

Intelligent Biomedical Clothing: The Future of Personalized Health Management?

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The underway evolution in healthcare and health delivery is mainly driven by societal changes, progress in sciences and technologies but also the increase of medical knowledge. Citizens are more “health conscious” and patients become “health consumers” asking for better healthcare and life style management. Ageing population and chronic diseases increase steadily, while better and cost-efficient disease management and rehabilitation as well as minimally-invasive diagnosis and treatment become urgent requirements. The significant progress in sciences and technologies, e.g. in microsystems and nanotechnologies, telecommunications, artificial intelligence and information processing offer, for the first time, a number of new possibilities and solutions bringing ambient intelligence and miniaturisation.

Intelligent personal systems and services are currently under development, in Europe and world-wide, to enhance healthcare provision through cost-effective, continuous monitoring of physiological and physical data from the inner body. The research is focused on the integration of biomedical sensors, the user-friendliness and the ambient intelligence. The technological achievements, so far, make it realistic, however challenging, to concentrate more efforts on the integration of different sensors into a unified, user-friendly wearable material that has large contact surface with the body, i.e. the textile.

The development of Intelligent Biomedical Clothing (IBC) is based on multidisciplinary research and requires a strong co-operation between engineers and scientists from fields including, mobile and wireless telecommunications, microsystems and nanotechnologies, textile & clothing, biomedical engineering, telemedicine, as well as public health and healthcare.

There are a number of possible IBC applications spanning from a citizens’ health watch, to patients’ disease and life management, including rehabilitation, e.g. diabetes management, cardiovascular diseases prevention and emergency intervention, drug delivery and stress management.

¹ The views developed in this paper are those of the authors and do not reflect necessarily the position of the European Commission.

The integration part of the technologies involved e.g. biomedical sensors, actuators, computing, power source and telecommunications into a smart cloth is at present stage on the threshold of developing prototypes and pilot projects e.g. SmartShirtTM (Sensatex, USA) and “medical assistance suit” (VTAMN French National Project). Several issues remain to be solved before large scale trials and clinical validation e.g. production of higher conductivity textile material, cleaning and washing, signal processing and data interpretation. Mid to long term R&D targets full integration of sensing, processing, actuating and communicating functions in a woven structure. Further research is required also in user acceptance and business models. Finally, IBC involves, obviously, a number of ethical issues e.g. misuse of data collected as well as social issues.