

CONTINUOUS MONITORING OF AQUACULTURE POND WITH  
OPTICAL BASED SYSTEMS

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## **ABSTRACT**

This thesis presents the development of a continuous monitoring equipped system for aquaculture pond with optical fiber sensors. Aquaculture, in large scale production often requires high labor intensity, real-time monitoring, remote sensing capabilities, and control. The scope of this project is to develop a micro-controller based control system with the use of optical fiber signal as input to measurement equipment and software for decision making. The project focusing on data acquisition and instrument interfacing between wavelength meter (HP86120C) and Agilent Vee as well as microcontroller for automated response. The aquaculture pond is equipped with a fiber optic sensing network to monitors water level, temperature sensor and intrusion detection. The fiber optic network is also used as a means of communication between external sensors and the main monitoring sensors. Information from above sensors and optical fiber medium upon reaching a monitoring station allows for control of a water pump, aeration system and notify the owner by sending a message using GSM.

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# CHAPTER 1

## *INTRODUCTION*

### **1.1 PROJECT BACKGROUND**

This project will present a model representation of a continuous monitoring system intended for an aquaculture pond that is equipped with optical fiber sensing system. A continuous monitoring system is a system that performs sensing continuously without human intervention. With large areas covered by the industry, a control system is required to ensure continuous monitoring of aquatic livestock.

Aquaculture is the cultivation of animals and plants in an aquatic environment. Today, aquaculture is said to supply an estimated 43% of all fish that is consumed globally. The Government under the department of Fisheries Malaysia has provided aquaculture industrial zone for high impact project (HIP) as much as 28099 hectares to be developed (sources from [www.dof.gov.my](http://www.dof.gov.my)). Of these 28099 hectares, 6435 hectares involves farming in ponds. An Aquaculture Industrial Zone (AIZ) was set up as part of the permanent food production zones by the state government as a measure to ensure that sufficient land is allocated for aquaculture development (source <http://www.fao.org>).

The industry has also seen a rapid increase in production. Over a period of ten years (2000-2010) the industry has experienced an increase in production from 150,000 tonnes in the year 2000 to about 580,000 tonnes in the year 2010.

The contribution of aquaculture sector to Malaysia's GDP shows a positive improvement within the years. Aquaculture sector has contributed 0.283 in production value as percent of GDP in 2003[1]. With respect to socio-economic development, aquaculture contributes towards improving food supply, employment and income.