# Robot Harvesting at Burlington Berries, Tasmania

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If you visit Burlington Berries during strawberry harvest, you will more than likely see a fleet of 16 Dogtooth robots silently picking strawberries.

Dogtooth Technologies is a technology and robotics company based in Cambridge, UK which has developed five generations of fruit picking robots and have 70 units deployed in Europe and Australia. They have been trialling their harvesting robots at Burlington Berries in Cressy, Tasmania since 2017, with a group of Gen3 robots.

This year is their fifth year at the site, and they are currently using 16 Gen4 units for this year's harvest trials. Overseeing this trial from Dogtooth is Eva Thilderkvist, who provides further detail on the robots and their activities.



**Dogtooth Gen3 robot picking strawberries in polytunnel infrastructure representative of that used throughout Europe**Photo credit: Dogtooth



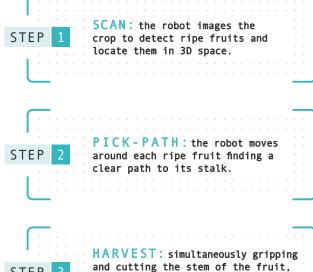
Dogtooth Gen3 robot picking a strawberry Photo credit: Dogtooth



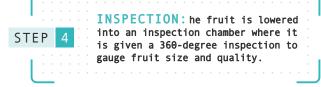
Dogtooth Robot picking strawberries in a glasshouse Photo credit: Dogtooth

#### Harvest innovation in action

Eva explains that as they work, each robot progresses through a 5-step harvest process:







PACKING: graded fruit is lowered into a punnet according to its size, colour, and quality. Substandard STEP fruit is automatically dropped into a waste container, all waste fruit is measured at this point.

Whilst picking fruit, the robots also carry out numerous other information gathering tasks which adds value to their process. This includes collecting images of the fruit which can be analysed and used for yield forecasting, a vital tool for labour management and generating marketing programs. Having this data collected remotely also frees up staff to perform other tasks such as de-leafing and plant maintenance operations.

For the trials, Eva explains that the robots work in teams within a set group of tunnels, enabling Dogtooth to monitor harvest rates and data to be evaluated more accurately. One of Burlington's supervisors manages each team, assisting where needed.

#### **Continuous improvement**

While the picking speed of these robots may not yet equal that of a manual worker, the pick rates have improved each year since the trials began. For Dogtooth, the present focus is on evaluating and improving picking rates through data collection and machine learning. Harvest data is uploaded directly from the robots to the cloud for evaluation by the teams at Burlington and Dogtooth. The harvest system uses a Wi-Fi network to communicate with the robots, enabling monitoring to be done on the ground via handheld devices.

Harvest records can be fed back to the grower in real time and displayed on a computer dashboard for easy analysis. This data, along with data from robots operating at several other sites around the world, helps Dogtooth to iterate the underlying technology, making the robots more robust, faster and operate at ever higher quality. Dogtooth only conduct trials on commercial farms, not in a controlled environment, as this gives a commercially driven outcome which allows a better understanding of the practical challenges of robotic harvesting. Working directly with growers also allows access to direct feedback on areas for improvement, helping the business to better understand the needs of growers.

Battery life is another area where Dogtooth are looking to improve performance. The current battery technology allows the robots to work for a period of up to 8 hours each day before returning to a shipping container to be stored and recharged overnight. Dogtooth have rolled out lithium-ion batteries with the next generation of robots and have managed to demonstrate 16 hour picking days, including picking at night.

### **Building the future**

Whilst the current generation of robots is unlikely to replace the human harvest workforce entirely, progress towards mechanised harvesting is happening quickly.



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