

IMPERIAL

Mechanical Engineering

Mechanical Engineering is key to addressing modern technological and societal challenges, driving innovation across a broad range of applications:

Safety

fires, ventilation,
emissions, forensic,
aerosols, noise,
pollution, satellites,
imaging, inspection,
defence

Transportation

aircraft, space,
automotive,
emissions, batteries,
hybrid thermal/electric,
decarbonization,
turbomachinery

Energy

hydrogen, nuclear,
storage/batteries,
fuel cells,
wind turbines,
future fuels,
harvesting, emissions,

Healthcare

surgery,
implants,
medical imaging,
robotics,
wearables,
sports

Manufacturing

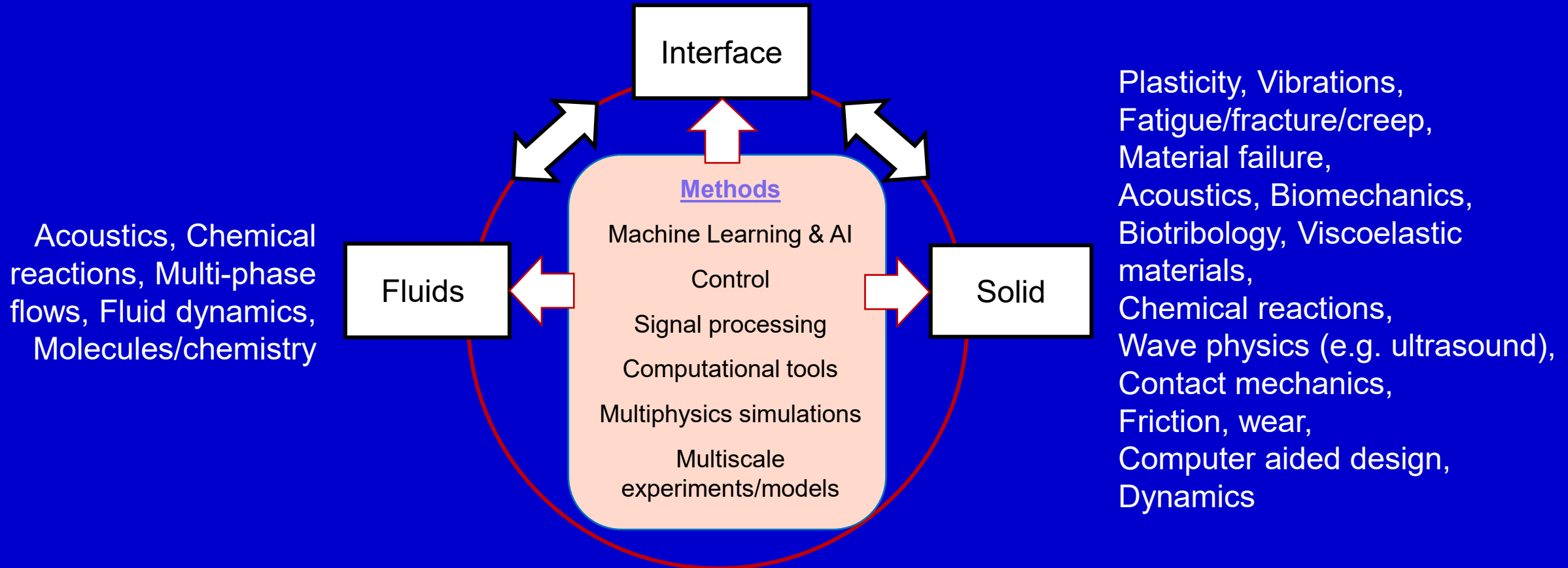
food processing,
additive manufacture,
forming, welding
robotics,
satellite,
defence

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Mechanical Engineering

Innovations are underpinned by core scientific and engineering principles...

Aeroelasticity, Aero-dynamics, Heat transfer, Thermodynamics, Lubricants,
Electrochemistry, Boundary layers, Solid-liquid interfaces, Tribology



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Mechanical Engineering

The department integrates advanced technologies and methodologies across a range of strategic research areas, including:

- *Future Transport*
- *Sustainable energy*
- *Healthcare*

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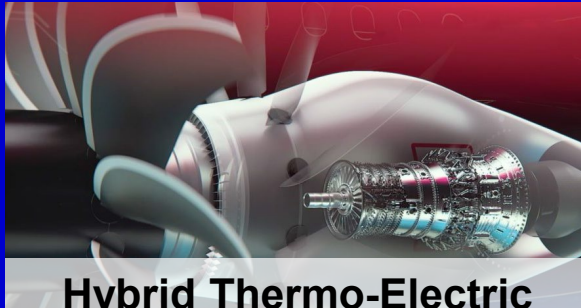
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Future Transport applications:



Net Zero Transportation

Electrical power unit
Batteries
Energy infrastructure
Energy storage
Sustainable fuels
Hydrogen



Hybrid Thermo-Electric propulsion

Propellers
Turbomachinery
Aeroelasticity
Lubrication
Additive manufacturing
Composites & adhesives



Safety

Fire safety
Noise and vibration
Pollutants
Circular economy
Policy



Intelligent Networks

Smart Sensors
Autonomous Systems
Robotics
Digital Twin
Techno-economics
Enterprise

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Sustainable Energy applications:



**Carbon Capture Utilisation
& Storage**

Net-zero
Nuclear energy
Fluid regeneration
Waste management



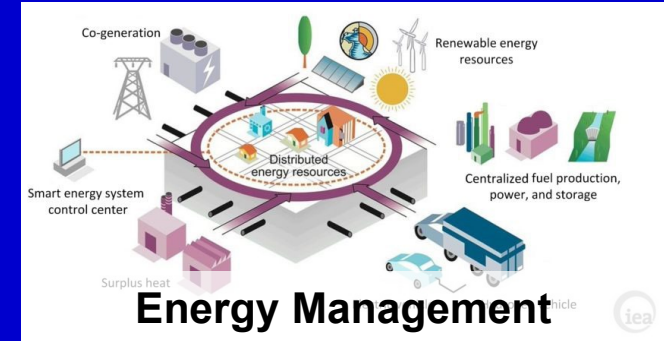
Energy Storage

Thermal power unit
Sustainable fuels
Hydrogen
Batteries
Electrical power units



**Energy Conversion
& Recovery**

Turbomachinery
Heat Recovery
Fuel cell
Smart Systems
Supercritical System



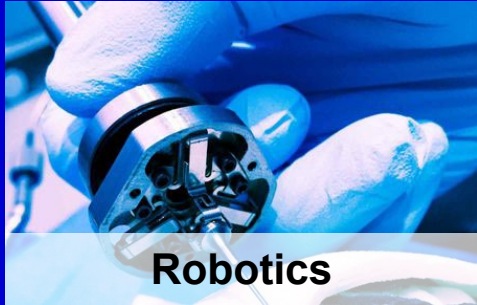
Energy Management

Techno-economics
Energy infrastructure
Pollutants
Circular economy
Policy

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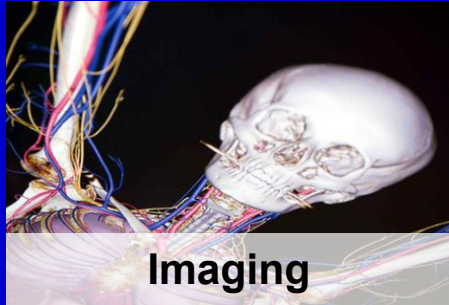
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Healthcare applications:



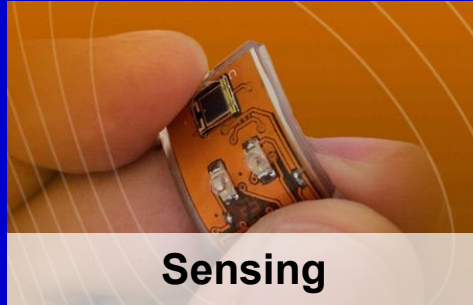
Robotics

Soft-robotics
Neurosurgery
Orthopaedics
Steerable needles
Nanobots



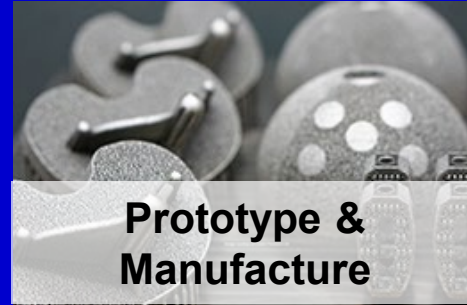
Imaging

Ultrasound
CT
MRI
Intraoperative
Data Fusion



Sensing

Wearables
Implants
Surgical robots
Surgical tools
Textiles



Prototype & Manufacture

Surgical robots
Surgical tools
Medical devices
Implants
Orthopaedics
Neurosurgery



Pre-clinical Testing

Surgical robots
Implants
Simulated surgery
ISO tests
Orthopaedics
Neurosurgery