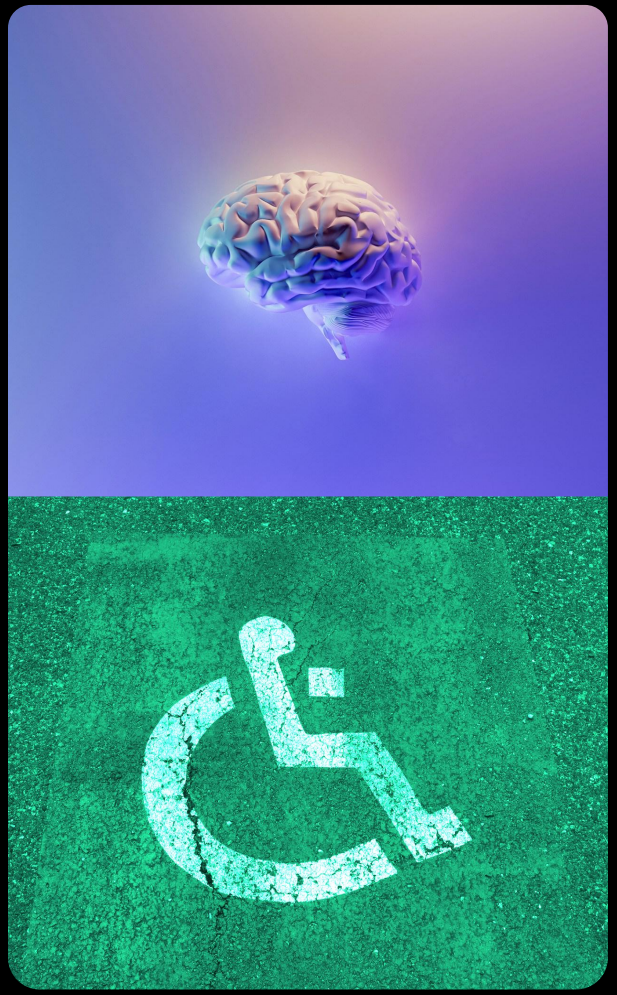

FEBRUARY 27

ChAIr:
Driven by thought

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Agenda

01 Wheelchair Mobility

02 State of the Art

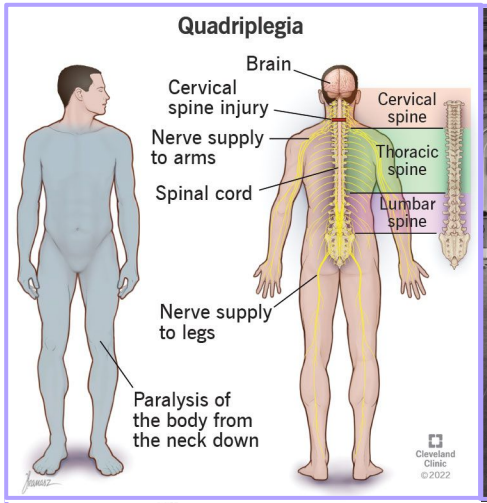
03 Our Approach

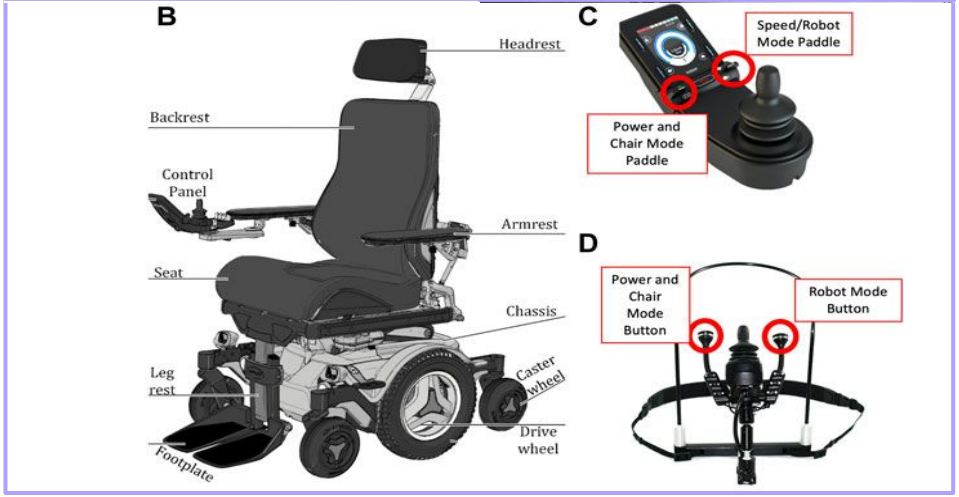
04 Organization

01

Wheelchair Mobility

accessibility, inaccessible for some





Wheelchair mobility

There is a high coincidence of wheelchair usership and quadriplegia globally.

- 65 million wheelchair users globally
- 5 million quadriplegic people globally
- existing options:
  - hand control
  - head control
  - sip-and-puff control
  - chin control

Quadriplegia Causes

Trauma

- Car crashes
- Falls
- Violence-related injuries
- Sports-related injuries

Ailments at birth

- Myelomeningocele
- Spina bifida
- Cerebral palsy

Illness

- Spine tumors
- Spinal cord cysts
- Spinal cord infections
- Lack of blood flow

Journal of NeuroEngineering and Rehabilitation:

“Chin controls is also an available control schema but may not be effective for someone with a neuromuscular disease that has progressed beyond their ability to control chin movement”

02

State of the Art

Existing Controls

Wheelchair Control

1. Advanced Joystick Control
2. Voice Control and Artificial Intelligence
3. Brain–Computer Interfaces (BCI)
4. Head or Facial Movement Control
5. Haptic Sensors and EMG (Electromyography) Control
6. Autonomous Control and Intelligent Navigation

Paradigms

Brain Computer Interface

1. Motor imagery (MI)

2. Methods based on auditory/visual stimuli (P300 & SSVEP)

EEG Signal Processing

Brain Computer Interface

1. Acquisition and Preprocessing: Noise removal, normalization.

2. Feature Extraction: Common Spatial Patterns (CSP), Fast Fourier Transform (FFT).

3. Classification: SVMs, LDAs, CNNs and deep learning.

Current Challenges

Brain Computer Interface

1. **Inter and Intra-Subject Variability**: Differences in EEG signals between individuals and across sessions.

2. **Noise and Artifacts**: Eye movements, muscle interference, and external electrical noise affect signal quality.

3. **Calibration Time**: Lengthy calibration sessions. Practical applications limited.

03

Our Approach:

BCI for wheelchair control

BCI unlocks novel control avenues for wheelchair users

Brain Computer Interface

Wheelchair Controller

By integrating cutting-edge BCI with wheelchairs, we're expanding mobility to a wider range of users with more restricted capabilities.

BCI Hardware Options

OpenBCI

The most open-source and customizable EEG platform with access to full raw data.

Muse

The most user-friendly and accessible EEG headset. Perfect for beginners.

Unicorn Hybrid Black

Research-grade EEG quality in a compact and easy-to-use design. Ideal for professional applications.

NeuroSky MindWave

The most affordable EEG device. Great entry-level option for simple applications and educational purposes.

Neurosity

The best developer-focused experience. Seamless integration with applications and cloud-based computing.

Emotiv

The best balance between research and consumer usability. High-quality EEG data with a polished, wireless design.

What is ChAIr?

Personalized AI Training

Choose 4 custom movements to control your wheelchair.

Adaptable to individual users—no fixed presets.

Fast & Easy Setup

Train your AI classifier in under 1 hour.

Intuitive interface—no technical expertise required.

Seamless Integration

We handle the connection to the wheelchair for a smooth experience.

Focus on usability, not complexity.

Organization:

Bringing ChAIr to reality

Meet the team

Martí Recalde

Computer Science
Philosophy

Bruno Sánchez

Mathematics

Zachary Parent

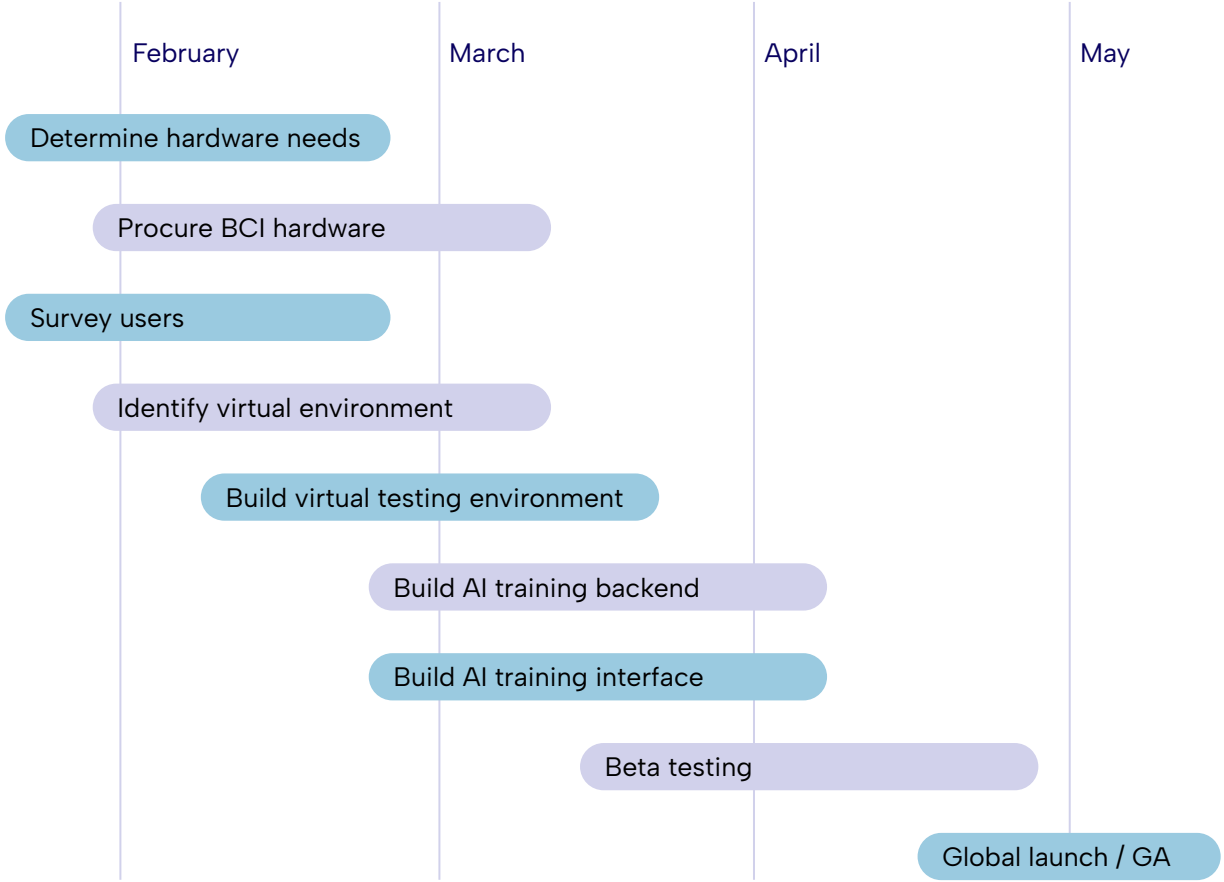
Aerospace Engineering
Computer Science

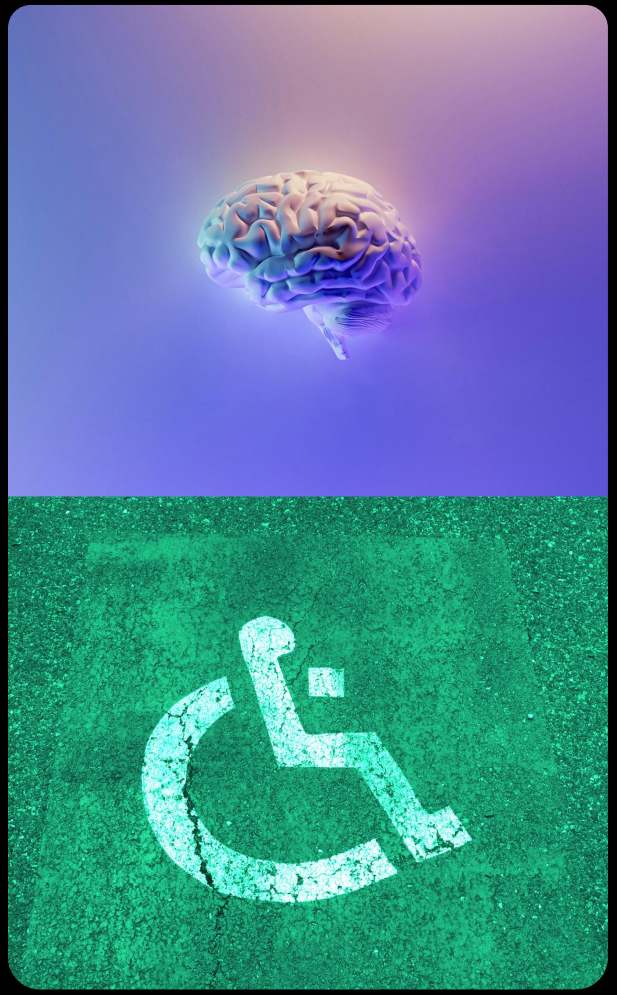
ChAIr is uniquely positioned to bring the advances in **Brain Computer Interfaces** to those who can benefit most, elevating the **mobility of quadriplegics** like never before

Bringing ChAIr to reality

Timeline

By **parallelizing** information gathering tasks, and working as a team to develop the AI training **backend** and **interface**, the team behind ChAIr intends to go to market by Summer 2025





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