Research interests

- **Composites** (**Head of Research Group: Prof. Xiaosu Yi**)

Research areas: High-performance aerospace composites, Multifunctional composites, Green Composites, Advanced composite manufacturing technologies, Recycling technology of composite materials, Adhesive bonding technologies.

- **Power Electronics, Machines and Control** (**Head of Research Group: Prof. Chris Gerada/Prof. He (Alan) Zhang**)

Research areas: Electrical Machines, Motor Drives and Motor Control, Power Electronics and Thermal Management

- **Geospatial and Geohazards** (**Acting Head of Research Group: Dr. Nicholas Hamm**)

Research areas: Engineering Surveying and Space Geodesy, Remote and in situ measurement, Positioning and Navigation Technologies, Building Information Modelling and Management, Remote Sensing, Geographic Information Science, Geospatial and Environmental Data Science, Geohazards, structural health monitoring.

- **Advanced and Intelligent Manufacturing** (**Acting Head of Research Group: Prof. Xiaogang Yang**)

Research areas: Conventional & Non-conventional Material Removal Processes, Processes for Adding Materials, Modelling, Dynamics and Control of Manufacturing Processes, Reactive Manufacturing Processes, Automation of Manufacturing Processes and Process Planning and Lean Production

- **Natural Resources and Environment** (**Head of Research Group: Prof. Jun He**)

Research areas: Air Quality and Pollution Control, Urban Climate Change, Water Quality and Wastewater Treatment, Aquatic Resource and Soil Management, Solid Waste Management and Treatment

- **Artificial Intelligence and Optimisation** (**Head of Research Group: Prof. Ruibin Bai**)

Research areas: Computational Intelligence, Computer Vision and Image Processing, Transportation Analysis and Optimisation, Big Data, Health Informatics and Biomedical Informatics, Data Mining, Machine Learning, Software Testing, Computer Security, Computability and Complexity Analysis, Internet Of Thing, Algorithms, Logic, Information Visualization, Human-Computer Interaction, Edge Computing, Deep Reinforcement Learning, 5G, Intelligent Sensors, Computational Economics.

- **Advanced Energy and Environmental Materials & Technologies** (**Head of Research Group:** Dr. Cheng Heng Pang)

Research areas: Advanced Composite Materials, Granular Materials and Geotechnology and New Energy and Environmental Materials

- **Fluids and Thermal Engineering** (**Acting Head of Research Group:** Dr. Yong Shi)

Research areas: Micro/nanoscale flows, mass and heat transfer, Design of microfluidics and lab on a chip, Thermal management for energy systems, multiscale (micro, meso and macro) modeling, physicochemical transport processes in energy conversion and storage devices (batteries, fuel cells, internal combustion engines and supercapacitors), thermal issues in intelligent manufacturing and 3D printing, Kinetic theory of gases , Space micropropulsion, multiphase flows and heat transfer, sustainable energy technologies, Machine learning approaches for thermofluids and energy analyses.

- **Partial Differential Equations** (**Head of Research Group:** Prof. Behrouz Emamizadeh)

Research areas: Optimal Rearrangements, Free boundary Problems, Geometric and Qualitative Properties of the Solutions, Critical Point Theory, Convex and Nonlinear Analysis

Free Discontinuity Problems, Regularity at the Crack-Tip/-Front, Variational Crack Propagations Models

A Posteriori Error Estimators for the Approximations Using Finite Element Methods, Guaranteed Upper Bounds on Norm of the Error

Non-Linear Evolution Equations, Normalized Standing-Wave Solutions, Models of Stability Problems

Mathematical and Theoretical Physics, Quantum Field Theory on Curved Spacetimes, Symmetry breaking in Inflationary Cosmology, Conformal Zero Modes

Mathematical biology, Nonlinear partial differential equations, and mathematical modeling.

Topological Combinatorics: using topological techniques to study combinatorial problems.

Computational Clinical Medicine, Mathematical/Statistical Modelling Ecology and Epidemiology, Mathematical Modelling of Systems Biology

- **Sensor, Sensor Networks, and Instrumentation** (**Head of Research Group: Prof. Vladimir Brusic**)

Research areas: Health and Wellbeing (Medical Imaging, OMICS, Health Monitoring), Smart Systems (Smart Home/Office, Smart Vehicle, Smart Health), Applications of Sensors and Instruments (Diagnostics, Prognostics, Optimization)

- **Sustainability and Innovation for Integrated Built Environment** (**Head of Research Group: Dr. Wu Deng**)

Research areas: The SBE Research Group aims to promote multi-disciplinary research across two broad research themes: Architecture and urbanism (A + U), and Architectural Engineering, Environmental Design and Energy (AEEDE). Among the many research topics that arise from the built environment, the following are of particular interest to the SBE Research Group:

1.Architectural humanity and history across various cultures, climates and geographic locations;

2.Past and contemporary urban transition and related sustainability issues in China and beyond;

3.Identification of best practices in the area of sustainable building and city development;

4.High performance building technologies and system integration.