Algebraic path tracking to aid the manual harvesting of olives using an automated service unit

Cheein, F. A. A., Scaglia, G., Torres-Torriti, M., Guivant, J., Prado, A. J., Arnò, J., ... & Rosell-Polo, J. R. (2016). Algebraic path tracking to aid the manual harvesting of olives using an automated service unit. Biosystems Engineering, 142, 117-132. <10.1016/j.biosystemseng.2015.12.006> Accessed 26 Nov 2020.

Abstract

Service units used in precision agriculture are able to improve processes such as harvesting, sowing, agrochemical application, and manure spreading. This two-part work presents, a path tracking controller based on an algebraic approach for an articulated service unit, suitable for embedded applications, and its implementation to a hierarchical navigation strategy to aid a manual harvesting process. The path tracking controller approach can be scaled to several trailers attached to the service unit. For harvesting, the service unit drives within an olive grove environment following the previously developed path and a trailer is used as a mobile hopper where olives, collected by human labour, are deposited. The service unit also registers and geo-references the amount of olives (mass) collected for the subsequent creation of yield maps. The developed navigation strategy improved the time associated with harvesting olives by approximately 42–45%. The mathematical formulation of the problem, some real time experimental results, the creation of a yield map and the statistical analysis that validated the method are included..