

LATVIA

Farm's performance, restructuring & modernisation

Location

Riga

Programming period

2014 – 2020

Priority

P2 – Competitiveness

Measure

M16 – Cooperation

Funding

Total budget 96 384.00 (EUR)

EAFRD 58 819.05 (EUR)

National/Regional 27 679.56 (EUR)

Private 9 885.39 (EUR)

Project duration

2018 to 2020

Project promoter

Riga Technical University
Institute of Industrial
Electronics and Electrical
Engineering

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n/a

A partnership project to develop an autonomous apiary monitoring system.

Summary

The Technical University of Riga, in collaboration with technology companies and beekeepers, developed and tested a unique autonomous solution for beekeeping, that can be used via a computer or smartphone. Unlike other IT-based beekeeping solutions in the world, this system allows keepers to monitor their whole apiary, not just an individual beehive or bee.



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Project Results

The system allows beekeepers to monitor their whole apiary and identify the best honey production locations.

The use of alternative energy sources means that the system can be used in different parts of Latvia.

The documentation developed during the project provides the information needed for beekeepers to build a similar system elsewhere.

Lessons & Recommendations

- ❑ The project has developed a scalable data collection solution that provides the desired processing capacity which can be adapted for wider use in the beekeeping sector.
- ❑ Stand-alone power generation cannot be guaranteed during the autumn-winter season in all geographical locations.
- ❑ Testing a prototype in real-life conditions is vital for confirming good performance.

Context

Latvia's geographical position is favourable for producing high-quality honey. While the number of apiaries has been increasing every year (2 931 apiaries in 2015 versus 3 272 units in 2020), the actual volume of honey produced has only increased by 3% between 2015 and 2019. This fact highlights the need for improvements in the efficiency of honey production in Latvia.

Scientists from the Riga Technical University Institute of Industrial Electronics and Electrical Engineering worked in cooperation with the Latvian Internet Association; the 'Maksikoms' IT company; and beekeepers Jānis Vainovskis ('Meduspils', Ltd.) and Valters Brusbārdis to implement a project to develop and test an autonomous beekeeping monitoring and control system.

Objectives

This EAFRD funded cooperation project aims to increase long-term productivity in the beekeeping sector and make it easier for producers to maintain their bee colonies.

Activities

Development of a remote monitoring system prototype.

The new system allows monitoring of three to five colonies at any one time, which allows the beekeeper to both gather data and make comparisons. A set of transmitters determine the population, nest temperature and external temperature of each monitored hive. A video monitoring system provides additional information about bee behavior which helps the beekeeper remotely assess (via phone or PC) the condition of their apiary. The system enables the timely diagnosis of disease or injury and the adverse effects of pesticides.

Testing the monitoring system in a real-life setting. Tests took place on two bee farms where, in addition to the monitoring tools themselves, the project partners installed a weather station in the apiaries and a stand-alone power supply system consisting of a solar cell, a wind generator, a battery bank, and a charge controller. The project partners wanted to determine whether the autonomous power supply would be enough to run the monitoring system twenty-four hours a day and in all seasons. The tests showed that:

- The system successfully monitors the bees of individual colonies and the apiary as a whole, enabling the beekeeper to react immediately to changes in the environment and bee behaviour.
- The gathered data and analytical tools help to identify correlations between a range of factors that affect bee productivity, such as weather conditions and the geographical location of the apiary.

Main Results

- This solution allows beekeepers to monitor their whole apiary and identify the best honey production locations.
- Autonomous beekeeping helps beekeepers to increase productivity by using the system to identify the most active periods of the bee colony in relation to weather conditions and blossoming times.
- The beehive video surveillance system helps to monitor flying activity during the day and to visually assess the condition of the apiary. The use of alternative energy sources means that the system can be used in different parts of Latvia.
- The documentation developed provides the information needed for any beekeeper to build a similar system.

Key lessons

Initially, it was not certain that the data collection and visualisation solution used in the prototyping phase would be able to easily scale the data for wider use. Testing the system in a real-life setting was key for the developers to improve its data processing capacity.

Although it is possible to provide autonomous solar power during the summer, it was not feasible to use wind power as the average wind speed is below the generator's minimum limit. Testing revealed that the system was not able to guarantee a stand-alone electricity supply during the autumn-winter season.

“The remote beekeeping monitoring system, introduced by Riga Technical University scientists and technology experts, allows beekeepers to observe insects live on their computer or phone. Day and night. And it allows to track whether there is plenty of honey or if there is any damage. Before, it was just guesswork.”

Jānis Vainovskis, a beekeeper

Additional sources of information

http://www.laukutikls.lv/sites/laukutikls.lv/files/raksti/autonomas_biskopibas_sistemas_gala_zinojums_v.1.3-1.pdf

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<https://www.rtu.lv/lv/evif/evif-par-mums/evif-zinas/atvert/rtu-zinatnieks-latvijas-radio-stasta-par-autonomo-biskopibas-uzraudzibas-sistemu>

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