smartAKIS
Smart Farming Thematic Network

eip-agri
AGRICULTURE & INNOVATION

THIS PROJECT HAS RECEIVED FUNDING FROM THE **EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME** UNDER GRANT AGREEMENT N. 696294

Algebraic path tracking

Title	Algebraic path tracking
Title (native language)	
Category	• Controlled traffic technology
Short summary for practitioners (Practice abstract) in English	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.
Short summary for practitioners	
Website	
Audiovisual material	
Links to other websites	
Additional comments	

Keywords	Farming equipment and machinery | Energy management
Additional keywords	Robot control; Service robot; Robot programming; Agricultural engineering; Harvesting aid; Yield mapping
Geographical location (NUTS)	EU
Other geographical location	Global
Cropping systems	Tree crops
Field operations	Harvesting
SFT users	Farmer | Contractor
Education level of users	All
Farm size (ha)	0-2 | 2-10 | 10-50 | 50-100 | 100-200 | 200-500 | >500

Scientific article

Title	Algebraic path tracking to aid the manual harvesting of olives using an automated service unit
Full citation	Auat Cheein, F.A.; Scaglia, G.; Torres-Torriti, M.; Guivant, J.; Prado, A.J.; Arnò, J.; Escolà, A.; Rosell-Polo, J.R. (2016). Biosystems Engineering, DOI:10.1016/j.biosystemseng.2015.12.006

Effects of this SFT

Productivity (crop yield per ha)	No effect
Quality of product	Some increase
Revenue profit farm income	Some increase
Soil biodiversity	No effect
Biodiversity (other than soil)	No effect
Input costs	No effect
Variable costs	No effect
Post-harvest crop wastage	No effect
Energy use	Some decrease
CH_4 (methane) emission	No effect
CO_2 (carbon dioxide) emission	No effect
N_2O (nitrous oxide) emission	No effect
NH_3 (ammonia) emission	No effect
NO_3 (nitrate) leaching	No effect
Fertilizer use	No effect
Pesticide use	No effect
Irrigation water use	No effect
Labor time	Large decrease
Stress or fatigue for farmer	Some decrease
Amount of heavy physical labour	No effect
Number and/or severity of personal injury accidents	Some decrease
Number and/or severity of accidents resulting in spills property damage incorrect application of fertiliser/pesticides etc.	No effect
Pesticide residue on product	No effect
Weed pressure	No effect
Pest pressure (insects etc.)	No effect
Disease pressure (bacterial fungal viral etc.)	No effect

Information related to how easy it is to start using the SFT

This SFT replaces a tool or technology that is currently used. The SFT is better than the current tool	agree
The SFT can be used without making major changes to the existing system	agree
The SFT does not require significant learning before the farmer can use it	disagree
The SFT can be used in other useful ways than intended by the inventor	agree
The SFT has effects that can be directly observed by the farmer	agree
Using the SFT requires a large time investment by farmer	no opinion
The SFT produces information that can be interpreted directly	agree

View this technology on the Smart-AKIS platform.

This factsheet was generated on 2018-Apr-03 11:57:16.