

## **Connected Health and Sensors**

### **Summary**

Over the past 20 years, connected health-related research by Ulster University's Nanotechnology and Integrated Bioengineering Centre has led to three high value spin-out companies, Heartscape, Heartsine and Intelesens, which hold over 35 patents in sensors and electro-stimulation devices. Together these companies, currently valued at almost £100m, have engineered medical innovations that have helped save many lives and have had global impact on healthcare costs and government policies.

### **Impact**

The impact of the university's research in these Connected Health related disciplines can be summarised as follows:

- over 150 jobs created across three spin-out companies, over £37m of investment and in excess of £30m annual sales;
- low-cost technology for critical care use that saves hundreds of lives every year, improves quality of life and cuts healthcare costs;
- enhanced global interest in the potential of home and hospital-based wireless monitoring;
- technology that is widely viewed as the future of healthcare sensor systems;
- new funding and business partnership models with multinational companies;
- best practice techniques for model clinical agreements;
- influence on government strategy and policy.

### **Products**

Our technology has led to a product portfolio which includes devices such as PRIME ECG, Vital Signs Wireless Patch, 12-lead Holter-telemonitoring, AED defibrillators, telemonitoring platforms and ECG electrodes. In particular, Ulster University's licensed electrode technology helped create the world's best-selling disposable ECG electrode, with over \$70m sales and now sold by Tyco, HP, Ludlow and Space Labs, among others.

Heartsine's Automatic Equipment Defibrillator is the world's most compact AED, generating an annual turnover of £20m; the telemedicine-based 12-lead electrodes systems have produced \$5m in licensed sales; and a 120 electrode ECG mapping system called PRIME ECG is now selling via Heartscape/Veratron (USA).

Intelesens has developed a miniaturised chest-worn platform incorporating wireless, algorithms for arrhythmia and motion detection as well as impedance-based monitoring of temperature and respiration patterns. The company is currently developing a range of products including chest-worn SpO<sub>2</sub> monitors and pulse-wave velocity sensors. A multinational is presently planning a worldwide roll-out of a monitoring system, which brings ECG arrhythmia recognition, respiration rate, fall detection, body temperature and heart rate into one wearable platform.

## Policy

Through the research carried out at the Nanotechnology and Integrated Bioengineering Centre, the university has played a pivotal role in establishing local health initiatives that have directly resulted in an increased focus at ministerial level; an inter-department MoU between the Northern Ireland Department of Health and Department of Enterprise and Trade; changes in policy; and an expansion in government Connected Health activities. Furthermore, the university's ongoing work in this area has created measurable economic and health benefits, with over 200 local companies and organisations benefiting through job creation and foreign direct investment.

The university has also built strong links with regional hospital trusts through its Centre for Advanced Cardiology Research, and has established substantial international collaboration agreements.

This connected health research has highlighted the value of tri-lateral partnerships with industry and clinicians that will continue to develop existing and new markets and clinical roadmaps for innovative sensor products that deliver substantial benefits in terms of both patient welfare and healthcare savings. The recent launch of the £6m Connected Health Innovation Centre will take much of this work forward.