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Current Status and Future Trends of Mechanized Fruit Thinning Devices and Sensor Technology

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Abstract : This paper reviews the different concepts that have been investigated concerning the mechanization of fruit thinning as well as multiple working principles and solutions that have been developed for feature extraction of horticultural products, both in the field and industrial environments. The research should be committed towards selective methods, which inevitably need to incorporate some kinds of sensor technology. Computer vision often comes out as an obvious solution for unstructured detection problems, although leaves despite the chosen point of view frequently occlude fruits. Further research on non-traditional sensors that are capable of object differentiation is needed. Ultrasonic and Near Infrared (NIR) technologies have been investigated for applications related to horticultural produce and show a potential to satisfy this need while simultaneously providing spatial information as time of flight sensors. Light Detection and Ranging (LIDAR) technology also shows a huge potential but it implies much greater costs and the related equipment is usually much larger, making it less suitable for portable devices, which may serve a purpose on smaller unstructured orchards. Portable devices may serve a purpose on these types of orchards. In what concerns sensor methods, on-tree fruit detection, major challenge is to overcome the problem of fruits’ occlusion by leaves and branches. Hence, nontraditional sensors capable of providing some type of differentiation should be investigated.

Keywords : fruit thinning, horticultural field, portable devices, sensor technologies
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