AMME/Westmead 2017/1 Paediatric Orthopaedic Implant Design

Primary Supervisor (FEIT): Dr Tegan Cheng tegan.cheng@sydney.edu.au – Sydney Medical School; School of Aerospace, Mechanical and Mechatronic Engineering; Kids Research Institute
Secondary Supervisor (Westmead): Professor David Little david.little@sydney.edu.au – Head, Orthopaedic Research and Biotechnology, Department of Orthopaedics

Project Description: The developing skeleton brings unique challenges to the successful design of medical devices for the paediatric population. Children have very different needs to adults, and medical device design requires consideration of their relative size, rapid growth, and high levels of physical activity.

In this project, the student will assist in the development of specialty orthopaedic for children’s fractures. This device will improve the fixation of young children with fractures in the femur. This project will involve computer modelling, 3D printing, and an iterative approach to medical device development.

AMME/Westmead 2017/2 Motion-Corrected Computed Tomography (CT) – Development of a Compact Optical Head Motion Tracking Method

Primary Supervisor (FEIT): Dr Andre Kyme andre.kyme@sydney.edu.au – School of Aerospace, Mechanical and Mechatronic Engineering; Brain and Mind Centre
Secondary Supervisor (Westmead): Professor Roger Fulton roger.fulton@sydney.edu.au – Faculty of Health Sciences

Project Description: Motion-corrected computed tomography (CT) is vital for achieving the highest possible diagnostic image quality without patient sedation or anaesthesia.

In this project the student will develop a compact optical head motion tracking method for CT to be integrated into a clinical scanner at Westmead Hospital for testing and validation. The student will acquire skills in computer vision, medical imaging, software and hardware development, and experimental methods. Outcomes of this project could lead to significantly reduced risk in imaging populations with a high propensity for motion, especially paediatrics.

AMME/Westmead 2017/3 Development of a Smartphone App for the Follow-Up of Patients with Liver Cancer

Primary Supervisor (FEIT): Associate Professor Zhiyong Wang zhiyong.wang@sydney.edu.au – Biomedical & Multimedia Information Technology Research Group; School of Information Technologies
Secondary Supervisor (Westmead): Associate Professor Vincent Lam vincent.lam@sydney.edu.au – Surgery, Westmead Clinical School

Project Description: Primary and secondary liver cancer is one of the most common cancers worldwide. After treatment, frequent follow-up blood tests and CT/MRI imaging are required to assess the treatment efficacy and to monitor the development of recurrent disease. There are significant burdens for patients to remember to get these important tests done at the correct time as well as for doctors to follow-up with the patients.

A development of a smartphone app will provide a communication platform for the patients and doctors:

• To provide timely notifications to patients for the requested tests
• To alert the doctors to chase the test results
Utilisation of Eye Tracking and Hand Movement Feedback to Enhance Surgical Skills Training

**Primary Supervisors (FEIT):** Associate Professor Jinman Kim [jinman.kim@sydney.edu.au](mailto:jinman.kim@sydney.edu.au) – BMIT Research Group; School of Information Technologies; Biomedical Engineering and Technology, and Dr Ashnil Kumar [ashnil.kumar@sydney.edu.au](mailto:ashnil.kumar@sydney.edu.au) – School of Information Technologies; Institute of Biomedical Engineering and Technology  
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**Project Description:** Our hypothesis is that inexperienced technicians (i) use their dominant hand effectively, but struggle due to the relative inactive, non-dominant hand; and (ii) view the operative field less effectively (smaller field of view), thereby limiting their interpretation of the surrounding anatomy and reducing safety.  
We propose an eye and hand tracking analysis, using computer vision technology, to not only highlight deficits, but positively enhance the learning across a range of experiences/technical skills.

Controlled Impedance Ankle Foot Orthosis (AFO)

**Primary Supervisor (FEIT):** Professor Alistair McEwan [alistair.mcewan@sydney.edu.au](mailto:alistair.mcewan@sydney.edu.au) – Biomedical Engineering and Technology; School of Electrical & Information Engineering; CARlab  
**Secondary Supervisor (Westmead):** Dr Matthias Axt [matthias.axt@health.nsw.gov.au](mailto:matthias.axt@health.nsw.gov.au) – Children’s Hospital at Westmead, Department of Orthopaedics & Orthopaedic Surgery

**Project Description:** This project involves the design of an advanced foot orthosis worn by those with movement disorders commonly as a result of stroke or brain injury. The suggested advancement is to use a material with controlled mechanical impedance to fill the gap between fixed and hinged AFO. The target group would be foremost children with cerebral palsy.

Analysing Food Intake from Meal Photos

**Primary Supervisor (FEIT):** Associate Professor Zhiyong Wang [zhiyong.wang@sydney.edu.au](mailto:zhiyong.wang@sydney.edu.au) – Biomedical & Multimedia Information Technology Research Group; School of Information Technologies  
**Secondary Supervisor (Westmead):** Professor Clara Chow [clara.chow@sydney.edu.au](mailto:clara.chow@sydney.edu.au) – Medicine, Westmead Clinical School

**Project Description:** Dietary pattern is an important determinant and component of management of many chronic health conditions. Diet is difficult to quantify simply and it can be difficult when looking at your plate of food to quantify its overall health value and how it might be improved.  
This project aims to harness the state-of-the-art vision computing techniques for better investigating public health issues. We will apply such techniques to monitor the diet of a user by automatically analysing food intake from meal photos.