CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF THE RESEARCH

Ocean is a very dynamic environment. It covers almost 71 percent of earth’s surface and it is divided into 5 areas consisting of Pacific, Atlantic, Indian, Southern, and lastly Artic Oceans. Ocean also holds 97 percent of water on earth and almost 95 percent of part of the ocean remains unexplored. This shows that there are many types of organism and microorganism yet to be discovered.

Earth’s system such as climate and weather are heavily affected by the condition of the ocean. The importance of the oceans and the organism live in it has gained some attentions nowadays. In recent years, the need for efficient ocean monitoring has led to the development in acoustic, physical and optical oceanography sensor. The sensor is mainly use for phytoplankton detection. Phytoplankton can be said as the heart of the marine ecosystem and the monitoring of the phytoplankton bloom is very important. It is the key for effective management of oceanic resources.

The phytoplankton bloom is the marine ecosystem health’s indicator. The bloom can happen in hundreds of square kilometre under the right conditions. The aforementioned conditions include the availability of carbon dioxide, nutrients and sunlight. Phytoplankton is the foundation of marine food web. Phytoplankton acts as the primary producers and aquatic animals like zooplankton feed on them. The availability of phytoplankton is very important for the whole marine ecosystem.
Nowadays, there are many ways to detect phytoplankton. The traditional methods like flow cytometry, high performance liquid chromatography and microscopy are reliable but also time-consuming and cannot provide in situ measurement. Detection of phytoplankton by using payload scientific instrument like Medium Resolution Imaging Spectrometer (MERIS) and Moderate Resolution Imaging Spectroradiometer (MODIS) is very expensive and not everyone has access to it. Development of instrument that can detect phytoplankton instantly at the research area can bring many advantages to ocean monitoring.

In situ sensor that can detect the phytoplankton is very useful for phytoplankton monitoring. The parameter to detect the phytoplankton needs to be analysed first and then an instrument or multisensory needs to be made.

1.2 PROBLEM STATEMENT

Considerable attention has been focused on the monitoring the phytoplankton in the ocean. It is because phytoplankton plays a very important part in the marine ecosystems. In situ data for phytoplankton detection can provide useful information for science and research purposes. Hence, this research is to develop a new unmanned surface vehicle instrument that can detect phytoplankton in the ocean.
1.3 OBJECTIVES

The main objectives of this project are:

- To analyse the detectability of phytoplankton.
- To develop multisensory for detecting phytoplankton under ocean water surface.
- To integrate other multi sensor for the unmanned surface vehicle, (USV).

1.4 PROJECT SCOPE

This study is focused on designing, fabricating and analysing an instrument for phytoplankton detection. In order to create such instrument, investigation about the in situ phytoplankton detectability has to be done. Parameter on how to detect phytoplankton in various environment need to be studied. An instrument will be developed as an in situ sensor in order to detect phytoplankton. Different water sources such as seawater and pond water will be tested and compared to the sample water that contains actual phytoplankton sample. The results will be compared and analysis will be made to know the detectability of the phytoplankton. The project will be carried out in the laboratory located in Faculty of Manufacturing Engineering, Universiti Malaysia Pahang and in Kuala Pahang area.