PGTA Project Proposal

Discipline:	Biomechanics and Motor Control
Project Title:	Optimal control of long-term feedback during periodic and continuous movements
Supervisory Team:	Dr Glen Blenkinsop Dr Michael Hiley
Summary of proposed project:	Movement variability is inherent in human movement, which during periodic and continuous movement may accumulate over time to cause significant deviations away from the planned movement pattern. To prevent such drastic errors in movement the central nervous system employs a feedback mechanism which detects deviations from the planned movement and triggers the appropriate response to correct the motions. Consequently, such a feedback control mechanism will produce further variability in the executed movement patterns, which may be mistaken for other forms of movement variability. Furthermore, errors within this long-term feedback control mechanism will result in poor postural control in prolonged gait and balance tasks, increasing the chance that the individual will fall or a sports performance will be threatened. The proposed project will use a combination of EMG, kinematic (motion capture) and kinetic (force plates, instrumented treadmill) data collection to examine and isolate the changes in movement coordination due to internal feedback mechanisms during continuous and periodic movement patterns (such as gait, tumbling, or high-bar giant swings). Subsequently, a computer simulation model will be created to recreate the predicted feedback processes to recreate the action under investigation during multiple cycles using a long-term feedback control strategy (such as a central pattern generator with PID controller).
Required skills, experience, and/or education:	Applicants should have at least a 2:1 Honours degree (or equivalent) in sport science (with a large component of biomechanics), physics, engineering, mathematics or a related subject. A relevant Master's degree and/or experience in one or more of the following will be an advantage: computer simulation modelling (OpenSim, AnyBody, Visual3D, etc.), 3D motion analysis (Vicon, Qualisys, etc.), MATLAB or similar.
Link to School research theme:	Sport Performance Lifestyle for Health and Wellbeing