



## PhD Project Advertisement

### Deep Learning and Drone Imaging for High-Throughput Cereal Phenotyping

We are seeking a motivated PhD candidate to develop next-generation AI and drone-imaging technologies for barley breeding and crop improvement.

Barley is a major global crop and underpins an Australian industry worth more than \$3.2 billion annually. Breeding programmes routinely evaluate thousands of lines across multiple environments, yet key yield-related traits such as head number and head loss are still often measured manually. These assessments are time-consuming, subjective and difficult to scale. In this project, the successful candidate will develop automated AI and drone-imaging approaches capable of measuring these traits rapidly and accurately across large commercial breeding trials, supporting the development of higher-yielding and more resilient cereal varieties.

The successful candidate will design and implement automated AI pipelines to detect, segment and count barley heads from high-resolution drone imagery collected across large-scale breeding trials. The project begins with an existing annotated dataset of more than 2,000 RGB drone images linked to manual ground-truth counts and will expand to include new drone imagery collected from commercial field sites across Victoria, South Australia and Western Australia. These datasets will enable the development and evaluation of deep learning and image-analysis methods under real-world field conditions.

The candidate will work with A/Prof Mohammad Pourkheirandish (School of Agriculture, Food and Ecosystem Sciences), Dr Patricia Menéndez (School of Mathematics and Statistics), and Dr Robert Turnbull (School of Computing and Information Systems) in an interdisciplinary research environment combining agriculture, AI, computer vision, statistics and data science. Through close collaboration with InterGrain, one of Australia's leading cereal breeding companies, the candidate will gain access to commercial breeding trials across Australia and contribute to the development of scalable, industry-ready phenotyping tools with strong potential for translation across other cereal crops.

#### Skills and training you will gain:

- AI and deep learning for computer vision
- Drone/UAV image acquisition and analysis
- Object detection, pose estimation and image segmentation
- Spatial statistics and statistical modelling
- Large-scale data analysis and machine learning workflows
- Quantitative genetics and phenomics
- Python-based machine learning and image analytics
- Industry-focused research translation and collaboration

This project is ideal for candidates with backgrounds in data science, computer science, remote sensing, statistics, agriculture or related quantitative disciplines who are interested in developing AI-driven solutions for real-world agricultural challenges.



The outcomes of this work will support the development of more resilient, high-yielding cereal varieties and create scalable phenotyping tools with strong potential for broader agricultural and commercial applications.

## Benefit

<http://scholarships.unimelb.edu.au/awards/graduate-research-scholarships>

## Eligibility requirements

To be considered for entry, you must have completed one of the following:

- A **4-year undergraduate degree** in a relevant discipline, including a **substantial research component** (equivalent to at least 25 per cent of 1 year of full-time study), with a weighted average mark (WAM) of **at least 75 per cent** in your final year subjects or equivalent, **or**
- A **masters degree** in a relevant discipline, including a **substantial research component** (equivalent to at least 25 per cent of 1 year of full-time study), with a WAM of **at least 75 per cent** or equivalent, **or**
- A **qualification and professional experience** considered to be equivalent.

Applicants who have not graduated from the University of Melbourne within the past five years will also need to provide referee reports.

## Selection Criteria

Preference will be given to eligible candidates who demonstrate some or all of the following:

- Experience in machine learning or computer vision
- Research software development experience
- Expertise in statistical modelling or data analysis
- Experience using high-performance computing or cloud computing environments
- Knowledge of agricultural science or plant biology
- Clear ability to communicate scientific ideas
- Creativity and problem-solving ability
- Ability to manage and complete complex technical tasks
- Ability to work both independently and collaboratively in multi-disciplinary teams

## How to apply

To apply for this project, please email the following documents before 30 June 2026 to A/Prof Mohammad Pourkheirandish ([mohammad.p@unimelb.edu.au](mailto:mohammad.p@unimelb.edu.au)):

- A one-page statement addressing your suitability for the project
- A one- to two-page responses to the selection criteria
- A curriculum vitae
- Academic transcripts
- Any other relevant supporting material