THE UNIVERSITY of ADELAIDE

Summer Research Scholarships

School of Mechanical Engineering

Project Titles 2017/18

Virtual reality and virtual acoustic simulation
Supervisor: A/Prof Carl Howard

Kinematic modelling of a human wrist motion using a computer game engine
Supervisor: A/Prof Carl Howard

Aortic motion analysis for heart attack prediction
Supervisor: Dr Mergen Ghayesh

Plaque growth in coronary arteries
Supervisor: Dr Mergen Ghayesh

Wave energy convertors: Design and analysis
Supervisor: Dr Mergen Ghayesh

Advanced measurement techniques for diseases arteries.
Supervisor: Dr Rey Chin

High Fidelity simulations for diseases and stented coronary arteries.
Supervisor: Dr Rey Chin

Drag suppression in rough wall turbulent flows.
Supervisor: Dr Rey Chin

Supersonic and hypersonic jet flows.
Supervisor: Dr Rey Chin

The effect of temperature gradients on the acoustic absorption in industrial silencers.
Supervisors: Prof Ben Cazzolato and A/Prof Carl Howard

Guided waves: applications to defect diagnostics, stress measurements and prediction of damage from earthquakes
Supervisors: A/Prof Kotousov, Dr Alex Ng and Dr Aditya Khanna

Advanced Digital Image Correlation for strain evaluation: from meters to nano-meters and from seconds to nano-seconds.
Supervisors: A/Prof Kotousov and A/Prof Giang Nguyen

Introduction to Fatigue and Fracture of Engineering Structures
Supervisor: A/Prof Kotousov

3D printing of Al12Si alloy using Selective Laser Melting
Supervisor: A/Prof Reza Ghomashchi

The effects of high-rise buildings on wind speed and comfort in the City of Adelaide
Supervisor: A/Prof Maziar Arjomandi

The effect of inversion layer stability of frost formation
Supervisor: A/Prof Maziar Arjomandi

Assessment of the performance of molten salt enriched by nano-particles in a solar-thermal system
Supervisor: A/Prof Maziar Arjomandi

Design and build an experimental rig for hemodynamic investigation of arteries
Supervisor: A/Prof Maziar Arjomandi

Analysis of pulsed air on solid-fuel combustion for cook stove development
Supervisor: Dr Cris Birzer

Numerical assessment of undershot paddle wheel performance for power generation
Supervisor: Dr Cris Birzer

Kinematic evaluation of bending, lifting and car ingress/egress techniques for patients with low back pain
Supervisors: Dr Claire Jones, Dr Will Robertson and Ms Erica Beaucage-Gauvreau

OpenSim musculoskeletal modelling for evaluation of lifting techniques
Supervisors: Dr Claire Jones, Dr Will Robertson and Ms Erica Beaucage-Gauvreau

Exploring mechanisms of neck trauma using cadaver models and injury databases
Supervisors: Dr Claire Jones and Mr Ryan Quarrington

Rotator cuff tendon failure and repair
Supervisor: Dr Claire Jones

Commissioning a model gas turbine combustor
Supervisors: A/Prof. Paul Medwell and Dr Michael Evans

Design and build an automated instrumentation system for combustion analysis
Supervisors: A/Prof. Paul Medwell and Dr Michael Evans

Jet flame modelling
Supervisors: A/Prof. Paul Medwell, Dr Michael Evans and Dr Zhao Tian

Thermo-acoustic instability of rocket engines
Supervisors: Prof Bassam Dally, Dr Justin Hardi and Dr Scott Beinke

Ammonia under MILD Combustion
Supervisors: Prof Bassam Dally, Dr Alfonso Chinnici

Autonomous vehicle control programming
Supervisor: Dr Lei Chen

Collision avoidance system testing for vineyard harvesters
Supervisor: Dr Lei Chen

Applications of wireless relay for energy crisis control
Supervisor: Dr Lei Chen

Intelligent air-conditioning control to save building's energy
Supervisor: Dr Lei Chen

Performance Assessment of Acoustic Measurements of 3D printed Impedance Tubes
Supervisors: Dr Md Ayub (Primary Contact) and Professor Anthony Zander
Project details:
Impedance tubes are commonly used in various standard acoustic tests using microphones for measuring acoustic performance such as absorption coefficient and transmission loss. In this era of 3D printing and nanotechnology, impedance tube can easily be fabricated in any size (both diameter and length) using 3D printing machine and can conveniently be used for acoustic measurements. However, analysis of the accuracy of acoustic measurements using 3D printed impedance tube has not been reported to date. In this project, impedance tubes of various diameters and lengths will be fabricated using 3D printing machine and the performance of acoustic measurement of the 3D printed impedance tubes will be assessed against the standard acoustic tests. In addition, the feasibility and prospect of using 3D printed impedance tube for acoustic measurements in the high frequency range of 8~10 kHz will be explored as the useable measurement frequency range of the standard impedance tubes is limited to 6.4 kHz based on the microphone spacing and tube diameter. The high-frequency 3D printed impedance tubes can be useful for measuring and assessing the performance of acoustic materials that are potentially designed for controlling noise in electric and hybrid vehicles where inverter noise is around 10 kHz and noise generated from cell phones and smart phones in the frequency range above 5 kHz.