Precision Agriculture
What does the future of agriculture look like?

Established in 2002, the university’s Precision Agriculture Research Group (PARG) develops new technologies that address current challenges in agriculture, horticulture and natural resource management using expertise from a range of fields. PARG is a multidisciplinary group of researchers developing innovative, low cost and accessible technology for industry and farmers. PARG uses the latest sensors and positioning technology to improve efficiencies and cost effectiveness.

“...

Agriculture is way too important to be a single discipline. The future of agriculture demands the latest in science, technology and mathematics to underpin innovations in plant and animal production.

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Prof. David Lamb
Precision Agriculture

The Precision Agriculture Research Group operates from the university’s SMART Farm, 7,000 acres of university-owned land, 10km northwest of the campus.

WORLD CLASS INFRASTRUCTURE

The research group was a part of establishing UNE’s SMART Farm Innovation Centre (SFIC). With connection to the National Broadband Network (NBN), Australia’s Academic and Research Network (AARNet) and satellite technology, the centre allows PARG’s researchers to be instantly and virtually connected and to employ a number of wireless, sensor technologies.

Since the opening of SFIC in May 2013, PARG has connected to research sites in 22 locations across Australia and New Zealand and currently collaborates with 17 government departments and universities, at home and abroad.

RESEARCH PROJECTS

- Developing applications for mobile devices such as smart phones for farmers to monitor and manage pasture biomass
- Virtual fencing for flexible, real-time control of livestock distribution
- Developing multistate monitoring tools for managing Australia tree crops
- Remote sensing as an industry-wide yield-forecasting, nitrogen-mapping research aid
- Low-cost, high-quality 3D crop monitoring with drones
- Establishing the UNE SMART Farm as a ‘landscape laboratory’
- Building applications for unmanned aerial vehicles (UAVs) to support field data collection, new sensor development and image-calibration work involving satellite and aerial images

MAJOR PARTNERS

- CSIRO
- Sugar Research Australia
- Meat and Livestock Australia
- Grains Research and Development Corporation
- Boeing Defence Australia
- Horticulture Innovation Australia
- Queensland, Victorian, New South Wales and South Australian state governments
- Australian Government’s Department of Agriculture and Water Resources
- CRC for Spatial Information
- 9 universities

PUBLICATIONS 2008 - 2015

- 3 book chapters
- 4 journal articles
- 4 books
- 131 conference publications

COLLABORATIONS IN NUMBERS

- 16 Full-time research staff
- 5 Post-graduate students
- 3 PhD graduates
- 1 Masters graduate
- 4 Research awards to individuals
- 3 Research awards to industry
- 4 Research awards to technology developers
- 5 industry end-users
- 3 education outreach programs

ACTIVE GRANTS

- Grant total $10.47M
- Industry $407,460
- UNE $546,541
- Government $9.48M

STAFF & STUDENTS (Data current October 2015)

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- Industry $407,460
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COLLABORATIONS IN NUMBERS

- 4 industry funding organisations
- 17 partnerships with research institutes
- 8 partnerships for individual projects
- 4 technology developers
- 7 industry service providers
- 5 industry end-users
- 3 education outreach programs
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- 3 book chapters
- 14 journal articles
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ACTIVE GRANT TOTAL $10.47M

- Government $9.48M
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- 4 industry funding organisations
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MEET FOUR OF OUR EXPERTS

PROFESSOR DAVID LAMB
Plant, soil and climate sensing

Prof. Lamb’s research interests include applied optics and precision agriculture and the development and application of remote and proximal optical and electromagnetic sensors, including optical fibre sensors for environment, chemical, physical and biophysical sensing.

dlamb@une.edu.au • +61 2 6773 3585

ASSOCIATE PROFESSOR ANDREW ROBSON
Remote sensing for crop management

A/Prof. Robson has been involved in agricultural research since 1996, firstly as a technician with the NSW Department of Primary Industries, and then with the Queensland government, developing remote sensing/GIS applications. Currently Andrew’s research includes peanut, sugar cane, tree crops and grains incorporating satellite, airborne and field based technologies.

andrew.robson@une.edu.au • +61 2 6773 4085

DR MARK TROTTER
Precision livestock management

Dr Trotter is a leading member of the UNE PARG and the CRC for Spatial Information. Mark’s research interests focus on spatio-temporal variability in agricultural systems and the development of sensors and management techniques that enable producers to increase production and efficiency.

mtrotter@une.edu.au • +61 2 6773 2465

DR GREG FALZON
Intelligent and autonomous systems

Dr Falzon is the director of C4D: Spatio-temporal Analysis Support Unit and has expertise in a wide range of statistical, image analysis, machine learning, and artificial intelligence subjects. He specialises in applying these techniques to agricultural challenges.

gfalzon@une.edu.au • +61 2 6773 2387

SERVICES

EDUCATIONAL OUTREACH
Provide training for primary and secondary, as well as tertiary and vocational education students, to build the capacity of our future farmers

RESEARCH AND DEVELOPMENT
Finding ways to integrate technology with farming practices to achieve optimal production

INDUSTRY COLLABORATIONS
Working with government agencies like the CSIRO as well as the CRC Spatial Information, small to medium enterprises and farmers to develop useful advanced technologies

INDUSTRY UPDATES
Conducting conferences and training camps for industry stakeholders to demonstrate latest research and technology applications

PARG COLLABORATION

In Queensland, PARG is working with the sugar industry to improve crop management using satellite technology.

In the New England region, PARG is developing tracking technology for monitoring wild dog populations.

PARG is located in Armidale, NSW with connections in research across Australia and New Zealand.

In terrestrial and satellite communication capabilities in order to mimic farming contexts and provide real-time data transfers.

PARG and the UNE SMART Farm have flow, terrestrial and satellite communication capabilities in order to mimic farming contexts and provide real-time data transfers.

EDUCATIONAL OUTREACH

PARG is a member of the UNE NBN Co. / AARNet.

PARG’s current work includes:

- Plant, soil and climate sensing
- Precision livestock management
- Remote sensing
- Intelligent and autonomous computer systems

PARG innovative projects include:

- Finding ways to integrate technology with farming practices to achieve optimal production
- Working with government agencies like the CSIRO as well as the CRC Spatial Information, small to medium enterprises and farmers to develop useful advanced technologies
- Conducting conferences and training camps for industry stakeholders to demonstrate latest research and technology applications
- Provide training for primary and secondary, as well as tertiary and vocational education students, to build the capacity of our future farmers

PARG’s research and development include:

- The proportion of Australian farmers exposed to PARG’s research and development
- 30% of Australian farms have been exposed to PARG’s research and development

PARG’s collaborations include:

- Working with government agencies like the CSIRO as well as the CRC Spatial Information
- Working with small to medium enterprises and farmers to develop useful advanced technologies
- Providing training for primary and secondary, as well as tertiary and vocational education students

PARG’s industry collaborations include:

- Finding ways to integrate technology with farming practices to achieve optimal production
- Working with government agencies like the CSIRO as well as the CRC Spatial Information
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PARG’s industry updates include:

- Conducting conferences and training camps for industry stakeholders to demonstrate latest research and technology applications
- Providing training for primary and secondary, as well as tertiary and vocational education students

PARG’s testimonial includes:

- Sundown Pastoral company has been actively involved with PARG at UNE using research and developed systems, products and theories.
- The major involvement has been in monitoring pastures from space and developing a system that can be used at farm-level for both pasture growth rate and biomass.
- This is used weekly to assist with setting pasture rotations covering in excess of 40,000 ha of improved pasture with over 25,000 backgrounding cattle. This monitoring is also used to assist with predictive pasture production using historical records. Also pasture renovation and fertilizer programs are developed with the assistance of pastures from space.
- GPS tracking collars have been used in many circumstances to evaluate grazing patterns of cattle and frequency of visiting loose lick supplements.
- We also visit the SMART Farm regularly for updates on new and emerging R&D. The drone technology currently demonstrated by PARG has certainly caught our eye at Sundown Farms.

MATTHEW MONK
Sundown Valley, Kingstown
Professor David Lamb

Plant, soil and climate sensing

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MEET FOUR OF OUR EXPERTS

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The proportion of Australian farmers exposed to PARG’s research and development is currently 30%.

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Improving outcomes for rural and regional communities is at the heart of UNE’s research endeavour. UNE is addressing the most challenging threats to the health, sustainability and livelihoods of regional communities, throughout Australia and abroad.

Professor Annabelle Duncan, Vice-Chancellor & CEO