Microsleeps: Characteristics, dangers, underlying mechanisms, detection, and countermeasures

Professor Richard Jones ME, PhD, FIPENZ, FACPSEM, FAIMBE, FlnstP, FIEEE

Lapses of responsiveness (‘lapses’) - microsleeps (0.5-15s), attention lapses, and lapses of task-focused attention—are complete transient disruptions in performance. They can be a surprisingly frequent phenomenon in healthy subjects—even when not sleep-deprived—and particularly so when engaged in extended monotonous tasks. They are of particular importance in the transport, military, and medical sectors in which there is a need to maintain sustained attention for extended periods and in which lapses can lead to multiple-fatality accidents. Our primary focus is on microsleeps, with contributions covering aspects of behavioural detection and characterisation, EEG-based characterisation and detection, and determination of the underlying mechanisms in the brain via simultaneous fMRI+EEG+EyeVideo while performing an extended continuous 2-D visuomotor tracking task. In addition to improving our understanding of what happens in the brain during microsleeps, we are using this improved knowledge of the spatiotemporal dynamics of microsleeps to substantially improve the early detection, and even prediction, of microsleeps and to use this as the basis for a non-invasive early-warning system with the potential to save many lives.

This talk will (i) provide an introduction into lapses, (ii) overview their importance in the real world, (iii) overview some of the key findings from our research studies on microsleeps and underlying mechanisms, especially in relation to sleep deprivation, fatigue, and obstructive sleep apnoea, (iv) indicate where we are at in the development of a head-mounted multi-modality lapse detection system, and (v) highlight some remaining challenges in an area which is both fascinating and of such importance to prevention of fatal accidents.

Dr Richard Jones is a neuroengineer & neuroscientist, Director of the Christchurch Neurotechnology Research Programme (www.neurotechnz.com) based in the New Zealand Brain Research Institute (www.nzbri.org), a biomedical engineer at Christchurch Hospital, and a Professor in Electrical & Computer Engineering, and Psychology, and Communication Disorders at University of Canterbury. He is also a Research Associate Professor in Medicine at University of Otago. His research interests fall largely within neural engineering and the neurosciences, with a focus on behavioural and physiological aspects of human performance, particularly relating to lapses of responsiveness and development of lapse detection technology. He is Editor of the Neural & Rehabilitation Engineering Theme at IEEE-EMBC Conferences and an Associate Editor of IEEE Transactions on Neural Systems and Rehabilitation Engineering.

Date: Thursday 23rd July
Time: 10:00am—12 noon
Venue: Seminar Room 3, Technology Park
         Bentley—Conference & Business Function Centre
Address: 2 Brodie Hall Drive,
         Bentley.

Parking is available at the Function Centre with over-flow on the grassed area.

Refreshments will be served after the seminar.

RSVP by 16/07/2015 to
matthew.govorko@curtin.edu.au