

**PRESSURE INDUCING PH SENSING ON FIBER BRAGG  
GRATING**

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In the name of ALLAH,  
Most Compassionate, the Merciful,  
Praise to ALLAH, Lord of the Universe.

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## ABSTRACT

This project presents system to continuously monitor pH by inducing pressure from electronics sensor to Fiber Bragg Grating (FBG). The problem with the current technology is that fiber optic chemical sensor need to undergo removal of cladding and sol-gel process which is not mass-manufacturer friendly and expensive. The objective of this project is to design alternative system to replace Fiber Optic Chemical Sensor. The project is divided into following scope (i) design the electronic gripper (ii) design servo driver circuit and (iii) characterize FBG response to gripper. To illustrate the functionality, we immersed electronic sensing in a solution and it will produce a change in parameters of output voltage. The output voltage is received by servo driver that produced voltage signal to electronic gripper and converted to pressure. The pressure is then applied to the Fiber Bragg Grating sensor. The output is detected by wavelength meter and analyzed by Agilent Vee. Results show a satisfactory regression factor of 0.99 in detecting the pH values. This project proves that electronics sensors can be combined with optical fiber sensing network to sense physical and chemical parameters in a single fiber.

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# CHAPTER 1

## INTRODUCTION

### 1.1 INTRODUCTION

In this chapter, generally is describing the overview of the project. Conveying the applicable procedures has been used in the project and the expected overall performance using the procedures will be explained. Also, in this chapter will state the problem statement and finally come up with a several objectives. Moreover, it will also touch on the scope of the project work and the organization of the project report.

### 1.2 PROJECT BACKGROUND

Malaysia has more than 150 river system [1]. There are lot of method has been made to control the water from being polluted. All monitoring parameter such as oil spill, water level, flow rate, pH and many else has been tested. In monitored chemical parameter of fluid, pH value is one of the most commonly use. Today, it is to sense the present of hydrogen ions in a solution. Different amount of concentration in hydrogen ions will indicate the pH level of certain element. The higher of the concentration of hydrogen ion in a particular element, the lower pH level of the element which means it is an acidic. In opposite way, it is base element. This chemical sensing of pH level start with litmus paper, which turn the blue litmus paper to red represent as acidic element, and red litmus paper to blue as acidic solution. Furthermore, measurement of pH is importance to find the chemical characteristics of the substance in order to optimize the desired reaction or to prevent unwanted reactions. One of the most popular and can be considered as standard measuring method for pH measure is glass electrode pH sensor. This is due to