Career Case Study – Professor Iain Spears

Professor Spears’ background is engineering, specialising in computational biomechanics in the areas of sport and exercise. Prior to sport and exercise, he worked in dental and orthopaedic research, completing his PhD at Liverpool University in the Department of Human Anatomy and Cell Biology.

His dental research work looked at the internal structure and mechanical properties of dental materials. His orthopaedic research involved the development of a virtual-reality testing environment for non-cemented hip replacements.

Together with students, Iain is studying metatarsal fractures in footballers using simulations to identify the cause. He has also worked with final-year students to research mouth guards and bike seats. The impact of being bit by a cricket ball is very different to being hit by a boxing glove. They found that mouth guard designs need to be sport-specific.

Their computer modelling of the interaction between bike seats and the body looked at how arteries and nerves get compressed. When sitting, weight is frequently placed on the ischial tuberosity (sitting bone). It’s important to get this bone over the top of your bike seat, rather than hanging off it. As a result, the team have made recommendations on safe cycling.

A boxing computer game has been tested out on 50 unhealthy men from Teesside as part of research into whether this type of game can improve people's health. Gamers find themselves up against a virtual boxer who reacts to their punches. Co-researcher Dr Alan Batterham, professor of exercise science said: "There is a growing body of evidence that brief relatively high-intensity exercise of this type is beneficial for health.

<http://www.telegraph.co.uk/education/universityeducation/8831727/Ten-life-changing-ideas-under-research-at-UK-universities.html?image=9>

Dynamic Motion Detection (DMD) Limited has been established on the back of this research and in collaboration with an Australian company, a new product called ShadowBoxer ACTIVE has been developed. This harnesses photorealistic 3D computer games and sophisticated motion capture technology to allow players to train in a virtual gym, punch along to their favourite music or fight against an opponent. The opponent can be either an artificially intelligent boxing avatar or a friend.   
  
Gamers of all ages and skill levels can undertake brief, High-Intensity Interval Training – or HIIT - a method of exercise which has been shown to significantly improve health with as little as 6-9 minutes exercise per week.

Iain is also working on a patented computer modelling system tracking human motion to predict falls in the elderly.