1. **Title of PhD Project**

Kinetic and EMG response sequences in the sprint start in athletics

1. **Supervisor(s) Details**

Professor Drew Harrison, Biomechanics, PESS Department, University of Limerick

1. **Aims of the Research**

This research aims to map the force and muscle activation responses in the sprint start from blocks in athletics in trained and novice athletes. The data will be acquired using a custom built instrumented starting system and wireless EMG.

1. **Short Justification/Rationale/Background to the Project**

The sprint start in athletics in a key part of all sprint and hurdle events up to and including 400 m. Previous research in our group has shown that the technology and the rules governing the detection of false starts need to be reconsidered (see Bronsnan, Hayes & Harrison, Journal of Sports Sciences, <http://dx.doi.org/10.1080/02640414.2016.1201213>). Ongoing research in the biomechanics research unit has led to the development of new false start detection technology, however more work is required to examine the sequence of Kinetic and EMG responses in the sprint start from blocks. This project will seek to validate the newly developed technology and examine the muscle activation and kinetic responses of elite and novice athletes in the sprint start. EMG response data will be acquired using Delsys Wireless EMG sensors.

1. **Study Design**

This research will examine the force and muscle activation responses in the sprint start from blocks in athletics. The data will be acquired using a custom built instrumented starting system and wireless EMG. The project will consist of a series of linked experiments examining various aspects of force generation in the sprint start. The initial pilot studies will validate the force acquisition system and obtain reliability data. Biological variability in force generation will be examined in trained and novice sprinters using repeated measures (within subject variability) to facilitate magnitude based inferences in later studies.

Finally a training based intervention study will examine the effects of strength training on reaction time, electromechanical delay and rates of force development in sprint and novice athletes.

1. **Participants & Procedures/Methods**

Participants will be recruited from international sprinters in Ireland and novices from the UL campus community.

1. **Data Collection and Analysis**

The data will be acquired using a custom built instrumented starting system and wireless EMG. Competence in Matlab or another suitable programming language will be required for data analysis. Similarly statistical analysis skills using R are desirable. Some courses are available in Matlab and R as part of the structured PhD programme.