



POLITECNICO  
MILANO 1863

Academic Year 2024-2025

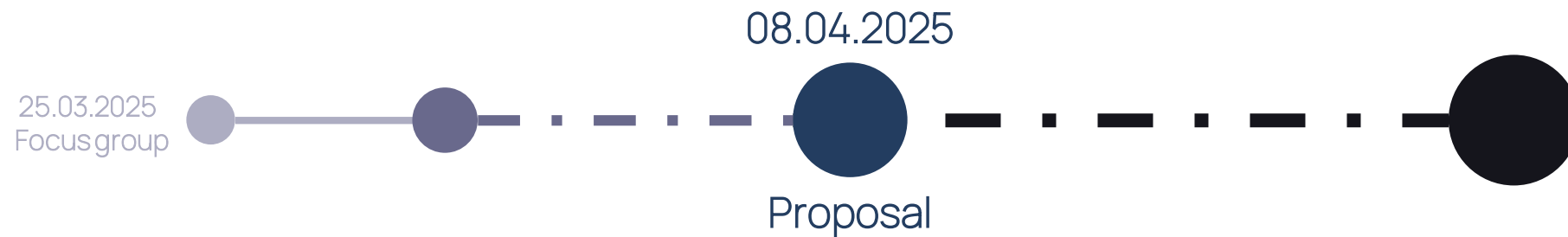
# Paralympics and Sport rehabilitation

08.04.2025

## Pressure - sensitive MAT + air chamber cushion



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Milazzo Alessandro Giuseppe	10766415
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Zanoni Chiara	10784594



Focus group

Proposal

Conclusion

## Participants



ANDREA



DAVIDE



ALESSANDRO

***‘ci ha restituito un pezzo di vita’***

Focus group

## Participants



ANDREA

Experience: various races

Issues: safety, comfort,  
upper limbs, outdoor

Purpose: use with families  
and friends



DAVIDE



ALESSANDRO

Focus group

## Participants



ANDREA

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DAVIDE

Experience: various races

Issues: transporting the  
trike, customization,  
comfort, safety, outdoor

Purpose: autonomous  
training



ALESSANDRO

Focus group

## Participants



ANDREA

Experience: various races

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DAVIDE

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trike, customization,  
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Purpose: autonomous  
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ALESSANDRO

Experience: training

Issues: safety, comfort,  
upper limbs, outdoor

Purpose: total body  
training

Focus group

Purpose: use with families  
and friends

Purpose: autonomous  
training

Purpose: total body  
training

## Critical issues



SAFETY  
→ Decubitus ulcers

COMFORT  
→ Ergonomic seat



Focus group





SAFETY  
→ Decubitus ulcers



COMFORT  
→ Ergonomic seat



## FUNCTIONAL REQUIREMENT

Description of the  
requirement:

1. Prevent further pressure sores
2. Be comfortable
3. Prevent unwanted movements (of the rider and the device)
4. Be lightweight and NOT bulky
5. Adaptable to the trike

Proposal



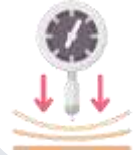
## Pressure-sensitive MAT + air chamber cushion

The independent cell cushion is designed to adjust the air within the chambers in response to pressure changes detected by the MAT, thereby reducing overload and enhancing load balancing.

## Pressure-sensitive MAT + air chamber cushion



CUSHION



PRESSURE SENSITIVE -  
MAT



MICROCONTROLLER

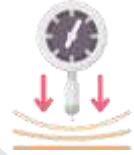
Proposal

## Pressure-sensitive MAT + air chamber cushion



### CUSHION

Adjustable cushion with separate air chambers for personalized support



### PRESSURE SENSITIVE – MAT



### MICROCONTROLLER

Proposal

## Pressure-sensitive MAT + air chamber cushion



### CUSHION

Material selection:  
hypoallergenic, breathable,  
non-slip, waterproof

Design optimization



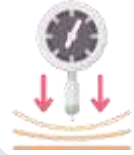
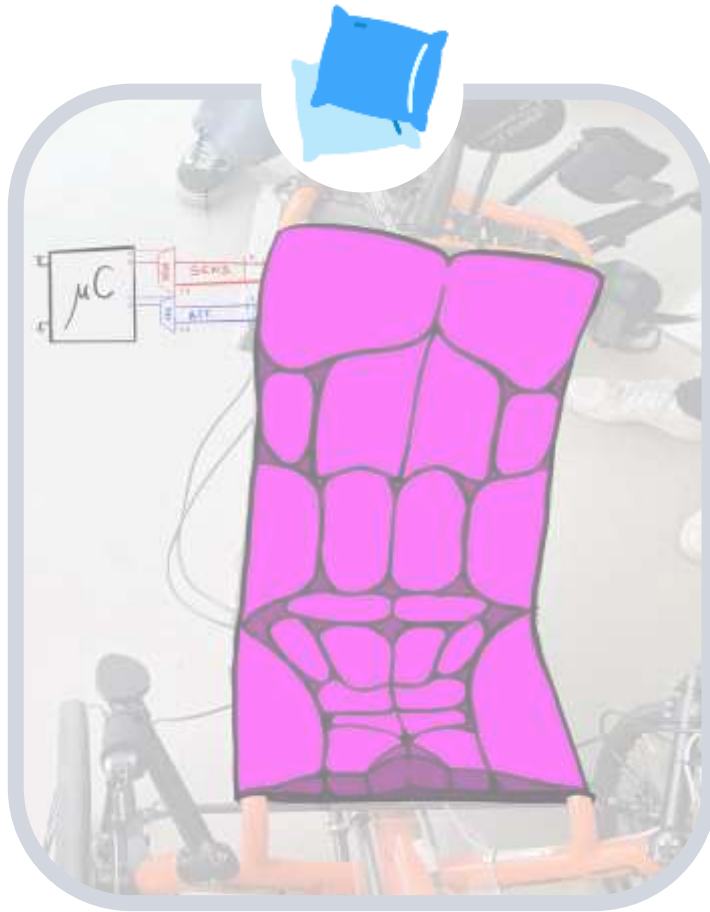
### PRESSURE SENSITIVE - MAT



### MICROCONTROLLER

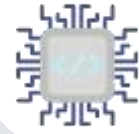
Proposal

## Pressure-sensitive MAT + air chamber cushion



PRESSURE SENSITIVE –  
MAT

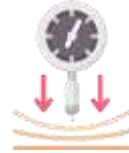
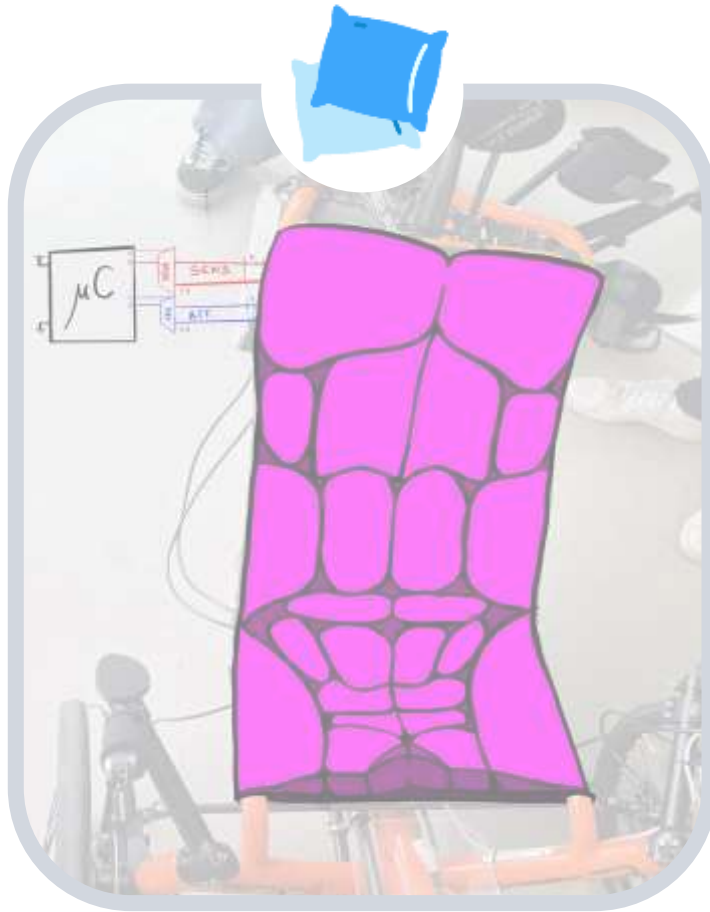
Sensor-equipped mat that  
monitors pressure  
distribution in real time



MICROCONTROLLER

Proposal

## Pressure-sensitive MAT + air chamber cushion



PRESSURE SENSITIVE –  
MAT

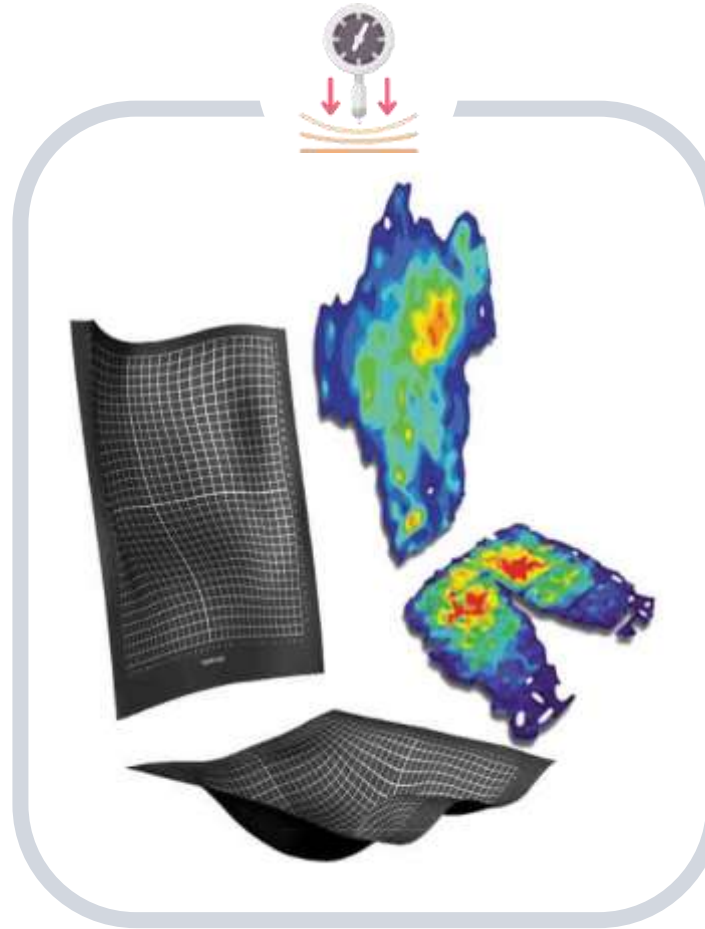
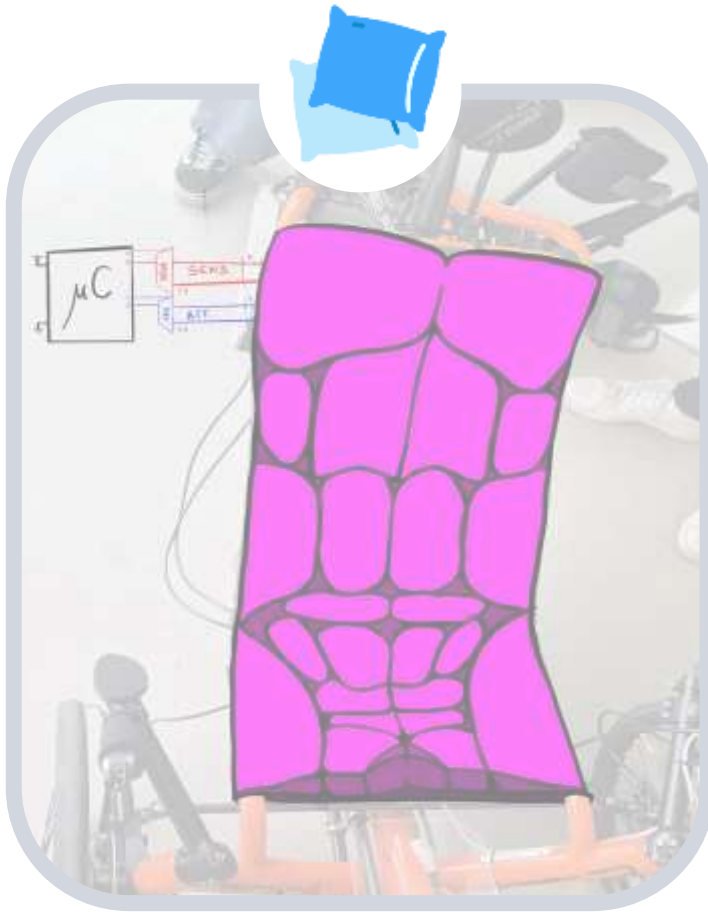
Sensor & system  
configuration:  
type, number, positioning,  
technical specifications



MICROCONTROLLER

Proposal

## Pressure-sensitive MAT + air chamber cushion



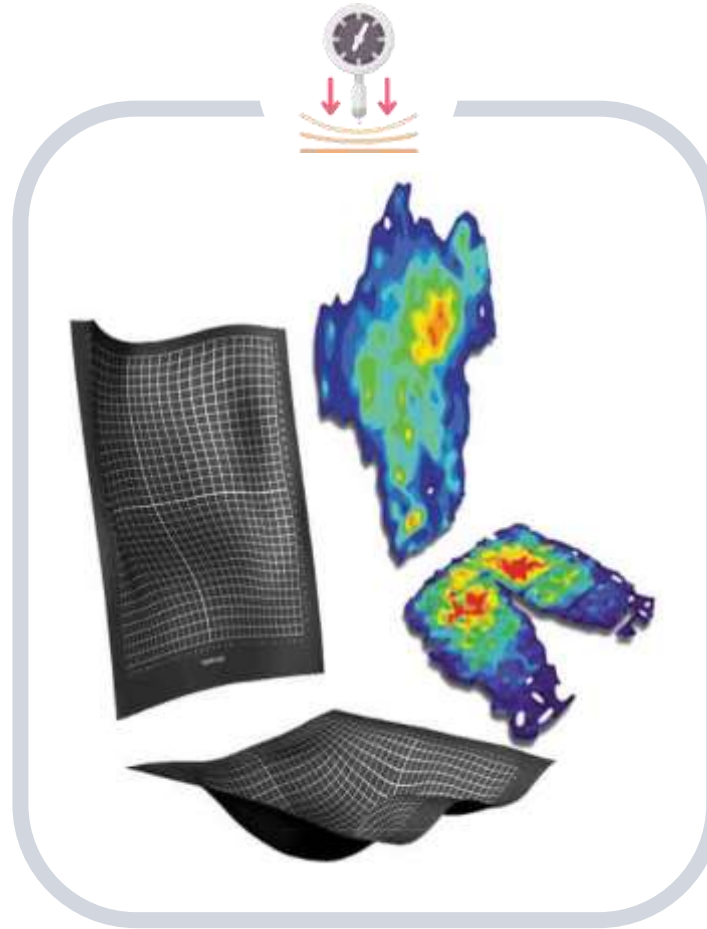
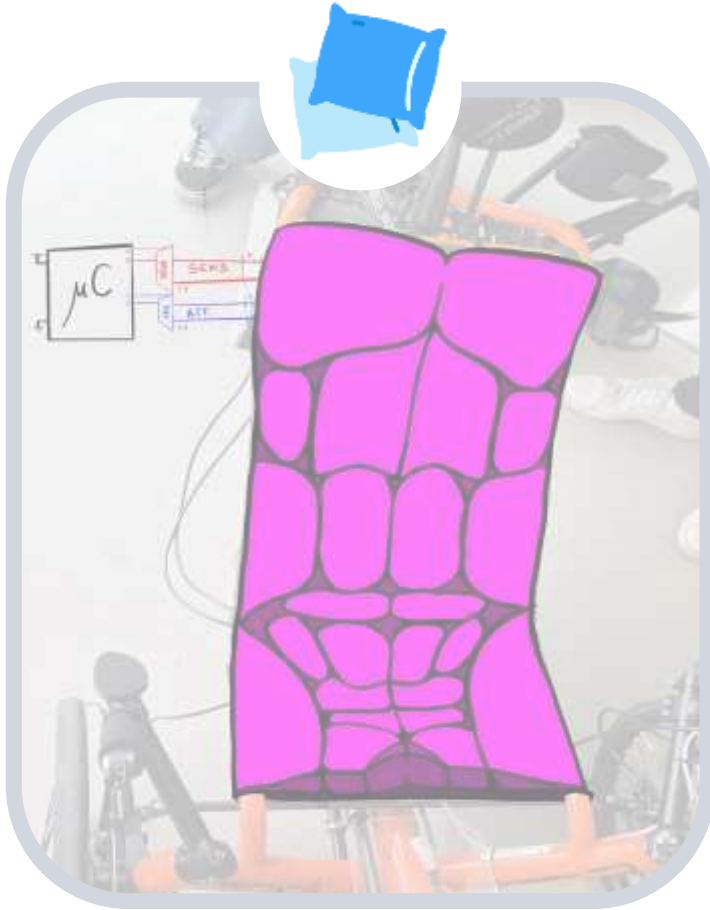
### MICROCONTROLLER

Integrated circuit that automatically regulates the pressure in the air chambers

Proposal



## Pressure-sensitive MAT + air chamber cushion




MICROCONTROLLER

System configuration &  
control:  
hardware and software

Proposal

## Conclusion



Aim: to provide a safer and more comfortable experience, allowing the user to focus more on performance without the fear of potential issues.

25.03.2025  
Focus group

08.04.2025

Proposal

Conclusion



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