# 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 Robotics |
| Job Reference | 93571 |
| Tenure | Specified Term of 3 years Full-time |
| Salary Range | AU$92,624 to AU$101,459 pa (pro-rata for part-time) plus up to 15.4% superannuation |
| Location(s) | Pullenvale, QLD |
| Relocation Assistance | Will be provided to the successful candidate if required |
| Applications are open to | All Candidates |
| Position reports to the | Principal Research Scientist, Robotic Autonomy Team Lead  |
| Client Focus – Internal | 0% |
| Client Focus – External | 0% |
| Number of Direct Reports | 0 |
| Enquire about this job | Contact Stano Funiak via email at stano.funiak@data61.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 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).

**Child Safety**

CSIRO is committed to the safety and wellbeing of all children and young people involved in our activities and programs. View our [Child Safe Policy](https://www.csiro.au/en/about/policies/child-safe-policy).

### 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 full time equivalent.**

Deploying robots in remote environments, such as the Moon, deep sea, underground mines, and caves, requires them to operate autonomously, perceive their surroundings, make decisions, plan their actions, and navigate extreme terrains with minimal human intervention. Traditional solutions to robot autonomy rely on model-based pipelines, which decompose the overall task into a collection of inter-connected algorithmic and optimisation blocks. This fellowship pursues a new approach to autonomous robot navigation by exploiting the complementary nature of traditional (model-based) and modern (data-driven) robot autonomy paradigms. The work will build upon and extend implicit neural networks, a promising emerging paradigm that incorporates domain information and algorithmic priors into deep learning models. Using this paradigm, the CERC Fellow will create novel unified models that retain the structure of traditional autonomy pipelines while codesigning and simultaneously tuning components together, rather than individually for each block. The CERC Fellow will demonstrate the methods developed in this project on a fleet of robots in realistic testbeds, simulating the exploration of remote planetary environments. The methods will be integrated into Wildcat, a state-of-the-art solution for simultaneous localisation and mapping, developed at CSIRO.

### 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.
	+ Deliver publications in top-tier robotics and machine learning venues, including ICRA, IROS, RSS, CoRL, RAL, ICML, NeurIPS, and JMLR.
	+ Contribute to open-source libraries for building nonlinear optimisation layers in PyTorch, and integrate into commercial software developed at CSIRO.
	+ Utilise design thinking methodology to plan and prepare research proposals, and apply non-academic impact methodology to research projects.
	+ Proactively undertake development to grow effective researcher capabilities to support career goals.
* Accessing commercially sensitive information of CSIRO and/or research or commercial partners.
* Representing CSIRO externally, including in public forums, with industry or the research sector or with Government.
* Demonstrating the methods and software on real robots and based on field trials on-site and externally.
* Supervising and advising undergraduate and PhD students.
	+ Adhere to the spirit and practice of CSIRO’s Values, Code of Conduct, Health, Safety and Environment procedures and policy and diversity initiatives.
	+ 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). The doctorate must be in a relevant discipline area, such as Robotics, Machine Learning, Computer Science, Computer Engineering, Electrical Engineering, or Mathematics.

Please note: To be eligible for this role you must have **no more than 3 years** (or full time equivalent) of relevant research experience after the completion of PhD.

1. Expertise in at least one of the following two areas: (a) machine learning theory/algorithms, including recent neural network architectures, or (b) applying deep learning to tasks such as robot navigation, robot perception, and computer vision.
2. Experience implementing deep learning architectures in frameworks such as PyTorch or TensorFlow.
3. High competency in at least one programming language, such as Python or C++.
4. Strong mathematical skills, particularly Mathematical Optimisation.
5. 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.
6. A strong record of publications in top peer-reviewed journals and/or conferences.
7. A record of science innovation and creativity, including the ability & willingness to incorporate novel ideas and approaches into scientific investigations.

## **Desirable**

1. Expertise in developing robot navigation, mapping, control, and/or planning algorithms.
2. Experience programming on modern hardware using frameworks such as CUDA and OpenCL.
3. Practical experience with hardware robotic platforms and/or software environments, such as Robot Operating System (ROS).
4. The ability to remain productive, positive, and resilient in complex, ambiguous and/or uncertain environments.
5. **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 to this CERC Fellowship role within CSIRO, candidates will be expected to commence employment by 31 January 2024. Candidates are also 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 ($89,680). 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 is subject to provision of a pre-employment background check and may be subject to other security/medical/character clearance requirements.

* The successful candidate will undertake a pre-employment background check. 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/) and [CSIRO Data61](https://research.csiro.au/data61/) 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