SEAMLESS E-HEALTH SYSTEMS

Dr Rita Paradiso of Smartex, Italy, describes how seamless bodysize knitting technology can become an integral part of health biomonitoring.

The use of the latest seamless knitting technology for integrating multi-sensory electronics into fabrics was a theme that ran through the 2nd Smart Fabrics conference held in Miami in March.

While still in its infancy, the market for 'smart fabrics' is said to be already worth US$340 million according to a recent study, growing at 19% annually and forecast to reach US$720 by 2008.

This rapid growth will be driven by applications in military, medical and sporting equipment, with implantable systems for monitoring heart rate, body temperature and other biophysical characteristics to the fore.

At the conference Dr Rita Paradiso provided details of the use of the latest advances employing Santoni SM4-TL-seamless knitting technology within the sphere of a number of EU-funded projects on body monitoring.

Dr Paridiso is research director for Smartex in Italy, which she described as a "compromise between industry and academics", backed by a number of traditional textile companies.

The first EU project that Smartex was involved in was WEALTHY, which established a system for a textile sensing shirt incorporating: six fabric ECG electrodes; four fabric impedence measuring electrodes; nine fabric insulated connections; four fabric piezoresistive sensors; and two embedded temperature sensors. "WEALTHY" is a wearable fully integrated system, able to acquire, simultaneously and in a natural environment, a set of physiological parameters like electrocardiogram, respiration, posture, temperature, movement index. Sensors and connections are integrated into the fabric structure, conductive fibres are woven with stretchable yarns. "WEALTHY" sensing textile interface also comprises a second EU project, MyHeart, developed this work by concentrating on prototypes aimed at detecting cardiovascular irregularities.

The technology has also been extended to bed linen for close-up monitoring of critically ill patients for 24 hour surveillance.

Electronics giant Philips is the driving force behind MyHeart, having come up with the idea and structure of the project. The consortium is now backed by 33 different organisations – including industrial concerns, research centres and hospitals. The result – available when the project ends in 2007 – should be a range of information and tools to help limit the chances of people ever contracting cardiovascular disease.

A metal component is necessary for the sensing, and a range of potential metal yarns has been investigated, including those containing conductive fibres such as stainless steel in blends with natural or synthetic fibres, yarns containing electroconductive fibres and polymeric or carbon-coated thread.

Silver yarns, made from X-Static fibre, which has a layer of pure silver permanently bonded to its surface, proved the most suitable in terms of textile processing, but not as good as other options for conductivity.

"Conductivity is the main property being exploited and for our applications, knitted technology is the right one, because we need different areas within the fabric structure with different types of yarns," said Dr Paradiso. "We have to decide in which