Key areas
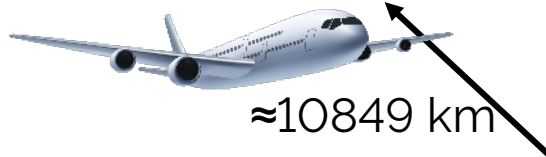
- Chemical Engineering
- Electrical Power Engineering
- Marine Technology
- Mechanical Engineering
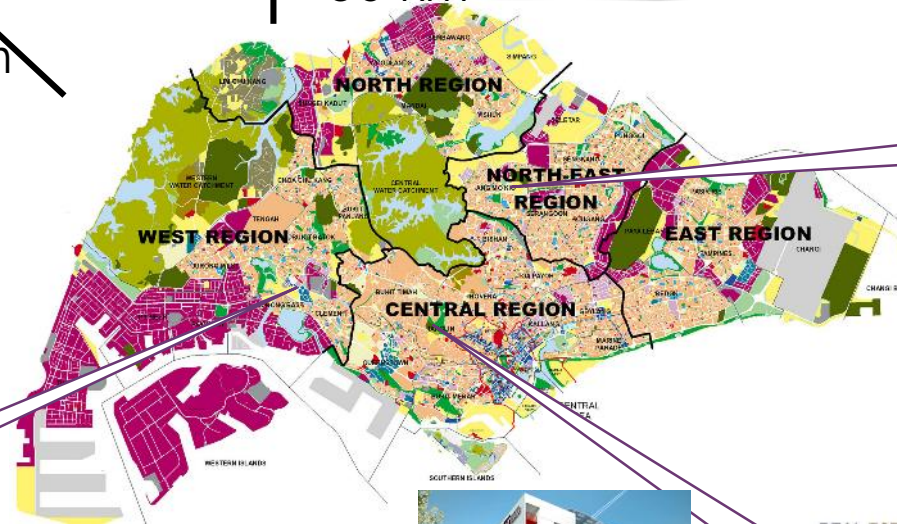
NU, UK

NUMED

≈50 km

≈10849 km

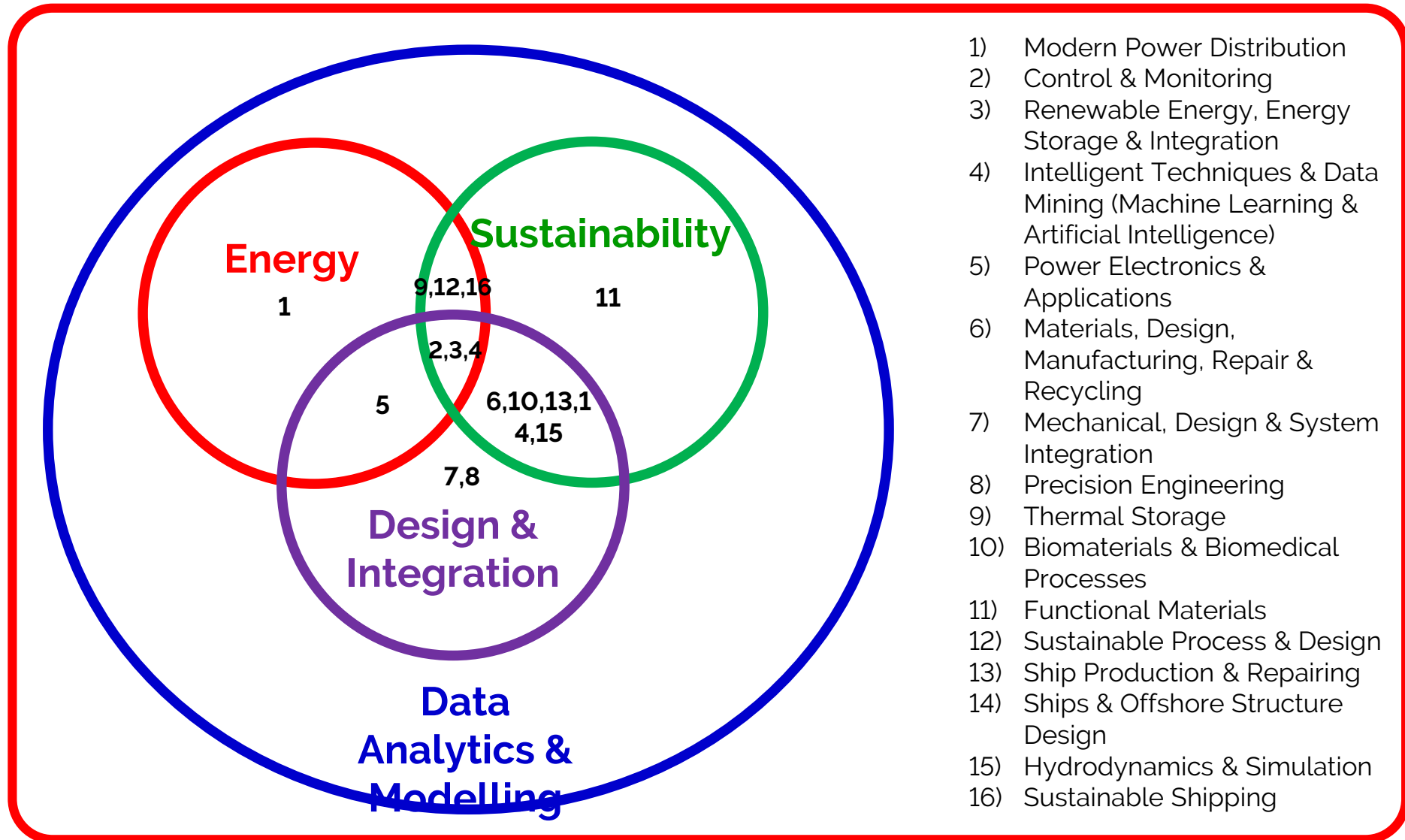NU @ NYP

NewRIIS
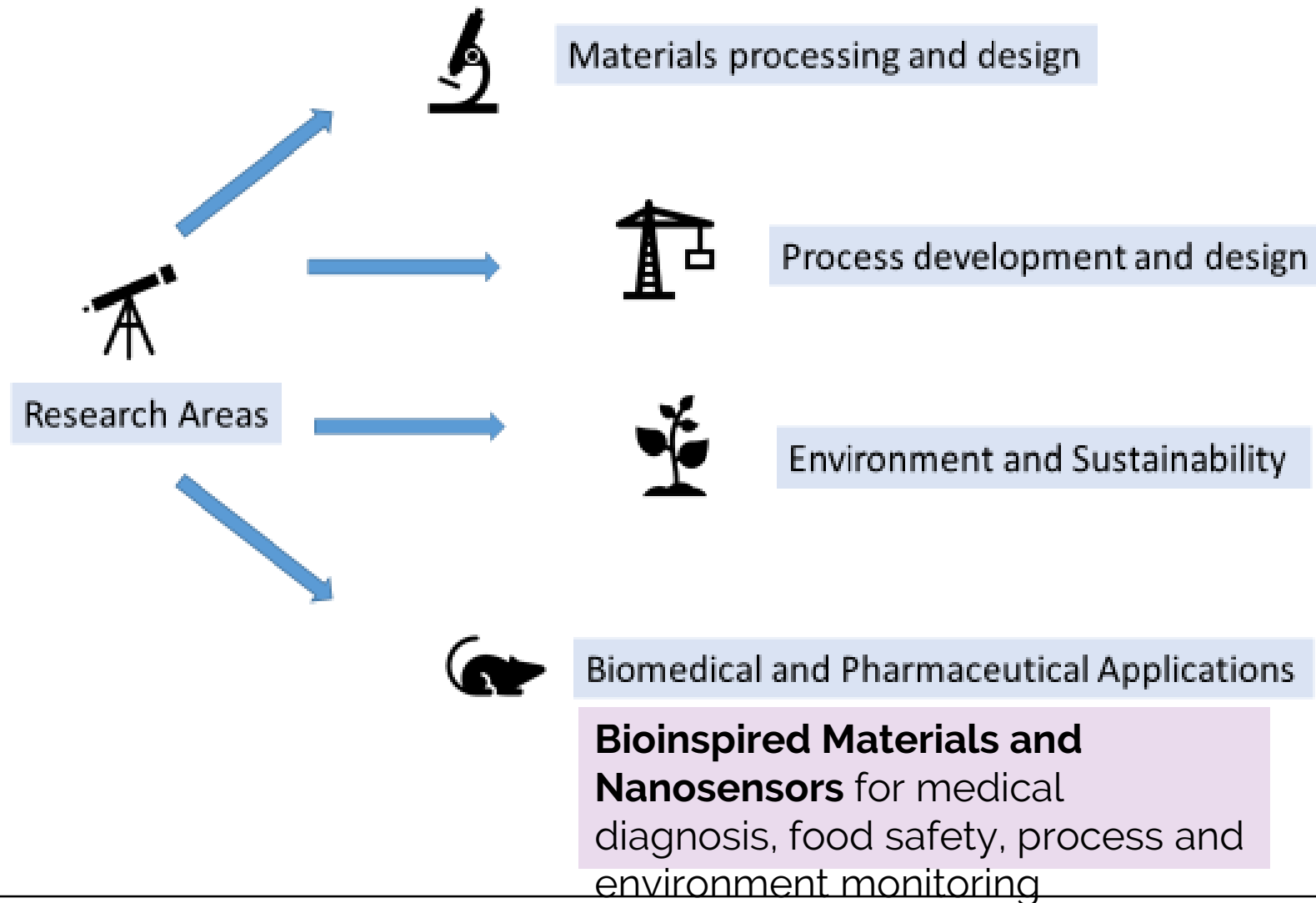
NU @ NP

1) Modern Power Distribution
2) Control & Monitoring
3) Renewable Energy, Energy Storage & Integration
4) Intelligent Techniques & Data Mining (Machine Learning & Artificial Intelligence)
5) Power Electronics & Applications
6) Materials, Design, Manufacturing, Repair & Recycling
7) Mechanical, Design & System Integration
8) Precision Engineering
9) Thermal Storage
10) Biomaterials & Biomedical Processes
11) Functional Materials
12) Sustainable Process & Design
13) Ship Production & Repairing
14) Ships & Offshore Structure Design
15) Hydrodynamics & Simulation
16) Sustainable Shipping

Materials processing and design

Process development and design

Research Areas

Environment and Sustainability

Biomedical and Pharmaceutical Applications

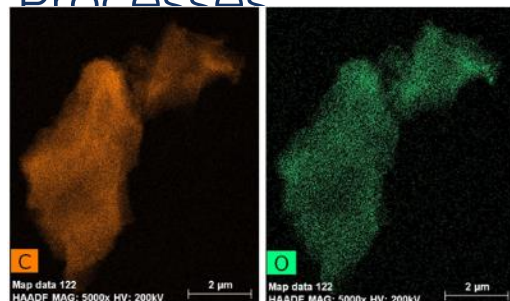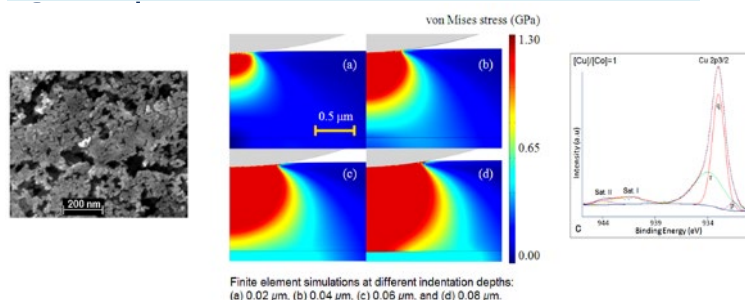**Bioinspired Materials and Nanosensors** for medical diagnosis, food safety, process and environment monitoring

Porous Carbon Materials & Adsorption Processes

Map data 122
HAADF MAG: 5000x HV: 200kV 2 µm

Map data 122
HAADF MAG: 5000x HV: 200kV 2 µm
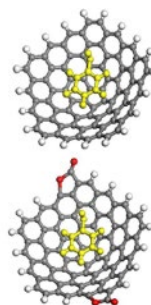
Life Cycle Assessment / Sustainable Processing

Mixed Metal Oxides

von Mises stress (GPa)

Finite element simulations at different indentation depths:
(a) 0.02 µm, (b) 0.04 µm, (c) 0.06 µm, and (d) 0.08 µm.

Wastewater Treatment

Metaldehyde

Larvae, S., & Koumanova, B. (2013)
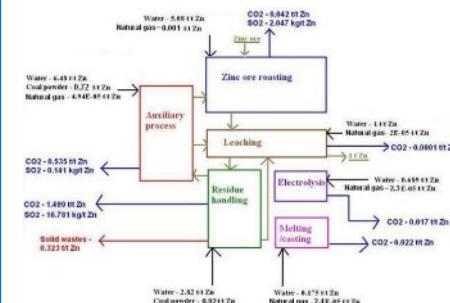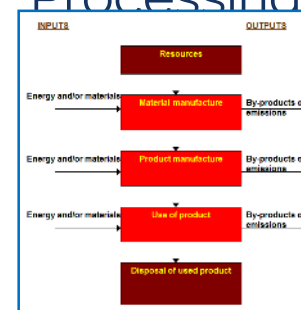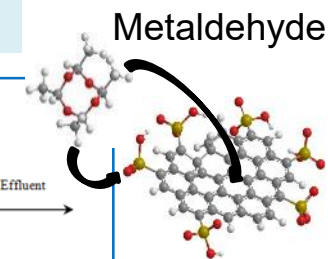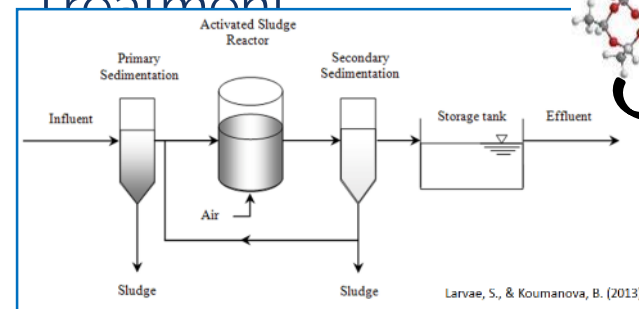
- **Newton Fund-British Council Institutional Links**
- **Newton Research Collaboration Programme- Royal Academy of Engineering, UK**
- **IRU-MRUN Collaborative Research Programme- Innovative Research Universities, Australia**

Email: ChunYang.Yin@ncl.ac.uk

Dr Tan Yen Nee

Newcastle University

Bioinspired Materials for Biomedical & Pharmaceutical Applications

Biosensing & Diagnostics
- Label-free colorimetric bioassays
- Light-scattering/SERS sensing
- Licensed product: ColoQuik ™
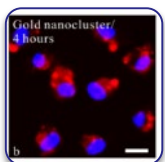
Fluorescent Imaging Probes
- In vivo tumor/cancer cell imaging
- Light-up fluorescent probes
- Redox-responsive imaging probes

Biopharmaceutical Application
- Protein quality analysis (aggregation)
- Rapid antibody titer & related assays
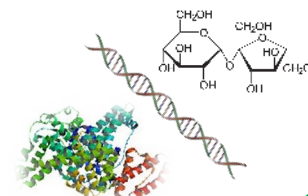- High-throughput drug screening

NanoMaterials-enabled Therapy
- Nanotheranostic
- Nanocarriers for gene, drug & PDT agents
- Antibacterials for broad spectrum MRA

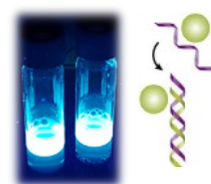## Carbon Nanomaterials for Medical, Agriculture & Environmental Applications

Natural precursors
- Biomass waste
- Biopolymers
- Small molecules

Bioinspired synthesis
- Photo-luminescent
- Biomimetic functions
- Biological recognition

Technological Applications

Multicolor Bioimaging | Enhance Growth | Detect Pollutants

Metallic Nanoparticles & Optical Nanosensor Design

Sensing Materials:
- Quantum Metal Nanoclusters
- Metallic Nanoparticles

Core Capabilities
- Synthesis of colorimetric and fluorescent nanoprobes
- Surface and biofunctionalization
- Signal amplification strategies
- Assay design and development

Unique features of Nanosensors:
- Ultra sensitivity
- High selectivity
- Simple, low cost & rapid detection
- Real-time & Multiplexing
- Automatic/miniaturized devices

Bio Pharma. Manufacturing Process. Pollutants. Food Safety

Drying technology

Bio-origin materials and quality improvement of dried products

Application of advanced drying techniques at low temperature & fast drying rate to produce better quality (e.g. thermolabile bioactive ingredients, color, texture etc) of dried materials
- Drying of pharmaceutical products
- Preservation of food waste for other uses
- Humidity control

MOSTI eScienceFund (Malaysia)
Development of dried thermophilic mixed culture by convective air drying for palm oil mill effluent (POME) treatment

Exploratory Research Grant Scheme (ERGS) (Malaysia)
Drying characteristics and quality of biomaterials dried undergone coulomb force assisted heat pump drying)

Email: Kent.Chin@ncl.ac.uk
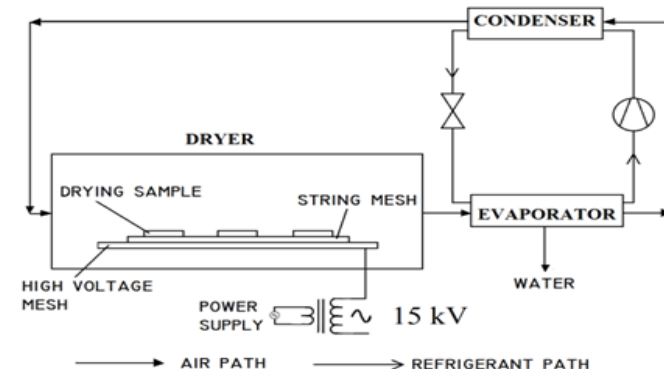
Bioreactor and Bioprocess Design and Development for the optimized production of biochemicals and biomolecules for industrial applications. Working with bacteria, fungus, genetically modified microorganisms, and mammalian cells.

Some examples include:

- Using *Escherichia coli* cloned with the highly oxygen-sensitive Glycyl Radical Enzyme p-hydroxyphenylacetate decarboxylase gene from anaerobe *Clostridia difficile* to convert renewable substrate to *p-cresol* as a platform chemical
- Using recombinant *Escherichia coli* to produce leukemia inhibitory factor
- Antibody expression and production
- Fungal fermentation to produce flavor molecules
- Fermentation to produce ethanol
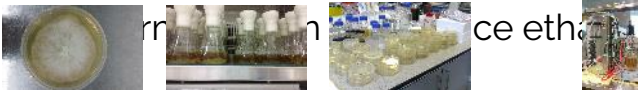
Stem Cells and Tissue Engineering
Proliferation of stem cells and differentiation of stem cells into cells and tissues of various lineages such as neural tissues and bone tissues, using specific cultivation conditions, bioreactor design and biomaterials.

Environmental Engineering
- Abatement of toxic mercury vapor using functionalized adsorbent
- Abatement of volatile organic compounds using packed and fluidized bed adsorbers
- Abatement of odorous emission using microorganisms isolated from wastewater treatment plants

Occupational Health
- Environmental monitoring and personal sampling of occupational exposure to toxic compounds
- Health effects of occupational exposure to hazardous substance and agents

Email: yuenling.ng@ncl.ac.uk

Dr Pavan Kumar Naraharisetti
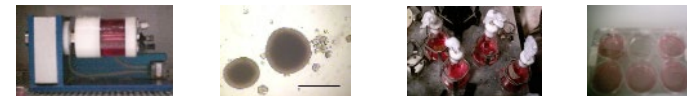
Laboratory Automation
- Factory-in-Lab: Bringing Elements of Industry 4.0 to the lab in the chemicals sector
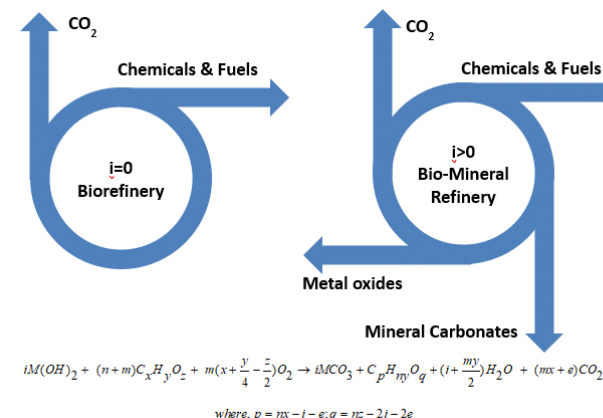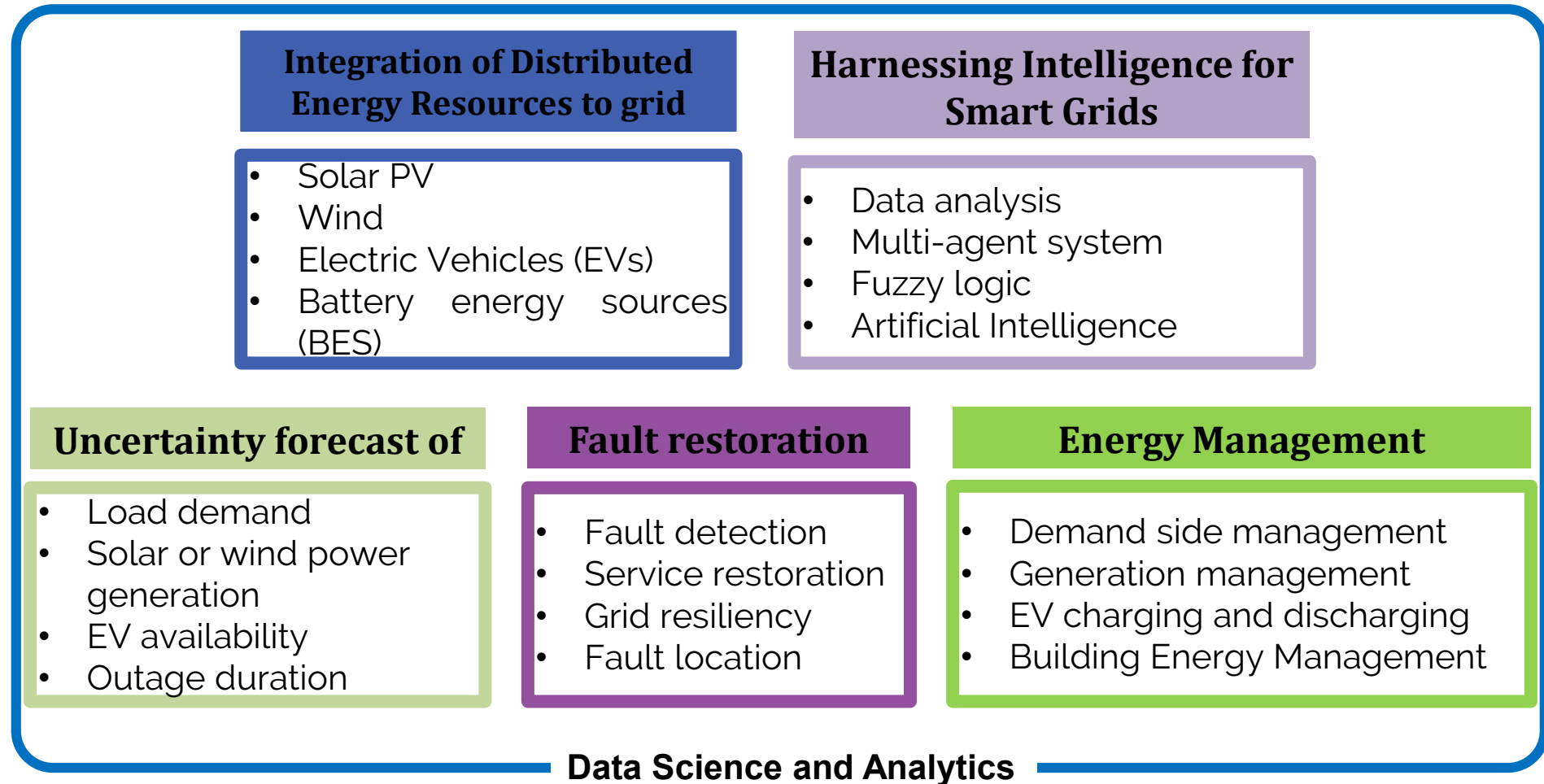- Design of Experiments
- Deconvolution of Spectral Data
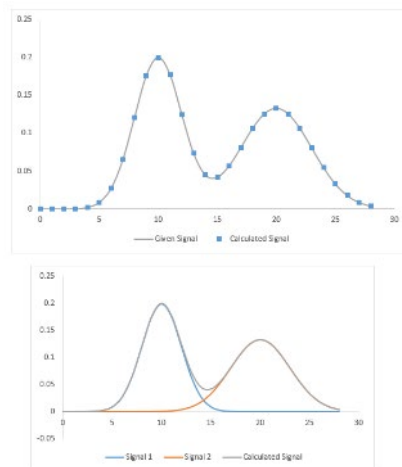
Mathematical Modelling and Algorithms
- Neural Network based Process Control
- Analysis of System of Systems – Self-Organizing Systems

Sustainable Chemicals – Energy Ecosystem Design
- Metrics for Circular Chemical Economy
- Biomineral Refineries for Design of Sustainable Industrial Cities
- Design of Sustainable Supply Chains including Life Cycle Assessment

$$iM(OH)_2 + (n+m)C_xH_yO_z + m(x+\frac{y}{4}-\frac{z}{2})O_2 \rightarrow iMCO_3 + C_pH_{ny}O_q + (i+\frac{my}{2})H_2O + (mx+e)CO_2$$

$$where, p = nx - i - e; q = nz - 2i - 2e$$

Email: Pavan-Kumar.Naraharisetti@ncl.ac.uk

Electrical Power Engineering

Integration of Distributed Energy Resources to grid

- Solar PV
- Wind
- Electric Vehicles (EVs)
- Battery energy sources (BES)

Harnessing Intelligence for Smart Grids

- Data analysis
- Multi-agent system
- Fuzzy logic
- Artificial Intelligence

Uncertainty forecast of

- Load demand
- Solar or wind power generation
- EV availability
- Outage duration

Fault restoration

- Fault detection
- Service restoration
- Grid resiliency
- Fault location

Energy Management

- Demand side management
- Generation management
- EV charging and discharging
- Building Energy Management

Data Science and Analytics

Dr Anurag Sharma

Research Interests:

- Energy Management in Smart grid,
- Fault Detection, Identification and Service restoration,
- Computational intelligence techniques for power system applications,
- Uncertainty handling and data analytics for distribution systems,
- Planning and integration of Distributed Energy Resources

Email: anurag.sharma@ncl.ac.uk

Google Scholar Link: https://scholar.google.com.sg/citations?user=DbW7jDoAAAAJ&hl=en

Newcastle University

Dr Khalid Abidi

Research Interests:

- Theory and modelling of dynamical systems
- Discrete-Time systems
- Time-delay systems
- Learning Control, Robust Control and Applied Nonlinear Control
- Robotics and Mechatronic Systems

Email: khalid.abidi@newcastle.ac.uk

Google Scholar Link: https://scholar.google.com.tr/citations?user=_mPjJwEAAAAJ&hl=en

Dr Naayagi Ramasamy

Research Interests:

- Converters for distributed renewable energy systems
- Renewable energy integration and applications in smart grid
- Advanced power electronic converters using state-of-the-art and emerging devices and materials
- Solid state transformers for the modern grid

Email: naayagi.ramasamy@ncl.ac.uk

Google Scholar Link: https://scholar.google.com.sg/citations?user=eD-HsMsAAAAJ&hl=en

Dr Sze Sing Lee

Research Interests:

- Power electronics
- Multilevel inverters
- Modular multilevel converters
- Impedance source converters
- PWM scheme and control of power converters

Email: SzeSing.Lee@ncl.ac.uk

Google Scholar Link: https://scholar.google.com/citations?user=eWHGGe0AAAAJ&hl=en

Dr Jianfang Xiao

Research Interests:

- Smart microgrid systems
- Microgrid inter-operability
- Energy management system
- Energy storage system (ESS) and hybrid energy storage system (HESS)
- Renewable energy integration

Email: Jianfang.Xiao@ncl.ac.uk

Google Scholar Link: https://scholar.google.com/citations?hl=en&user=bEcJigYAAAAJ

Dr Noori Kim

Research Interests:

- Electroacoustic/electro-mechanic/electromagnetic systems
- Low power transducers and sensors (i.e. Hearing-aid transducers)
- Internet of Things (IoT) and Convolutional Neural Network (CNN) applications

Email: Noori.Kim@newcastle.ac.uk

Google Scholar Link: https://scholar.google.com/citations?user=SK79ZnoAAAAJ&hl=en

Dr Arun Kr Dev

Newcastle University

Assessment and improvement of out-of-plane bending induced fatigue failures in offshore mooring chains

Research Work in Progress
- Simplified Numerical Formulations for OPB assessments
- Interlink Stiffness
  - Finite Element Methods
  - Model Testing
- Global Stiffness
- BM Transfer Function
- Stress Concentration Factors
  - Multiaxial Stress States
  - Fracture Mechanics
- Validation
- Application
- Improvement Options

marine@newcastle

Research Interests:

❖ Ship and Offshore Hydrodynamics
❖ Model testing of ships and offshore floating structures
❖ Shipyard Management and Practice
❖ Marine and Offshore production process and management including shipyard simulation.
❖ Green Ship Technology: energy management, hull optimization, propulsion plant, fuel efficiency, emission, decarbonization, discharge, etc.
❖ Renewable Energy: floating substructure, floating platform, wind, wave and tidal energy, etc.

- VIV in
  - Current
  - Regular Waves
  - Current with Regular Waves

- No VIV in Irregular Waves

- No excitation in Inline Mode (Surge).

- Cross Flow Mode (Sway) and in Torsional Mode (Yaw) excited.

- Larger response in light conditions (mass ratio)

Jackup Sway VIV

Jackup Yaw VIV

Investigation on the effect of oscillatory lift forces on the self elevating offshore platforms with tubular (cylindrical) legs

Email: a.k.dev@ncl.ac.uk

Dr Cheng Siong Chin

Newcastle University

Research Interests:

Intelligent Systems Design of complex systems in uncertain environment involving Predictive Analytics (data mining, predictive modelling and machine learning).

Research Projects:

❖ 2019-present: EMA grant on **AI** System for **Energy Storage** in Hot and Humid Climate

❖ 2018- present: EDB-IPP grant on **Smart** and High Precision Leakage Localization.

❖ 2018 to present: EDB-IPP grant on **Intelligent** Leakage Warning System.

❖ 2016 to 2019: SMI on **Intelligent** Software Tool for **Noise** Modelling and Prediction.

❖ 2013 to 2016: SMI on the **Battery** Power System for **ROV**.

❖ 2013 to 2015: Defence Innovative Research Programme Project on **AUV** Docking Hoop Control

❖ 2013 to 2017: EDB-IPP grant on **Noise** and Vibration Control of Offshore Structure.

❖ 2013 to 2018: EDB-IPP grant on Vibration and Psycho-**Acoustic** Parameters in Hard Disk Drive.

Email: cheng.chin@ncl.ac.uk
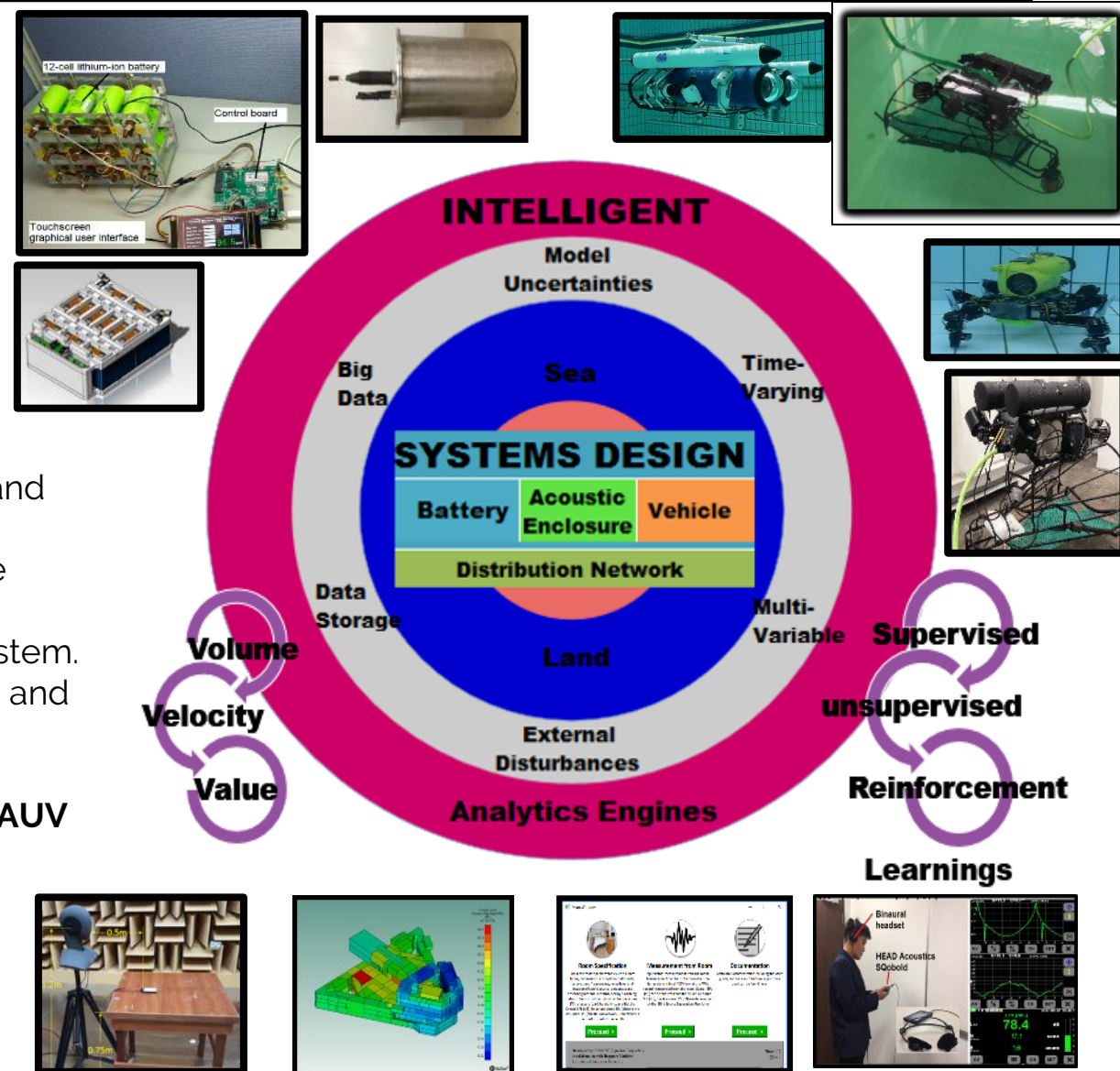
Research Interests:

❖ Engineering design of Shipboard Engines & Machinery
❖ Renewable Energy & Green Fuels
❖ Decarbonization of Fossil Fuels
❖ Energy Management & Emissions Control
❖ Modeling and Simulation of ORC and Trigeneration Cycles
❖ Combustion & Storage of LNG
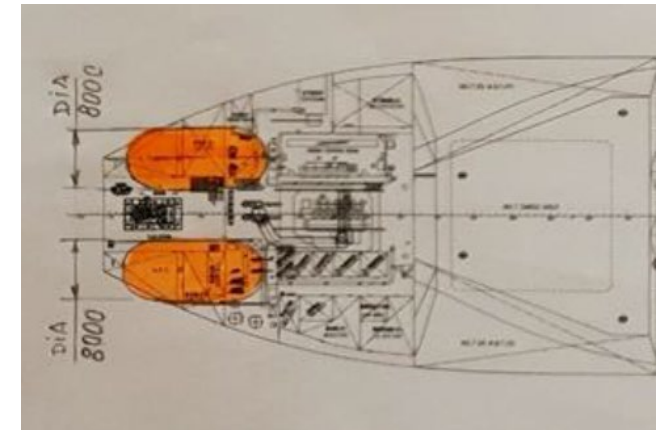❖ Engineering Design for Smart Ocean Liners & Ferries
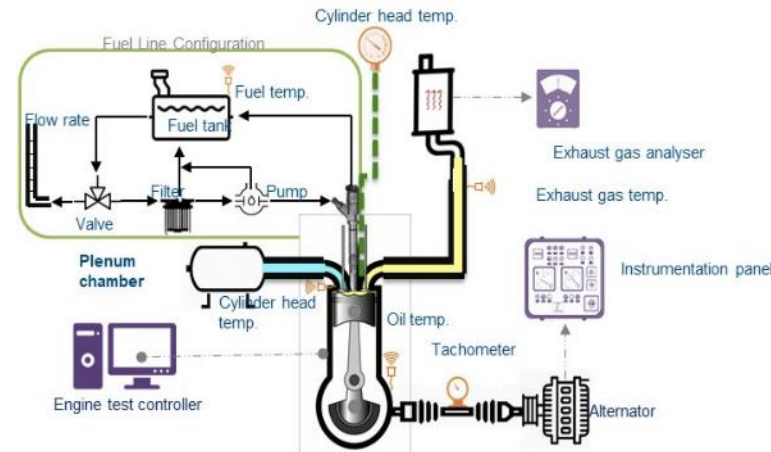
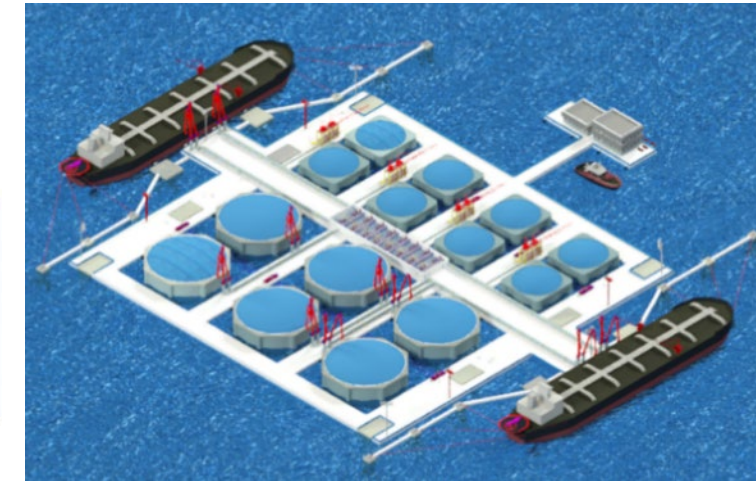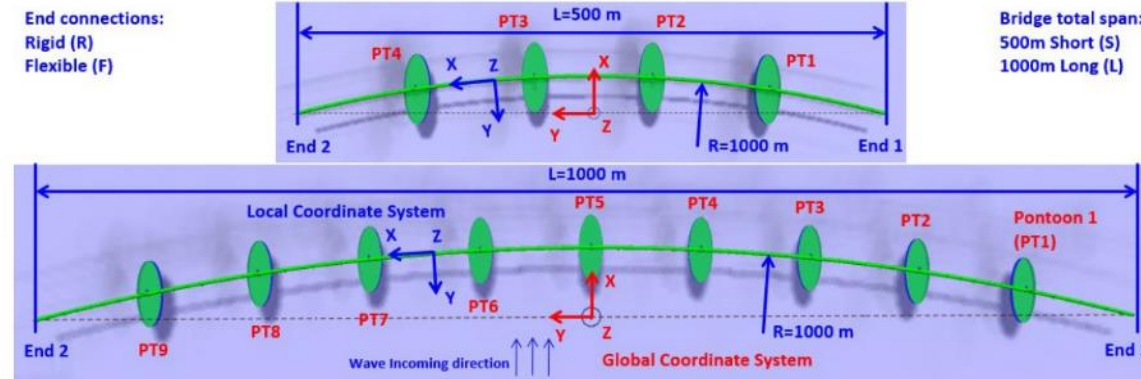**Alternative fuel oil for petrol & diesel engines from recycled plastics**
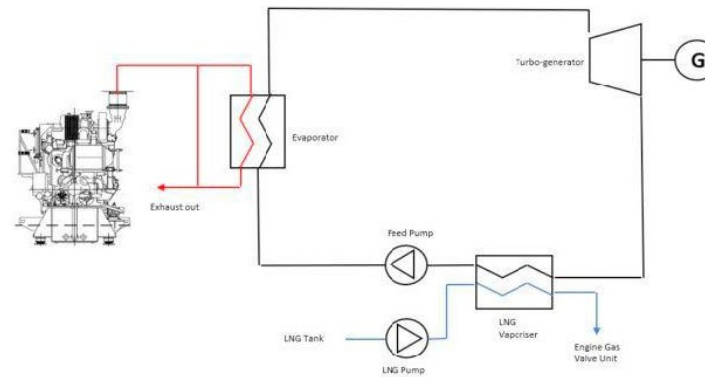
System modelling of ORC for waste heat recovery system in marine applications

**Applied research in removing Exhaust Emission with wet scrubbers**

Engineering design for LNG combustion and storage for marine applications

Dr Ling Wan

Research Interests:

❖ Combined wind and wave energy devices (integrated concepts)
  • Hydro-structural-servo-elastic integrated analysis
  • Hydrodynamic analysis, Structural dynamics, Model test
❖ Multi-purpose modular very large floating structures
  • Floating hydrocarbon storage facilities
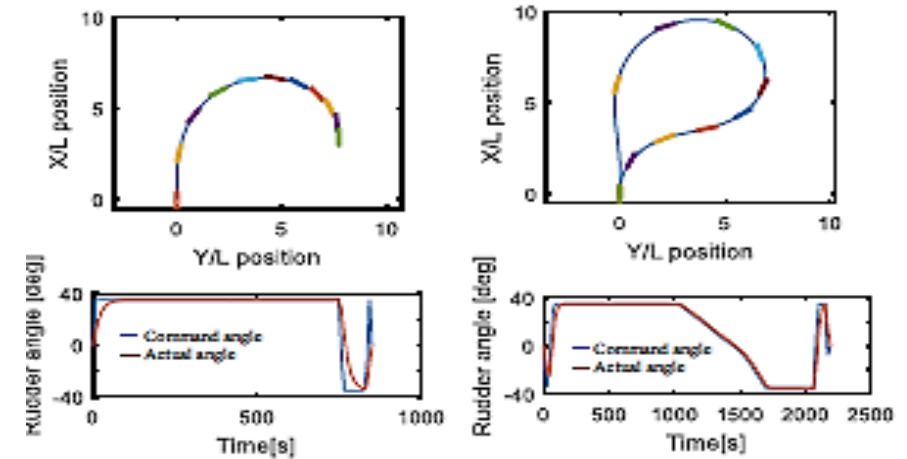 • Modular floating structures
❖ Floating bridges

Email: Ling.Wan@ncl.ac.uk

Dr Mohammed Abdul Hannan

Newcastle University
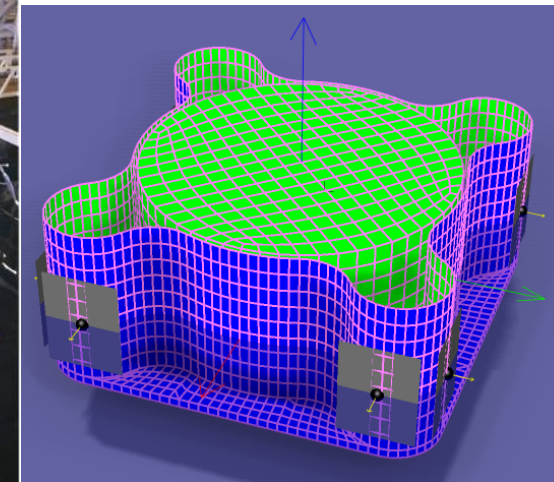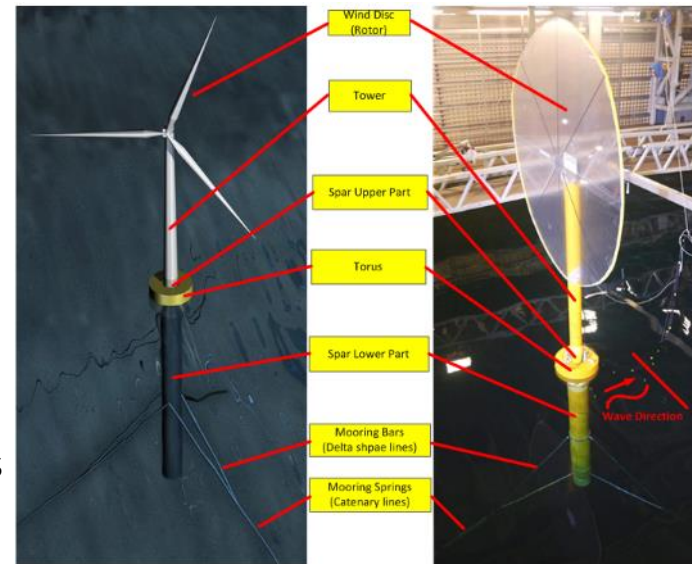
Research Interests:
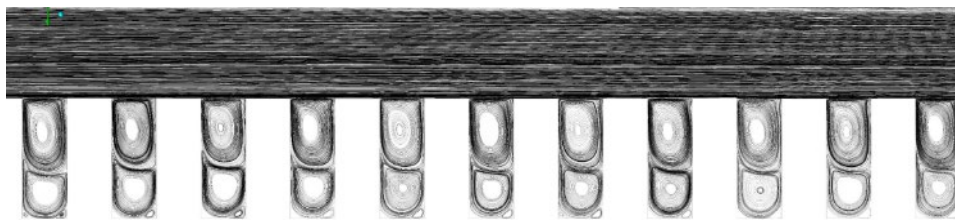
❖ Sustainability in Engineering design
❖ Renewable Energy
❖ Computational Fluid Dynamics
❖ Ice Structure Interactions
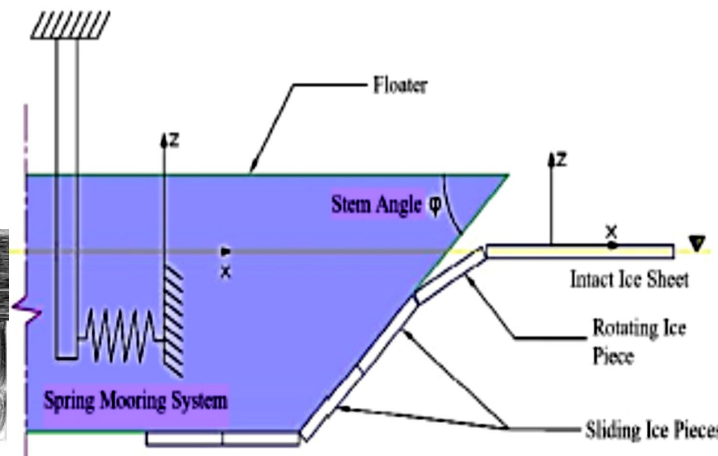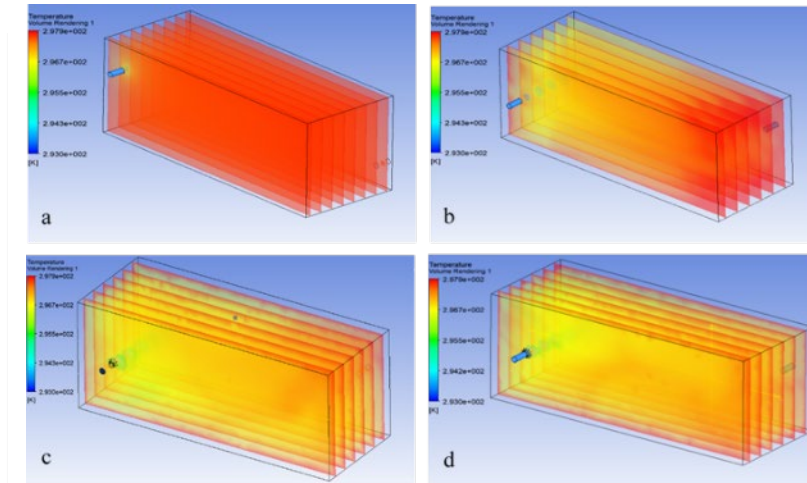❖ Wave Structure Interactions
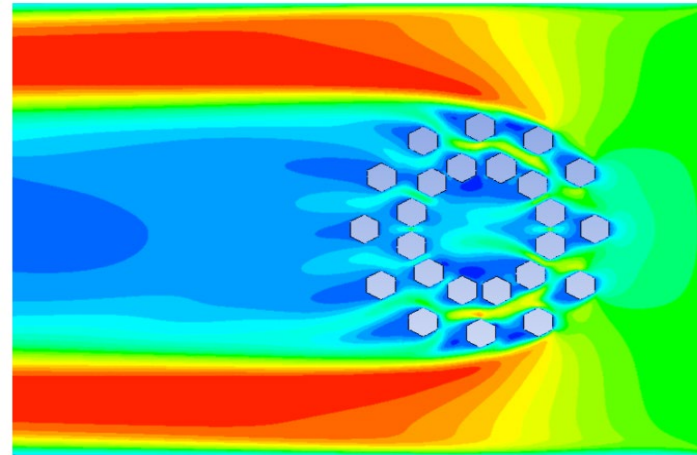
Wave Cloaking (Simplified 2D analysis)

Optimisation of Ship Manoeuvring in Narrow Channel

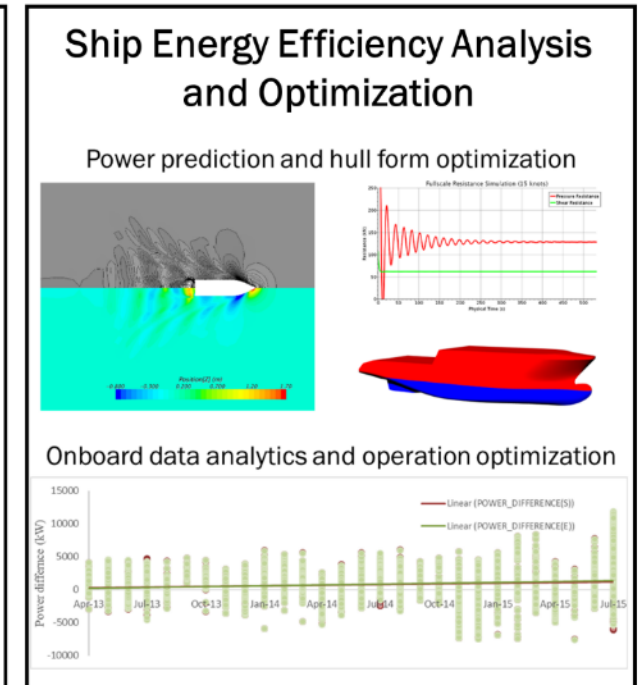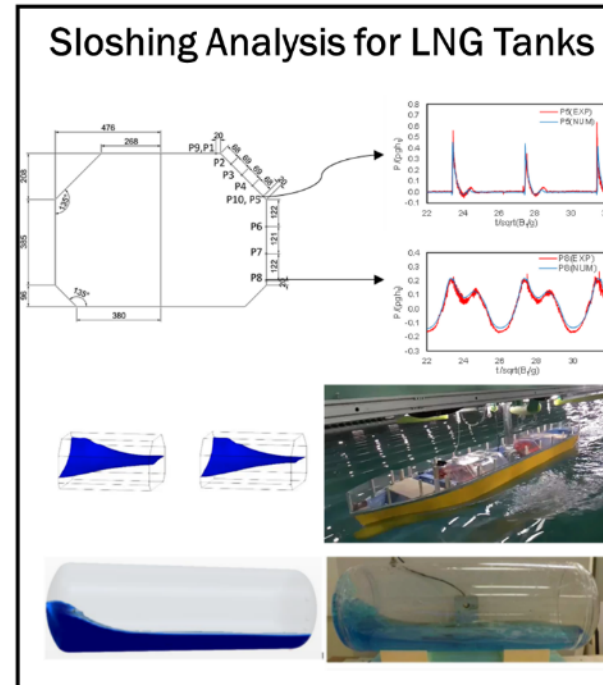Drag Reduction Using Microcavity on Flat Surface

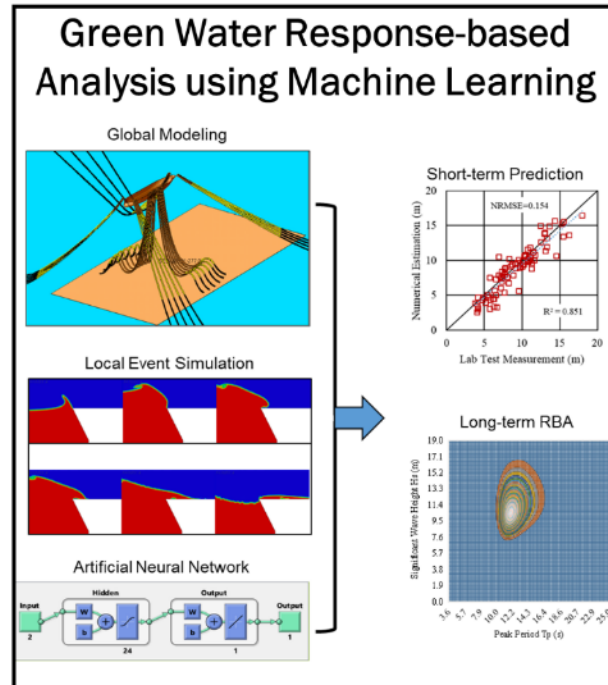Numerical Model of Ice Structure Interaction

Improving the performance of Earth Pipe Cooling System Using Aerofoils

Email: Abdul.hannan@ncl.ac.uk

Computational Fluid Dynamics & Marine Applications

Green Water Response-based Analysis using Machine Learning

Global Modeling

Local Event Simulation

Artificial Neural Network

Short-term Prediction

Long-term RBA

Sloshing Analysis for LNG Tanks

Ship Energy Efficiency Analysis and Optimization

Power prediction and hull form optimization

Onboard data analytics and operation optimization

Potential PhD Projects:

1. Computational fluid dynamics applications in marine and offshore engineering: green water, ship energy saving devices and techniques, added ship resistance in waves, ship resistance in ice field, etc.
2. Ship energy efficiency and performance monitoring.

- Advanced manufacturing research
- Virtual environments
- Thermal storage systems
- Design and system integration
- Advanced materials/composites research
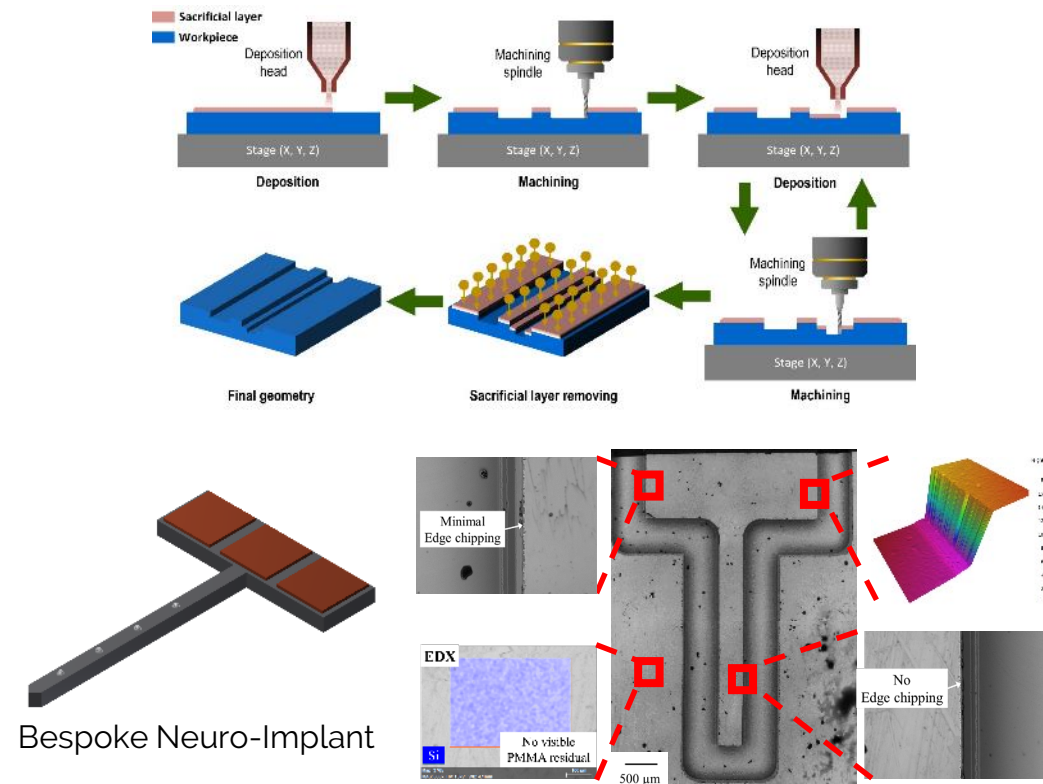
Dr Zi Jie Choong

Newcastle University
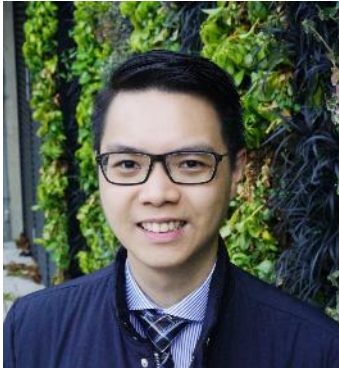
Advanced manufacturing research

Biomedical Implants Manufacturing

Development of a Hybrid Manufacturing Technique for Shaping of Bespoke Neuro-Implant to Minimise Processing Defects

EPSRC (UK), 2014 to 2021

Bespoke Neuro-Implant

Research Interests

Smart Manufacturing System Design
Sensor design and integration to support process monitoring.

Data-Driven Manufacturing Process Optimisation
Analysis of acquired data from a process for informed and sustainable decision making process

Atomistic and Multi-Scale Modelling
Investigate the material microstructure evolution during a manufacturing process

Email: Zijie.Choong@newcastle.ac.uk

Dr Junjie Chong

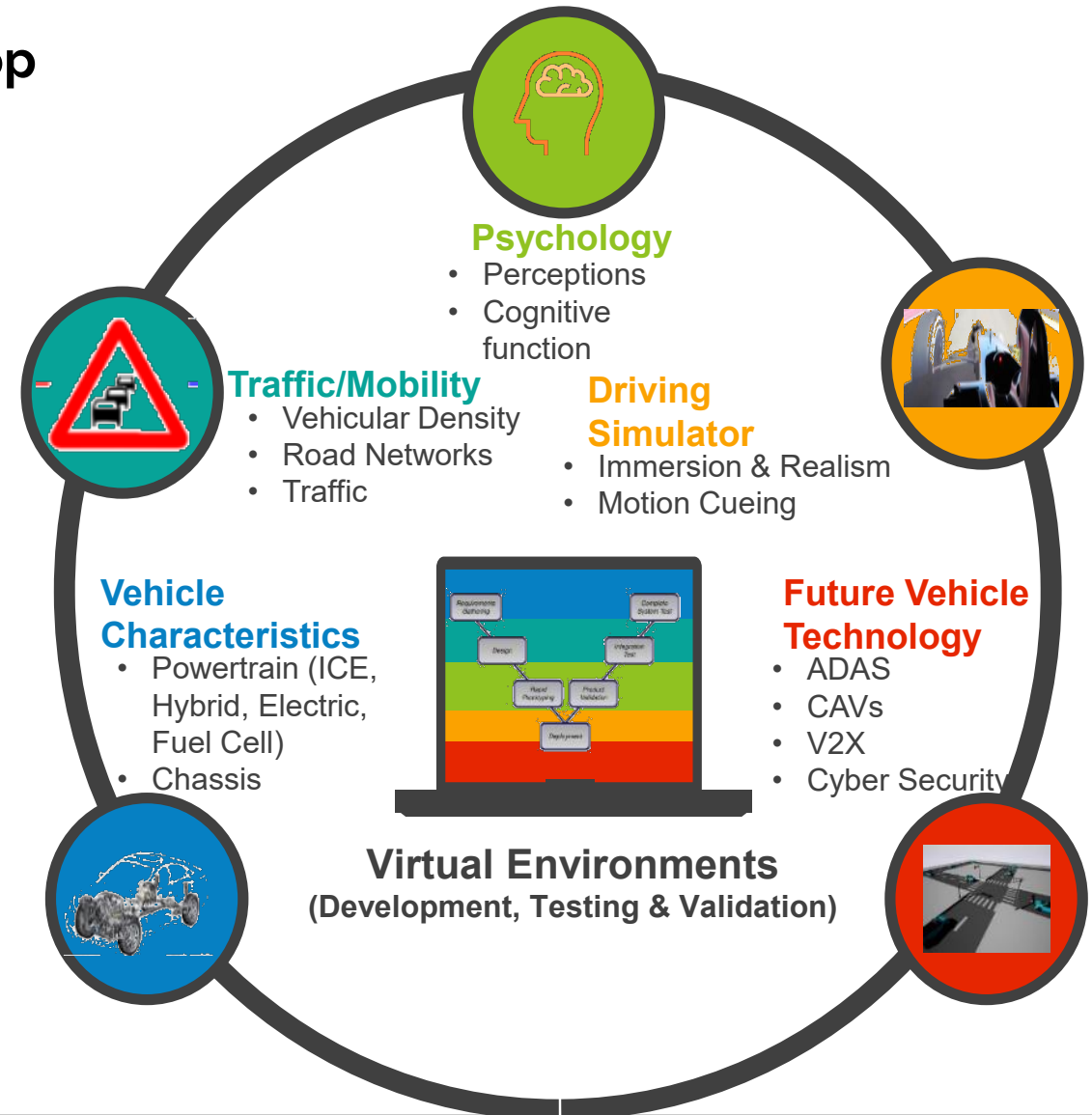## Human-hardware-in-the-loop (H2IL) test platform

Virtual Environments for Future Electric Powered-Mobility Development using Human-Hardware-in-the-Loop

Dynamic Wireless Charging Strategies for E-Scooter

WIREless Charge-While-Driving for Electric Scooters Range Extension (WIREScooters)

Connected Urban Transport for Last Miles Delivery

For Horizon 2020
(Small Business & Fast Track Innovation for Transport)

Email: junjie.chong@ncl.ac.uk

Psychology
- Perceptions
- Cognitive function

Traffic/Mobility
- Vehicular Density
- Road Networks
- Traffic

Driving Simulator
- Immersion & Realism
- Motion Cueing

Vehicle Characteristics
- Powertrain (ICE, Hybrid, Electric, Fuel Cell)
- Chassis

Future Vehicle Technology
- ADAS
- CAVs
- V2X
- Cyber Security

Virtual Environments
(Development, Testing & Validation)

System optimisation of thermal storage systems using phase change materials

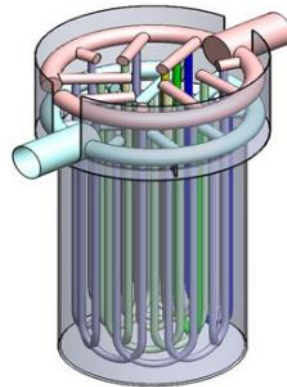

High temperature applications
Development of high temperature thermal storage for Concentrated Solar Power Plant

Australian Renewable Energy Agency (ARENA) R&D, 2016-2019

Numerical Analysis:
- Computer fluid dynamics modelling of phase change thermal storage systems for high and low temperature applications

**Low temperature applications:**
- Optimising the control and operation of PCM thermal energy storage systems integrated with solar photovoltaics
- Optimisation of thermal energy storage system using phase change materials
- Air-conditioning system optimisation
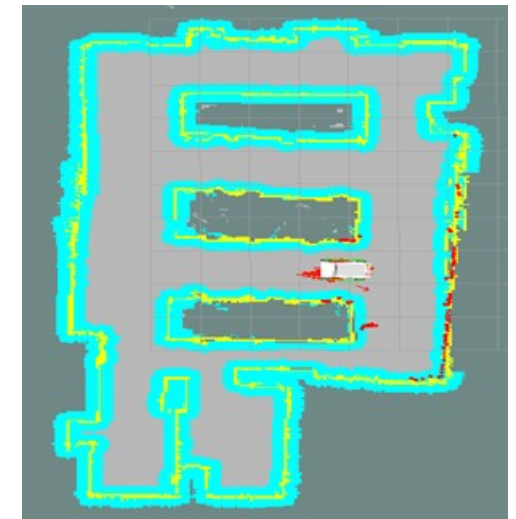- Development of PCMs

Email: steven.tay@ncl.ac.uk

Newcastle University

Design and system integration of service robotics
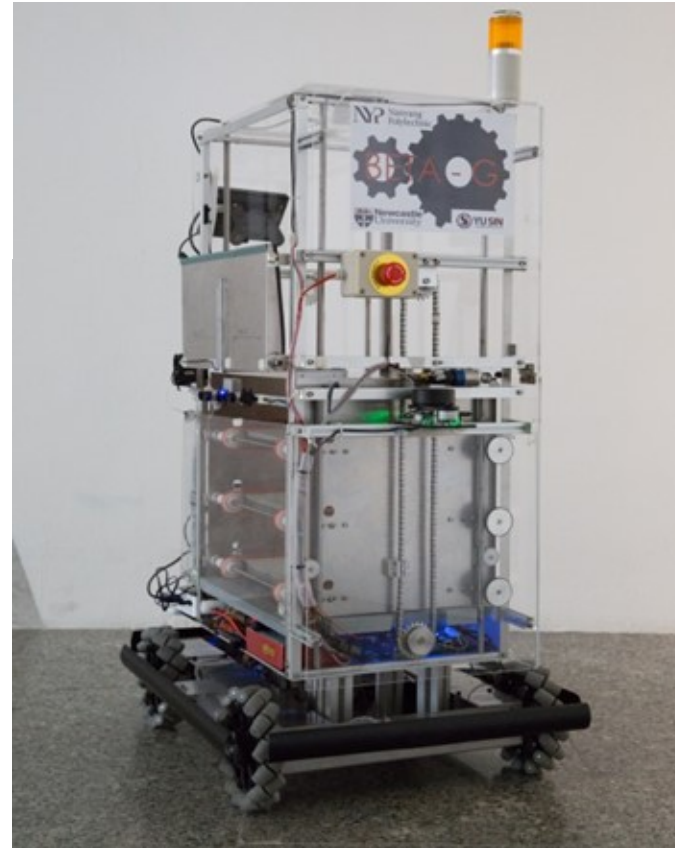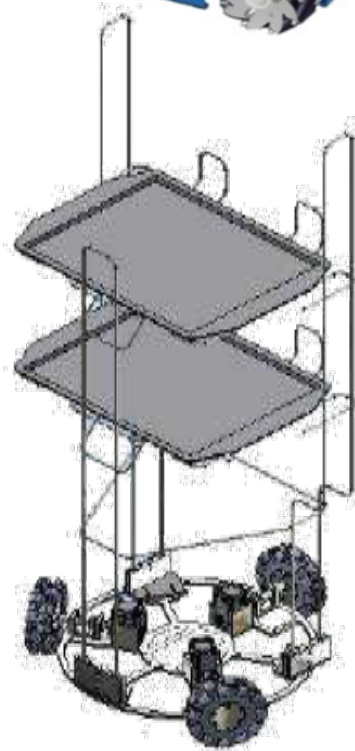
Waiter robot
Modular base & 3-tier dumb waiter design

Light weight version of delivering food to table. Omni-directional base suitable for smaller restaurants

Mapping & navigation using ROS

Email: michael.lau@ncl.ac.uk

Advanced materials research

- **Additive manufacturing**
  - Design optimization for AM
  - Metal-based FDM
  - Composite printing

- **Microwave heating of materials**
  Significant reduction in processing time & energy and improved properties

- **Lightweight metal alloys and composites**
  Addition of nanoparticles or alloying elements leading to improved strength and ductility

- **Computational materials**
  Machine learning for prediction of mechanical properties of composites
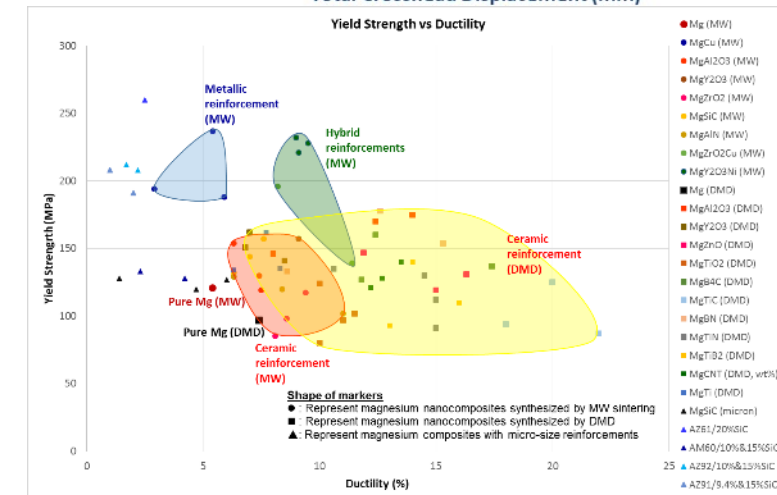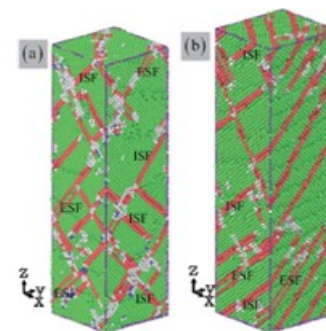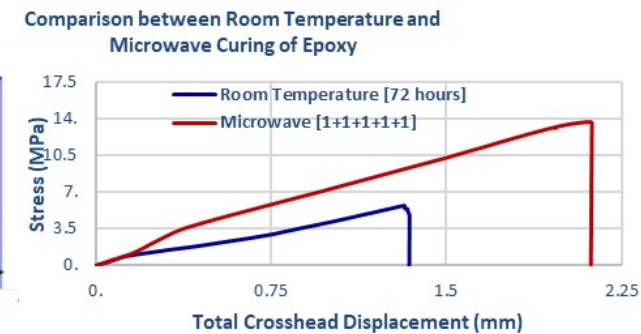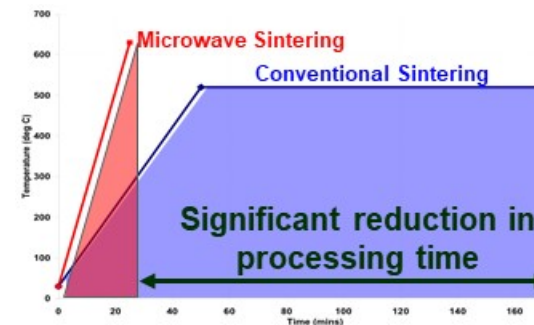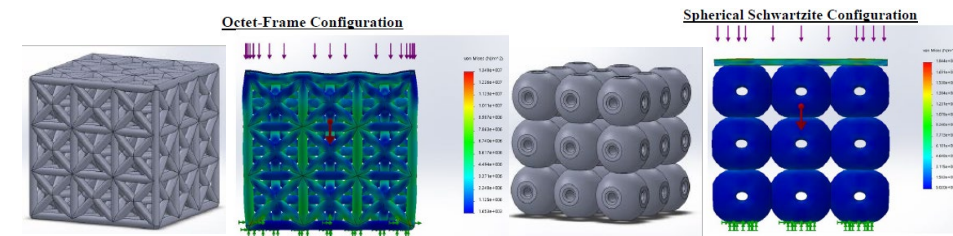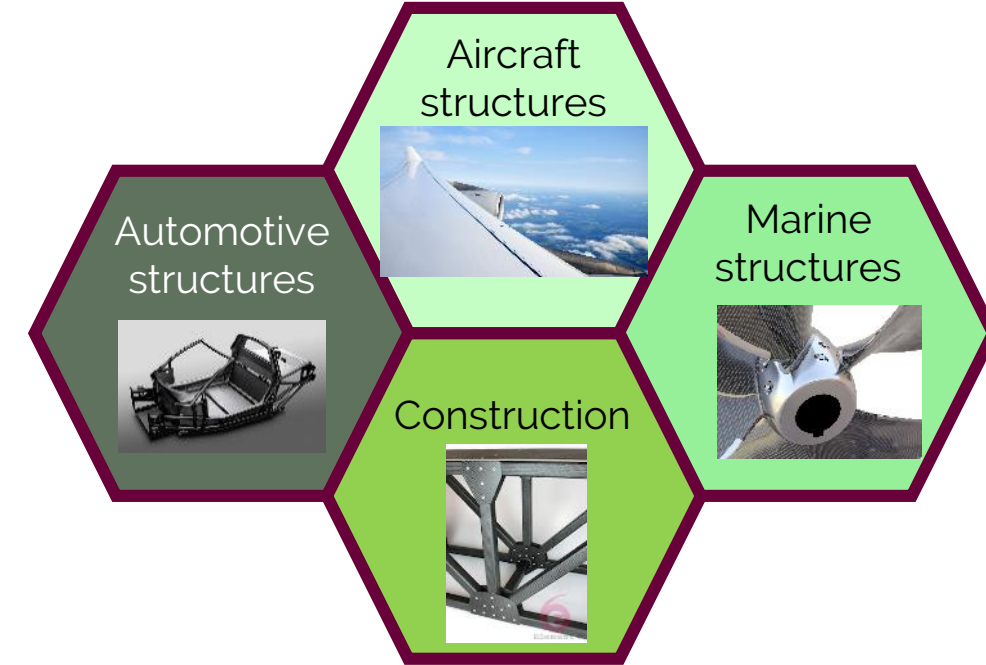
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M. Gupta and W.L.E. Wong, *Materials Characterization*, 105, 30-46, 2015.

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ADVANCED COMPOSITES RESEARCH

Mechanics of Composite Materials
- Design of hierarchical, light-weight fibre & nanoparticle polymer-based composites
- Damage detection in composites
- Repair of polymer-based composite materials, e.g. aerostructures

Automotive structures

Aircraft structures

Marine structures

Construction

Specimen — Quasi-static indentation — Front / Rear — Visual inspection

Ultrasonic C-scanning — Infrared thermography

Drilling injection and vent holes — Resin-injection repair — Compression-after-impact test

Developing composite repair strategy

On-going Projects
1. Optimization of 3D printing of polymer-based composite materials
2. Development of smart composites using 3D printing systems
3. Design of novel polymer-based composite materials reinforced by nanoclay particles, CNTs, for water filtration
4. Repair of fibre reinforced composite materials and structures
5. Design of novel nanocomposite resin reinforced by nanoclay particles, CNTs, for composite repair

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