

Robotic Prosthesis

Robotic hand prosthesis

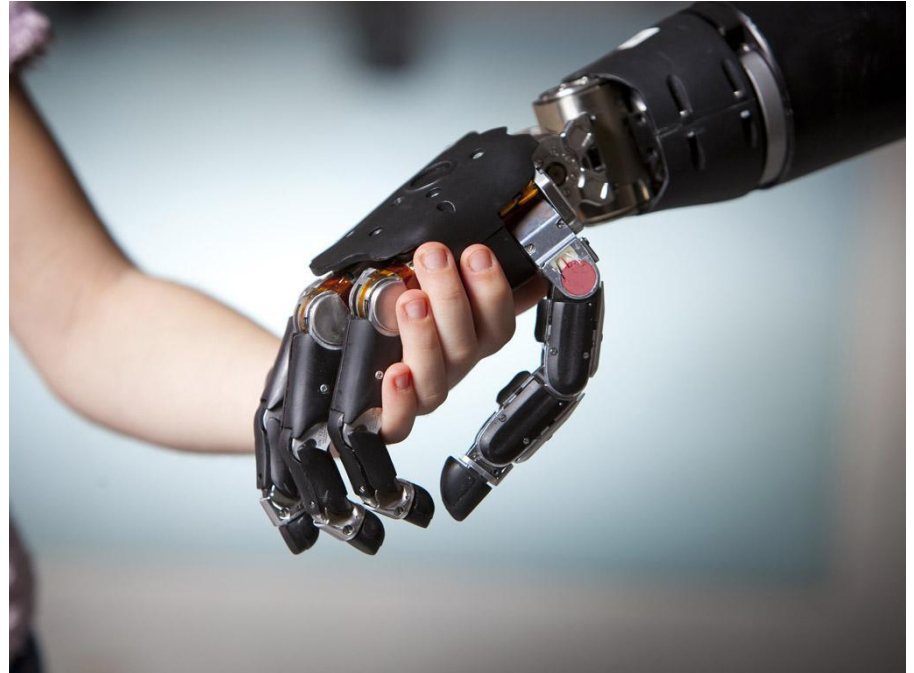


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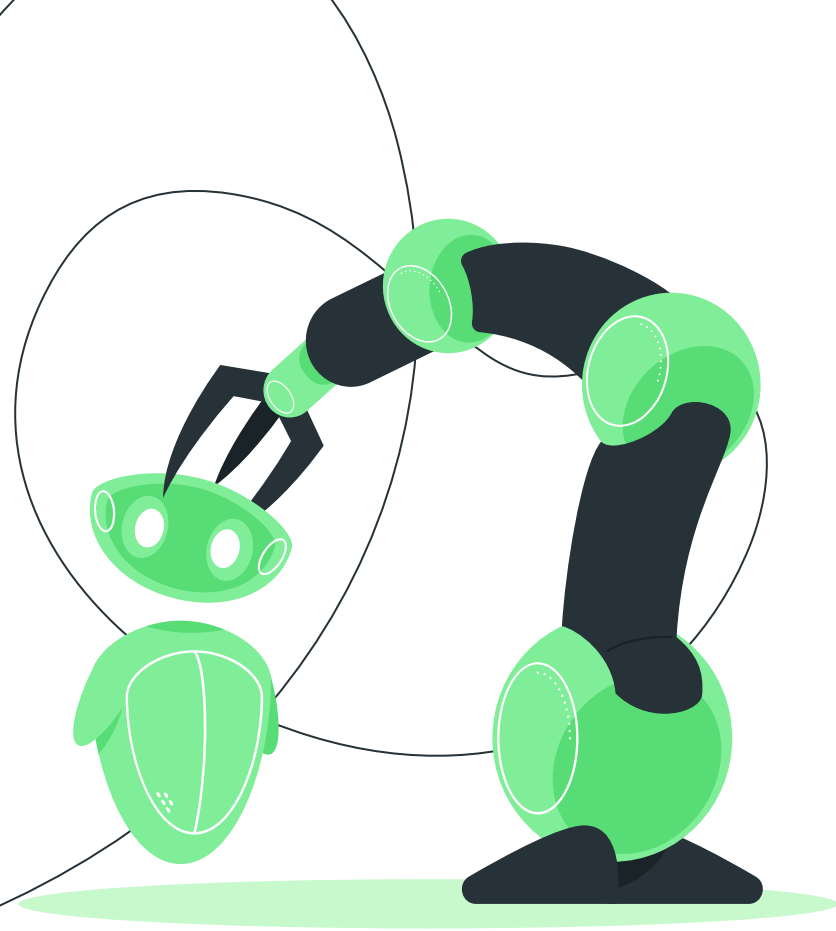
Theoretical design

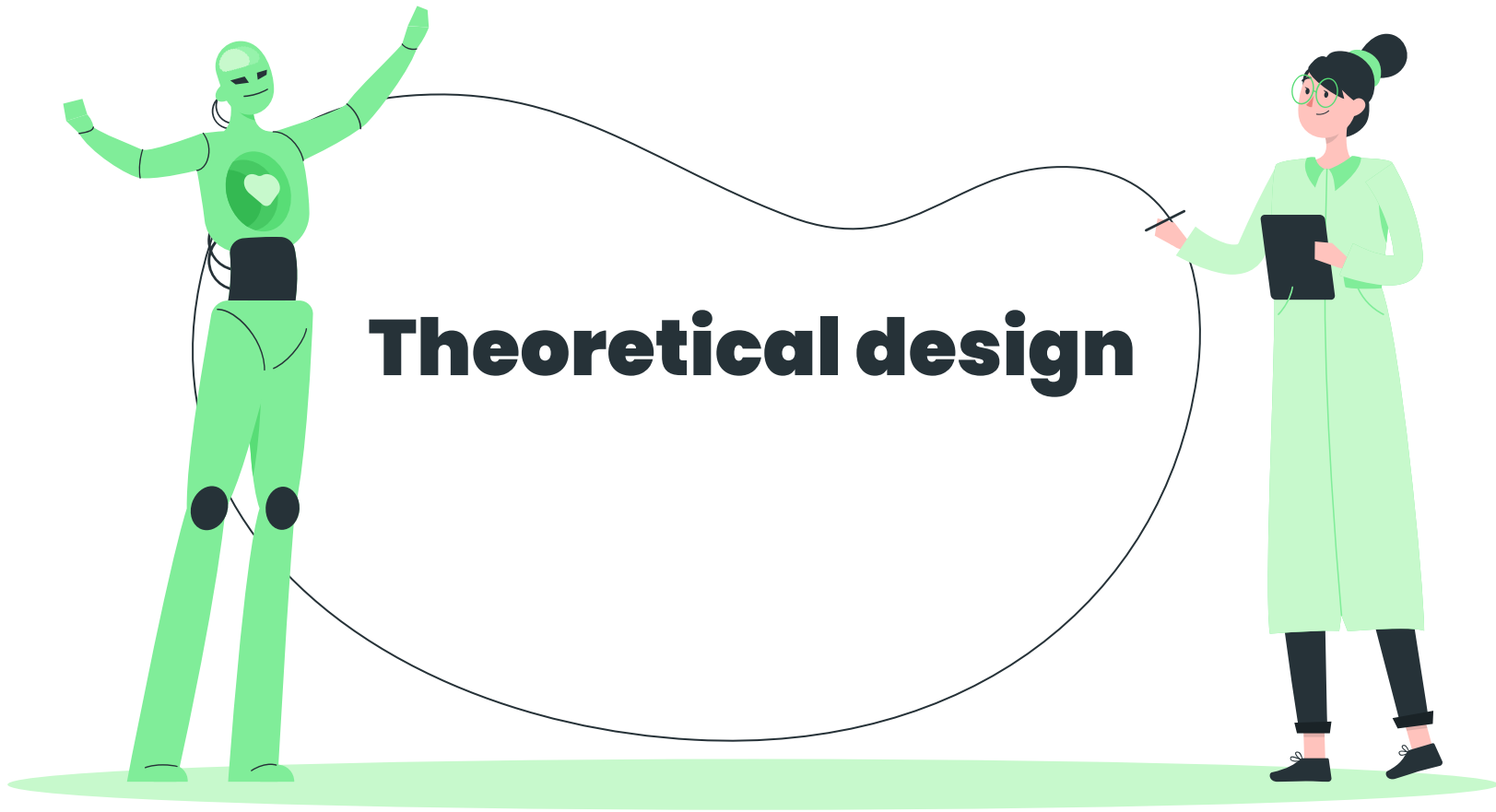
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Conclusion + Demo

Introduction

- Development of a functional prosthesis
- Health area



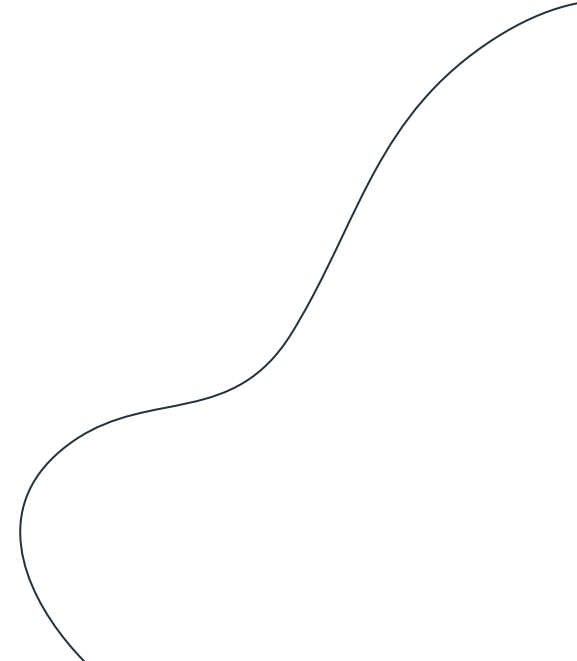
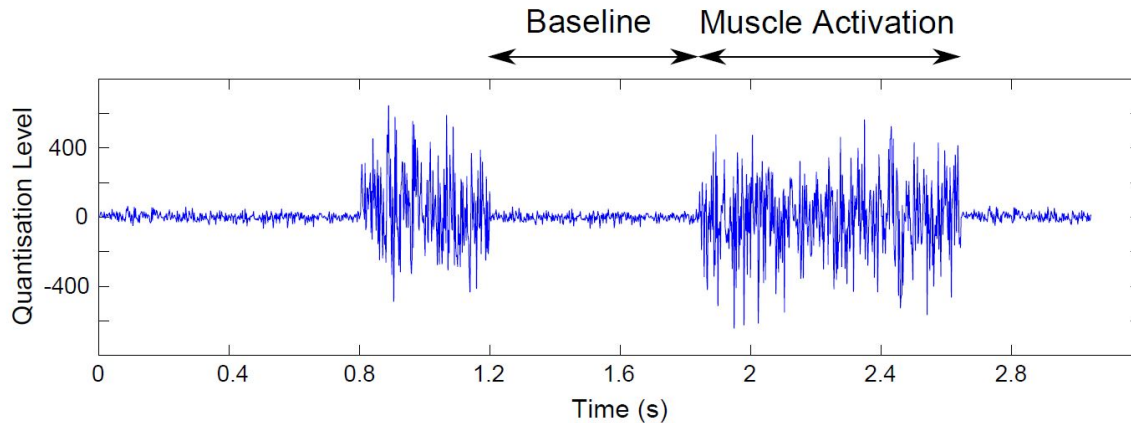


Theoretical design

About The Theory

EMG signal : (*Filtering and processing*)

- Frequency : 0Hz - 500Hz
- Noise

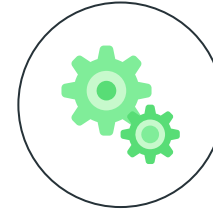


About The Theory



Filtering and processing

- Analog signal recovery
- Analog to digital conversion
- Signal processing

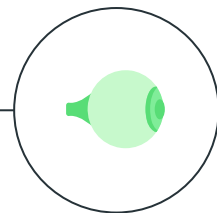
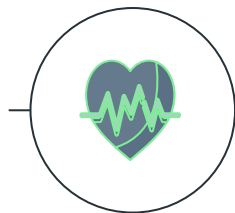


Control

- Control of the robotic hand

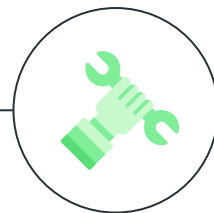
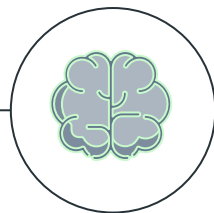
Abstract

Sensor



Filtering

Processing



Control

Technical Features

1

EMG Sensor

- Myoware muscle sensor
- Electrodes

2

Microcontroller

- STM32F072RB

3

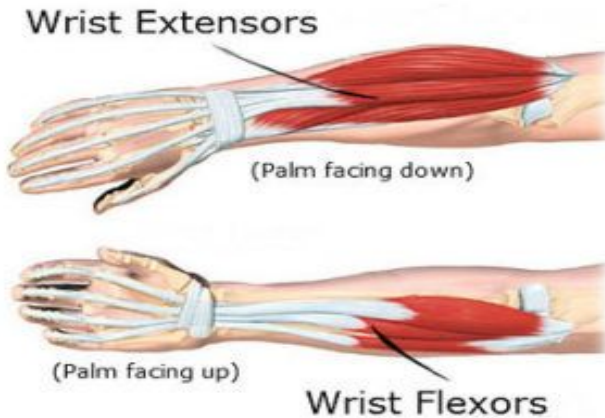
Robotic hand

- Bionic Robot Hand SKU ROB0142
- SKU:DFR0265 shield

Technical design

EMG signal: - 2 pairs of electrodes + Ref

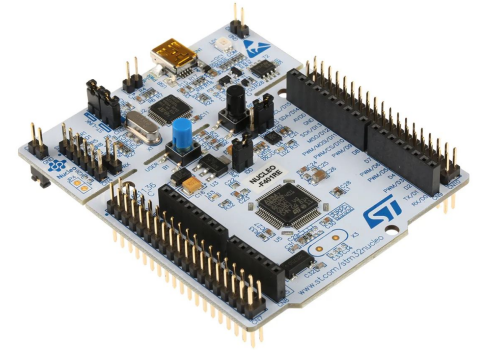
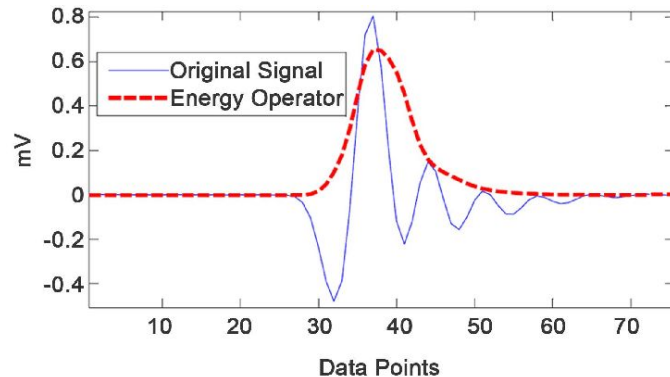
- Analogic filtered signal
- Butterworth low pass 6th at 50Hz
- Flexor and extensor muscles



Technical design

STM processing:

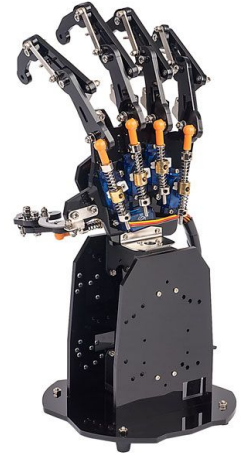
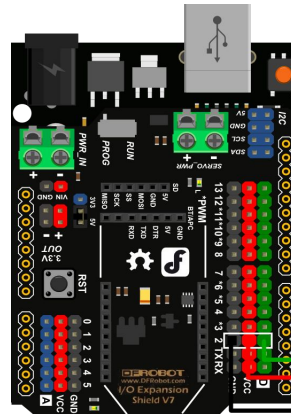
- ADC conversion using DMA channel 11 and 12
- Digital filtering : band pass 2nd (100 - 400 Hz)
- Hysteresis Threshold and comparison
- Teager Kaiser Operator Energy



Technical design

Robotic hand control:

- 5 servos motors (PWM signal)
- Driving by IO Expansion shield
- 5 fingers together



Anatomy Of The Error

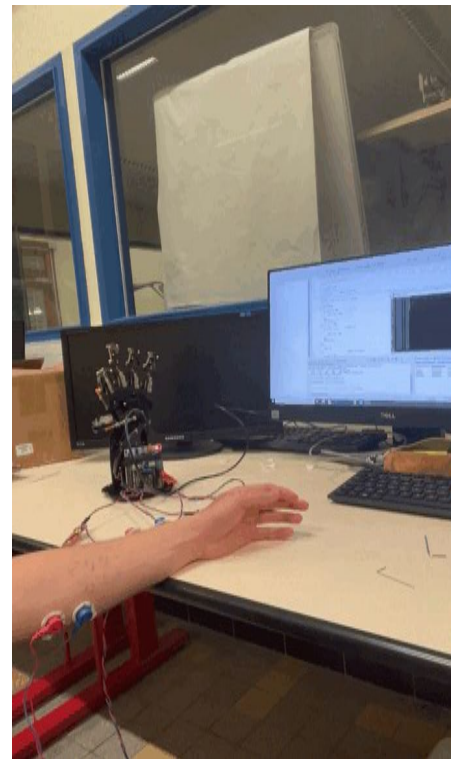
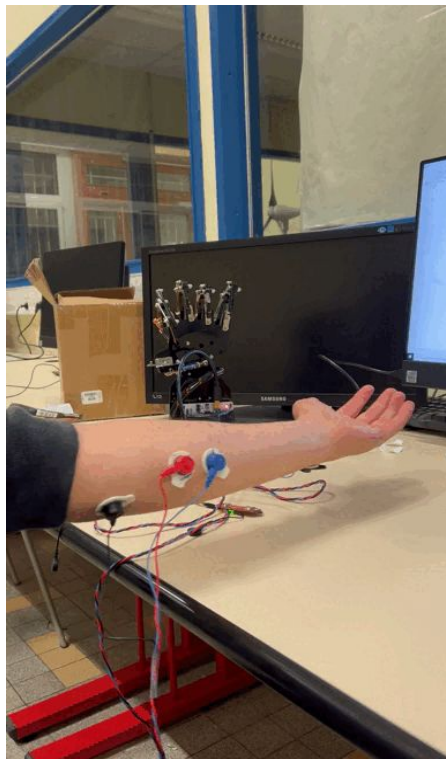
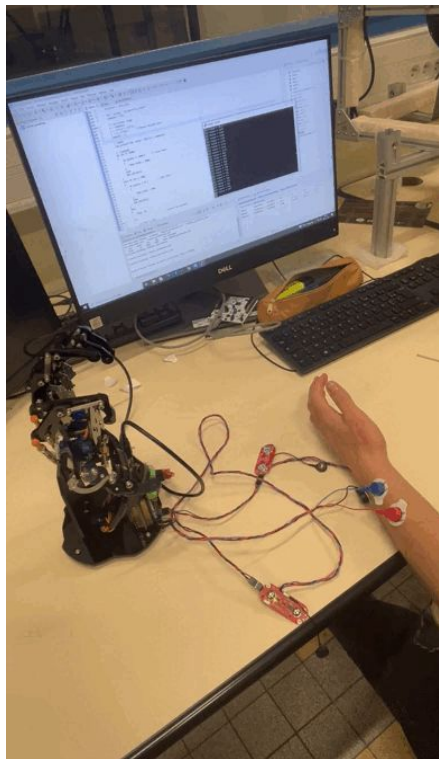




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Conclusion

DEMO





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<https://gitlab.polytech.umontpellier.fr/victor.rios/robotic-prosthesis>

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