PGTA Project Proposal

Discipline:	Biomechanics and Motor Control
Title:	To determine the underlying control strategy employed in human locomotion.
Supervisory Team:	Dr Michael Hiley Dr Sam Allen
Summary of proposed project:	Aim: To determine the underlying control strategy employed in human locomotion: walking, jogging, running. In order to realise the overall aim, it will be necessary to determine the level of noise to be introduced at the motor command level to recreate the observed kinematic variability in human locomotion. A combination of experimental and theoretical (computer simulation) approaches will be required. Summary: In everyday activities, such as walking, the underlying control strategy is often considered to be that of minimising effort (joint torques) or minimising. However, when using such criteria to optimise technique, the patterns of movement produced differ from those used in human gait, particularly in relation to the amount of foot-ground clearance. Similarly, when optimising sporting movements minimising joint torque has been used with limited success, since sporting activities are often defined by maximising the expenditure of effort or energy in order to achieve a performance outcome. As a result, neither criterion (minimising joint torque or energy) can fully explain the control strategy employed during human locomotion. When a person performs the same task a number of times it might be expected that within each attempt there will be some variability in the technique used. Some of the variability will be due to feedback mechanisms occurring during the movement, errors in the localization (estimation of initial conditions) and movement planning stages, together with execution errors due to noise within the motor system. It has been proposed that maximising the likelihood of success at a task, despite the presence of noise from within the motor system. Preliminary work has demonstrated that the underlying strategy for some sport related tasks could be explained by attempting to maximise success. However, it is unclear whether maximising success can explain the technique used in more fundamental skills such as locomotion.
Skills/experience/ education required:	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, 3D motion analysis applied sport science support.
Link to School research theme:	Sport Performance