

<b>Project Title</b>	Computational prediction of vascular injuries after traumatic brain injury
<b>Supervisor</b>	Prof David Sharp (Department of Brain Sciences) Dr Mazdak Ghajari (Department of Design Engineering)
<b>Theme</b>	Biomechanics and Mechanobiology Computational and Theoretical Modelling
<b>Project Type</b>	Desk based
<b>Project Description</b>	<p>Head exposure to large mechanical forces in sporting collisions, road traffic collisions and falls can damage different tissues, such as vessels. Vascular injury is a key injury, which determines the direction of care in the acute phase and is a biomarker of mild traumatic brain injury. The capability to accurately predict vascular injuries will provide new opportunities for improving clinical care and prevention systems.</p> <p>We have developed a high-fidelity computational model of traumatic brain injury (TBI), which allowed us to predict the location of pathology seen in post-mortem cases and MRI data from live patients. The model has been improved by incorporating detailed anatomy of vessels and validated for a few cases.</p> <p>This project will focus on two aspects: a) predicting vascular injuries in more cases to improve our understanding of its biomechanics and b) using deep learning to develop a surrogate model that predicts vascular injury in real-time. The outcome of the project will be a new tool that will allow us to test and improve the prevention effects of mitigation systems.</p>