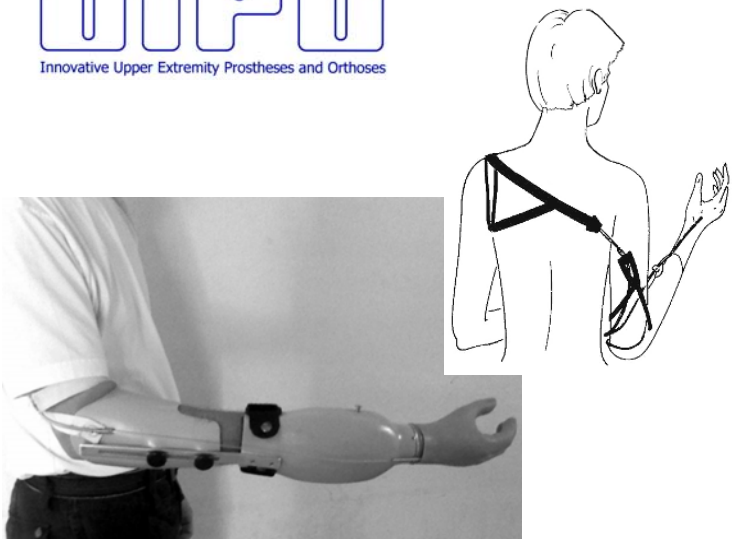
Delft Institute of Prosthetics and Orthotics

DIPO

Innovative Upper Extremity Prostheses and Orthoses

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**MASTER GRADUATION PROJECT**

# COMPREHENDING THE BASIC PRINCIPLES BEHIND THE SHOULDER CONTROL OF ARM PROSTHESES

Nowadays about 31% of the users of an arm prosthesis prefers a body powered (BP) prosthesis and 43% prefers a myoelectric (ME) one. BP-prostheses have the advantage of providing direct proprioceptive feedback about the opening width of the hand and the applied pinch force. This feedback enables blind and subconscious control of the prosthesis. ME-prostheses provide almost none but visual feedback of the opening width only. They also have a larger mass and a lower durability.
Despite the benefits of the BP-prosthesis, most of the research effort has been put into further development of the ME-prosthesis. Therefore, users of BP-prosthesis are thrown back on prostheses which were designed decennia ago and have hardly been improved ever since. There is a great demand for the development of improved BP-prostheses. The most common used type of body control is the principle of shoulder control. This principle has been used over a long period in various versions. Still it has been studied rarely and its exact working principle is still not well understood.

## ASSIGNMENT

Analyse the working principle of the shoulder controlled prosthesis. Design and perform a test, in which the different parameters of shoulder control can be studied, for example by building and using a prosthesis simulator. Analyse the test results. Answer the following questions:

- Which factors are important in shoulder controlled prostheses?
- What are the capabilities of the human body in shoulder control, e.g. displacements, forces, [proprioceptive] feedback?
- What advises can be given for the design of new shoulder controlled prostheses?

## ADDITIONAL INFORMATION:


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