EPSRC Centre for Doctoral Training in Robotics and AI for Net Zero (RAINZ CDT)

Prof Simon Watson
The University of Manchester
RAINZ CDT Director

Meet Me

- MEng Mechatronic Engineering with Industrial Experience, UMIST/UoM, 2008
- PhD Electrical and Electronic Engineering (Robotics), UoM, 2012
- Lecturer in Robotic Systems, UoM, 2013
- …
- Prof of Robotic Systems, UoM, 2025






What is a CDT?

A significant proportion of the UK Research Councils' funding for postgraduate research studentships is now awarded to institutions via Centres for Doctoral Training.

- Competitive stipends
- Opportunities to engage in research collaborations with leading researchers from across the partnership
- Integral involvement of leading industry, business, government and charity partners in both training and research
- Innovative and engaging postgraduate research experience from training as part of a cohort

RAINZ CDT Overview

4-cohort CDT

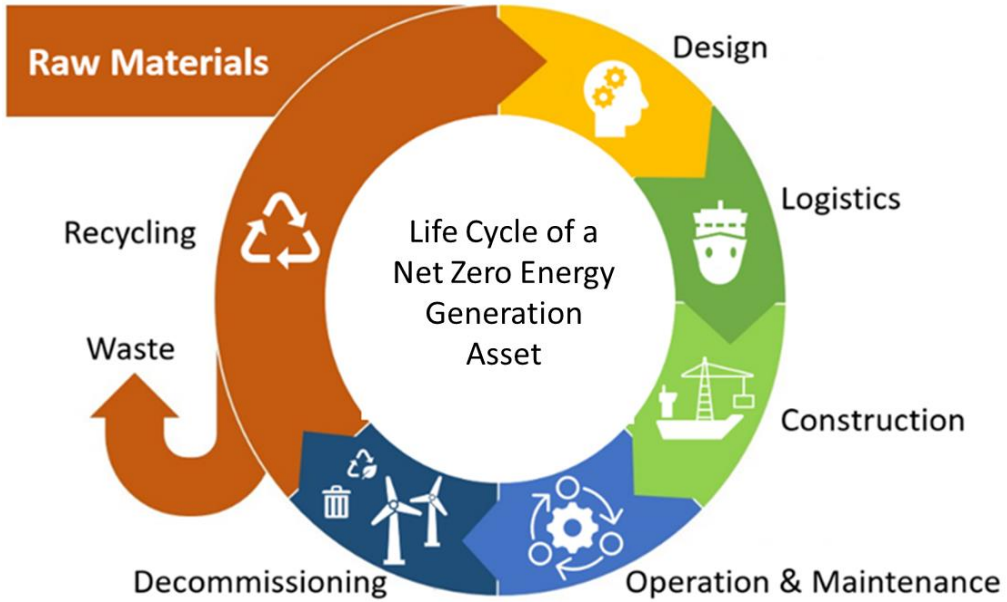
- **Cohort 1** (Sept ‘25) – Autonomous physical interactions in constrained environments – 12 Students
- **Cohort 2** (Sept ’26) – Long-term autonomous monitoring and maintenance of assets – 17 Students
- **Cohort 3** (Sept ’27) – Safe co-existence with human operators
- **Cohort 4** (Sept ’28) – Operation in highly dynamic environments

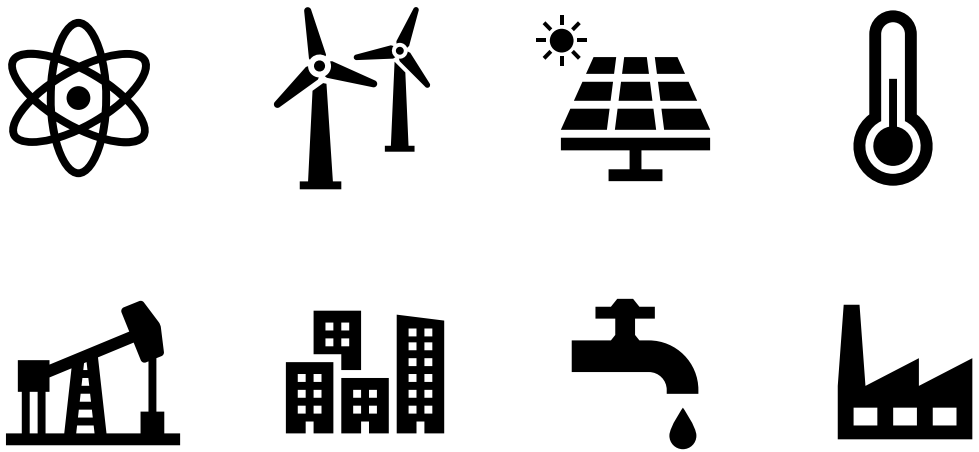




Funded by UK Government

Vision


Raw Materials
Design
Logistics
Construction
Operation & Maintenance
Decommissioning
Waste
Recycling
Life Cycle of a
Net Zero Energy
Generation
Asset



Structure

1+3 model:

- Year 1: MSc Taught studies* and summer school

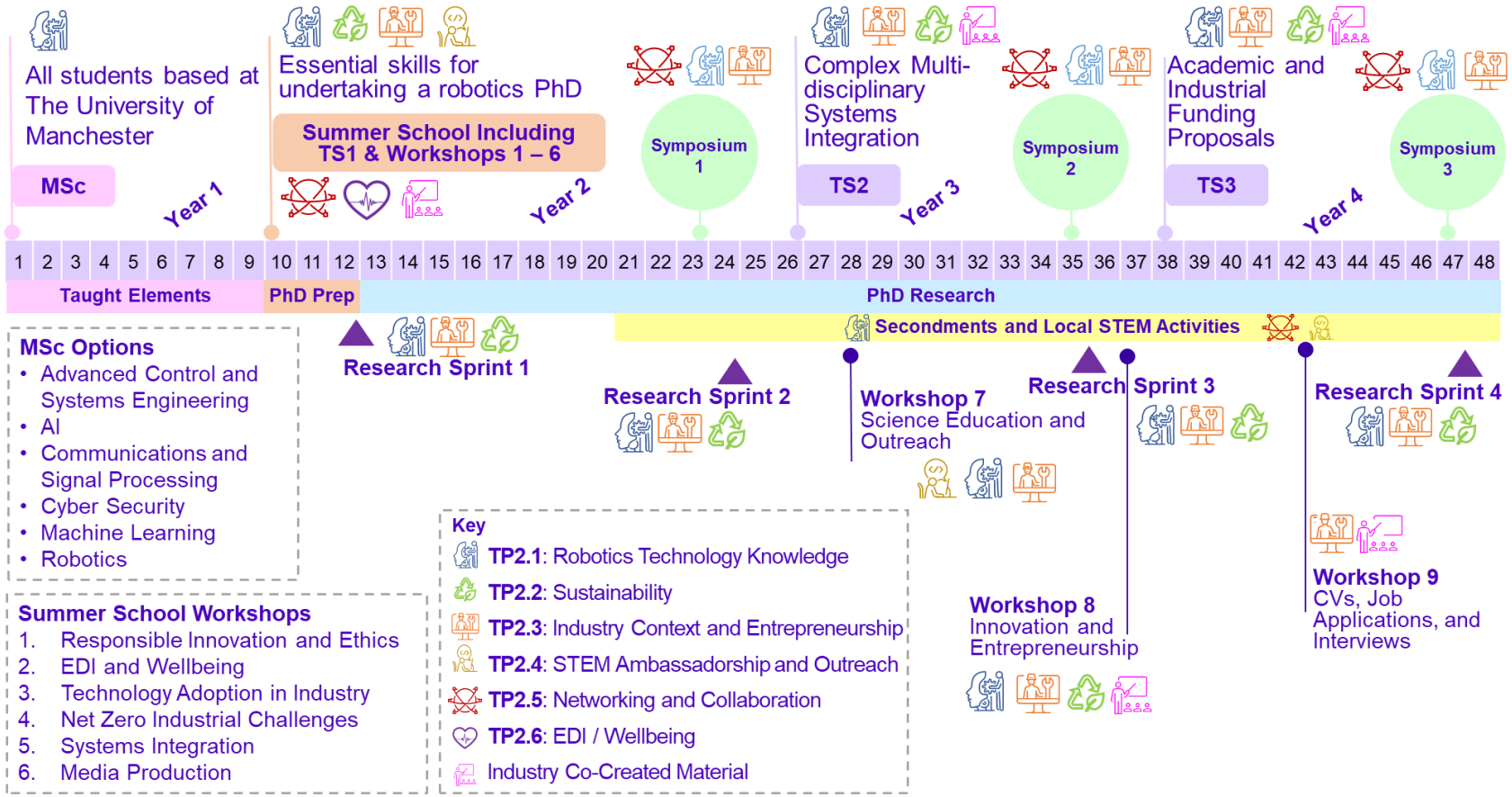
- Years 2 – 4: PhD research at host Universities

*Students will not graduate with an MSc

Training principles (TP)



Structure


All students based at The University of Manchester
MSc
Year 1
Essential skills for undertaking a robotics PhD
Summer School Including TS1 & Workshops 1 – 6
Year 2
Symposium 1
Complex Multi-disciplinary Systems Integration
TS2
Year 3
Symposium 2
Academic and Industrial Funding Proposals
TS3
Year 4
Symposium 3
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
Taught Elements
PhD Prep
PhD Research
Secondments and Local STEM Activities
MSc Options
• Advanced Control and Systems Engineering
• AI
• Communications and Signal Processing
• Cyber Security
• Machine Learning
• Robotics
Research Sprint 1
Research Sprint 2
Workshop 7
Science Education and Outreach
Research Sprint 3
Research Sprint 4
Workshop 8
Innovation and Entrepreneurship
Workshop 9
CVs, Job Applications, and Interviews
Summer School Workshops
1. Responsible Innovation and Ethics
2. EDI and Wellbeing
3. Technology Adoption in Industry
4. Net Zero Industrial Challenges
5. Systems Integration
6. Media Production
Key
TP2.1: Robotics Technology Knowledge
TP2.2: Sustainability
TP2.3: Industry Context and Entrepreneurship
TP2.4: STEM Ambassadorship and Outreach
TP2.5: Networking and Collaboration
TP2.6: EDI / Wellbeing
Industry Co-Created Material

Cohort 1
Summer School 2026

Short courses across three capability areas (6-week summer school)

People & inclusion

Equality, Diversity and Inclusion
18 hours

Understanding Mental Health
15 hours

Neurodiversity
3 hours

Technology & AI

Cyber Security
6 hours

GenAI for Research
6 hours

Ethics for Robots, AI, and Autonomous Systems
12 hours

Making Videos with Smartphones
6 hours

Research & practice

Responsible Research and Innovation
3 hours

Export Control
1 hour

Field Robotics and Industrial Collaborations
70 hours

PhD Preparation
42 hours

RAINZ CDT

Industry Partners























































Projects

Students apply to pre-defined projects rather than propose their own.

Projects for 2027 intake will be released Jan2027.

Cohort 1 PhD Projects

Glasgow

- Human-AI collaboration for enhanced delicate object handling in remote teleoperation **(UKAEA)**
- Multi-robot Cyber-physical Systems for Solar Farm Health Monitoring and Maintenance **(Bentley Systems)**
- Physical Interactions in Constrained Environments: Reasoning, Sensing, Manipulation and Consensus **(Magnox)**

Manchester

- Assuring Teams of Robots **(Sellafield)**
- Circular Economy and Robotic Life Cycles
- Simulation-Based Tool Development for Optimizing Robotics and Maintenance Strategies in Tritium Breeding Blankets for Fusion Reactors **(Kyoto Fusioneering)**
- Smart Robotic Systems for Autonomous Inspection – Enhancing Data Collection and Analysis **(Siemens Energy)**
- Spatial Perception for Robotics **(BAE Systems)**
- Theory of Mind and Intention Reading in Human-Robot Interaction

Oxford

- Design, Fabrication, and Control of a Soft Robotic Arm for a Legged Inspection Robot **(Baker Hughes)**
- Learning Robust World Models for Autonomous Robotic Maintenance of Net Zero Energy Infrastructure **(UKAEA)**

Cohort 2
PhD Projects

Glasgow

- AI-empowered Zero Touch Wireless Network Management for Reliable and Efficient Autonomous Robot Fleets **(Sellafield)**
- AI-Enabled Tactile–Vision Robotic System for **Long-Term Asset Monitoring (NRS)**
- AI-Powered Resilient Teleoperation for Autonomous Robotics
- Long-Term Collaborative Autonomous Monitoring of Energy Infrastructure Using Airborne Platforms for High Fidelity Scene Reconstruction
- PRINZ: Privacy-Preserving Robotic Inspection of Net-Zero Infrastructure

Manchester

- Autonomous mobile robotic detection and localisation of gas leaks within industrial facilities **(Baker Hughes)**
- Measuring Confidence in Heterogeneous Verification **(Sellafield)**
- Robotics for Inspection in Confined Steel Structures **(National Highways)**
- SAEMS Submersible Autonomous Ecosystem Monitoring System **(Freshwater Biological Association)**
- Secure Network Architectures for Mobile Robotics **(NCSC)**
- Techno-economic optimisation of robotic inspection for circular offshore energy assets
- Uncertainty-Driven Autonomy – Acting on Uncertainty in Prognostics and Health Management of Complex Assets **(BAE Systems)**

Oxford

- Adaptive Human-Robot Teams for Mobile I&M Across Dynamic Environments **(MTC)**
- Agile motion planning with energy-storage actuators **(Createc)**
- Long-Term 3D Change Detection of Industrial Facilities **(Sellafield)**
- Mission, Task and Motion Planning for Humanoids Enabling Rapid Response, Maintenance and In-Situ Repair for Fusion **(UKAEA)**
- Predicting and Mitigating Robot and AI Failures in Long-Term Unmanned Inspection Missions in Industrial Settings **(Baker Hughes)**

Funding

Studentships are fully-funded for home students

Funding will be from UKRI, Universities and Industry

- 4-year studentships include:
  - Tuition fees*
  - Maintenance stipend (£21k - £30k** per year)
  - Research and Training Support Grant (~£1.6k/year)

*Fees are paid at the Home rate. Cover for international fees needs to be negotiated with the host University.

**Higher stipend subject to funding and only available to Home students
Stipends are tax free. Equivalent to ~£24k - £39k pre-tax salary.
Students based at University of Oxford get £2k/year top-up to cover higher living costs (capped at £30k)

Cohort 2 & 3
TechFirst Doctoral Support

Funded by UK Government

TechFirst

- **Programme context:**
  - Part of the UK Government's *TechFirst* skills programme
- **Scope:**
  - Supports ~500 doctoral students across UKRI CDTs and DFAs
  - Focused on priority areas within the UK's digital and technologies sector
- **Aim:**
  - Strengthen the UK's innovation pipeline
  - Support a more inclusive, resilient, and high-impact research ecosystem
- **Pilot objective:**
  - Assess whether enhanced stipends improve the competitiveness of PhD pathways compared to entry-level industry roles
  - Support individuals returning to education from industry
- **Funding:**
  - Additional top-up to the UKRI minimum stipend to take it to **£30k**
- **Student commitment:**
  - Up to 10 days per year of TechExpert activities
  - Includes training in outreach, commercialisation, and industry engagement

Funding Constraints and Eligibility

Eligibility

Dependent on each project.

Baseline is First or strong Upper Second-class honours degree (2:1 with 65% average), or international equivalent, in a relevant BEng/MEng/MSc degree

The terms of the funding mean that only a **maximum of 30%** of the cohort can be international students.

We actively encourage BEng students to apply, as Masters training is provided

Students with a Masters degree will still need to complete the CDT Masters training.

Timelines

January – July 2027: student recruitment

September 2027: Cohort 3 starts

How to Engage

https://www.rainz-cdt.ac.uk/

https://www.linkedin.com/company/rainz-cdt/

rainz@manchester.ac.uk



Simon Watson
CDT Director



Nuria Barrios Jurado
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