

## Vicon's tools for the Sports Scientist

Vicon offers state of the art motion capture hardware and software. Capturing the data is a streamline process, but how the sport scientist models the captured data can vary in many ways. This workshop will outline the different possibilities of data processing that Vicon software offers post data capture. Modelling your data at a basic level using nativePiG and ProCalc, and at an advanced level through integrated Matlab and Python, will be demonstrated by Vicon engineers Sarah Ward and Dr Aaron Chin.

Dr Cyril J Donnelly (University of Western Australia) and Dr James Dunne (Stanford University) will host a short tutorial providing a brief overview of the computational tools needed to get your motion capture data into OpenSim. During this tutorial, you will also be provided with a detailed overview on a novel marker registration technique demonstrated to improve the accuracy and reliability of joint angles calculated in OpenSim (i.e. inverse kinematics).

Vicon has recently been involved in an FP-7 European funded project (RePlay Project) which aims to provide a beneficial resource for the protection, preservation and promotion of traditional and minority sports, through the use of innovative technologies, investigations and the extraction of expertise from leading traditional sports bodies and associated professional organisations. Dr Amin Ahmadi (Dublin City University) will present the use of a Vicon system in conjunction with inexpensive sensor modalities (Kinect and wearable inertial sensors) to capture, digitise, preserve and promote traditional sports and games in Europe.



**Dr Amin Ahmadi** received the PhD degree in MEMS Inertial Sensors and Motion Analysis from Griffith University, Brisbane, Australia in 2010. His research was highlighted as a feature in the New Scientist and appeared on the BBC and ABC television and radio channels. He along with his colleagues also won the Australian prestigious Minister Excellence Award for Innovation and Creativity in Wireless Monitoring of Sports Performance.

Currently, he is involved in a number of European funded projects to develop novel solutions for monitoring and analyzing human movements using wearable inertial sensors and computer vision techniques. His research interests include sensor fusion, machine learning and human motion analysis using wearable inertial sensors for rehabilitation and sporting activity applications.



With unique skill sets in experimental research and neuromusculoskeletal modeling and simulation, **Dr Donnelly**'s research interests are associated with bridging the nexus between these seemingly disparate fields. Specifically, Dr Donnelly uses neuromusculoskeletal modeling and simulation (i.e. *in-silico* research) to inform best practice sport injury prediction and sport injury prevention prescription among community and elite level athletes. Following conferral of his PhD in September 2012, Dr Donnelly appointed to Lecturer (ongoing), where he helps lead the Biomechanics research group in the School of Sport Science, Exercise and Health at the University of Western Australia. Though still classified as an early career researcher, Dr Donnelly has already supervised 11 Honours students, 3 MSc students, 1 MPhty and 1 PhD student to completion and is currently supervising 2 honors students, 1 MSc student and 11 PhD students. These supervisions involve collaborations across Australia, the United States, the United Kingdom and Japan. Dr Donnelly has also shown a strong ability and capacity to publish in international journals, with national and international level research groups. This is evidenced from his evolving track record (h-index 7), which includes 13 high quality manuscripts, (70% listed in the Q1 of each journals FOR), in international peer reviewed journals with 5 manuscripts currently under review. Dr Donnelly has also delivered 45 conference presentations, 2 keynote lectures and 23 invited lectures to date. Dr Donnelly's long-term research goals are to use his international research ties to secure nationally competitive grants and broaden the scope and application of his research so to inform best practice clinical care for athletic and clinical populations across Australia and the world.

**Sarah Ward** has been a member of the Vicon Life Science Support team



for the past 3.5 years. Throughout this time she has travelled the world visiting universities, institutes and hospitals gaining extensive experience in motion capture and motion capture protocols. Part of her daily role includes consulting, teaching and training Vicon users for their specific project requirements. She has gained a broad understanding of data acquisition devices due to their integration into Vicon software. Sarah is currently completing her PhD in Biomechanics at The University of Western Australia with a research focus on the kinetics and kinematics of the upper limb of professional violinists.