**SCAN TO KNIT**

A Smart Textile Platform for Personalised Prosthetic Textiles

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**Background**

In Sweden, approximately 3000 people are amputated every year; about 90 % of which cases are amputees of the lower extremities and about 10 % of the upper limbs. When a person becomes a limb amputee, he or she is faced with staggering emotional and financial lifestyle changes. The amputee requires a prosthetic device(s) and services, which become a life-long event. The simple truth is that if the prosthesis is uncomfortable, the person is not going to wear it. Surveys from Europe indicate that overall satisfaction with prosthetics among amputees is ranging between 70-75%.

**Objectives**

The objective of the project is to investigate textile methods that contribute the missing links to develop personalised smart textile solutions for prosthetic limb users with a special emphasis on improving user comfort.

**CASE 1: Personalized prosthetic socks for improved socket-stump interface comfort**

Improving pressure-, humidity- and thermal-related comfort in a cost-effective manner that requires fewer skills is a challenge to the prosthesis industry. The human skin is a sophisticated organ that is vulnerable to sustained and concentrated exposure of any kind. A slightly poor fit in the prosthetic socket or even a poorly placed seam of a prosthesis sock can result in localised pain, bruising, redness, blisters, or skin ulcerations in the residual limb. In practice, true comfort is extraordinarily difficult to achieve and maintain.

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**CASE 2: Smart textiles for home-based Phantom Limb Pain (PLP) treatment**

The combination of smart textiles and the new textile production technology, i.e. Scan to Knit allow an individualised sock/sleeve with integrated myoelectric electrodes positioned according to the evaluation of remaining muscle tissue performed at the clinic to be produced for each amputee. Such an individualised sock/sleeve opens up for home-based treatment of PLP that can be administered by the amputee without any assistant from a prosthetist or therapist.

**CASE 3: Smart socks for controlling powered prosthetics**

Textile electrodes, have proven to be an attractive alternate method of recording Electromyographic (EMG) signals. This solution enable the design and production of a functional textile interface between the amputated limb and the socket of the prosthetic device to improve wearability and comfort at the same time facilitating myoelectric control of powered prosthesis.

This project support the shift of the healthcare paradigm from the traditional mode of “hospital” based treatment to self-administered, person-centred treatment performed in the home environment.

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