

Sustainable Farming – Fewer Pesticides Thanks to IoT Technology

Challenge & Solutions

It is estimated that agriculture accounts for more than 70 percent of the world's water consumption and that up to 58 percent of the pesticides applied in agriculture is unnecessary. Therefore, the ability to determine whether crops in the field need water, fertilizers or pesticides – and if so, when and how much – is vital to sustainable agriculture and to fight hunger in an ever-growing world population. Decisions on crop management are at best made based on records collected at public climate monitoring stations. While this information applies to very large areas, agro-climatic conditions vary over short distances and thus global information is of little use for the optimization of crop growing. For example, key variables such as soil-moisture content may change within just a few meters.

In order to collect and analyse key parameters for optimized crop growing, the CNODE experiment within the EuroCPS project designed and built low-cost sensor nodes with just a few sensors to monitor highly variable and critical parameters: air temperature and humidity, and soil moisture at three different depths. The solution is based on spectrally efficient modulations such as differential binary phase-shift keying (DBPSK) and Gaussian frequency-shift keying (GFSK) and simultaneously optimizes network capacity and maximizes the communication link budget. Despite sending data directly to the server over long distances, the nodes require minimal maintenance and enable a battery life of at least five years using Sigfox's low-power, wide-area (LPWA) connectivity. This makes the solution affordable and practical to use. The accurate information collected by the solution will on average enable farmers to reduce pesticide application by 35 percent and irrigation-water consumption by 50 percent.



EuroCPS Support

CEA-Leti, a research institute of CEA Tech, acted in this experiment as DIH connecting its Sigfox transceiver to the STM32L0 Microcontroller Platform and transferring the entire solution suitable for the sustainable farming application to the SME Encore that is active in that field.

Digital Skills

Encore Lab: Agro-climatic sensor nodes to monitor crops and environmental variables.

CEA-Leti: Ultra narrowband (UNB) transceiver for Sigfox Internet of Things network, validation of sensor nodes.

Company

Encore Lab is a technology-based company whose main aim is the development of innovative systems dedicated to sustainable farming – Based in La Rioja (ES) - www.encore-lab.com



Since
2010

15 employees

Partners:

ST Microelectronics, FR.
CEA Leti, FR.



Impact / What's next

The CNODE technology is being integrated in Cesens, Encore Lab's flagship, sensor-based product for providing farmers with real-time information about their crops. Thanks to the extended functionality of its flagship product, the company expects to sell more than 10,000 units within the first five years after its 2017 market launch. Sales are estimated to reach 1M€ by 2022. In addition, the company expects to double its staff to 20 during that period, thanks to the results of the CNODE project.

Dramatically optimising water consumption in crop farming has also a huge humanitarian dimension, as persistent hunger is in particular observed in areas where water availability is limited. Increasing harvests thanks to optimized consumption of the rare resource water will strongly contribute to the fight against hunger. Finally, the considerable reduction of pesticides has also environmental impact in using fewer chemicals that contaminate the soil.