# OpenWeedLocator (OWL): An open-source, community-driven and low-cost fallow weed detection tool

Guy Coleman[1], William Salter, Michael Walsh
[1]University Of Sydney, Australia
(guy.coleman@sydney.edu.au)

**Summary** Fallow periods are an important tool to maximise crop yield potential in moisture limited environments and require effective weed control for optimal efficiency. With weed densities typically low, the targeting of individual plants through site-specific weed control (SSWC) is an opportunity to substantially reduce input usage and hence cost. Whilst promising, the efficacy of the technique is dependent on reliable and effective weed detection methods. Current proprietary methods are suited to fallow weed detection only and based on plant reflectance with optoelectronic sensors. Advancements in algorithms and small, yet powerful computers are enabling the use of digital images for weed detection and recognition in both fallow and more complex in-crop environments. The development of an image-based fallow weed detection tool, leaves the door open for future in-crop weed recognition use. The OpenWeedLocator (OWL) is an open-source, community-driven and low-cost device for image-based weed detection in fallow systems that acts as a practical educational tool and improves accessibility of the technology. The OWL uses a Raspberry Pi computer running simple green detection algorithms on a camera feed. The outcome of these colour-based algorithms activates relays connected to the general-purpose input/output (GPIO) pins on the board for an actionable response such as spot spraying or targeted tillage. Validation of the device was conducted over seven fallow fields of varying stubble loads and types around Wagga Wagga and outer Sydney in NSW. The four algorithms were similarly effective in detecting weeds with an average precision of 79% and recall of 52%, with up to 92% and 74% for precision and recall respectively at individual test sites. By taking a community-driven approach to image-based weed recognition technology, OWL is redefining the approach to site-specific weed control.

**Keywords** Site-specific weed control, weed detection, computer vision