THE UNIVERSITY OF MANCHESTER

PARTICULARS OF APPOINTMENT

FACULTY OF SCIENCE & ENGINEERING

SCHOOL OF ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE

RESEARCH ASSOCIATE IN ADAPTIVE AND RELIABLE AI ACCELERATION

VACANCY REF: SAE-030209

Salary:	Grade 6, £37,694 - £46,049 per annum, depending on relevant experience
Hours:	Full time
Duration:	Fixed term available for 18 months
Location:	Oxford Road, Manchester

Enquiries about the vacancy, shortlisting and interviews:
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Background

The successful applicant will join the University of Manchester as part of the Horizon Europe research project TAICHIP, funded by UK Research and Innovation (UKRI) under the UK government's Horizon Europe funding Guarantee. The project brings together 4 partners from across Europe, to enhance networking activities between research institutions of the widening countries and top-class leading counterparts, encompassing joint research, knowledge transfer and exchange of best practices.

Research in TAICHIP consists of developing advanced design methodologies for energy-efficient and reliable AI chips. It focuses on open-hardware architectures for both processor cores and accelerators, and on building full-stack design capabilities for the reliable acceleration of deep learning frameworks from system modelling to silicon implementation through runtime adaptivity.

The Department of Computer Science at The University of Manchester is partner of the TAICHIP project. It is internationally recognised for its excellence in research, teaching, and industry engagement. Ranked in the UK's top 10 for Computer Science (QS World University Rankings 2025), Manchester is the birthplace of the world's first stored-program computer and home to the first Computer Science graduates. The Department offers one of the most sought-after

subject combinations in the sector, supported by a broad range of modules and a vibrant student community. It was ranked shared first place for the best Computer Science research environment in the UK (REF 2021) and is consistently among the most targeted universities by top UK employers (THE Graduate Market 2024).

Overall Purpose of the Job

A key responsibility of the University of Manchester within the TAICHIP project is to lead the research on advanced AI-acceleration frameworks. The Manchester team, through the Advanced Processor Technologies group, focuses on exploring new forms of dynamic interaction between accelerators and host processors (or tightly coupled microcontrollers) for improved power efficiency and/or reliability monitoring.

This research aims to enable smarter, self-adaptive AI-chip architectures that can dynamically balance performance, energy consumption and fault tolerance. More specifically, the successful candidate will deal with the efficient and reliable implementation of dynamic neural network models. Compared to static models, which have fixed computational graphs and parameters at the inference stage, dynamic networks can adapt their structures or parameters to different inputs, leading to notable advantages in terms of accuracy, computational efficiency, adaptiveness, etc.

The work will have a dual focus:

(1) Enhancing execution efficiency through hardware and software extensions that enable more effective dynamic rescheduling of accelerator resources, thus achieving adaptivity with minimal reconfiguration overhead and improved energy and latency performance.

(2) Exploiting the adaptive structure of dynamic models to develop novel resilience mechanisms against permanent hardware faults. Reliability analysis and fault-tolerance techniques have never been directly connected to the execution of dynamic networks, opening new opportunities for intelligent runtime monitoring while demanding new approaches to fault mitigation.

The specific research direction will depend on the successful candidate's skills and

interests. This position is available as a Research Associate role (grade 6).

Key Responsibilities, Accountabilities and Duties

- Conduct individual and collaborative research on the efficient and/or reliable implementation of dynamic learning models within the TAICHIP work programme.
- Publishing research findings in suitable research outlets.
- Continually update knowledge and understanding of dynamically-reconfigurable AI systems, translating knowledge of advances into research activity.
- Deal with routine communication using a range of media, and communicate complex information, orally, in writing and electronically.
- Liaise with project team and partners, building internal contacts and developing external networks to promote research activity.
- Manage own research and administrative activities, with guidance if required.
- Provide guidance as required to support any students who may be assisting with the research.
- Actively participate as a member of the TAICHIP research team, presenting

information on research progress and outcomes; attend and contribute to periodic project meetings.

- Use creativity to analyse and interpret the results of the accelerator optimization framework and generate original ideas for efficient and reliable dynamic neural networks.
- Contribute to collaborative decision making with colleagues in areas of research.
- Plan own day-to-day research activity within the framework of TAICHIP work programme.
- Balance the competing pressures of research and administrative demands and deadlines.
- Carry out tasks that require the learning of dynamic neural networks and their end-to-end deployment, driven by the requirements of efficient dynamic adaptivity.
- Be aware of the risks in the work environment and their potential impact on their own work and that of others.

PERSON SPECIFICATION

Essential Qualifications, Skills G Experience

- Applicants should already have obtained a PhD (or equivalent) in computer science, electrical engineering or a related discipline; and/or relevant postgraduate research or industrial experience.
- Good first degree (or equivalent) in computer science, electrical engineering or a related discipline.
- Experience in at least two of the following areas of expertise:
  - Design and implementation of deep learning accelerators (e.g., FPGA, ASIC, or heterogeneous SoC platforms).
  - Drivers and runtime systems for AI accelerators, including resource management and scheduling.
  - Expertise in accelerator integration within complete SoC architectures, including communication interfaces and memory hierarchy.
  - Reliability analysis and fault-tolerant design, especially for hardware accelerators.
- Proficiency in relevant programming and modelling environments (especially Python, PyTorch, C/C++ and HDL).
- Strong analytical and experimental skills, with an interest in cross-layer approaches to performance, power, and reliability.
- Experience in research projects and in the scientific publishing process of research outcomes.

Desirable Qualifications, Skills G Experience

- Hands-on implementation, optimization, and deployment of neural networks on real embedded or heterogeneous platforms.
- Experience with dynamic neural network models (e.g., conditional computation, adaptive inference, specialized training methods).
- Strong publication record, commensurate with career stage.