



Novel Wireless Monitoring for Water Discharge in Industry

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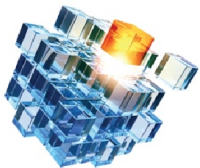
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Highlights: Water is an important natural resource which needs constant quality monitoring for ensuring its safe use. Keeping industrial water discharges so that it is always within a standard determined for domestic usage is a crucial task. As the country is making its progress through industrialization, our water resources are prone to a threat of pollution especially from the industrial activities. It is a challenge in the enforcement aspect as it is impossible for the authorities to continuously monitor the location of water resources due to limitation especially in man power, facilities and cost of equipment. This often lead to a too late to be handled situation. Traditionally, the water quality detection has been carried out manually wherein the water samples are collected and taken to the laboratories for analysis. Since these methods fail to deliver real time data, we propose a water quality monitoring system based on wireless sensor network which helps in continuous and remote monitoring of the water quality data. The system architecture is based on hierarchical topology in which the monitoring scenario is divided into four general areas; each forming a cluster comprising of several wireless sensor nodes responsible for sensing, data collection & processing and communication. The wireless sensor node in the system is



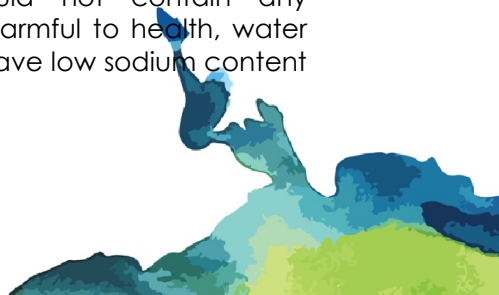
designed for monitoring three of the main parameters that affect the quality of water, i.e. pH, conductivity and temperature of water. The proposed sensor node design mainly comprises of a signal conditioning module, processing module which is implemented using microcontroller and wireless communication module. So the sensed parameter values will be wirelessly transmitted in real time to the base station using wireless communication after the required signal conditioning and processing techniques. This system provides an energy efficient and low cost sensor unit for monitoring water quality through the use of inexpensive, low power devices for the hardware design.

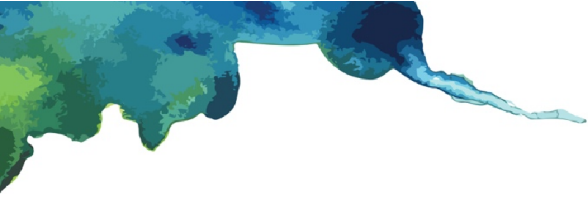
Key words: *Discharge, pollution prevention, wireless monitoring, energy efficient, low cost.*

Introduction

Water is limited resources and essential for agriculture, industry and creature existence on earth including human beings. The usage for water increases as population grows until the demand sometimes overshoots the supply or availability. Although the quantity of water on Earth is same all the time, the quality of the water that is available has drastically changed. Fresh water is predicted to become the principle limitation for sustainable development within this century. The economics, social, environmental and public health implications of decreasing water quality are worldwide threat.

Water quality monitoring is essential to control physical, chemical and biological characteristics of water. For example, drinking water should not contain any chemical materials that could harmful to health, water for agricultural irrigation should have low sodium content

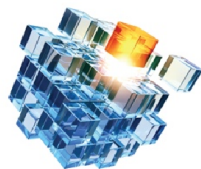




water for industrial uses should be low in certain inorganic chemicals. In addition, water quality monitoring can help with water pollution detection and discharge of toxic chemical and contamination in water.

In Malaysia, water quality has been monitoring by Malaysian Department of Environmental (DOE), Ministry of Natural Resources and Environment Malaysia. The Water Quality Index (WQI) used to appraise the river water quality is based on 6 parameters that are Dissolved oxygen, Biochemical Oxygen Demand, Chemical Oxygen Demand, Ammonical Nitrogen (NH_3N), Suspended solids (SS) and pH. The implementation of Water Framework Directive (WFD) across the EU, and the growing international emphasis on the management of the water quality is giving rise to an expanding market for novel, miniaturized, intelligent monitoring system. In particular, the implementation of WFD poses new challenges for water managers who have traditionally monitor water quality by taking samples and analyzing them in the laboratory.

Accurate measurement and analysis of water quality data is required for a multitude of applications ranging from the agricultural sector to clinical laboratories. In many of these applications, a hand-held unit is needed. Currently there are certain hand-held devices that are available in the market. However, the existing product does not have storage capability and not automated, which requires a considerable time commitment from the researcher to come on to the site every day. Due to these two limitations, the sample size often cannot be large enough to cover the entire month or year. Therefore, the difficulty of overall and successive water



quality sampling becomes a barrier to water quality forecasting.

Therefore, one significant objective of this research is to design and develop a multi-parameter water quality measurement system, which would be easy to maintain, would produce and store a large data that was readily interpretable by the user or researcher. This proposed system will integrate the water qualities sensors, data acquisition, microcontroller and data logging system. Data can be observed in real time as well as offline by downloading it to the PC. The distribution of water qualities parameters values over a period of time can be plotted for further analysis and study.

Description of Innovation

The product was developed to ease industry to monitor their water discharge quality to the environment. The wireless feature is added in the innovation to computerize it and with data logger system for data archiving.

Current product is readily subscribed by industry as our distributor. The product is ready to be market as it is critically demand by the legal requirements by Department of Environment

Background of Innovation

The product falls in the environmental added value device since it requirements are necessary to be installed at discharge source in industry. The discharge point that considered as sewage treatment plant, industrial effluent treatment plant, fish pond, shrimp pond and many more.



Advantages of Innovation

The wireless features are the novelties highlight in this innovation. The computerize system make it feasible to have data logger features to fit the industrial demand in data reporting and archiving.

Commercial Value of Innovation

Qualem Resources (M) Sdn Bhd is our industrial partner. They also do the same product development and marketing. We work together for the commercialization of the product in industry. Qualem Resources do the patent registration and also register it with "Suruhanjaya Perkhidmatan Air Negara" (SPAN), so by this certification, the product can be produce in large scale. Standard price are decided to be at RM 10,000 per installation.

Result

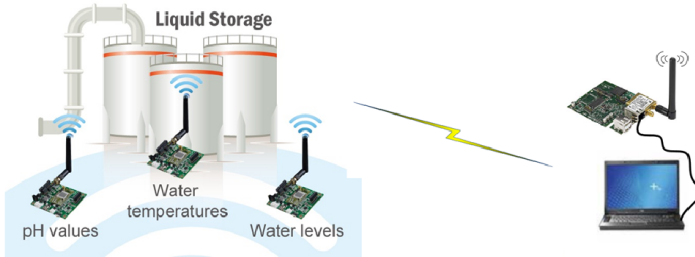
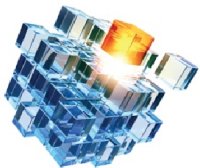
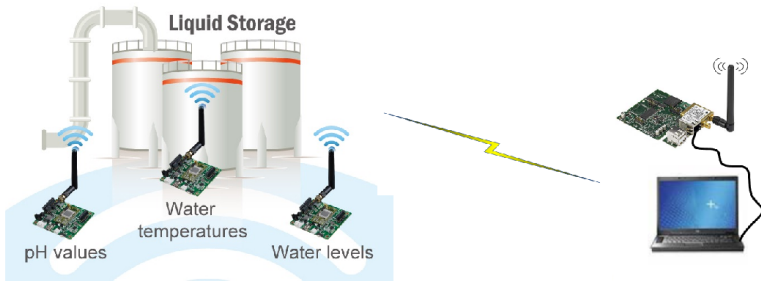


Figure 1. The feature of novel wireless monitoring





Acknowledgement

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References

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