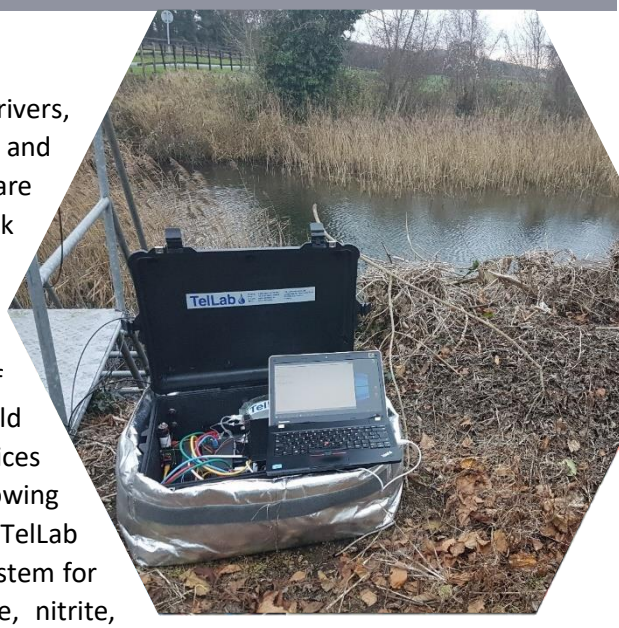
Smart, Portable Lab-on-a-Chip System to Detect and Report Water Pollution in Real Time

Challenge & Solutions



Despite concerted EU efforts to minimize water pollution, many of Europe's rivers, lakes and groundwater reservoirs are still threatened by municipal, agricultural and industrial waste. More than 40 percent of rivers and coastal water bodies are affected by diffuse pollution from agriculture. More than 20 percent are at risk from industrial facilities, sewage systems and wastewater treatment plants. This stubborn problem has prompted a strategy of early detection and mitigation of pollution incidents. But researchers have struggled to develop an affordable, accurate water-monitoring system that can detect elevations of nitrate and phosphate and report test results in real time. While hand-held sensors and water-monitoring devices have been developed, autonomous devices that can save data to the cloud through an Internet of Things (IoT) platform, allowing remote access to results, are not yet available. Through the EuroCPS project, TelLab responded to these challenges with Aquamonitrix, a portable lab-on-a-chip system for monitoring surface-water and industrial effluents. It measures pH, nitrate, nitrite, phosphate and ammonia simultaneously in real-time, while controlling data acquisition and data processing and delivery to the cloud, which allows remote access to real-time results from any smartphone, tablet or PC.

EuroCPS Support

BME, at the Budapest University of Technology and Economics, identified a suitable communications module, for the monitoring and testing system with global compatibility, and contributed to hardware and software integration in the system, using Intel's Quark system-on-chip platform.

Digital Skills

TelLab: Microfluidic analytical platform, MEMS-based water-quality monitoring devices.

BME: Technological communication strategies, e.g. LPWAN or GSM; specification of hardware and software requirements for MEMS.

Company

TelLab is a multidisciplinary company focused on R&D around the core operating divisions of environmental analysis, oil and transformer-oil analysis and the manufacture of reagent chemicals (IE) http://tellab.ie

40 employees

Since 1991

Partners:
BME

MŰEGYETEM 1782

Impact/What's next

Aquamonitrix's capabilities such as data acquisition, in-situ data processing and delivery to the cloud differentiate it from competing products. The system can provide over 26,000 sample results annually, compared to current manual sampling, which typically results in 12-52 results per year. Capturing the data in real time detects pollution events immediately, allowing effective mitigation measures that minimize the damage. It gives agribusinesses, municipalities and government bodies a powerful tool to reduce pollution of Europe's rivers, lakes and groundwater reservoirs. By accelerating development of the system, the EuroCPS project has enabled a European product launch in Q4 2018. TelLab projects sales of Aquamonitrix and ancillary services will reach €1.95 million within three years of the launch, and the company will increase headcount by up to eight employees. In addition, TelLab expects to integrate new techniques for detecti ng and analyzing the presence of total organic carbon (TOC), chemical oxygen demand (COD), total nitrogen and suspended solids in Aquamonitrix. These enhancements will be available in Q2 2021.

EuroCPS
Cyber-Physical Systems

EuroCPS is an European funded project gathering several design centers in order to boost and initiate synergies between innovative companies, major CPS-platforms and CPS-competency providers.