

# TECHNOLOGY PROFILE

## Sensing Device to Evaluate Pedalling Technique

### Technology Overview:

Researcher Dr David Rouffet and Bio-instrumentation Engineer Mr Robert Stokes from the School of Sport & Exercise Science, Faculty of Arts, Education and Human Development and the Institute of Sport and Active Living (ISEAL) at Victoria University have developed a sensing device which is capable of measuring the position of the crank arm and changes in pedalling cadence within a pedalling cycle when cyclists are riding in real-world conditions. Existing devices detect only one or two crank arm positions and can calculate only an average cadence value per pedalling cycle.

This innovative sensing device will measure and display a novel indicator of pedalling technique calculated from cadence (or pedalling rate) values obtained at different parts of the pedalling cycle (defined from the crank arm positions). This new indicator of pedalling technique will be easy to interpret and is relevant for recreational and professional cyclists, cycling coaches and researchers.

It is possible to embed the sensing device in the bottom bracket of any type of bike (road, track, mountain, BMX, etc.) and to connect it to an existing cycle computer or smart phone in order to display the new indicator of pedalling technique.

The device is unobtrusive, weatherproof, and because of the way it is embedded, it will not compromise the pedal stance i.e. there is no encoder wheel/take-off sprocket fitted between the crank bearing and the pedal as in other systems.

### State of Development:

The first prototype sensing device is under development and should be available in early November. This prototype will allow instantaneous variation of pedalling cadence to be measured and analysed in order to describe the pedalling technique.

Additional technical support is being provided by our external development partner with whom we have entered into a collaborative research agreement.

### Intellectual Property Position:

This technology is protected by Australian Provisional Patent Application Number 2011901094 entitled 'Sensing Device', filed on 7 April 2011.

### Market Overview:

In 2011, annual world bicycle production is estimated to be **108,799,200** units<sup>1</sup>. In 2009, NBDA<sup>2</sup> estimated that 2,977,589 **performance bicycles** were sold in the USA, of which the top three manufacturers by market share were Trek (22.8%), Specialized (10.8%) and Giant (10.1%). The relevant performance bike market was segmented as follows:

Road/700c bikes	14.9% or 365,664 units
Mountain bikes	27.8% or 685,534 units <sup>3</sup>

<sup>1</sup> <http://www.worldometers.info/bicycles/>

<sup>2</sup> National Bike Dealer's Association

<sup>3</sup> Bicycle Retailer & Industry News, July 1, 2010, p.32

In 2007, the top three international manufacturers of **all bicycles** were China (87 million), Taiwan (4.9 million) and Italy (2.52 million). The top three exporters of bicycles were China (59.23 million), European Union (6.1 million) and Taiwan (4.75 million)<sup>4</sup>.

In the USA, cyclists are predominantly well-educated affluent, white, male baby boomers. In 2009, 3.9% were Afro Americans while 3.7% were Hispanic. In 2008, 53.2% of all cyclists were male, while 46.8% were female<sup>5</sup>.

The market for performance bikes is relatively stable but may be affected by external factors such as downturns in the economy, shifts in recreational trends and the move to a 'green' economy.

### **Opportunities for Technology Co-development:**

Victoria University is seeking partners who have an interest in licensing this technology for further development and commercialisation.

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<sup>4</sup> Bicycle Retailer & Industry News, July 1, 2008, p.33

<sup>5</sup> Ibid. June 1, 2009, p.26