Olympic sensing

Advanced motion sensor technology has sharpened Team GB's training

- **Wearable sensors developed at Imperial College London help athletes and their coaches monitor performance and identify where improvements can be made**
- **The sensors have been used for training GB's Olympic athletes across many sports**

Wearable sensors, developed at Imperial College have been adopted for Olympic training helping identify the often tiny alterations to movement, which are necessary to sharpen competitive edge. Their 'e-AR' device (shown above) is ear-worn and mimics the natural function of the inner ear for measuring balance, gait, as well as shock-wave transmission through the skeleton.

The e-AR sensors were eagerly adopted into Olympic training for Rowing, Bobskeleton, Cycling, Sailing, Canoeing and Field Hockey.

This has led to innovative training solutions for GB athletes. For example, bob-skeleton coaches were able to alter the warm-up process after using the sensors with the athletes.

The sensor device has been further developed for use during swimming. By using the pitch and roll angles, the sensor detects the type of stroke and the wall push-offs. Lap count and split times are derived from this. In addition to the ear-worn device the researchers have now added sensors for swimmers to wear on wrists and ankles collecting more information about their movements.

How can Olympians increase their competitive edge?

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Find out more

Tiny alterations during an athlete's training can make all the difference at Olympic level. Yet coaches have a very hard time detecting where improvements can be made when working with such near-perfect sports-people. Imperial's wearable sensors provide a solution to this.

Batteries are usually the largest and heaviest component in wearable sensors. The sensors created at Imperial College are based on innovations that enable them to operate with very low power consumption, minimising the size of the battery required. Another key element is the real-time processing of the data which happens on-board the sensors.

The researchers at Imperial College are now working to extend the benefits of the wearable sensors into healthcare. The sensors are able to monitor patients' recovery after operations that affect their mobility. So far, there have been several clinical trials at the Imperial College Healthcare NHS Trust with over 150 patients. The sensors enable comparison of patient recovery and remote monitoring for early detection of complications.

> "[Imperial's sensors resulted in] tangible impacts for the preparation of our athletes for Vancouver 2010 and London 2012"
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> **Dr. Marco Cardinale, Head of Sports Science and Research - British Olympic Association**

> "Providing both athletes and trainers with sport-specific real time feedback allows for understanding of training and race analysis and performance"
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> **Paul Thompson MBE, Chief Coach – Women and Lightweights - GB Rowing Team**

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