

Image recognition brings selective broccoli harvesting robot a step closer

Manually harvesting broccoli for the fresh produce market is highly labour-intensive and responsible for some 35% of the total production costs of this crop. Alongside considerable cost savings, robotic harvesting would also decrease the load on horticultural workers in the peak season. Researchers at Wageningen Plant Research have developed image recognition software which has brought robotic broccoli harvesting a step closer.



A fully automatic harvesting robot would need to be able to identify broccoli in the field *and* determine its size and ripeness.

Researchers at Wageningen Plant Research have developed image recognition software that can distinguish a broccoli plant from the background based on texture and colour. This is an important first step in the development of a fully automated harvesting robot.

The automatic recognition software has been tested in various field trials and evaluated using images of broccoli of various sizes and of both marketable and non-marketable ripeness. With an accuracy of 94%, the technology looks very promising. The results were presented at AGRICONTROL 2016, the 5th IFAC conference on Sensing, Control and Automation Technologies for Agriculture, in Seattle in the US.

More information:

P.M. Blok, R. Barth and W. van den Berg, 2016, [Machine vision for a selective broccoli harvesting robot](#), IFAC-PapersOnLine, volume 49 (16), pages 66-71.

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Video:



the broccoli head at the stem.

This video demonstrates how a broccoli head is sized using image analysis. Broccoli heads that are too small or that were rejected in a previous image are passed over by the harvesting robot. The robot is moving upwards (from south to north) and makes and analyses a new image every 15 cm. This ensures that no plants are overlooked (because the broccoli plants are spaced 30 cm). A circle is drawn around the broccoli head in order to accurately estimate the actual centre (blue cross). The centre is the input for a robotic arm that automatically descends and neatly harvests