Final Presentation

Project

Accessibility and Universal Design
Team Members

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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

1st Prototype

Test

2nd Prototype
Testing And Improvement

- Winch
- Harness
- 3rd Prototype
- Final

Test
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

- Assembling
- Testing
- Improving
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