# 'Anywhere, anytime' 3D motion capture technology is child's play in Edinburgh

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The sensors are the size of a small matchbox

Revolutionary technology that creates 3D computer animations from real-life movements without the need for expensive 3D cameras will be tested by children visiting this year's Edinburgh International Science Festival.

It will form part of the Festival's new exhibition 'InMotion' at the National Museum of Scotland.

Developed at the Centre for Speckled Computing at the University of Edinburgh with Engineering and Physical Sciences Research Council (EPSRC) funding, this world-leading technology uses unobtrusive 'intelligent' sensors attached to the body to track the wearer's motion. The data is sent wirelessly to a PC and, using specially developed software, turned into a 3D animated figure that exactly mimics the

movements of the wearer in real time.

To date, the only way of doing this has been to use high-tech 3D camera systems only available in leading-edge laboratories and big-budget movie and TV studios. But the new technology is easily portable and so can be used anywhere, anytime, as well as potentially offering much lower costs. It could make a huge impact in fields such as medicine and sport, as well as the entertainment industry.

At the festival, children will be able to strap sensors the size of a small matchbox to their arms, legs and bodies and watch a computer animation which moves exactly as they do.

Potential uses in healthcare are already being trialled, with important benefits achievable because the technology allows patients to be monitored in their own homes, while going about their daily routine. In gait analysis or the examination of children's fine or gross motor skills, for example, this means the patient can engage in their normal day-to-day activities rather than contrived movements in a laboratory or hospital environment, enhancing the value of the analysis. The data would simply be transmitted wirelessly over the internet and the computer animations studied 'live' or stored for later viewing.

There could also be benefits in the field of respiratory diseases, with sensors attached to the patient to monitor the rise and fall of the chest. This would not only enable monitoring to be undertaken remotely but would also dispense with the need for patients to wear a face mask or nasal tube.

In the world of sport, the technology could be used to analyse in 3D a golfer's swing or, in cricket, a batsman's technique. Other sports where it could potentially be harnessed include tennis and gymnastics.

The key to the technology is these sensors' ability not only to sense movement (as conventional sensors can already do) but also to process data autonomously and work together in wireless networks. This radically new concept in information technology is known as 'speckled computing' because each individual sensor (or 'speck') is so small, and it has the potential to revolutionise the way we communicate and exchange information.

"Thousands of specks could collaborate as a programmable computer network called a 'specknet'," says Professor DK Arvind, who is leading the work at the University of Edinburgh. "Specknets will act as a bridge between the physical world and the virtual world, linking them together more closely than ever before and capturing data where it simply hasn't been possible to capture it in the past.

"In terms of 3D motion capture, speckled computing takes the process out of laboratories and studios and enables it to be undertaken in almost any environment. It really is all about democratising 3D motion capture, a technology which until now has only been available to an elite few."

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