# Research Associate

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| Work Area | Institute of Photonics (www.strath.ac.uk/science/physics/instituteofphotonics/) | | |
| Faculty | Faculty of Science (www.strath.ac.uk/science/) | | |
| Staff Category | Research | Reference No | 657406 |
| Reports To | Dr Antonio Hurtado | Grade | 7 |
| Salary Range | £36924 - £45163 | Contract Type | Fixed Term (12 months) |
| FTE | 1 (35 hours/week) | Closing Date | 11/11/2024 |
| Working Arrangements | Fully On-site. Due to the nature of this role, it is based fully on-site. | On Site Facilities | Car parking, sports centre, catering. |
| Holidays | 31 days + 11 statutory days<br>Option to purchase additional holidays. | | |
| Pensions | Contributory pension scheme available to all staff including generous employer contribution. | | |
| Training | Professional Development with Organisational and Staff Development Unit (OSDU) plus external training if required. | | |
| Family Friendly Benefits | Generous parental leave provision, on-campus nursery and options for flexible working. | | |
| Health and Wellbeing | University Sport centre, Occupational Health service, access to health and wellbeing events, cycle to work scheme, Employee Assistance Programme, agile working and established carers support network and carer friendly policies. | | |

## Job Advert

Applications are sought for a Post-Doctoral Research Associate position in Neuromorphic Photonics for Ultrafast Artificial Intelligence Systems. The position is based at the Institute of Photonics (IoP, Dept. of Physics) at the University of Strathclyde.

The successful candidate will work with Dr. Antonio Hurtado, on the UKRI funded Turing AI Fellowship Programme 'Photonics for Ultrafast Artificial Intelligence (PHOTON-AI)'. The goal of this programme is to design, develop and investigate novel optoelectronic technologies for low energy and ultrafast neuromorphic (brain-like) photonic systems for applications in light-enabled Brain-inspired Computing and Artificial Intelligence. This will involve the design and investigation of photonic artificial neural networks using semiconductor lasers (e.g. Vertical Cavity Surface Emitting Lasers-VCSELs) and optoelectronic systems as building blocks, as well as to analyse their performance in complex processing tasks (e.g. image/video processing, pattern recognition, data classification) for use in a variety of industry-informed applications.

The successful candidate will have access to state-of-the-art photonic and micro-fabrication laboratories at Strathclyde. In addition to the development and experimental investigation of the aforementioned opto-electronic neuromorphic photonic systems, the successful candidate will be involved in the development of suitable training algorithms to ensure their successful operation in complex processing tasks. A background in photonics and/or opto-electronic devices and systems and experimental analysis of free-space/fibre-coupled/integrated optical systems is desirable. A background in the programming and algorithm development for the training of neuromorphic (photonic) systems and neural networks is also desirable.

In addition, institutional training courses in leadership skills are available and the successful candidate will be encouraged to undertake these to further their own career objectives. An ability to communicate research effectively is important and public communication training will also be provided.

The project defines strategic collaborations with a wide network of project partners and stakeholders in the UK and overseas. The appointed researcher will work closely with these partners with the opportunity for research visits and secondments to partners as well as travel for dissemination of results at international conferences.

Our research team, with expertise in fundamental and applied research in neuromorphic photonics, nonlinear dynamical systems, light-enabled AI and nanophotonics, are a collegiate and welcoming group and we are looking for a candidate who will enjoy working in the collaborative and dynamic environment at the IoP. We look forward to hearing from candidates with good experimental background and strong oral and written communication skills. Candidates should have an academic or industrial R&D record in photonics or optoelectronics and a demonstrable ability to work both collaboratively and independently.

Whilst a Research Associate is sought for this position, applications from candidates who are close to completing a PhD are also welcome. In such circumstances, appointment will be made at grade 6 level (Research Assistant) and duties and grade will be revised accordingly.

The Hurtado group places the highest importance on equality, diversity and inclusion (ED&I) within our team and recognises the benefits that come with a diverse workforce. Thus, we are particularly welcoming of applications from candidates from under-represented groups, and from those with non-standard career paths. ED&I has been embedded throughout our work and will continue to be an important consideration as our research work develops.

*Whilst a Post-Doctoral Research Associate is ideally sought for this position; applications from candidates who are close to PhD completion or whose award is pending, are welcome. In such circumstances, the appointment will be made at Research Assistant level (RS06 salary scale £ 32,296 -£ 35,880) and duties will be adjusted to reflect the grade of the post. This will continue until the PhD award is confirmed, at which point the duties and grade will be revised accordingly.

# Job Description

**Brief Outline of Job:**

To undertake research in the Strathclyde's Institute of Photonics (IoP), working on the development and investigation of neuromorphic photonic systems for ultrafast brain-inspired computing and AI. To deliver on the objectives of the UKRI Turing AI Acceleration Fellowship 'Photonics for Ultrafast Artificial Intelligence (PHOTON-AI)', in collaboration with project partners and stakeholders. In particular, investigating the operation of artificial photonic neurons and photonic neural networks built with semiconductor laser and optoelectronic systems (e.g. VCSELs), developing novel training algorithms for such neuromorphic photonic computing systems, and demonstrating their successful training to perform strategic functionalities (e.g. pattern recognition, image processing, etc.). To progress the work of the research programme towards high quality publications and presentation of research results in scientific conferences, working with the wider team in a self-motivated but coordinated and organised manner. The researcher will work under the general guidance of the research leader; to establish a personal research portfolio and plan research proposals, with assistance from senior colleagues as required; to engage where required in relevant teaching, professional and knowledge exchange activities; and input to administrative activities.

**Main Activities/Responsibilities:**

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| 1. | Development and investigation of neuromorphic photonic systems built with semiconductor lasers and optoelectronic systems (e.g. VCSELs) |
| 2. | Develop and photonic neural network architectures using laser and optoelectronic systems as building blocks. |
| 3. | Electrical and Optical characterisation of neuromorphic photonic systems based upon free-space and fibre-optic optical interconnecting techniques. |
| 4. | Measurement of developed systems, including high-bandwidth time dynamical analyses, spectral characterisation, speed operation, power performance. |
| 5. | Development of suitable training algorithms and validate the operation of the fabricated neuromorphic optoelectronic systems in key industry-informed processing functionalities. |
| 6. | As part of a wider research group or programme, develop research objectives and proposals and play a lead role in delivery of a research programme on Neuromorphic Photonics for Ultrafast Artificial Intelligence functionalities in relation to the 'Photon-AI' Turing AI Acceleration Fellowship funded by UKRI working within an existing team and with guidance from senior colleagues. |

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| 7. | Engage with project partners and stakeholders to share information and ideas, develop collaborative research initiatives, inform the development of research objectives, participate in project meetings and research visits and secondments, prepare and submit joint scientific publications and to identify potential sources of funding. |
| 8. | Plan and manage own workload with guidance of colleagues as required in order to achieve research goals set jointly at the team level. Assist the principal investigator with the administration of the UKRI Turing AI Acceleration Fellowship. |
| 9. | Conduct individual and collaborative research, including determining appropriate research methods and contributing to the development of new research methods. |
| 10. | Identify sources of funding and contribute to the securing of funds for research, including drafting grant proposals and planning for future proposals and building research collaborations. |
| 11. | Write up research work for publication, individually or in collaboration with colleagues, and disseminate results as appropriate to the discipline by, for example, peer reviewed journal publications and presentations at conferences. |
| 12. | Participate in external networks to share information and ideas, inform the development of research objectives and to identify potential sources of funding. |
| 13. | Collaborate with colleagues on the development of knowledge exchange activities, by, for example, participating in initiatives which establish research links with industry and influence public policy and the professions. |
| 14. | Work closely with and support the research and development of PhD students. Supervise student projects, provide advice to students and contribute to teaching as required by, for example, running tutorials and supervising practical work. |
| 15. | Contribute in a developing capacity to Department/School, Faculty and/or University administrative and management functions and committees. |
| 16. | Engage in continuous professional development. |

# Person Specification

**Educational and/or Professional Qualifications**
(E=Essential, i.e. a candidate must meet all essential criteria to be considered for selection, D=Desirable)

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| E1 | Good honours degree and PhD (or equivalent professional experience) in Photonic Technologies (Science or Engineering) or related discipline. |

**Experience**

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| E2 | Experience of working experimentally on (opto-)electronic devices and systems and/or laser systems and/or photonic devices or systems. |
| E3 | Experience in optical and electronic measurements of laser and (opto-)electronic and/or photonic devices/systems (e.g. spectral measurements, temporal analysis, modulation response.) |
| D1 | Experience in working with free-space or fibre-coupled optical systems. |
| D2 | Experience in working with semiconductor laser systems (e.g. free-space/fibre-optic VCSEL systems, VCSEL-arrays, VCSEL design, modelling and characterisation). |
| D3 | Experience of working with nonlinear photonic/opto-electronic systems (e.g. laser nonlinear dynamical systems, etc.) and/or photonic integrated circuits and networks. |
| D4 | Experience of working with neuromorphic (photonic) systems, e.g. reservoir computing, spiking lasers, artificial (photonic) neuronal models and networks, etc. |
| D5 | Numerical simulation skills in photonic and/or (opto-)electronic device modelling. |
| D6 | Experience in the development of algorithms to train neuromorphic computing systems and/or artificial neural networks (photonic, electronic or otherwise). |
| D7 | Track record in using automated laboratory and programming software, e.g. python, matlab, Verilog, VHDL. |
| D8 | Experience of relevant student supervision |
| D9 | Experience of working within a research team with collaborative links to academia and/or industry and/or public bodies. |

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| **Job Related Skills and Achievements** | |
| E4 | Proven ability to independently plan and execute experimental programmes, proactively drawing on assistance from colleagues and working to deadlines. |
| E5 | Proven ability to effectively communicate in writing own scientific research. This can include the preparation and submission of high-quality scientific publications reporting research outcomes and/or project reports/deliverables and/or project/fellowships applications. |
| D10 | Proven ability to contribute to the supervision and support of PhD students. |
| D11 | Proven ability to work with academic and industrial partners and stakeholders including the ability to plan and participate in research with collaborators in the UK and internationally. |
| E6 | Excellent experimental and laboratory skills. |
| D12 | Experience of knowledge exchange related activities |
| **Personal Attributes** | |
| E7 | Ability to conduct individual and collaborative research, working collegiately within a team environment, using knowledge and skills to contribute to other projects where appropriate; |
| Ability to plan and manage own work-load effectively, coordinating this with the objectives of the team and collaborators. | |
| E8 | Willingness to engage proactively with colleagues to find joint solutions for research challenges |
| E9 | Ability to conduct research independently and without the need for day-to-day supervision whilst contributing to a strong team environment; willingness to plan and participate in research on collaborators sites in the UK and internationally. |
| E10 | Excellent interpersonal and communication skills, with the ability to listen, engage and persuade, and to present complex information in an accessible way to a range of audiences. |

## Application Procedure

Applicants are required to complete an application form including the name of three referees who will be contacted without further permission, unless you indicate that you would prefer otherwise. Applicants should also submit a Curriculum Vitae and a covering letter detailing the knowledge, skills and experience you think make you the right candidate for the job. Applicants should also complete the Equal Opportunities Monitoring Form.

## Other Information

Further information on the application process and working at Strathclyde can be found on our website (http://www.strath.ac.uk/hr/workforus).

Informal enquiries about the post can be directed to Dr Antonio Hurtado, Reader and UKRI Turing AI Acceleration Fellow (antonio.hurtado@strath.ac.uk ; +44 (0)141 548 4668). Further information on the Institute of Photonics can be found at: www.photonics.ac.uk.

### Conditions of Employment

Conditions of employment relating to the Research staff category can be found at: Conditions of Employment.

### Rewards and Benefits

Our staff have access to a wide range of outstanding benefits that include financial rewards, family friendly and wellbeing benefits and career development opportunities, details of which can be found here.

### Probation

Where applicable, the successful applicant will be required to serve a 9 month probationary period.

### Pension

The successful applicant will be eligible to join the Universities' Superannuation Scheme. Further information regarding this scheme is available from Payroll and Pensions.

## Relocation

Where applicable, the University offers a relocation package to support new employees who meet the eligibility criteria. The relocation package is offered as a contribution towards costs incurred, and is designed to be flexible, allowing staff to use the financial support available in the way that will be most helpful to them. Further details are outlined in the Relocation Policy.

## Interviews

Formal interviews for this post will be held in November 2024.

## Equality and Diversity

The University of Strathclyde is a socially progressive institution that strives to ensure equality of opportunity and celebrates the diversity of its student and staff community. Strathclyde is people-oriented and collaborative, offering a supportive and flexible working culture with a deep commitment to our equality, diversity and inclusion charters, initiatives, groups and networks.

We strongly encourage applications from Black, Asian and minority ethnicity, women, LGBT+, and disabled candidates and candidates from lower socio-economic groups and care-experienced backgrounds.

## University Values

The University's Values capture what we're all about: who we are, what we believe in and what we stand for. Our Values have been derived from how we act and how we expect to be treated as part of Strathclyde.

# Conditions of Employment

Research Staff

## 1. GENERAL CONDITIONS

Members of staff are subject to the Charter and Statutes and the Ordinances and Regulations of the University, published in the Calendar, and to any amendments or additions thereto approved by the University Court and, in the case of the Charter and Statutes, the Privy Council. Staff are also expected to familiarise themselves with, and adhere to, general University policies and procedures, as published on University web pages.

The University Court recognises Strathclyde Universities and College Union (SUCU) as the sole body with which it will negotiate and consult on all collective issues concerned with the terms and conditions of employment of Research Staff. Such terms and conditions may be varied by the University Court after negotiation and consultation with SUCU.

Each member of staff is responsible for the proper performance of allocated duties to the person or persons specified in the member of staff's letter of appointment and any accompanying papers.

The University is committed to ensuring that its business is conducted in an open and transparent manner and will take all appropriate steps to address risks of bribery or corruption. Members of staff are required at all times to act honestly and with integrity and to safeguard the resources for which they are responsible. The University has in place a robust Public Interest Disclosure (Whistleblowing) Policy to enable concerns to be brought to its attention. This is available at www.strath.ac.uk/publicinterestdisclosure. Other relevant policies, e.g. Fraud Prevention and Conflicts of Interests, can also be found on the University's website.

Any member of staff may at any time be exposed to commercially sensitive information, information related to potentially valuable intellectual property or information which may otherwise be of a confidential nature. This information, which could be found anywhere in the University, may be written or disclosed orally, can include information of a commercial or technical nature, and may be owned by the University or by third parties. The University requires all employees to keep any such information confidential in the first instance and not disclose, publish or otherwise disseminate it without prior consent of the University. Such confidentiality obligations are commonplace and in the commercial interests of the University. When in doubt advice should always be sought from Research and Knowledge Exchange Services prior to disclosure.

The University operates probationary periods for new staff, the duration of which will be specified in individual letters of appointment. The normal probation period for posts in this staff category is 9 months for those at grades 6 and 7, and 12 months for grades 8 and above. Further guidance on probationary procedures is published at http://www.strath.ac.uk/staff/policies/hr/.

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Further information on the terms and conditions specified in this document and other staffing policies and procedures can also be found at www.strath.ac.uk/hr.

## 2. SALARY

Appointments are made at an appropriate salary point on the University's grading structure, with initial placing determined according to qualifications and experience. Increments are paid to staff on the 12 month anniversary of their appointment. Where this is not the first of the month, the increment will be paid on the first of the month directly after the 12 month anniversary. This allows 1 progression to the next point on the salary scale until the top guaranteed point of the scale is reached.

Salaries are paid directly to staff members nominated bank account, normally on the second last working day of the month.

## 3. HOURS OF WORK

Working time is that required to fulfil the duties of the post. The University Court recognises that research staff carry out these duties in a variety of ways appropriate to the nature of the research activity, but expects regular contact to take place between the research staff employee and the supervisor/grantholder (where these positions are occupied by different individuals) during normal working hours on week days. There are exceptions to this pattern which may involve contact at other locations or in the evenings, or at weekends, but these arrangement will be made with the agreement of the member of staff concerned.

Duties may, by arrangement with Head of Department/School/Director, include some teaching associated with the post (up to a maximum of 40 hours per semester) for which no additional payment will be made.

Additional work which does not fall within the scope of that described above may by arrangement attract payment which must be authorised and processed through the payroll.

## 4. HOLIDAYS

Annual leave entitlement is 31 days per year to be taken by agreement with the line manager. For staff members working on a part-time basis, holidays will be calculated on a pro-rata basis.

In addition to annual leave there is an entitlement to eleven public holidays per year which should be taken on days that the University is closed for this purpose. The University presently closes for four additional days over the Christmas and New Year period. **These additional days count against the annual leave entitlement.**

For staff members working on a part-time basis, public holiday entitlement will be calculated on a pro-rata basis.

Annual leave and public holiday entitlements should be taken in the leave year to which they relate. Up to five days leave can be carried forward into the new leave year subject to line management agreement. In exceptional circumstances, Heads of Department/School/Director may approve carry forward of accrued annual leave in excess of five days.

The University's expectation is that staff take all accrued holidays prior to their termination date. If staff have exceeded their entitlement the University will deduct an equivalent number of days pay from final salary payments.

## 5. SICKNESS ABSENCE

During any period of absence through illness or injury provided the appropriate notification and certification procedures have been followed the University will pay a member of staff (having taken account of the aggregate of all periods of absence due to illness during the twelve months immediately preceding the first day of the current absence) as follows:

| **Period of Continuous Employment at start of absence from work** | **Full Pay** | **Half Pay** |
|---|---|---|
| Less than 1 year | 1 month | 1 month |
| 1 year but less than 2 years | 2 months | 2 months |
| 2 years but less than 3 years | 4 months | 4 months |
| 3 years but less than 5 years | 5 months | 5 months |
| 5 years or more | 6 months | 6 months |

In order to manage the University's sick pay scheme the University requires to maintain sickness absence records on individual members of staff. When making payments after the expiry of statutory sick pay the University will deduct an amount equivalent to any benefit normally payable by the Department of Work and Pensions. For full details on the general University policy in this area please refer to the Sickness Absence Management Policy at www.strath.ac.uk/staff/policies/hr.

## 6. PENSIONS

If you are under age 75 at the date your appointment commences you will automatically become a member of the pension scheme operated by the University — the Universities Superannuation Scheme (USS). You will be admitted to the career revalued benefits scheme called the USS Retirement Income Builder; the contribution rate that currently applies is 6.1% of pensionable salary. A threshold applies to the maximum salary that counts towards the USS Retirement Income Builder. The current threshold from 1 April 2024 is £70,296 per year. Contributions based on salary above the monthly equivalent rate of the threshold are paid to the defined contribution section of the scheme called the USS Investment Builder. Please use the following link to access information, including the USS Member Guide: https://www.uss.co.uk/for-members/youre-a-new-joiner. The scheme booklet is called 'Your Guide to the Universities Superannuation Scheme'.

The University operates a salary exchange arrangement, Pensions Plus, for members of the USS. Pensions Plus enables pension contributions to be made in a manner so that both employees and the University can benefit from available National Insurance Contribution savings. You will be automatically included in Pensions Plus, provided it does not adversely affect your take-home pay or your ability to claim certain state benefits. If your earnings fall below the Pension Plus pay protection limit you will be opted out of Pension Plus. This will not affect your membership of the USS.

New members of staff may opt out of USS within three months of taking up appointment and will then be treated as if they had never been a member of the scheme. After three months members of staff who wish to withdraw from USS during their employment will be required to give a minimum of 28 days' notice in writing to the University. Any member of staff who wishes to opt out should contact the Pensions Section, Finance, in the first instance (pensions@strath.ac.uk). Please note that if you are a member of Pensions Plus and withdraw from USS with less than two years of membership, or cease employment with the University and have less than two years of USS membership, the option of a refund of pension contributions will not be available to you. Instead, USS must provide you with a pension benefit that is payable from your Normal Pension Age. Regardless of whether you participate in Pensions Plus, if you are a member of the pension scheme for two years or more you are not entitled to a refund of pension contributions on leaving the scheme, you will be entitled to a pension benefit.

The University reserves the right to alter or withdraw Pensions Plus as it sees fit or as required to comply with legislative changes. Withdrawal or amendment of Pensions Plus will not affect your membership of USS. If you do not wish to participate in Pensions Plus but wish to remain in the pension scheme please contact the Pensions Team who will provide you with a non-participation form.

Information regarding pension scheme membership can be found on the Pensions pages of the University's website. Full information regarding USS can be found on the USS website – www.uss.co.uk

## 7. PLACE OF WORK AND RESIDENCE

Members of staff will be based on the John Anderson Campus, unless otherwise stated in the letter of appointment. The Department/School in which the post is initially placed will be specified in the letter of appointment although there will be an expectation to work at such other places as required in the course of employment.

If the need arises for members of staff to work outside the UK for a period (or periods) of more than one month then such arrangements will be subject to mutual agreement. Members of staff would then be provided with a statement in advance setting out the terms covering such periods of employment.

The University does not normally place specific restrictions upon the place of residence of members of staff. All staff are, however, expected to reside in a location which is compatible with the satisfactory fulfilment of all the duties associated with their appointment.

## 8. CONSULTANCY/FURTHER ACTIVITIES

To support the strategic objectives of the University and to facilitate individual professional development, the University encourages staff to engage in professional activities with outside bodies related to their field of work. In many cases, such activity will be approved on the basis that it represents University knowledge exchange activity and should therefore be treated as part of the individual's overall workload and managed through the University's systems. It is also recognised that there will be some cases where an activity is entirely separate from the University and should thus be notified/approved as a personal business activity. For further information please refer to the "University Procedure in relation to Work for Outside Bodies including Consultancies", which forms part of the employment contract and can be accessed at www.strath.ac.uk/hr.

## 9. DISCIPLINARY AND GRIEVANCE PROCEDURES

Further information on the University's disciplinary and grievance procedure can also be found at www.strath.ac.uk/policies/hr or on request from Human Resources.

## 10. NOTICE AND TERMINATION

Members of staff are employed on the conditions indicated in individual letters of appointment and any accompanying papers. The University is not obliged to give notice of termination or continue any employment beyond the end of that period. Where the period of the contract of employment is for one year or less it may be terminated short of the fixed term period by one months notice on either side. Where the period of the contract of employment is for more than one year, or where there have been a further contract or series of contracts immediately consecutive, the employment may be terminated short of the fixed term period by three months' notice on either side, except during the probationary period when the notice period is one month.

If the appointment is for a fixed term it will expire at the end of the period without the necessity for notice.

Revised April 2024