CERIS : Civil Engineering Research and Innovation for Sustainability

SYNAPPS – Platform for estimation, control and optimisation of wastewater treatment plants

Summary

The wastewater produced by the large world population is an important source of pollution. These waters are also capable of accelerating the loss of biodiversity and preventing the execution of the objectives established by the international community. With respect to the European Union, the legislations have clear and binding objectives for its member states. However, they are very flexible with respect to the means used to achieve those objectives, allowing for alternative solutions and encouraging strategy innovation on the treatment of wastewater.

In line with the European Union's strategy of sustainable development, which predicts the adoption of increasingly stricter measures for environmental control, energy efficiency and rational management of resources, this project presented itself as having a high potential for economic appreciation, centred in the development and validation, under real conditions, of an innovative system of estimation, control and optimisation of wastewater treatment plants.

The SYNAPPS project had a total duration of 30 months and was developed according to the following structure:

Activity 1 – Initial studies: Initially

This activity was focused on the consolidation of the state of the art with regard to sensors, intelligent control models, existing solutions, legislation and recommendations applicable within the scope of the project, as well as to deepen knowledge about the functional, energetic and environmental performance of wastewater treatment plants, which were the target of the final product.

Activity 2 – Architecture of the estimation, control and optimisation platform

In this activity, the functional structure of the control and optimisation system was defined using computational intelligence techniques, along with the functional requirements of the system components and modules. Additionally, engineering projects necessary for the materialisation of the product were prepared.

Activity 3 – Estimation, control and optimisation models

Estimation, control and optimisation models were implemented in this activity in order to adjust the treatment processes in real time, based on continuously collected data, ensuring high functional, energetic and environmental efficiency.

Activity 4 – Materialisation of the platform

In this activity, the platform was materialised, taking into account its installation in the wastewater treatment plant used to collect initial data, in order to validate the concept in all aspects relevant to its commercialisation and subsequent use.

Activity 5 – Validation of the platform in real facilities

This activity aimed to evaluate the performance of the estimation and control methodologies of the target variables of the process, as well as the environmental, energetic and operational performance of the new platform in real conditions. Additionally, a life cycle assessment study was carried out, which highlighted the main advantages of using the new product.

Activity 6 – Broad dissemination of results

Through this activity, the results of the SYNAPPS project were systematised and prepare technical and scientific content for dissemination among the public and the market.

Product resulting from the project

An integrating platform, made up of hardware and software modules, which can be installed in most medium and large wastewater treatment plants, with the hardware module made up of analysers/sensors available on the market and the software module developed with the skills and criteria defined in this project.

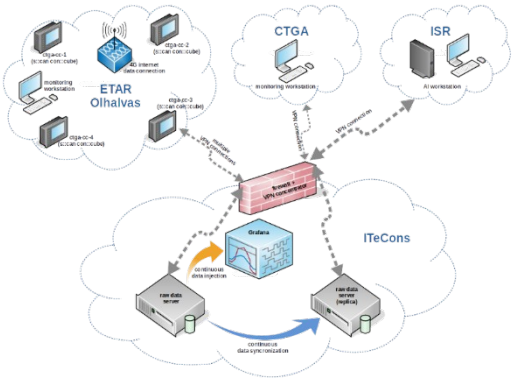

Figure 1. Scheme of communication between terminals, servers and workstations from data obtained with sensors installed at WWTP.

SYNAPPS

Project Reference

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Leading Institution

CTGA – Centro Tecnológico de Gestão Ambiental, Lda. (Portugal)

Partners

Itecons – Instituto de Investigação e Desenvolvimento Tecnológico para a Construção, Energia, Ambiente e Sustentabilidade (Portugal), ISR – Instituto de Sistemas e Robótica (Portugal)

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CERIS

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