DEVELOPMENT OF THE WATER QUALITY MONITORING AND NOTIFICATION SYSTEM

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PROJEK SARJANA MUDA II

Tajuk Projek : DEVELOPMENT OF THE WATER QUALITY MONITORING AND NOTIFICATION SYSTEM

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A very special dedication for my beloved family especially to my parent,

Teng Boon Cheng and Thee Guat Kim.

Also for my gracious supervisor Dr. Farid Arafat Bin Azidin

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ABSTRACT

The high use of fertilizers and other sectors such as mining and construction have caused the reduction of water quality globally. Water is an essential need for human to survive. Drinking contaminated water can caused water-borne disease. Hence, we need to design a water quality monitoring system to measure the water quality parameter in real time to notify the user whether the water quality is normal or abnormal. The monitoring system is constructed by using turbidity sensor, pH sensor and temperature sensor. All the surrounding reading is sense by the different sensor and processed by microcontroller. In this project, we will be uses Arduino microcontroller because it an open-source prototyping platform based on easy-to-use. This system is a combination of water quality monitoring system and notification system. The notification system is developed by using GSM system (Global System for Mobile Communication). The water quality monitoring system can implement to measure the water quality parameter. The system will not release any chemical to the sources of water when measuring. The water quality monitoring system can implement into the different places to check the water quality parameter in real time. It also can implement into reservoir in town to ensure the water is maintained at the safety level for human drinking.

ABSTRAK

Penggunaan baja dengan terlampau dan sektor-sektor lain seperti perlombongan dan pembinaan telah menyebabkan pengurangan kualiti air di peringkat global. Air adalah keperluan penting bagi manusia untuk terus hidup. Minum air yang tercemar boleh menyebabkan penyakit bawaan air. Oleh itu, kita perlu membentuk suatu sistem pemantauan kualiti air untuk mengukur parameter kualiti air dalam masa nyata untuk memberitahu pengguna sama ada kualiti air adalah normal atau tidak normal. Sistem pemantauan dibina dengan menggunakan sensor kekeruhan, sensor pH dan sensor ORP. Semua bacaan sekitar adalah perasaan oleh sensor yang berbeza dan diproses oleh pengawal mikro. Dalam projek ini, kita akan menggunakan mikropengawal Arduino kerana ia platform prototaip sumber terbuka berdasarkan penggunaan yang mudah. Sistem ini adalah gabungan sistem pemantauan kualiti air dan sistem pemberitahuan. Sistem pemberitahuan dibangunkan dengan menggunakan sistem GSM (Global System for Mobile Communication). Sistem pemantauan kualiti air boleh melaksanakan untuk mengukur parameter kualiti air. Sistem ini tidak akan mengeluarkan sebarang kimia kepada sumber-sumber air apabila mengukur. Sistem pemantauan kualiti air boleh melaksanakan ke dalam tempat-tempat yang berbeza untuk memeriksa parameter kualiti air dalam masa nyata. Ia juga boleh melaksanakan ke dalam takungan di bandar untuk memastikan air dikekalkan pada tahap keselamatan untuk minum manusia.

LIST OF ABBREVIATIONS

GSM	-	Global System for Mobile communication
SMS	-	Short Message Service
SIM	-	Subscriber Identity Module
PIC	-	Programmable Integrated Chip
SD	-	Secure Digital
LCD	-	Liquid Crystal Display
ORP	-	Oxidation Reduction Potential
pH	-	Potential of Hydrogen

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INTRODUCTION

This chapter will discuss about the project overview, problem statement, objective and scope of project.

1.1 Project overview

It is a well-known fact that clean water is absolutely essential for healthy living. Adequate supply of fresh and clean drinking water is a basic need for all human beings on the earth, yet it has been observed that millions of people worldwide are deprived of this [1]. Freshwater sources around the world are threatened by water pollution. Not only are we managing our resources poorly through wastage, we are also thoughtlessly dirtying it [2]. The Department of Environment (DOE) has been conducting monitoring of river since 1978, primarily to establish baselines and to detect water quality changes in river water quality and has since been extended to identifying of pollution sources as well. A total of 1,064 manual stations located within 143 river basins throughout Malaysia [3].The figure 1.1.1 show the river water quality Malaysia from year 2001-2008 [4].

River Water Quality, Malaysia, 2001-2008

Year / Category	2001	2002	2003	2004	2005	2006	2007	2008
Very Polluted	13	14	9	9	15	7	7	7
Slightly Polluted	47	43	52	53	51	59	45	60
Clean	60	63	59	58	80	80	91	76
Total River Basin	120	100	120	120	146	146	143	143

Source: Adapted from *Department of Environment, Environmental Quality Report, 2008, p. 50.*

Figure 1.1.1: The river water quality Malaysia from year 2001-2008.

The Department of Environment (DOE) used Water Quality Index (WQI) to evaluate the status of the river water quality. The WQI serves as the basis for environment assessment of a watercourse in relation to pollution load categorization and designation of classes of beneficial uses as provided for under the National Water Quality Standards for Malaysia [5]. The figure 1.1.2 shows the standard value of the water quality parameter [6].

Parameters	Standard value (s_i)
Ph	6.5–8.5
Turbidity (NTU)	5
TDS (mg/l)	500
Total hardness (mg/l)	300
Sulphates (mg/l)	200
Magnesium (mg/l)	30
Nitrates (mg/l)	45
Chloride (mg/l)	250
Calcium (mg/l)	75

Figure 1.1.2: The standard value of the water quality parameter.

1.2 Problem statement

The high use of fertilizers and other sectors such as mining and construction have caused the reduction of water quality globally. Water is an essential need for human to survive. Drinking contaminated water can caused water-borne disease.

The main sources of water pollution are discharge of untreated raw sewage from households and factories, chemicals dumped from factories, agricultural run-offs that make their way into our rivers and streams and groundwater sources [2].

The main problem caused by water pollution is the effect it has on aquatic life. Dead fish, birds, dolphins, and many other animals often wind up on beaches, killed by pollutants in their habitat. Pollution disrupts the natural food chain as well [7].

Hence, we need to design a water quality monitoring system to measure the water quality parameter in real time to notify the user whether the water quality is normal or abnormal.

1.3 Objective

The objectives of this project are:

a) To develop a real time water quality monitoring system.

b) To design a notification system based on GSM (Global System for Mobile Communication) for notifies users.

c) To analyze the data and reading obtained from water sample.

1.4 Scope of project

Design and develop a monitoring system that will check the quality of water in parameters of temperature, pH value and turbidity. The monitoring system is constructed by using turbidity sensor, pH sensor and temperature sensor. All the surrounding reading is sense by the different sensor and processed by microcontroller. In this project, we will be uses Arduino microcontroller because it an open-source prototyping platform based on easy-to-use. This system is a combination of water quality monitoring system and notification system. The notification system is developed by using GSM system (Global System for Mobile Communication). When the simulation is success, the circuit will be constructed and it will be tested. All the circuit, sensor and microcontroller will be embedded in a portable box. After that, this system will be installed in a prototype to show its application in real situation.

1.5 Methodology