

# EDUEXO PRO SPECIFICATION

The EduExo Pro enables teachers, researchers, students and hobbyists to learn about exoskeleton technology. The do-it-yourself kit contains all parts and components you need to assemble an arm exoskeleton. In addition, a comprehensive handbook teaches theoretical knowledge and contains a manual on how to assemble the hardware, design basic controllers, connect the exoskeleton to a self-made video game, and how to run simple experiments.



Language	English
Vest size	One size (children >12y to adult size L)
Arm	Adjustable size, left and right configuration possible
Dimensions (packed)	35 cm x 40 cm x 10 cm
Micro controller	Arduino Nano 33 IoT
Motor	Digital servomotor with up to 5.5 Nm and position feedback
Mechanical spring	Spiral spring with 1.38 Nm/rad
Force sensor	10kg straight bar load cell
Muscle activity sensor	Myoware electromyography sensor
Other	2 programmable buttons LED for instant feedback 2 jack connectors 3.5mm Access point for custom connection
List price	€1490 without taxes

## TEACHING WITH THE EDUEXO PRO

The EduExo Pro was designed to facilitate teaching practical courses on topics ranging from hardware design, electronics, control theory, software design to scientific evaluation. The handbook contains all the information a student would need to assemble the exoskeleton and program basic control strategies. It is ideally suited for group work, allowing each student to contribute in a unique way (hardware, electronics, control, game design, experiments) or encouraging them to go through each step together. The EduExo Pro can be customized in many ways, from implementing more advanced control strategies to improving the hardware. Teachers have complete freedom to customize and add modules to suit their needs.



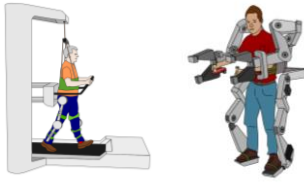
# HANDBOOK



The handbook has ten main chapters that will introduce you to many aspects of robotic exoskeletons and their technology. The chapters start with the necessary theoretical background, followed by a set of tutorials that can be implemented with the EduExo Pro hardware.

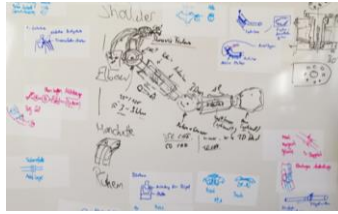
## 1. Introduction

The first chapter introduces the field of robotic exoskeletons. A look at exoskeleton history, examples of existing systems, and their applications.



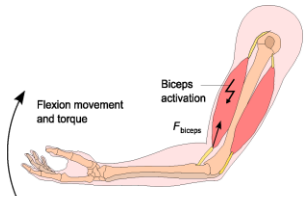
## 2. Exoskeleton Development

What do exoskeleton developers do all day? This chapter talks about development methods and required skills.



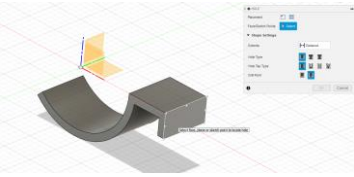
## 3. Anatomy and Mechanics

The third chapter covers the basics of human functional anatomy and exoskeleton mechanics. Here it gets hands-on with a tutorial on the assembly of the EduExo Pro.



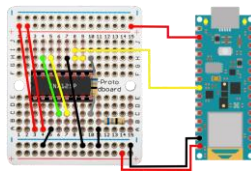
## 4. Mechanical design

Time to discuss hardware design and manufacturing. Learn about technical drawing, CAD design, stress-strain analysis, and design a customized arm cuff that can be 3D printed.



## 5. Electronics

This chapter teaches the basic electronics knowledge and skills needed to safely connect all electronic parts of the EduExo Pro.



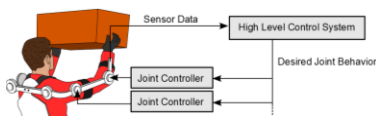
## 6. Software

This chapter covers the software that turns the mechanical exoskeleton into a robotic exoskeleton. It contains source code examples for all exoskeleton core functions.



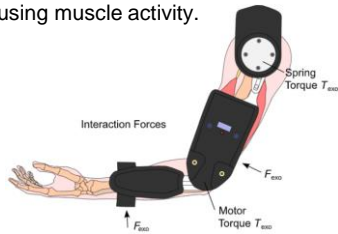
## 7. Basic Control Systems

In chapter seven, control systems are discussed. Different controllers that define the exoskeleton-user interaction are introduced. Step-by-step we discuss, implement, and test them.



## 8. Advanced Control Systems

The most important task of the control system is to ensure that it provides support when needed. To do so, the user's movement intention and physical load are valuable information. They can be estimated using muscle activity.



## 9. Virtual Reality & Video Games

Virtual realities and video games are well-established methods in use with exoskeletons. They are, for example, used to increase motivation in patients that use exoskeletons for rehabilitation, e.g., after a stroke.



## 10. Scientific Experiments

Now that the exoskeleton is finished, it is time to evaluate the support it provides in a systematic way.