



**Tecnológico
de Monterrey**

Escuela de Ingeniería y Ciencias
Departamento de Mecatrónica
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REDESIGN AND CONSTRUCTION OF AN EXOSKELETON

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November 2018



CENTRO DE INVESTIGACIÓN EN MICRO SISTEMAS Y BIODISEÑO



Problem

When a patient must rehabilitate his lower extremities after an operation or accident he may not have the strength to stand and walk to reactivate his motor skills. One way to solve it is with the help of an active exoskeleton for rehabilitation. In addition, in the mechatronics department of the Monterrey Institute of Technology and Higher Education, Campus Mexico City, a prototype of an exoskeleton is required that can be used for research and development of this technology.

General Objective

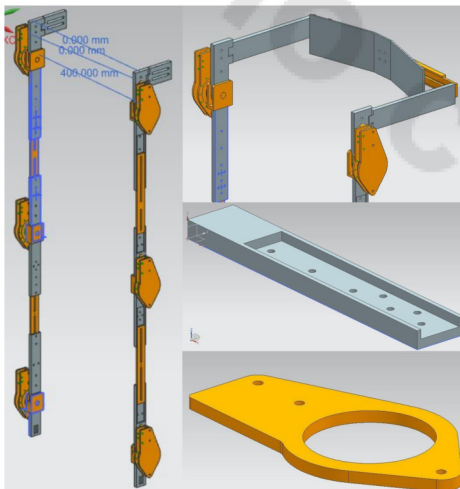
Develop a functional prototype of an exoskeleton based on an existing prototype, the H1 of the Technaid company.



Specific Objectives

- Design an exoskeleton based on the H1 Technaid.
- Structurally analyze the designed prototype, verifying the stress and deformations developed resemble the original model.
- Manufacture the prototype.
- That the new physical model is functional (that the user can move better or the same as with the original model).

CAD Design



Results

Original

Redesign



Assembly



Future Work

- Manufacture the parts made in the machines of the mechanical laboratory with the VF-12 HAAS (CNC).
- Redesign the lumbar support of the exoskeleton (which is more ergonomic and does not require bonding by adhesives).
- Send to manufacture the gears in metal.
- Analyze the functionality of the exoskeleton with the electrical system subsystem, or design the latter for its subsequent coupling.

Manufacture



Mastercam

Z-SUITE



Zmorph

- Use of the machines in the mechanics workshop (Lathe, milling cutter, saw-tape, shear, etc.)
- Union of plastic and metallic components with cyanoacrylate and sodium bicarbonate.

Ethical Dilemma

- Autonomy principle
- Charity principle
- Precautionary principle

Conclusions

It was possible to design an exoskeleton based on Technaid's H1 model, which structural analysis indicates that it will withstand efforts and deformations similar to the original model. It was possible to manufacture a functional prototype, and therefore, the objectives of the project were achieved. In addition, the aforementioned validates the methodology followed by the team of this project.