



Escola Politècnica Superior
d'Enginyeria de Vilanova i la Geltrú

UNIVERSITAT POLITÈCNICA DE CATALUNYA



Final Presentation

Project
Accessibility and Universal Design

Team Members

- **Bilgin Kahraman** – Electrical-Electronics Engineering
- **Julia Nazareth Ferreira** – Industrial Engineering
- **Maiwen Belkalem** - Packaging Engineering
- **Valentin Calzan** – Packaging Engineering
- **Rachid El Ouad** – Human Technology
- **Victor Marin** – Mechanical Engineering



Standing aids for Students with disabilities



The main aim is to improve the children's
quality of life.

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Accessibility chair

- Promote & coordinate projects
- Help disabled people
 - Access to facilities
 - Use of technology
- Different approaches
 - R&D
 - Teaching
 - Awareness



Project description



- Two students with disabilities associated with Accessibility Chair.
- Develop a mechanism to add to their existing wheelchairs.
- Find a solution to help our clients to stand up more easily.

SERGI'S PROFILE

- 17 years old
- Student in the *Escuela el CIM* of Vilanova

DIAGNOSIS

- Young cerebral paralysis :
 - tetraplegia
 - muscular tone affected
- Training everyday with a [bipedestador](#)
- Needs the help of 2 assistants to stand up

NEEDS

- Minimize the assistance he needs to stand up
- Minimize his efforts

DARIO'S PROFILE

- 14 years old
- 75 kg weight and 1.62 meters high
- Student in the Col·legi Públic Baix a Mar of Vilanova i la Geltrú

DIAGNOSIS

- Spastic diplegia
 - generalized hypotonia
 - muscular strength affected in his lower limbs
- Can stand up alone with his arms' strength
- Able to walk thanks to a [metallic support](#)

NEEDS

- Minimize his efforts to stand up
- Find a device to help him to be more autonomous

Selected Solution - Sergi

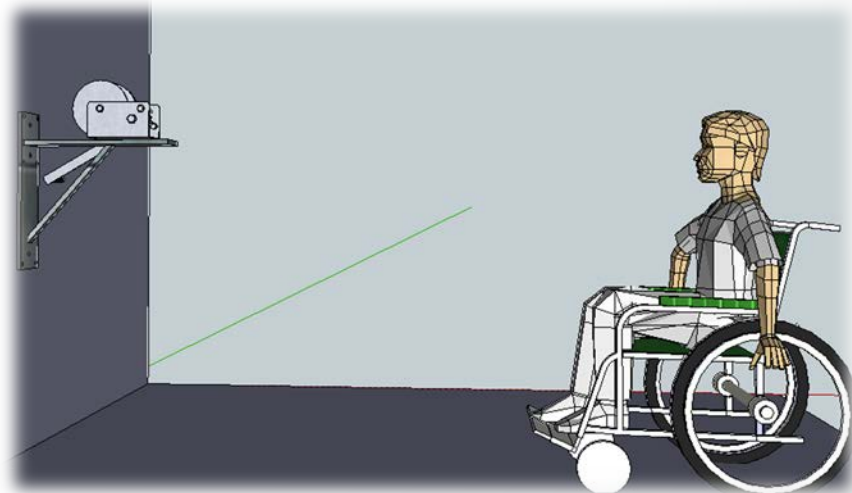
- From existing fishing stand-up system
- Can help Sergi to stand up gradually
 - Winch attached to the wall
 - Harness pulled by the winch



Manual winch

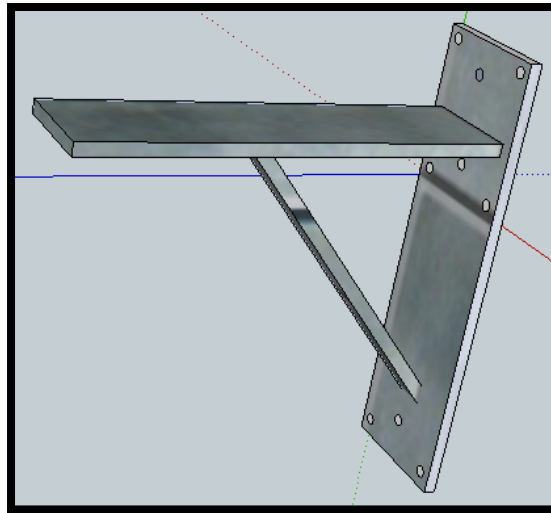
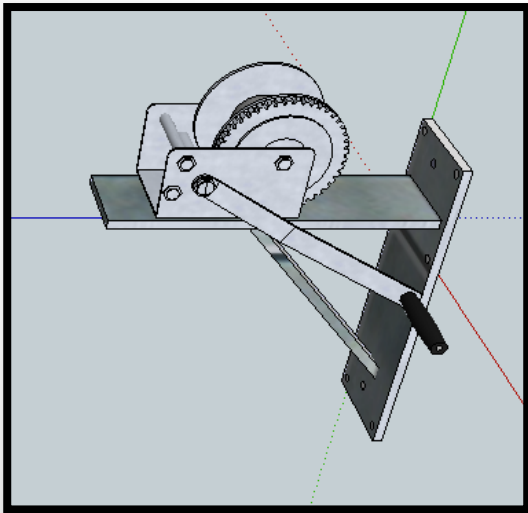
Why did we choose this winch?

- Simple design
- Durable
- Easy to operate
- Low price
- Low maintenance



Wall-mount

- Has to be sturdy
- Has to be easy to make
- Has to be strong enough to support Sergi's body weight



Harness

3 possibilities :

- Buy an existing harness (climbing harness)

Av : homologated

Inc : Not 100% adapted, expensive



- Buy all the material and find a professional seamstress

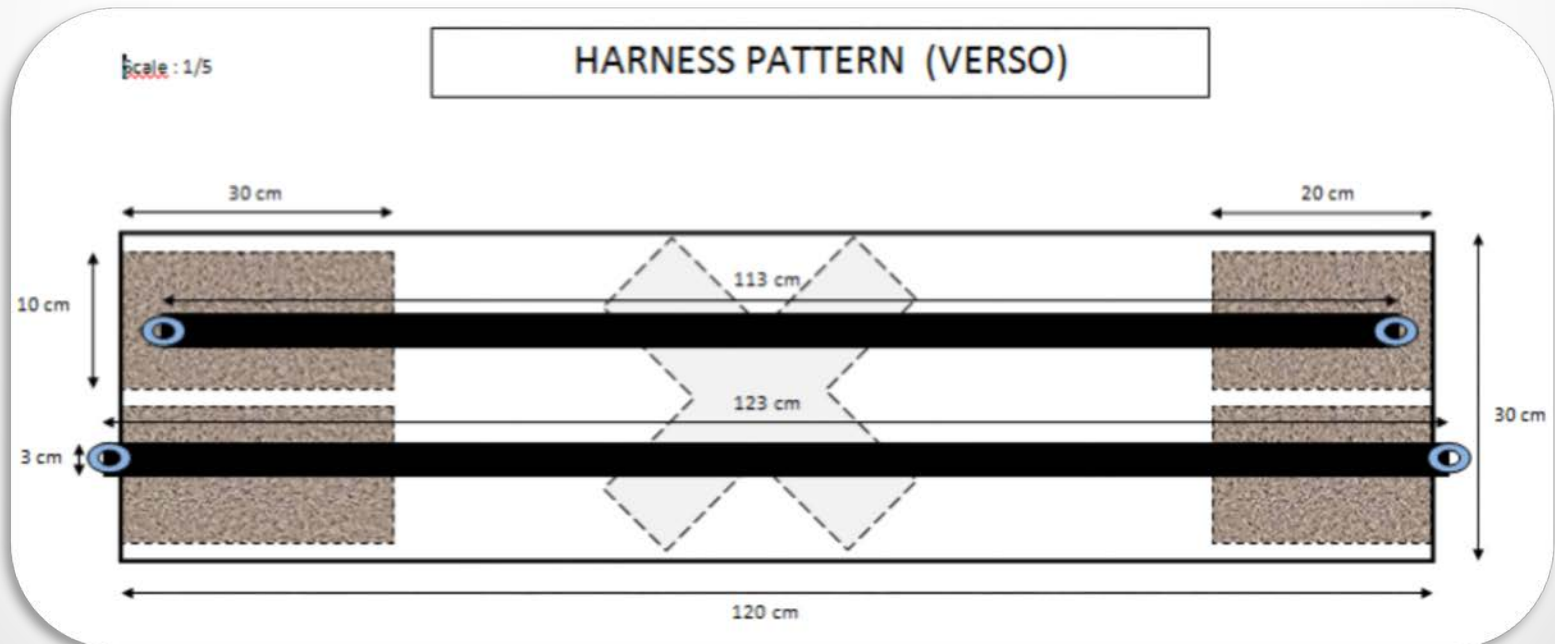
Inc : Hard to find all materials, expensive, long delays

- Build the harness in collaboration with physiotherapists

Av : cheapest solution, possibility to try it directly

Design

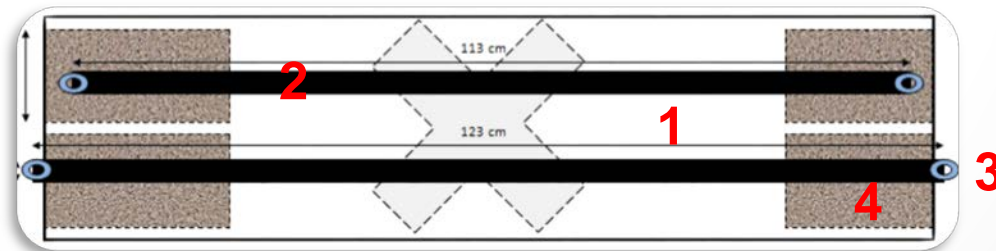
- In collaboration with the physiotherapists :
 - Take Sergi 's measurements
 - Present our idea and select one
- Design the harness' pattern for sewing



Materials

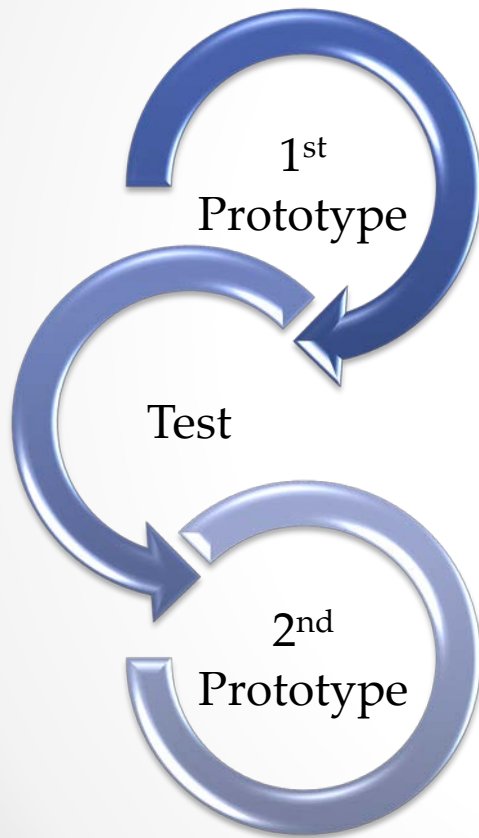
The main materials were chosen accordingly to the availability of the school:

1. Fabric: Cotton
2. Straps: Polyester Nylon
3. Attached point: Steel Rings
4. Closing : Velcro

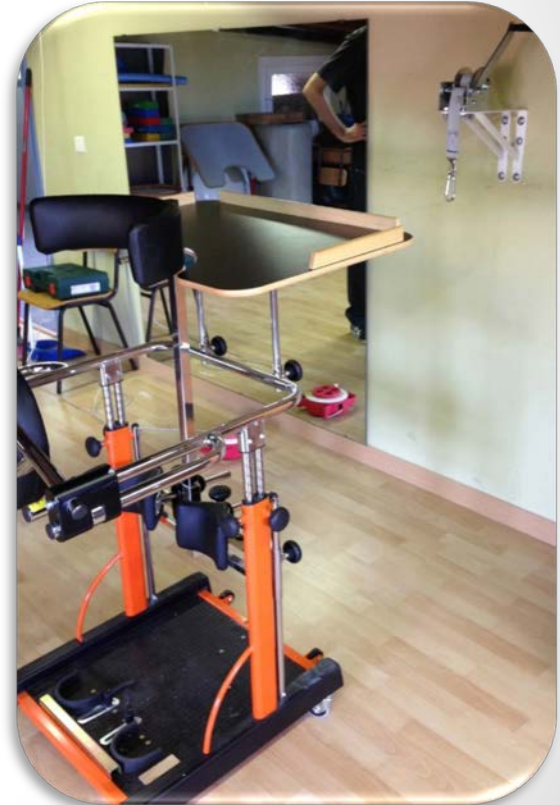


*Ergonomics was taken into account.

Testing And Improvement



Testing And Improvement



- Winch
- Harness

3rd Prototype

Test

- Final

Testing



Selected Solution - Dario

Main Objectives solve:

- ➡ Help Dario to stand up gradually out of his wheelchair and transfer to stander.
- ➡ Could stand up alone
- ➡ Auto-sufficient system
- ➡ Raise up more than 70%
- ➡ Prevents problems reducing pressures on joints and muscles with prolonged use

Selection Criteria



Buy an existing
assistive-seats &
modify it

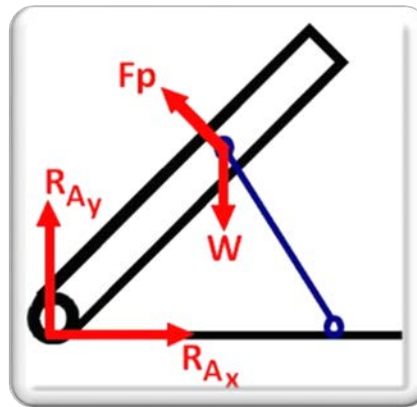


Build an elevator seat &
adapt it



Design

- Mechanism performance (70%-80% weight)



- Seat design

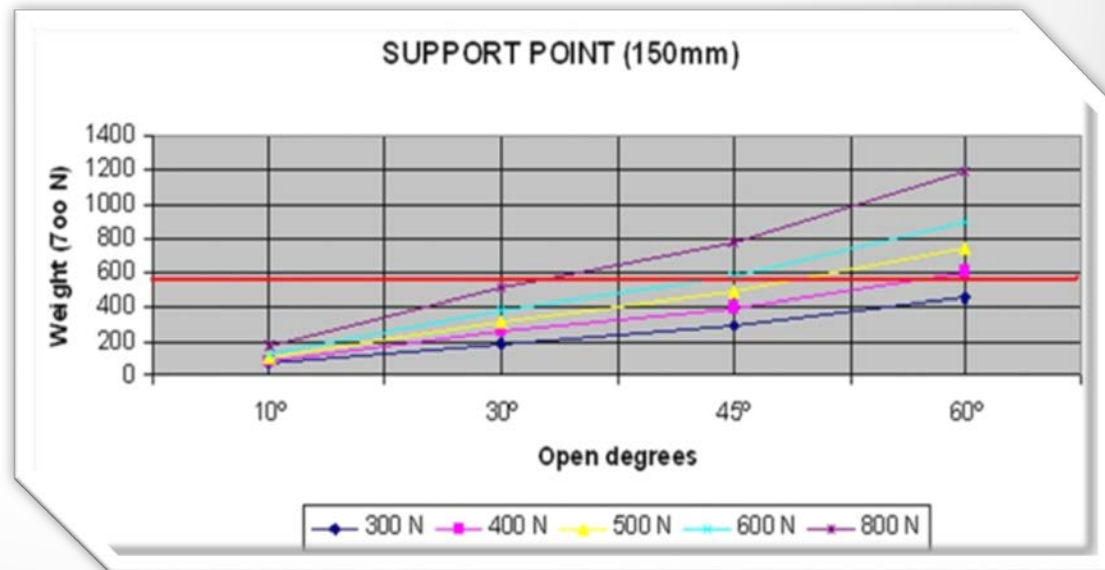
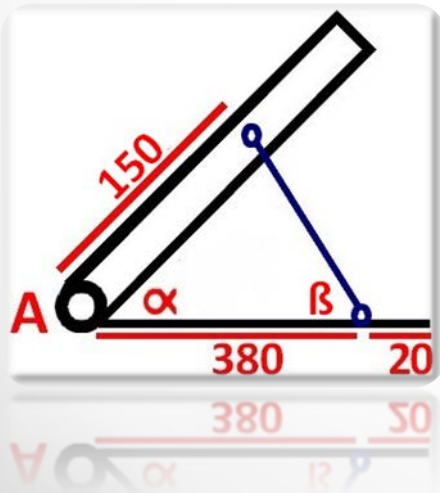


Performance

To solve this challenge, it is necessary to know:

- Body weight of 75kg
- Best distance between support point and reference point
- Performance (70%-80% weight)

Force and length piston(piston range in market)



Design

- Important aspects to design prototype:
 - ✓ Ergonomic
 - ✓ Comfortable
 - ✓ Attractive design
 - ✓ Quality materials & sustainable
 - ✓ be portable & lightweight
 - ✓ Safe(non-slip material)
 - ✓ Try to maximize resources

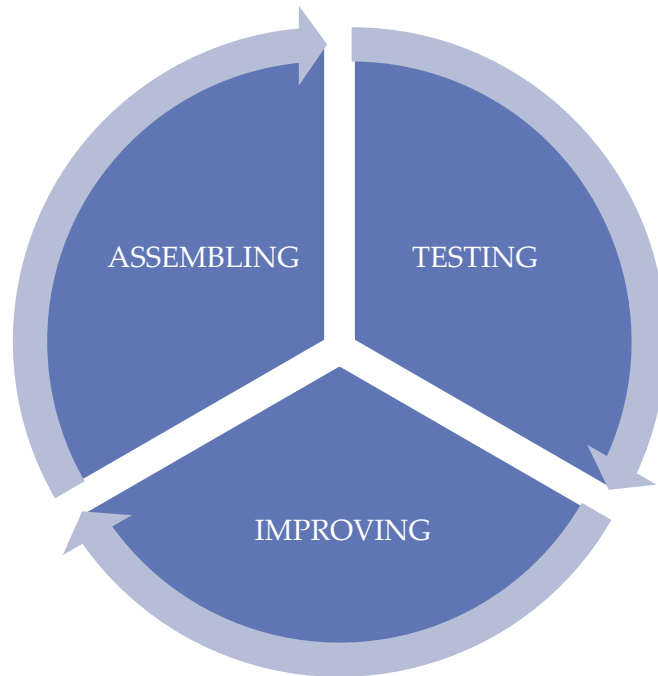


Materials

- There are four components necessary to make a new seat:
 - Pneumatic Piston
 - Wood
 - Supporting Piston
 - Box of Screws
 - Metal Hinges
 - Foam and Textile



Testing And Improvement



Testing and Improvement



1st prototype



2nd Prototype

Test



Prototype Testing



Next steps

Elevator seat:

- Modify for easy transport
- Find more sustainable materials.

Harness and winch:

- Bipedestador must be more stable
- The winch should be adapted to transport more easily

Thank you for your attention

