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# Position Details

## CSIRO Early Research Career (CERC) Postdoctoral Fellowship– CSOF4

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| The following information is for applicants | |
| Advertised Job Title | CSIRO Postdoctoral Fellowship in Machine Learning for Computer Vision |
| Job Reference | 92082 |
| Tenure | Specified Term of 3 years  Full-time |
| Salary Range | AU$92,624 to AU$101,459 pa + up to 15.4% superannuation |
| Location(s) | Canberra, ACT (other locations may be considered) |
| Relocation Assistance | Will be provided to the successful candidate if required |
| Applications are open to | * Australian/New Zealand Citizens; * Australian Permanent Residents; and * Australian temporary residents currently residing in Australia (visa sponsorship may be provided to eligible onshore candidates) |
| Position reports to the | Team Leader |
| Client Focus – Internal | 50% |
| Client Focus – External | 50% |
| Number of Direct Reports | 0 |
| Enquire about this job | Contact Russell Tsuchida or David Ahmedt via email at [russell.tsuchida@data61.csiro.au](mailto:russell.tsuchida@data61.csiro.au) or [david.ahmedtaristizabal@csiro.au](mailto:david.ahmedtaristizabal@csiro.au) |
| How to apply | Apply online at <https://jobs.csiro.au/>  Internal applicants please apply via **Jobs Central**  If you experience difficulties when applying, please email [careers.online@csiro.au](mailto:careers.online@csiro.au) or call 1300 984 220. |

**Acknowledgement of Country**

CSIRO acknowledges the Traditional Owners of the land, sea and waters, of the areas that we live and work on across Australia. We acknowledge their continuing connection to their culture and pay our respects to their Elders past and present. View our [vision towards reconciliation](https://www.csiro.au/en/about/Indigenous-engagement/Reconciliation-Action-Plan).

### Role Overview

**CSIRO Early Research Career (CERC) Fellowships** provide opportunities to scientists and engineers who have completed their doctorate and have less than three years relevant research experience. These Fellowships aim to develop the next generation of future leaders of the innovation system through:

* A differentiated career development program to deliver capability excellence and breadth across all facets of the national innovation system;
* Research training via strategic research and development projects with a clear focus that will deliver real impact through science and engineering excellence;
* An innovative culture supporting the development and demonstration of original thinking and expertise leading to peer-recognition; and
* Opportunities to develop skills and experience in collaborative research teams to effectively work within national and global multi/transdisciplinary and multi-stakeholder environments.

CERC Fellows **are appointed for three years or part time equivalent.**

We are seeking to appoint a highly motivated postdoctoral fellow to conduct cutting-edge research broadly on the theme of **incorporating domain knowledge into machine learning models for computer vision.** The appointed fellow with collaborate closely with the University of Adelaide’s Centre for Augmented Reasoning, hosted by the Australian Institute for Machine Learning. We offer three not necessarily disjoint views on incorporating domain knowledge into hybrid machine learning models:

* **Physical models**. For example, one might describe observed data using an underlying differential equation or inverse problem with dynamic and unknown parameters. The parameters might be represented using the output of a neural network. The weights of the neural network might be adjusted by implicitly differentiating through a predictive loss. Relevant keywords are *physics informed neural network, implicit neural network, deep declarative network, neural ODE* and *deep equilibrium model*.
* **Graphical causal models.** Machine learning predictors are often purely associative, mapping a predictor to a response variable without consideration for the causal structure which links them. In some causal structures, such as collider structures, the direction of causality can be used to improve predictive modelling, interpretability and fairness. Of particular interest is the nonparametric (kernel, or perhaps neural network) setting, considering tasks such as classification or image segmentation. Relevant keywords are *causality* and *collider regression.*
* **Data across modalities.** Sometimes rich domain information is itself another data. For example, medical images might be accompanied by technical textual descriptions. Relevant keywords are *multimodal learning* and *domain alignment.*

We expect that strong candidates will have insights that fit into one or more of the above views.

We expect that the fellow will be able to translate their core research into an applied setting of interest to CSIRO in their final year. Areas of interest might include astronomy, agriculture and food, robotics and manufacturing.

As part of this opportunity, the fellow will work closely with collaborators from the University of Adelaide’s Centre for Augmented Reasoning, hosted by the Australian Institute for Machine Learning, and CSIRO’s Data61. The successful candidate will join the high-performing Imaging and Computer vision Group at the CSIRO’s Data61, joining 600 other data science scientists building innovative solutions for Australia. The fellow will be supported by a large team comprising many post-graduate students and be involved in their supervision.

### Duties and Key Result Areas

Under the direction of senior research scientists and engineers, this CERC Fellow will:

* + Carry out innovative, impactful research of strategic importance to CSIRO that will, where possible, lead to novel and important scientific outcomes.
  + Recognise and exploit opportunities for innovation and the generation of new theoretical perspectives, and progress opportunities for the further development or creation of new lines of research to be applied in a range of domains such as environmental science and manufacturing.
  + Work collaboratively with colleagues within the team and across CSIRO in internal and external projects with associated deliveries.
  + Independently undertake experimental and/or observational research activities, often requiring the supervision and/or training of others to ensure experiments are established in accordance with research design, or as required.
* Produce high quality scientific papers suitable for publication in high quality journals and for presentation at top ranked international conferences in computer vision and machine learning venues.
* Set research directions for students and research visitors. This includes collaboration between partners such as the University of Adelaide and fellows in other business units, who may not necessarily be working on the same project.
  + Initiate and collaborate with the development of research proposals and apply non-academic impact methodology to research projects.
  + Contribute to the effective functioning of the research team and help deliver CSIRO’s organisational objectives and plans.
  + Communicate effectively and respectfully with all staff, clients and suppliers in the interests of good business practice, collaboration and enhancement of CSIRO’s reputation
  + Adhere to the spirit and practice of CSIRO’s Code of Conduct, Health, Safety and Environment procedures and policy, Diversity initiatives and Zero Harm goals.
* Other duties as directed.

The CERC Fellow learning, development and training programis developed between the CERC Fellow and their CSIRO supervisor. The program will focus on enhancing the Fellow’s capabilities to the level expected of an independent researcher and will include on-the-job and course-based development encompassing:

* Discipline-specific techniques and protocols
* Professional growth
* Project management
* Communication and influencing skills
* Working and collaborating with others

## **Selection Criteria**

#### Essential

*Under CSIRO policy only those who meet all essential criteria can be appointed.*

1. A doctorate (or will shortly satisfy the requirements of a PhD) in a relevant discipline area, such as Machine Learning, Computer Vision, Computer Science, Statistics or Mathematics.

Please note: To be eligible for this role you must have **no more than 3 years** (or part time equivalent) of postdoctoral research experience.

1. A solid history of peer reviewed publication (e.g. NeurIPS, ICLR, ICML, AAAI, CVPR, ICCV, AISTATS, JMLR, … ).
2. Demonstrated experience in conducting research and development activities in one or more of the following: machine learning or deep learning, computer vision, optimisation, scientific computing, computer science, mathematics.
3. Confident Python programming and experience with one or more ML platforms such as PyTorch, Tensorflow.
4. High level written and oral communication skills with the ability to represent the research team effectively internally and externally, including the presentation of research outcomes at national and international conferences.

## **Desirable**

1. Demonstrated experience in probabilistic or Bayesian methods, kernel methods, implicit neural networks or applied machine learning.
2. Demonstrated GPU/Parallel Computing experience.
3. **The ability to work effectively as part of a multi-disciplinary, potentially regionally dispersed research team, plus the motivation and discipline to carry out autonomous research.**

## Required Competencies

* **Teamwork and Collaboration:** Cooperates with others to achieve organisational objectives and may share team resources in order to do this. Collaborates with other teams as well as industry colleagues.
* **Influence and Communication:** Uses knowledge of other party's priorities and adapts presentations or discussions to appeal to the interests and level of the audience. Anticipates and prepares for others reactions.
* **Resource Management/Leadership:** Allocates activities, directs tasks and manages resources to meet objectives. Provides coaching and on the job training, recognises and supports staff achievements and fosters open communication in the team.
* **Judgement and Problem Solving:** Investigates underlying issues of complex and ill-defined problems and develops appropriate response by adapting/creating and testing alternative solutions.
* **Independence:** Recognise and makes immediate changes to improve performance (faster, better, lower cost, more efficiently, better quality, improved client satisfaction).
* **Adaptability:**Copes with ambiguity or situations that lack clarity. Adapts readily to changing circumstances and new responsibilities (which may include activities outside own preferences) in the interests of achieving team objectives. Recognises the need for and undertakes personal development as a result of changes.

To be appointed as a CERC Fellow within CSIRO, candidates are required to have **submitted** their doctoral thesis at the time of commencement, as a minimum requirement, if PhD conferment has not been obtained. If a candidate has submitted, but their PhD has not yet been formally attained, the starting salary will be CSOF4-1 (AU$87,068). Upon CSIRO receiving written confirmation that the PhD has been awarded (within a six month period from commencement date), the salary will be increased to the negotiated level and the difference will be back-paid to the Officer’s start date.

Special Requirements

Appointment to this role may be subject to conditions including provision of a national police check as well as other security/medical/character clearance requirements.

* The successful candidate will be asked to obtain and provide evidence of a National Police Clearance or equivalent. Please note that individuals with criminal records are not automatically deemed ineligible. Each application will be considered on its merits.
* If the successful candidate is not an Australian Citizen or Permanent Resident, they may be required to undergo additional security clearances, which may include medical examinations and an international standardised test of English language proficiency (i.e. IELTS test- https://ielts.com.au/)

**Our value proposition**

We want CERC Fellows to join our world class science, engineering and digital teams to solve big, complex problems that make a real difference to the future of Australia and the world.

You'll get to work with some of the most talented minds in their fields, not just in Australia, but in the world. At CSIRO, we spark off each other, learn from each other, trust each other and collaborate closely to achieve more than we could individually.

Find out more about our CSIRO Early Research Career (CERC) Fellow Experience Employee Value Proposition (EVP) [here](https://www.csiro.au/en/careers/postdoctoral-fellowships).

## **About CSIRO**

We solve the greatest challenges through innovative science and technology. Visit [CSIRO Online](http://www.csiro.au/), the [Quantum Technologies Future Science Platform](https://research.csiro.au/qt/) and [Data61](https://data61.csiro.au/) for more information.

CSIRO is a values-based organisation.  In your application and at interview you will need to demonstrate behaviours aligned to our values of:

* People First
* Further Together
* Making it Real
* Trusted