WESTERN SYDNEY UNIVERSITY

Hawkesbury Institute for the Environment

Future Food Systems

PHD SCHOLARSHIP
DEVELOP CROP-BASED SENSORS FOR REAL-TIME MONITORING AND CONTROL UNDER PROTECTED CROPPING

Smart farming has many advantages such as accurate irrigation and fertigation to save resources and better control of crop growth, health and disease development. The main characteristics of indoor farming is that it attempts to control all environmental factors (e.g., temperature, humidity, water, nutrition and lighting) to optimise the farming production and minimise operation cost.

The PhD project is part of larger project focussed on developing an Internet of Things (IoT) for Indoor Farming funded by the Future Food Systems Cooperative Research Centre (FFS CRC www.futurefoodsystems.com.au). The IoT project is a collaboration between the University of New South Wales (UNSW, A/Prof Wen Wu), Western Sydney University (A/Prof Oula Ghannoum) and WBS Technology.

THE PROJECT

The PhD project aims at developing a suite of low-cost crop-based sensors for smart indoor farming. These include microclimate sensors inserted within the crop canopy such as temperature, humidity, CO_2 and radiation, as well as icameras such as RGB camera, colour detector and hyperspectral imaging, typically used for plant phenotyping.

The ultimate goal is to link in real time environmental conditions and fertigation input with crop-based data collected from affordable cameras and sensors. These 'biological' sensors will inform about fruit quality and crop growth and health. For the advanced sensors that produce a large amount of data, the project will also develop edge-computing algorithms to reduce amount of data transmitted in the wireless communication channels and the end-to-end system latency.

The successful applicant will be based in Sydney, Australia at the Hawkesbury Institute for the Environment, which hosts the National Vegetable Protected Cropping Centre (www.westernsydney.edu.au/nvpcc) and is a node of the FFS CRC (www.futurefoodsystems.com.au)

This PhD project will suit an ambitious early career scientist who is willing to take on a challenging project in a multi-disciplinary and fast developing field linking crop phenotyping, image analysis and IoT communication systems.

The PhD candidate will be supervised by a multidisciplinary team including a **Crop Biologist** (A/Prof Oula Ghannoum; www.westernsydney.edu.au/hie/people/researchers/assoc_prof_oula_ghannoum), **an IoT Specialist** (A/Prof Wen Wu, www.cse.unsw.edu.au/~wenh) and **a Data Scientist** (Dr Yi Guo, www.westernsydney.edu.au/staff_profiles/WSU/doctor_yi_guo).

WHAT DOES THE SCHOLARSHIP PROVIDE?

» Domestic students will receive a tax free stipend of $30,000 per annum and a funded place in the doctoral degree.

» International students will receive a tax free stipend of $30,000 per annum. Those with a strong track record will receive a fee waiver.

» The project will also provide funding for research costs and conference travel.

CRITERIA

The successful applicant should:

» Demonstrate an exceptional interest in plant phenotyping;

» Demonstrate experience in some or all of the following areas:

- Demonstrated experience with basic statistical methods and large data-set analysis is essential.
- Experience in working with R, MATLAB, Python or similar packages to develop data processing and analytical algorithms is recommended.
- Collection and analysis of digital imaging (e.g., RGB, infrared and/or hyperspectral) is highly desirable.
- Good knowledge of plant physiology is desirable.

» Hold qualifications and experience equal to an Australian First Class Bachelor Honours degree or equivalent overseas qualifications and be enthusiastic and highly motivated to undertake further study at an advanced level.

» Have good communication skills and be creative.

» International applicants must also demonstrate a high level of proficiency in the English language. Please refer to the English language requirements at **www.westernsydney.edu.au/international/home/admissions/entry_requirements.**

HOW TO APPLY

» Applicants should discuss their eligibility and interests with Associate Professor Oula Ghannoum at **O.Ghannoum@westernsydney.edu.au**.

» Contact the Graduate Research School to discuss enrolment and scholarships at **grs.scholarships@westernsydney.edu.au**

» Please submit an application form, CV, names and contact information of two referees, and a one-page document stating how your research interests align with the project's aims.

Closing date: 31 October 2020

» The application form can be downloaded:
www.westernsydney.edu.au/graduate_research_school/