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HYDROMON: The First On-Line Water Quality Monitoring System Built-in a Public Supply Network

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Abstract

This paper presents a system and a procedure for early detection of chemical and bacterial contamination in a drinking water supply. The system monitors several physical, chemical, and bacteriological parameters in water at various locations within the supply network, simultaneously. In case of contamination, the system can issue warnings at an early enough stage to minimize and, possibly, avoid exposure of the public to harmful pollutants. As an added feature the system also makes it possible for the general public to view the status of the water supply on a conventional internet browser and to access historical data via a dedicated website.

The system is based on a number of remote sensors located throughout the water supply network. The sensors collect over 20 physical and chemical parameters, including temperature, turbidity, conductivity, oxygen content, pH, red-ox potential, chlorine concentration, DOC/TOC, CSB / BSB, and nitrate concentration. The sensors also allow traces of biological pathogens to be detected including *Escherichia coli*, *Salmonella*, *Shigella*, *Pseudomonas*, *Legionella*, to name just a few.

The sensors communicate using a self-organized wireless network, sharing data and control commands. Flow data from a myriad of water meters scattered across the distribution network are used to evaluate the geographical source of pollutants and their likely propagation patterns, so as to optimize any necessary counteractions. Such actions range from pre-emptive shutoffs to network fragmentation, or even a global shutoff. As a further development, the system, after being duly equipped with the appropriate actuators, will enable the safety countermeasures to be taken automatically.

The main purpose of a systematic water quality data collection and management is the ability to counteract possible water contamination events in a timely manner. However, the collected data can also be used to make forecasts of the water quality at different spots in the network under the influence of external factors or to predict the likely diffusion patterns in a case of contamination.

To the best of our knowledge Hydromon is the first system enabling real-time detection of a wide variety of water quality and safety indicators in many locations distributed across a relatively large geographical area. We believe that such systems should become ubiquitous for ensuring high standards of water quality in supply networks worldwide.