Queensland Spatial Excellence Awards 2017 Citation

Undergraduate Student Award *(Highly Commended)*

John Tasker

John has made an exceptional contribution to spatial sciences teaching, research and in outreach to new students through his activities in 3rd year and in in his just completed Honours year. John tackled a highly complex problem of developing a new approach to analyses and map vegetation structure from airborne lidar across Australia. His thesis is "Structural Classification of Select Australian Vegetation Communities Using Airborne LiDAR" A quantitative understanding of vegetation structure is vital to inform protection and management of Australia's vegetation communities.

Structural vegetation classifications are an established method used to accurately map vegetation over regional to continental areas. Airborne light distance and ranging systems are increasingly used source of remotely sensed data, with the capacity to provide three-dimensional quantitative measures of vegetation structure at high spatial resolutions. This project developed a novel vertical segmentation methodology to characterise vegetation structure using ALS data collected over four contrasting Australian environments.

Currently and historically, detailed mapping and monitoring of vegetation has used stereo-photography and field surveys. Airborne lidar offers a potentially effective way to map the vertical stratification and structure of vegetation in the same manner as traditional approaches, but with high accuracy, precision and spatial coverage.

However, there are currently no techniques suited to this type of mapping, with data being processed as first and last returns, showing tree tops and the ground. John has developed and tested an innovative new technique across four highly different vegetation communities in Australia, that will enable vegetation vertical structure to be mapped accurately for the first time globally. John's method effectively integrates traditional botanical structure-floristics approaches, with modern data and processing. His method has the potential to alter how we map and monitor vegetation in Australia and globally. This type of approach is used commonly in government and industry by groups collecting spatial data on vegetation at all scales.

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John's approach has relevance to a broad range of vegetation mapping and monitoring conducted by the spatial industry for:

- local, state and national mapping of vegetation communities according to set structure and floristics standards set by Government Herbaria;

- scientific mapping and monitoring of vegetation structure for biomass, carbon and plant physiology assessments;

- horticultural assessments of trunk, stem, fruit and canopy dimensions to direct pruning, harvest and other remedial actions;

- agricultural assessments of biomass and canopy structure in grain crops and sugar-cane; and

- silvicultural applications for measuring and mapping tree trunk, branch and canopy structure, wood volume and biomass for production forestry.

John has been awarded first class honours (GPA 7 / High Distinction) for this project.

Judges' Comments

" John shows great innovation based on his technical knowledge and understanding of the same. His project is very relevant to some of the major Australian industries."