



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**WATER QUALITY DATA TRANSMITTER**

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronics Engineering Technology (Telecommunications) with Honours

by

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**BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA**

TAJUK: WATER QUALITY DATA TRANSMITTER

SESI PENGAJIAN: **2014/15 Semester 2**

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I hereby, declared this report entitled “Water Quality Data Transmitter” is the results of my own research except as cited in references.

**Signature** :.....

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**Date** :

## **APPROVAL**

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Electronics Engineering Technology (Telecommunications) with Honours. The member of the supervisory is as follow:

.....  
(MOHD SAAD BIN HAMID)

## **ABSTRACT**

Water quality data transmitter is a device that helps to describe the water quality parameter such as pH, turbidity and temperature of the water. It will monitor the process of sampling and analysing the water condition. This project is focused on aquaculture species. Water quality data transmitter is designed to allow fish farmers to monitor and control their fish in the pond much more easily than before. It is also for fish farmers to understand more about the water quality parameter that needed for their fish. It is equipped with an early warning detection that can help fish farmers monitoring their pond. The data are transmitted by using the GSM module and user will get an SMS regarding the condition of their pond. This can enhance the productivity of the fish because user can always monitor the level of water quality that suitable with the fish. This project also can help fish farmers in the village because this device is easy to use and convenient.

## **ABSTRAK**

Pemancar data kualiti air adalah alat yang membantu untuk menggambarkan parameter kualiti air seperti pH , kekeruhan dan suhu air. Ia akan memantau proses pensampelan dan menganalisis keadaan air. Projek ini memberi tumpuan kepada spesies akuakultur. Pemancar data kualiti air direka bentuk untuk membolehkan penternak ikan untuk memantau dan mengawal ikan mereka di dalam kolam lebih mudah berbanding sebelum ini. Ia juga untuk petani ikan untuk memahami lebih lanjut mengenai parameter kualiti air yang diperlukan untuk ikan mereka. Ia dilengkapi dengan pengesanan amaran awal yang boleh membantu penternak ikan memantau kolam mereka. Data tersebut dihantar dengan menggunakan modul GSM dan pengguna akan mendapat SMS mengenai keadaan kolam mereka. Ini boleh meningkatkan produktiviti ikan kerana pengguna sentiasa boleh memantau tahap kualiti air yang sesuai dengan ikan. Projek ini juga boleh membantu penternak ikan di kampung kerana peranti ini adalah mudah untuk digunakan dan mudah

## **DEDICATIONS**

Alhamdulillah, praise to the Almighty Allah S.W.T

This thesis is dedicated to:

My beloved family,

My Parents,

My Supervisor,

My lecturers

And all my friends

Thanks for their encouragement and support

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Alhamdulillah, thank you Allah because of His blessing, I finally complete and finish my final year project successfully.

During the process to complete my project objective, I do a lot of research either by using internet, reading past year thesis, reference books and journal. With the guidance and support from peoples around me, I finally complete the project due to the time given. Here, I want to give credit to those who helped me to achieve what I had achieved in my final year project.

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# CHAPTER 1

## INTRODUCTION

The first chapter introduces brief idea of the project. It focused on the overview of the project, detailing the objectives, the problem statement, scope and outcome of the project.

### 1.0 BACKGROUND

Water covers two-third of the Earth's surface with over 97% presents in the oceans and less than 1% in freshwater streams and lake. Water is an essential habitation for fish and other marine lives. The source and quantity of water available are the most important factors to consider when choosing a site for an aquaculture facility. Many undesirable chemicals and environmental factors associated with certain fish farms can be traced to lack of background information on the source of water used before the final site for a new farm is selected, a thorough investigation of the quality and quantity of water must be considered by the producer.

Fish usually avoid severe organic pollution, except sometimes round sewage works outfalls, where they eat well, at least in cold weather. Fish mortalities occur in natural populations and under aquaculture conditions. They are caused by a variety of factors. Fish can behave erratically, get sick or die in response to toxic substances, poor water quality and infectious disease. Fish have home ranges, territories within which they move and outside which they rarely go. However, they will go outside to get away from pollutants (like ammonia) which they can detect and perhaps be distressed by (Zakaria, 2006).

## **1.1 PROBLEM STATEMENT**

A major challenge for aquaculture is to produce more food, feed and fibre to meet growing global demand. It also generates effects external to market, both positive and negative (Parris, n.d.). For that reason, this project can help fish farmers to reduce the possibilities of losses in their breeding project. Before this, there were only have a system to check the quality water for the fish farmers in the time given so if there were anything happened to the water, the fish farmers will not know because they cannot check it themselves. Therefore this project is equipped with the early warning detection that can inform to the fish farmers if there were problem in their pond.

## **1.2 OBJECTIVE**

The objectives of this project are:

1. To study the required parameter for water quality analysis.
2. To implement the transmission of water quality information over wireless technology

## **1.3 SCOPE OF PROJECT**

The scopes are listed to ensure the project is conducted within its intended boundary. Scope is useful to ensure the project is heading in the right direction to achieve the goal. The scopes of this project are to study the basic of microcontroller from several published papers and books and also study the code use to detect the water quality parameter. The main focuses for this project is to study the basic parameter of the water quality for certain aquaculture species with the addition of using GSM module and microcontroller. The parameters for this project can be classified as:

### **1.3.1 THE BASIC CONCEPTS OF WATER QUALITY PARAMETER.**

Water quality parameters are including dissolved oxygen, pH level, temperature, turbidity and nutrient. The main focuses for this project are on dissolved oxygen, pH level, temperature and turbidity. All these parameters are crucial to freshwater organism to survive. If one of these parameters is overloaded or not sufficient, the chance for freshwater organism to die is high. So, the understanding for all parameter is needed for this project.

### **1.3.2 THE BASIC APPLICATION OF GSM MODULE.**

Global Service Mobile (GSM) enables user to roam between different network and communicate everywhere with everybody at any time provided in the range of GSM coverage. GSM technology contains the essentials intelligent functions for the support of personal mobility of mobile user (Bettstetter & Hartmann, 2004). By using this technology, all the information that had been collecting from the pond can be transfer easily.

### **1.3.3 THE FUNCTION OF MICROCONTROLLER.**

Arduino is a small microcontroller board with a USB plug to connect to computer and a number of connection sockets that can be wired up to external electronics. It can be controlled from the computer and then disconnected and allowed to work independently (Blum, 2002). Arduino uses the C and C++ language programming. The function of microcontroller in this project is to detect the water quality parameters and create the early warning detection for the fish farmers.

## 1.4 THESIS STRUCTURE

### Chapter 1:

The first chapter introduces brief idea of the project. It focused on the overview of the project, detailing the objectives, the problem statement, scope and outcome of the project.

### Chapter 2:

Projects background is discussed in this chapter. The method concept, theory, and some characteristic of component of hardware that used in this project is discussed in this chapter. This chapter also contain a definition of term used in this project also discusses the concept of the research and how it related to the theory.

### Chapter3:

This section is methodology chapter. Methodology chapter is a schedule or steps that need to be complete, detailed reports of studies done to achieve aim objective. This chapter explains the procedure taken to complete the project. It consist the detail development of this project

### Chapter4:

The chapter four is about the result and discussion that we obtain based on the methodology that we used. All the simulations, data collection and analysis obtained were discussed in detail. The results were compared with the outlined objectives in order to state some hypothesis and conclusion.

### Chapter 5:

The chapter five is about the conclusion and future work. In this section, we will conclude what we have done and followed by some recommendation on how to improve the performance of the system based on the desired results.

## **CHAPTER 2**

### **LITERATURE REVIEW**

In order to make this project successful, some studies and researching has been done. The information and studies for this project was collected from many sources such as books, articles, journals and internet. All this information was used in this project as a guide to make sure this project can be done in the time given. All the studies and information collected was based on major component and topic that related to this project.

#### **2.0 WATER QUALITY**

Have you been thinking about the water that we use for drinking, cooking, bathing or cleaning? Did you know what kind of quality it has before we use it? What happened or what state are the water is before we use it? Did you? All the questions were referring to one word for sure; water quality(Farrell-Poe 2000).

Water quality is a characteristics of water in term of chemical physical, biological and radiology characteristics. It is a measure of the condition of water relative to the requirement of one or more biotic species and or to any human need or purpose. The most standard used to assess water quality related to health of ecosystem, safety of human and drinking water. Another perception of water quality is that of a simple property that tells whether the water is polluted or not. There are many sections of water quality management. It all difference by different uses.

### **2.0.1 HUMAN CONSUMPTION**

Human consume a lot of water in their daily life. Water is essential in life because all of the major activity will use water. So, untreated water may have contaminants such as viruses, protozoa, bacteria, organic chemical contaminant from industrial process and even radioactive contaminants. Water quality depends on the local geology and ecosystem. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of these contaminants does not necessarily indicate that the water poses a health risk.

### **2.0.2 INDUSTRY AND DOMESTIC USE**

Dissolved minerals may affect suitability of water for a range of industrial and domestic purposes. Water from industrial waste is the most dangerous contamination of all water uses because most of industrial activity is involving chemical substances. There will be many chemical substances in industrial waste. The parameters of water quality for industrial waste are following the waste characteristics for industrial waste. Although the interpretation of most water waste characteristics is straightforward and definitive, special consideration must be given to the organic content. The organic content of the waste can be estimated by the BOD, COD, TOC and TOD.

### **2.0.3 ENVIRONMENTAL WATER QUALITY**

It is also called ambient water quality, relates to water bodies such as lakes, rivers and oceans. Water quality standards for surface water vary significantly due to different environmental conditions, ecosystem and intended human uses. Toxic substances and high population of certain microorganisms can present a health hazard for non-drinking purposes such as irrigation, swimming, fishing, and rafting, boating, and industrial uses. These conditions may also affect wildlife, which use the water for drinking or as a habitat. Modern water quality laws generally specify protection of fisheries and recreational use and require, as a minimum, retention of current quality standards.

## 2.1 WATER QUALITY MONITORING

Water quality monitoring is a process of sampling and analysing the water condition and characteristics. The complexity of water quality as a subject is reflected in the many types of measurements of water quality indicators. The most accurate measurements of water quality are made on-site, because water exists in equilibrium with its surroundings. Measurements commonly made on-site and in direct contact with the water source in question include temperature, pH, dissolve oxygen, conductivity, oxygen reduction potential (ORP), turbidity, and Secchi disk depth. There is some equipment to collect the sample of the water. One of it is a rosette sampler. A rosette sampler is focused on using to collect water samples in deep water.

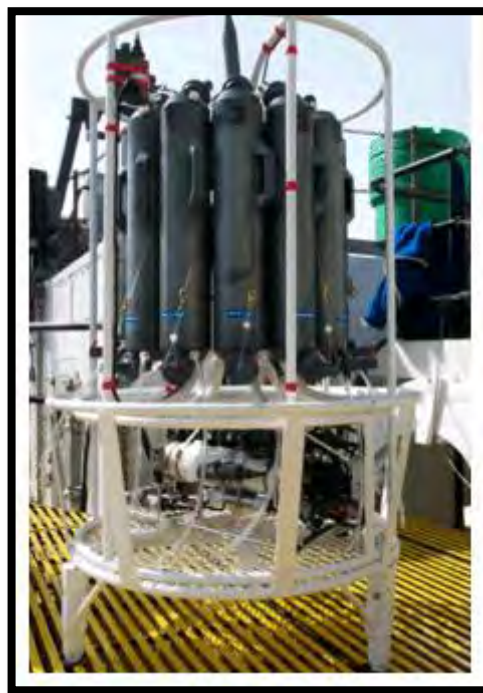


Figure 2. 1: A Rosette Sampler (Chapman, 1996)

Water characteristics such as dissolve oxygen, pH, nutrient and temperature are also known as parameter. The parameter can be in physical, chemical or biological in nature. Parameter of water quality is as shown below. Monitoring the different aspect of water quality will enable changes in the aquatic environment to be detected and understanding the ecosystem to develop. For any aquaculture project,