

Media communiqué

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Empa spin-off develops a sweating robot for industry and research

High-tech dummies that perspire

Last year four spin off companies were founded based on Empa technologies, one of them being Humanikin GmbH, established in October. Founder and ex-Empa researcher Mark Richards has been developing mannequins – special life size dummies which can move and perspire, thereby imitating the human body as realistically as possible. They are used in the development of better functional clothing for use in sports or for extreme working applications.

Although Mark Richards and his company, Humanikin GmbH, have been standing on their own feet for several months now, in one respect they have never left Empa. The British physicist and physiologist has set up his new business on the premises of the “tebo”, the Technology Center of Empa St. Gall. In these rooms lives SAM, the **S**weating **A**gile thermal **M**anikin. SAM is an articulated life size dummy which sweats, and is therefore capable of accurately simulating the human body in terms of heat loss, perspiration and movement. SAM represents the pinnacle of current development, being based on Richard’s previous models including a sweating torso (created to evaluate sleeping bag materials) and a sweating head called “Alex” (used for climatic tests on a helmet).

First steps towards independence

The mannequins allow researchers to evaluate and compare functional textiles in a reproducible way under laboratory conditions for the first time. Previously the subjective impressions of test persons were used as the basis for judgment, a technique which was neither neutral nor scientifically reproducible.

SAM and his fellow dummies were a great success. Very quickly research institute and commercial companies became interested not just in Empa’s analyses and test results in this field but also in the simulation hardware itself, in order to allow them to carry out their own experiments. However, a research organization such as Empa is not in the business of manufacturing mannequins for third parties on an industrial scale. Nevertheless, the level of demand for his dummies gave Mark Richards the idea of establishing a spin-off, so after securing Empa’s support he presented his business model to the “tebo” and worked out a business plan.

Just the beginning....

Richards has plenty of new ideas about building intelligent thermal controls, for some of which patent applications have already been made. For example, SAM will be equipped with an improved skin to allow the

heat losses to be more accurately measured. Richards intends to develop systems which will better imitate the local dynamic perspiration behavior and skin temperature. As part of this development SAM will also become more human – he will be given an anatomically shaped face as well as hands and feet.

Customers for “SAM v2.0” include other research institutions apart from Empa itself and companies involved in the textile industry. Humanikin GmbH will not, however, actually produce the dummies itself, but rather concentrate on generating innovative ideas and working in cooperation with industrial partners who will manufacture and sell the mannequins (or component parts).

The demand is not just for complete mannequins – a model head is sufficient, for instance, in order to evaluate and test a helmet. A mini computer tomograph is also planned, which will allow scientists to investigate in more detail using X-rays the physical processes which occur in articles of clothing placed on an area of artificial skin. This will throw light on what happens to perspiration and body heat in clothing.

Mark Richards also reckons that his application to establish an EU research project named “Prospie” (**P**rotective **R**esponsive **O**uter **S**hell for **P**eople in **I**ndustrial **E**nvironments) has a good chance of being successful. Submitted a short time ago, the application has already passed two stages of the acceptance process. The project team will develop working clothing which integrates thermal warning systems, with Humanikin being responsible for providing suitable sensors and electronics. In the research project Richard’s team will be working in a consortium together with 16 partners from all over Europe, including Empa.

Further information

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Pinocchio and his master: SAM the perspiring mannequin with his creator, scientist and young entrepreneur Mark Richards.

The image (in print resolution) and text in electronic format are available from redaktion@empa.ch