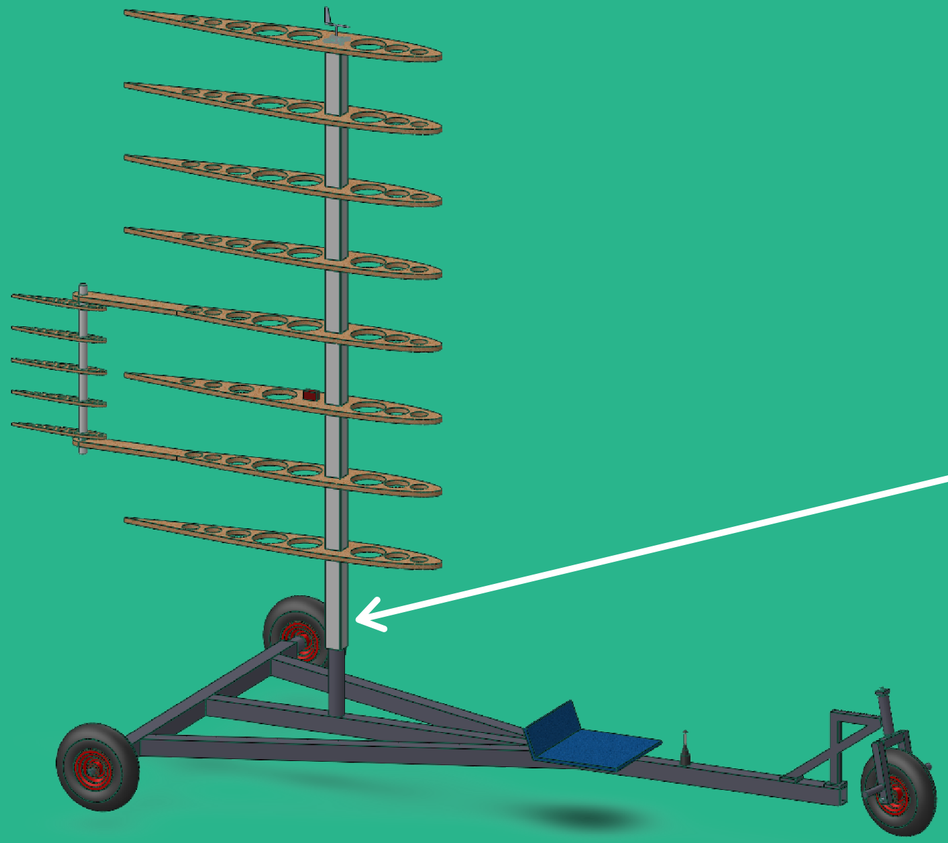
most lift/drag

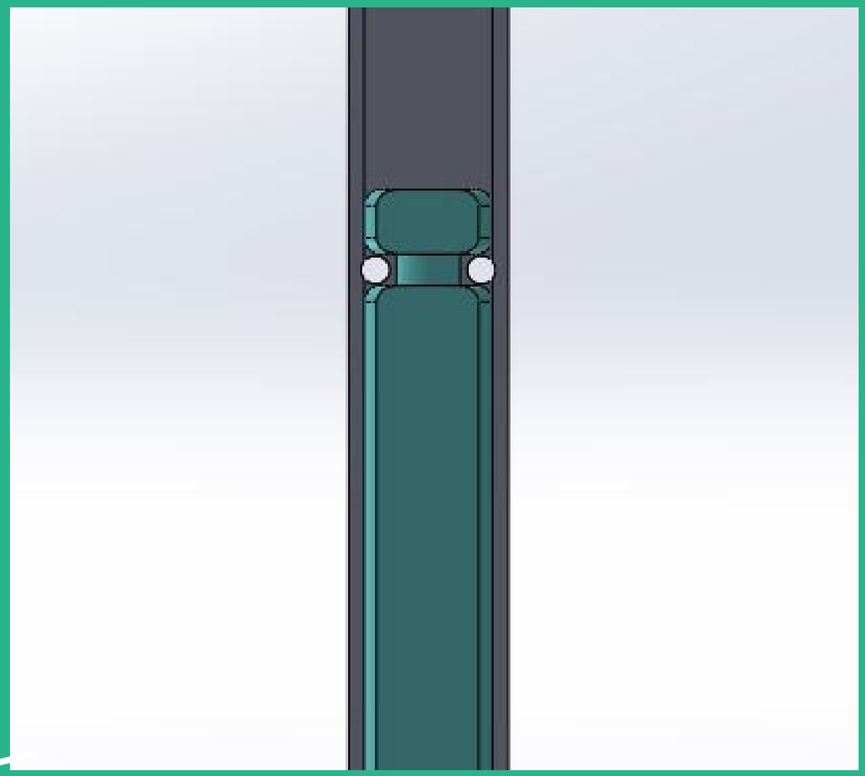
FUNCTION OF THE TAIL

- Use the tail to steer the main wing
- Tail steered by servo motor
- Less energy needed
- Aluminium rods



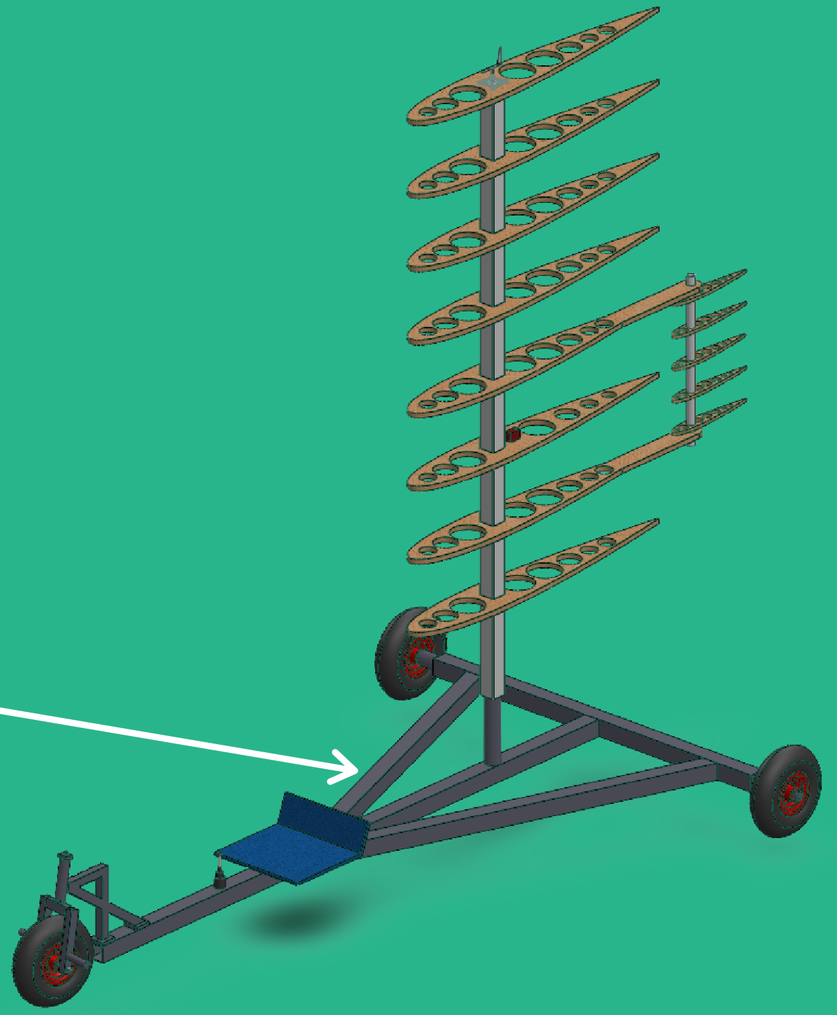
MAST CONNECTION





- Allows rotation
- Connection of the mast to the frame
- Two screws and nuts
- Ø45 mm

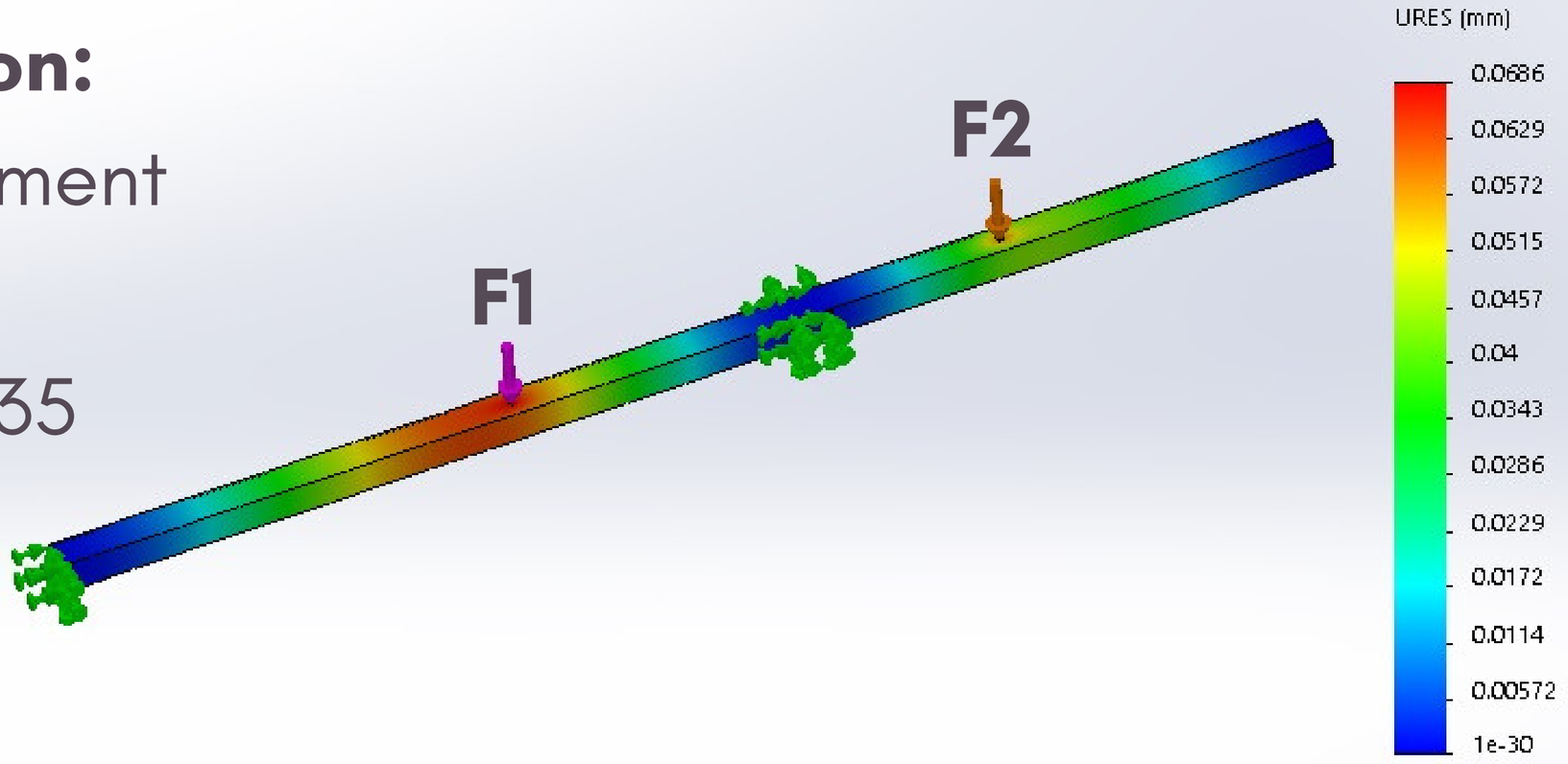
FRAME



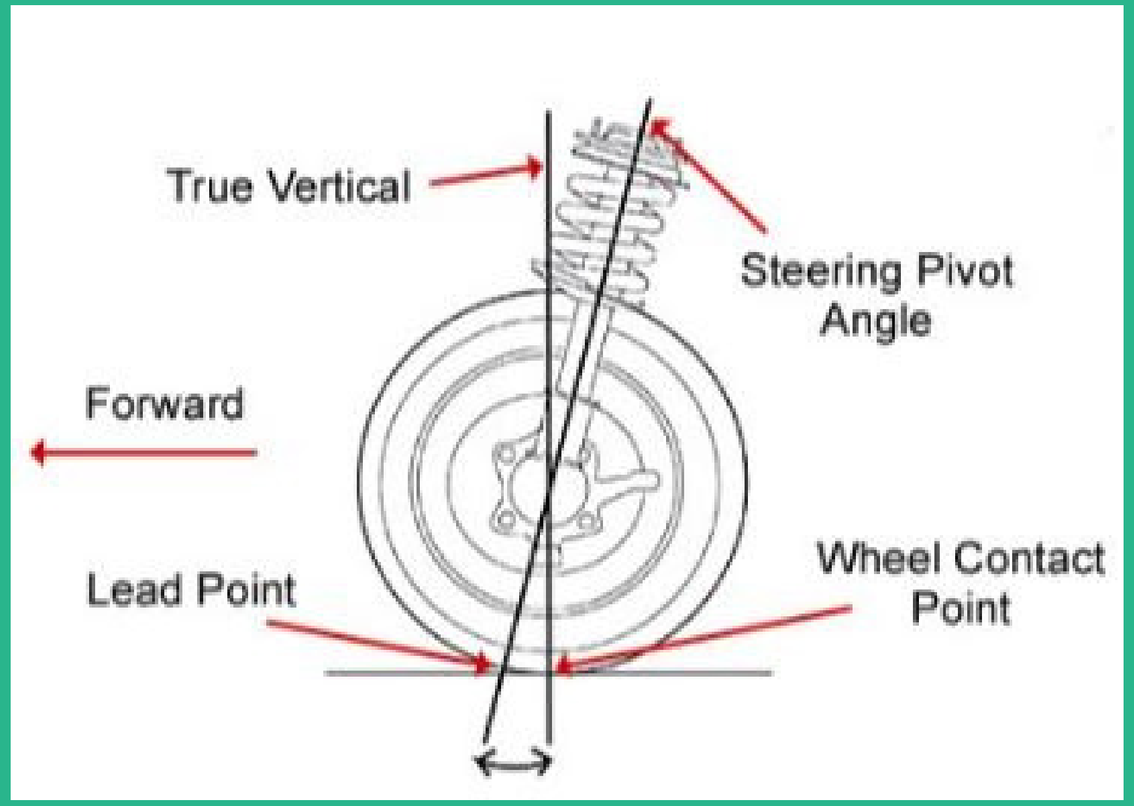
FRAME

Solidworks simulation:

- Maximum displacement of 0.07 mm
- Structural steel S235
- 50 x 50 x 3 mm
- F1 = 800 N
- F2 = 400 N



FRONT WHEEL STEERING



First solution: wrong caster angle

- A torque was created which turned the front wheel
- Wheel fell to the side

Final Solution: caster angle of 10°

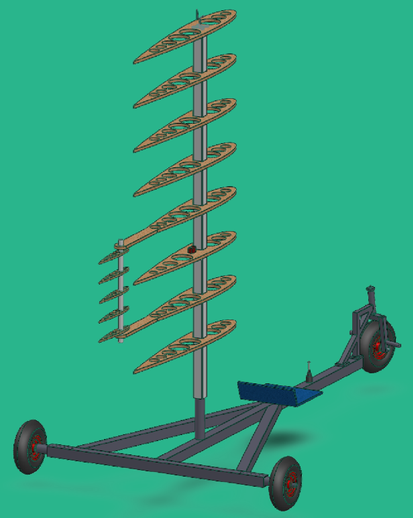
- Torque steers to straight - ahead position
- Wheel is not falling to the side

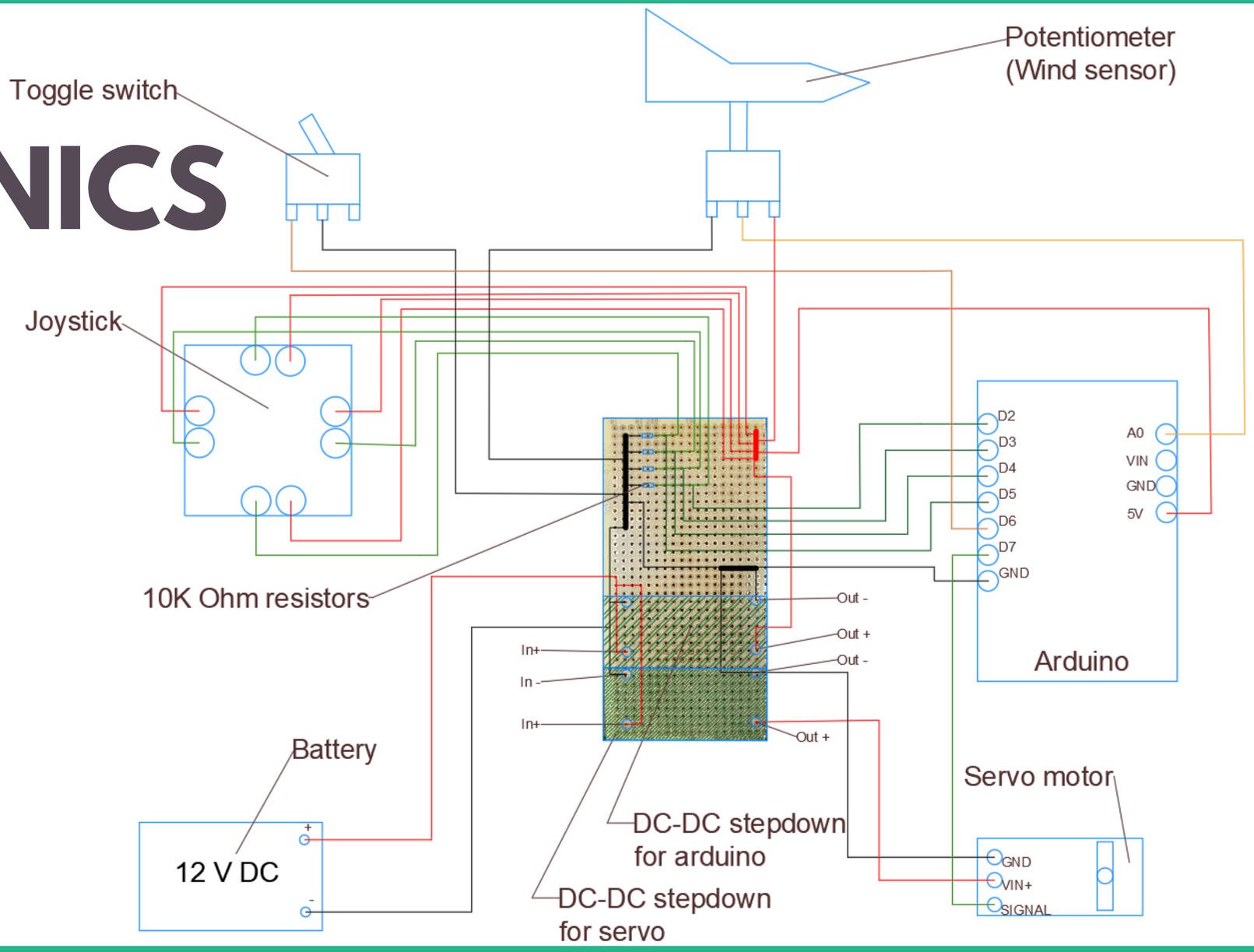
FRONT WHEEL STEERING

First solution

Final solution

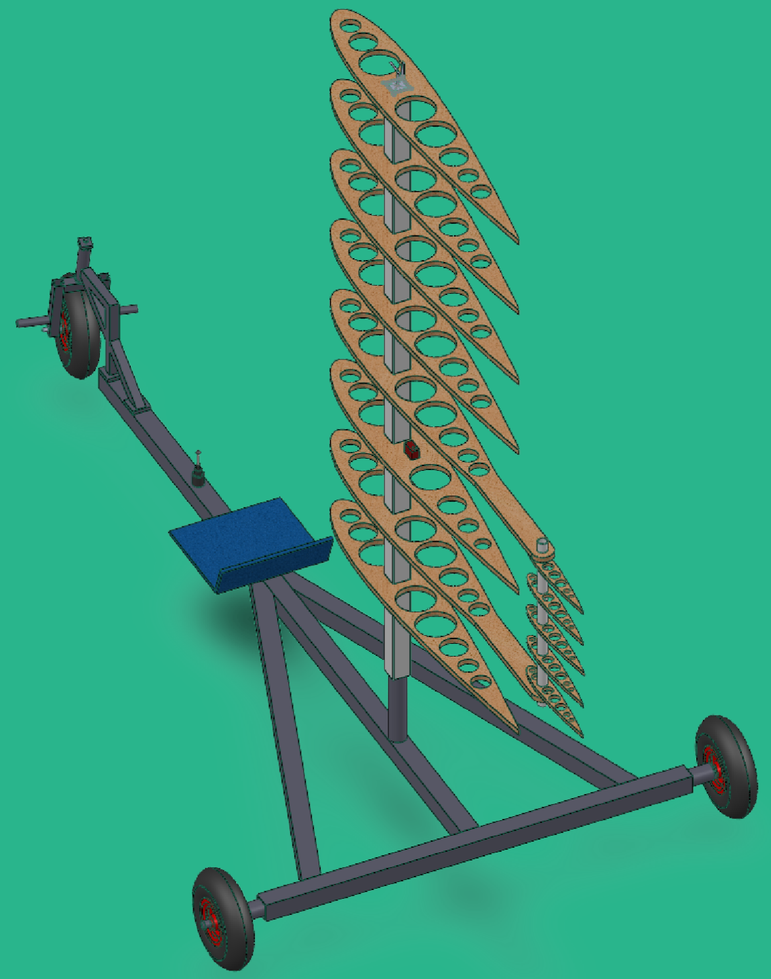
ELECTRONICS





FUTURE DEVELOPMENT

- Reliable braking system
- Lighter materials
- Adjustable seat system
- Wireless connection between electronic components
- Additional electronic parts



ACKNOW-LEDGEMENT

Instituto Superior de Engenharia do Porto

LSA ISEP Laboratório de Sistemas Autónomos

Gislotica Mechanical Solutions

tecnogial

Digi-Key ELECTRONICS

STRUCTURES

Mechanical workshop and technicians [redacted]

The Teachers [redacted]

The Supervisors [redacted]


ANY
QUESTIONS?