• Field robotics start-up, spun out of University of Sydney

• Based on technology developed at the Australian Centre for Field Robotics (ACFR)

• Been developing air and ground robotic solutions for the agriculture industry since 2005.

• Greater than $25M received from the grains, horticulture, and meat and livestock industries to support R&D.

• Robotic solutions cover a range of agriculture commodities, including tree crops, vegetables, broadacre and grazing livestock.

• With intelligent tools they can perform non-chemical weeding, intelligent spraying, as well as automated harvesting in the not too distant future.
Agriculture and environment robots - developed in our lab

Drones

Large Scale

Small Holder
Ground Robotics for Farming
A farmer faces many challenges....

<table>
<thead>
<tr>
<th>On Farm</th>
<th>Environment</th>
<th>End of Supply Chain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ageing Farmer</td>
<td>Climate Change</td>
<td>$$ Input &amp; Supply Chain Costs</td>
</tr>
<tr>
<td>No Succession</td>
<td>Pest &amp; Disease</td>
<td>International Trade</td>
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<tr>
<td>Low labour availability</td>
<td>Chemical resistance &amp; Regulations</td>
<td>✔ Customer Perfection</td>
</tr>
<tr>
<td>$ High labour cost</td>
<td>Water Availability</td>
<td></td>
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<tr>
<td>Physical and Mental Well-Being</td>
<td>Waste</td>
<td></td>
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</tbody>
</table>
Digital Farmhand – Modular System for all Cases
Digital Farmhand – Local Smallholder Farmer Demo

Farmhand travels down rowscrop collecting data.

Other model.

Standard implements include a spray.

Plant weights.

Weight per plant.

Number of plants per meter.

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Digital Farmhand Trials in the Indo-Pacific Region

Indonesia

Google

Di-Wheel+Indonesia

Fiji

Google

Digital+Farmhand+Fiji

Samoa

Google

Digital+Farmhand+Samoa
Indonesia – Smallholder Farms
Indonesia – Field Trial and Workshop
Indonesia – Crop Health and Pests & Diseases
Indonesia – Operational & Logistical Challenges
Pacific Island Trial – funded by DFAT innovationXchange (iXc)
Fiji – Field Trial & Workshop
Samoa Field Trials
Low Tech Solution
Key lessons from DFAT iXc Indo-Pacific Field Trials

### Educational & ICT Analysis
- Excellent communication infrastructure
- Weak general technology adoption
- Technology education must focus on sustainability

### Field Trials & farmer engagement
- Undertook trials in Fiji and Samoa
- Excellent farmer engagement & many lessons learnt about how the Digital Farmhand technology would be used

### Economic Analysis
- \$\$ lower labour costs for weeding and chemicals
- improve yield & provide greater variety for nutrition security with crop intelligence
- service model as most sustainable model

DFAT iXc Indo-Pacific Key Lessons
Next Generation Farmers
NSW Ag Robotics STEM Program 2019-2021

- 20 schools across 2 years

- Funded by Dept of Industry through Office of NSW Chief Scientist

- Aims:
  ➢ to increase awareness of AgTech in regional communities,
  ➢ to develop a sustainable program, and
  ➢ to close the digital divide

- Program is an important entry point into regional communities to demonstrate the benefits of using bots such as Digital Farmhand

- Funding provides a seed to establish further regional industry support to continue and extend the program beyond the initial 2 years

FARMING is usually considered a difficult and labour-intensive career, but robots equipped for the job are hoped to inspire young people to enter the agriculture sector.

Canobolas Rural Technology High School will be one of 10 regional high schools across the state to participate in the $1.3 million Ag Robotics STEM Program.

The students have already spent the past term learning how to program a digital farmhand robot, with the robot arriving on Friday.
High School Study Guide – teacher resource

- 80 page study guide discussing agriculture and robotics along with lesson plans for use with Digital Farmhand
- Aligned to Australian high school technologies curriculum
- Study guide will encourage teachers to use program as a way of meeting their own performance indicators as well as bridging technology divide between city and regional students
Future Digital Farmhand–Community
Digital Farmhand for Smallholder Farmers

Smallholder commercial farmers globally

Developing countries

Indigenous agriculture

Capturing the next generation

STEM
Science • Technology • Engineering • Math

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Robotics and AI for Smallholder Farmers

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