

SMART CLOTHING FOR COOLING

Information: k.m.b.jansen@tudelft.nl

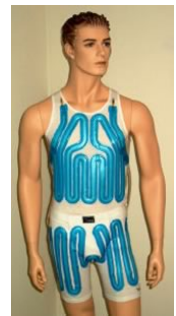
Key words: Cooling vest, new technologies, external vessel system, 3D printing

INTRODUCTION

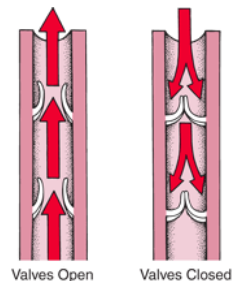
Humans need to control their body temperature within a restricted temperature range in order to function properly and clothing plays an important role in this thermoregulation process. The most simple strategy humans use to cope with fluctuating thermal conditions is to change clothing whenever the conditions change. We take out our sweater when we get warm during running or when the sun starts to shine and we put on our thick coat when we go outside in winter. There are, however, a series of occasions where it is difficult, undesirable or impossible to change clothing in order to respond properly to fluctuations in external or internal conditions, for example:

- hot environments where the body needs sealed protection (Ebola suits, steel workers)
- sports in warm environments (hockey, football, cycling, etc)
- medical: local cooling of injuries and hot flashes
- workers in rapidly changing thermal conditions (fork lift drivers)

In this project you will develop new and innovative solutions for clothing which can actively control the body temperature. This will not only give people more comfort in hot or cold environments but is also intended for professional users which are exposed to extreme conditions for a longer time and still have to perform within the safety limits, for sportsmen striving to improve their performance and for patients requiring cooling of specific body parts.



The new cooling solution in this proposal is based on the human blood circulation system itself. We intend to integrate an artificial external system of flexible tubes equipped with 3D printed valve sections in a garment. During body movements the tubes are continuously compressed and released and since the valves only allow the fluid to flow in one direction, the result is a net flow which can be used to spread the heat towards previously selected body parts. In this way we create a radically new cooling method which uses the human body energy to power the fluid circulation system. We want you to design and test this cooling system and produce a functional prototype which will be used for further research and testing.



RESEACH TEAM

This project is part of the STW Smart Clothing project of the Emerging Materials chair in which the AMFI (Amsterdam Fashion Institute), as well as Inuteq (personal cooling apparel), Teijin Aramid (heat resistant fibers) and Tanatex (cooling sizings for textile) are involved. During your project you can use the technical expertise and facilities of the Applied Labs as well as those of the AMFI and the companies involved. You will cooperate with physiologists as well as other students and researchers in the STW project.

YOUR ASSIGNMENT

You will design and test a new cooling system for the temperature control of the human body based on the working principle of the human blood circulation and integrate this in a functional smart garment.