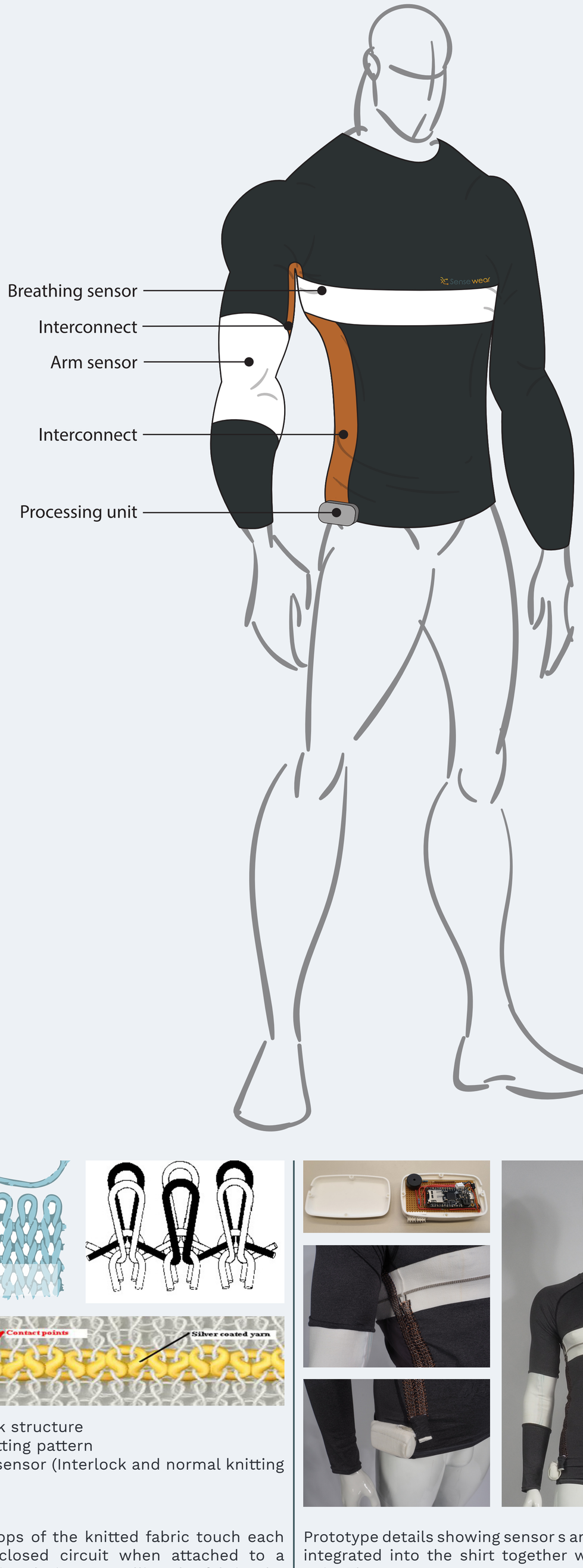
Knitted smart textile sensors

Integrating technlogy into garments by using knitting

By: Daan van der Valk

Keeping an eye on body performance and personal health, also called E-health, is becoming more and more popular. Smart wearables like fitness bands and smartwatches make this type of monitoring possible. As technology changes and improves constantly, clothing would be a perfect new medium to integrate technology in, as we are in contact with textiles daily.



SenseWear is the results of this vision. A wearable garment with integrated knitted breathing and arm movement sensor.

The arm sensor can detect small and large movements and has been tested from 10 - 40% strain. The breathing sensor is able to detect the small increase in the chest when the wearer is breathing.



Knitting was done on the Stoll CMS 530 dual gauge knitting machine. This machine is also used in the garment industry to create all things knitted like sweaters, beanies and more.

Top right: Interlock structure
Top left: Basic knitting pattern
Bottom: Photo of sensor (Interlock and normal knitting combined)

The conductive loops of the knitted fabric touch each other creating a closed circuit when attached to a resistance measuring device. By pulling the fabric, the loops gradually stop touching, increasing the path length for electricity to flow, thus increasing the resistance.

Prototype details showing sensor s and interconnections integrated into the shirt together with the processing unit. The sensor are sewn onto an existing pressure shirt.