



## MASTER GRADUATION PROJECT – HUMAN MOVEMENT SCIENCES

# MOVEMENTS FOR TWO WAY CONTROLLED BODY POWERED PROSTHESES

Upper limb amputees are not satisfied with the commercially available arm prostheses. This is indicated by the high rejection rates of prosthetic devices. The Delft Institute of Prosthetics and Orthotics (DIPO) focuses on the improvement of body powered arm prostheses. These mechanical arm prostheses are controlled by the movements of the users. Because of the proprioceptive feedback of the human movements such a prosthesis can be operated without the need of constantly monitoring the prosthetic hand when e.g. grasping an object. The user can actually feel what his prosthesis is doing.

Commercially available prostheses operate with a one way control: for active closing body powered prostheses the prosthetic hand is held open by a spring and the closing of the hand is initiated by shoulder and arm movements. For an active opening prosthesis the control of the hand is inverse; the prosthetic hand is closed by a spring and is opened by shoulder and/or arm movements.

In an ideal world the user can control both, opening and closing of the prosthetic hand (two way control), by his natural movements. This way the user gains a broader feedback than in one way control. The question rises which movements can be used to power a two way controlled arm prosthesis. How can these movements be "harnessed" and transmitted to the prosthesis? Which movements and created forces guarantee optimal proprioceptive feedback?

## ASSIGNMENT

In the scope of this MSc assignment you should consult literature to gain a general understanding of the problems during prosthesis operation. You should analyse movements capable to power a prosthetic device. A prototype of a "movement harnessing system" should be designed and should finally be tested during simple control tasks.

## ADDITIONAL INFORMATION:

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