



RESEARCH ASSISTANT / RESEARCH FELLOW

DEPARTMENT/UNIT	Monash eResearch Centre
FACULTY/DIVISION	Office Vice-Provost (Research and Research Infrastructure)
CLASSIFICATION	Level A/B
DESIGNATED CAMPUS OR LOCATION	Clayton campus

ORGANISATIONAL CONTEXT

Everyone needs a platform to launch a satisfying career. At Monash, we give you the space and support to take your career in all kinds of exciting new directions. You'll have access to quality research, infrastructure and learning facilities, opportunities to collaborate internationally, as well as the grants you'll need to publish your work. We're a university full of energetic and enthusiastic minds, driven to challenge what's expected, expand what we know, and learn from other inspiring, empowering thinkers. Discover more at www.monash.edu.

Monash eResearch Centre (MeRC) is a University commitment to accelerating research by applying advanced computing and information technology to important research problems. The centre partners with individual researchers, Australian research institutions and global research communities. MeRC is a leader amongst international eResearch initiatives, supporting over 2000 researchers by operating a number of projects including the MASSIVE high performance computing facility, R@CMon - a node of the Nectar Research Cloud, petascale data storage and life-cycle infrastructure, data safe havens for global communities, and the national Characterisation Virtual Laboratory. Staff at the Monash eResearch Centre deliver impact: we help visualise how the human brain is connected, we design high performance computing systems, we write data processing workflows for one-of-a-kind Australian microscopes, and we write smart software for interrogating unique data collections. MeRC is driven by the quality and passion of our staff, and the partnership with the researchers we work with. For more information about the work we do, please visit our website: www.monash.edu/eresearch.

POSITION PURPOSE

A Level A/B research-only academic is expected to contribute towards the research effort of the university and to develop their research expertise through the pursuit of defined projects relevant to the particular field of research.

Retinal photography enables us to visualise the back of the eye. It is an important, low-cost and non-invasive diagnostic tool for common eye diseases such as glaucoma, diabetic retinopathy and macular degeneration. The retinal microvasculature is a window to the body's overall microvascular health. Subtle retinal changes have been identified as effective biomarkers to predict the risk of cardiovascular disease (CVD), which accounts for 14% of Australia's total burden of disease. Currently, the interpretation of retinal imaging relies heavily on the subjective assessment of trained professionals.

The candidate for this position will work towards implementing a pilot retinopathy-based screening and monitoring, and apply artificial intelligence (AI) to 'mine' for data from such a program to develop an AI algorithm to predict CVD risk. Furthermore, the candidate will evaluate the current CVD status, risk factors, screening history, ethnic- and socio-economic factors in patients referred to CERA using natural language processing (NLP, a fast data extraction method) applied to electronic patient records; compare and validate the existing and mathematical risk-stratification algorithm with a newly developed, improved risk-stratification algorithm based upon the AI analysis. A multidisciplinary approach will be utilised to develop and clinically validate an integrated AI system.

Model 1: AI screening for early diagnosis of eye diseases in primary care settings. The AI system will provide point-of-care diagnostic assistance to enable non-eye care professionals to identify eye diseases. Resulting in more targeted referrals to eye professionals, earlier disease diagnosis and potential healthcare cost savings.

Model 2: AI integration in eye care clinics. Eye disease diagnosis relies heavily on imaging technologies that require clinicians' subjective interpretation which varies considerably. The AI system has been validated to give reproducible and consistent classification outputs that will minimize errors and diagnostic variation by eye professionals.

Model 3: AI risk prediction for CVD at cardiology clinics. Retinal vascular changes, such as calibre, tortuosity and nicking are indicators of CVD end-organ damage. They are associated with the risk of developing a cardiovascular event. The integration of an AI retinal risk score with existing classical risk calculators, such as the Framingham and Coronary Risk Evaluation, will provide an additional tool for risk prediction.

Reporting Line: The position reports to Senior Research Fellow Monash eResearch

Supervisory Responsibilities: Not applicable

Financial Delegation: Not applicable

Budgetary Responsibilities: Not applicable

Key responsibilities

Specific duties required of a Level B research-only academic may include:

1. The conduct of research either as a member of a team or independently and the production of conference and seminar papers and publications from that research
2. Supervision of research-support staff involved in the staff member's research
3. Guidance in the research effort of junior members of research-only Academic staff in their research area
4. Contribution to the preparation or, where appropriate, individual preparation of research proposal submissions to external funding bodies
5. Involvement in professional activities including, subject to availability of funds, attendance at conferences and seminars in the field of expertise
6. Administrative functions primarily connected with their area of research
7. Occasional contributions to the teaching program within the field of the staff member's research
8. Co-supervision or, where appropriate, supervision of major honours or postgraduate research projects within the field of the staff member's area of research
9. Attendance at meetings associated with research or the work of the organisational unit to which the research

is connected and/or at departmental, school and/or faculty meetings and/or membership of a limited number of committees

KEY SELECTION CRITERIA

Education/Qualifications

1. The appointee will have:
 - a doctoral qualification in the relevant discipline area or equivalent qualifications or research experience

Knowledge and Skills

1. Strong track-record in machine learning, computer vision or medical imaging processing (e.g. CVPR/ICCV/TPAMI/TMI/MICCAI/NeurIPS/ICML).
2. Proved research experiences on ophthalmology AI projects with great impact.
3. Excellent programming skills (in C++ and Matlab/Python) are required.
4. The candidate is also expected to have a strong foundation in computer vision, artificial intelligence, machine learning, NLP, especially deep learning (using e.g. Keras, PyTorch). Knowledge of computational biomechanics techniques (e.g. finite element) is a plus. Knowledge of optical coherence tomography, and Ophthalmology.
5. Demonstrated analytical and manuscript preparation skills;
6. Ability to solve complex problems by using discretion, innovation and the exercise diagnostic skills and/or expertise
7. Well-developed planning and organisational skills, with the ability to prioritise multiple tasks and set and meet deadlines
8. Excellent written communication and verbal communication skills with proven ability to produce clear, succinct reports and documents
9. A demonstrated awareness of the principles of confidentiality, privacy and information handling
10. A demonstrated capacity to work in a collegiate manner with other staff in the workplace
11. Demonstrated computer literacy and proficiency in the production of high level work using software such as Microsoft Office applications and specified University software programs, with the capability and willingness to learn new packages as appropriate

OTHER JOB RELATED INFORMATION

- Travel to other campuses of the University may be required
- There may be a requirement to work additional hours from time to time
- There may be peak periods of work during which taking of leave may be restricted

GOVERNANCE

Monash University expects staff to appropriately balance risk and reward in a manner that is sustainable to its long-term future, contribute to a culture of honesty and integrity, and provide an environment that is safe, secure and inclusive. Ensure you are aware of and adhere to University policies relevant to the duties undertaken and the values of the University. This is a standard which the University sees as the benchmark for all of its activities in Australia and internationally.