Agri-food Industry (wine and animal feed) / Data Analysis (collaborative robotics) / Decision Making (artificial intelligence)

Summary

This pilot project will address the design, prototyping, and validation of collaborative robotic systems that use artificial intelligence to autonomously adapt to parameter changes in the most efficient manner possible across various stages of food production, processing, packaging, and distribution. All of this will be done while fostering functional collaboration with humans and efficient, safe interaction.

Moreover, the ROCOLA project is an innovative initiative that promotes innovation, cooperation, and the development of knowledge bases in rural areas, strengthening the ties between food production and research and innovation. The project is focused on the development of new processes and technologies in the food sector, applicable to Catalonia, and addresses at least one of the established focus areas in the 2014-2020 RDP, 2A: improving the economic outcomes of all farms and facilitating their restructuring and modernisation, particularly with the goal of increasing their market participation and orientation, as well as diversification.

Objectives

The project's objective is to enhance the competitiveness of agri-food operations through their modernisation by incorporating collaborative robotics into their processes.
As explained in the previous section, the maturity level of the technology and the sector's significance present optimal conditions to initiate the process.
One of the key tools will be the development of a guide that describes the current state of the field with specific examples and pilot test results, and that generates recommendations for implementation.
To achieve this overarching goal, intermediate objectives will be attained:

- Analysis of production processes and feasibility of integrating collaborative robotics
- Compilation of existing experiences in collaborative robotics within the agri-food industry
- Design of three prototypes
- Launching pilot tests for three typical operations
- Conducting simulations of new configurations
- Evaluation of the pilot test
- Technical assessment

Description of Planned Actions in the Project

Description of Tasks:
T1.1. Study of the production processes of the companies and the challenges associated with the introduction of collaborative robotics and intelligent automation.
T1.2. Evaluation of the potential impact of robotisation and selection of processes to pilot.
T1.3. Overview of the current stage of robot utilisation in the agri-food industry.
Concurrently with the two preceding tasks, all available examples of collaborative robot applications in the agri-food sector will be presented.
T2.1. Review of the state of the field in technological components and algorithms for planning and control, as well as learning and artificial intelligence techniques.
T2.2. Component selection and proposal of design for collaborative robotic and smart automation configurations for the selected processes.

T3.1. Design and construction of prototypes.
T3.2. Implementation of collaborative robot prototypes for conducting pilot tests at the Codorniu and Lamons facilities.
The implementation of a collaborative robot prototype at Lamons for assisting in the palletisation of the final product is anticipated. This action has been chosen because it is quite common in the agri-food industry and thus can be easily replicated in other sectors.
For Codorniu, the possibility of installing two prototypes for feeding the encapsulation machine and another for performing the batonnage (stirring) task will be evaluated. These are two highly replicable tasks within the wine sector.
T3.3. Definition and collection of impact indicators for the proposed configurations.
During the pilot test operation, various changes will be made to the robot configurations to extract key data and generate operational recommendations in the event the prototype is scaled to a commercial solution.
T3.4. Technical evaluation of collaborative robot configurations through simulations and implementation in realistic conditions.
Configurations that cannot be done physically will be simulated by EURECAT to evaluate their outcomes.
T3.5. Analysis and estimation of the economic and production impact of the proposed collaborative robot configurations.
T4.1 Compilation of proposals.
The objective of this task is to gather all information generated throughout the project: from the pilots (T3.5), simulations in EURECAT's work environments (T3.4), and all available information about the latest developments in collaborative robot utilisation in the agri-food industry (T1.3).
T4.2 Developing and publishing the guide in digital format.
Once the information is collected, it will be prepared in an informative and practical format so that it may be included in the guide. It is anticipated that the first part will include a statement of the main identified uses, and the second part will have various case studies (including those carried out in this project), demonstrating the technical and economic viability of these applications.
T5.1 Project coordination.
The project coordinator is responsible for its overall coordination, acting as a link between administration and consortium interests, while maintaining relevant records and distributing pertinent information. The coordinator will be responsible for organising meetings.
T5.2 Project management.
The project coordinator will ensure that the predefined work plan is executed. The project coordinator will also monitor project progress, ensure communication among consortium members, assess risks, minimise potential deviations from the initial plan, and coordinate administrative aspects and legal processes that may arise from the project's development.

Expected Results and Practical Recommendations

As described in the project objective, the ultimate outcome of the project is intended to address the feasibility of incorporating collaborative robotics in the agri-food sector.
The primary tangible and beneficial outcome for the sector will be the document titled 'Guide for the Implementation of Collaborative Robots in the Agri-Food Industry'.

Operational Group Leader

ENTITY: BAUCELLS ALIBÉS S.A.

Operational Group Coordinator

ENTITY: AEI INNOVI ASSOCIATION

Other members of the operational group (grant recipients)

ENTITY: CODORNIU SA

ENTITY: LAMONS SA

Other members of the operational group (grant non-recipients)

ENTITY: EURECAT

Subject Area(s) of Application

☐	Agricultural production system
☐	Agricultural practice
☐	Agricultural equipment and machinery
☐	Livestock and animal welfare
☐	Plant production and horticulture
☐	Landscape / Territory management
☐	Pest and disease control
☐	Fertilisation and nutrient management
☐	Soil management
☐	Genetic resources
☐	Forestry
☐	Water management
☐	Climate and climate change
☐	Energy management
☐	Waste and byproduct management
☐	Biodiversity and natural environment management
☒	Food quality / processing and nutrition
☒	Supply chain, marketing and consumption
☐	Agricultural and forestry competitiveness and diversification
☒	General

Territorial Scope

PROVINCE(S)	COUNTY(IES)
Barcelona, Lleida	Osona, Alt Penedès, Segrià, Vallès Occidental

Communication about project (publications, workshops, multimedia...)

News related to project advancements will be posted on the INNOVI.CAT website, and the project will be publicised through INNOVI and partner social media networks.

Project Website

https://www.innovi.cat/news/rocola-robotica-col-laborativa-per-al-sector-alimentacio/

Additional Project Information

PROJECT DETAILS	TOTAL BUDGET
Start Date: July 2021	Total Budget: €245,496.00

Current Status: In Progress	DACC Funding: €113,530.32
	EU Funding: €85,645.68
	Own Funding: €46,320.00

Financed by:

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Order ARP/113/2021, of 20 May, approving the regulatory bases for innovation cooperation grants by fostering the creation of operational groups of the European Agricultural Innovation Partnership in the field of agricultural productivity and sustainability and the implementation of innovative pilot projects by these groups, and Resolution ACC/1660/2021, of 27 May, making the call for the aforementioned grant.

Generalitat de Catalunya
Departament d'Acció Climàtica, Alimentació i Agenda Rural

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Europa inverteix en les zones rurals