Creating a SHE Task – Developments in prevention of herbicide resistance

* Introduce students to the Agbot using the following video clip:

*QUT Digital Agriculture – AgBot 2*

<https://research.qut.edu.au/digital-agriculture/projects/robot-platform-design-agbot-ii-a-new-generation-tool-for-robotic-site-specific-crop-and-weed-management/>

This website includes a 4 min video explaining the technology and uses of the Agbot and the following information that includes many SHE concepts that can discussed in class.

## Project Overview

The AgBot II is an innovative agricultural robot prototype fully designed and fabricated by QUT researchers and engineers with significant co-funding from the Queensland Government. AgBot II forms part of a new generation of crop and weed management machinery, intended to work in autonomous groups across both broadacre and horticultural crop management applications. The robot’s cameras, sensors, software and other electronics enable it to navigate through a field, apply fertiliser, detect and classify weeds, and kill weeds either mechanically or chemically, providing a tool for farmers to help reduce operational costs and efficiency losses.

By engaging with farmers in the initial design phase, AgBot II can provide multiple benefits to farm operations including:

* **Increased reliability of operations:** By developing equipment which can be produced at a lower cost per unit then traditional machinery, farmers will have the ability to purchase several robots to operate simultaneously in the field. Multiple robots increase the reliability of the operation, if a mechanical failure occurs, additional machines can continue operating.
* **Improved soil health:** The light weight design of AgBot II reduces soil compaction which affects crop root development and soil health in terms of water and nutrient absorption.
* **Data driven decisions:** AgBot II can operate at slower speeds, enabling the robot to use on-line weed detection and classification software to identify optimal weed destruction methods.
* **Improved yield:** Autonomous weed classification and multi-mode (chemical and non-chemical) weed destruction methods including herbicide, mechanical and micro-wave destruction methods.

## Real-World Impacts

Why is this important for Australia? Weeds cost Australian farmers around $1.5 billion per annum in weed control activities, and an additional $2.5 billion per annum in lost agricultural production. Across Australia, many farmers use non-tillage farming techniques to reduce losses of soil nutrients and moisture, primarily relying on herbicides to manage weeds.

With an increase in herbicide resistant weeds, multi-mode (chemical and non-chemical) destruction methods are becoming pivotal for the profitable operation of farms. This technology promises to reduce the cost of weeding operations by approximately 90%, which could save the Australian agricultural sector $1.3 billion per annum.

## Project Milestones

In June 2015, trials of the AgBot II prototype were carried out at the Queensland Government’s Redlands Research Station, with outstanding results. In these field trials, AgBot II achieved:

* An overall success rate in weed detection and classification above 90%. Its highest performance was with cotton (97.8%) and wild oats (97.3%), its lowest performance with sowthistle (82.0%).
* Demonstrated success of spot-spraying selected weed species.
* Use of a robotic hoe to mechanically remove weeds from the soil.
* The following website contains links to further articles that students could use to start pursuing a particular SHE aspect of their interest for their own report:

*Farmers urged to mix up weed control as herbicide resistant weeds spread across the country*<http://www.abc.net.au/news/rural/rural-news/2016-02-09/spread-of-herbicide-resistance/7151996>