**CHAPTER ONE**

**INTRODUCTION**

Water is the engine for all life and no lives can overview without water on this plane. In the course of recent decades, fish ponds in and around Ghana have slowly capitulated to a reasonable level of contamination. Using of chemical fertilizers and dumping of anything into ponds are the real essential types of fish pond pollution in Ghana. It is a need to check the water of fish ponds regularly utilising agile technologies. Wiping out water pollution in fish ponds inside and out may appear as though an incredible idea however restricting its belongings when it happens is absolutely conceivable. The essential goal of this undertaking is to devise a strategy to screen the quality of fish pond water with an end goal to help in water pollution control in Ghana with the assistance of IoT.

This project monitors the quality of water, interns of monitoring the level of water, the temperature of the water and its surrounding, the turbidity of the water (how clean the water is) as well as the PH levels of the water. So this system monitors all of these aspect and finally when all check have been completed, its sends the information or data as an SMS to notify the authorized personnel. The series of continuous measurements will be published on a website for further study.

**Background to the study**

Activities have been taken everywhere throughout the globe to create ventures dependent on testing water to help in controlling fish pond conditions. It may not be explicit to water contamination observing but rather comparative ideas are included.

Libeliums Smart Water gadget screens the status of an aquarium's wellbeing in Europe. It explicitly screens parameters like pH, electro conductivity, oxidation/decrease potential (ORP) and temperature. A cloud based arrangement is created to help in observing information continuously giving a quick and successful response in the event of rising variations from the norm.

A similar example to that of this project can be seen in the coastal water pollution monitoring initiative in the Gulf of Kachchh with the only difference being in terms of it having a much larger scope and vastly more expensive protocols deployed to counter the effects of the industrial development.

Locally, at the University of Cape Coast, there are numerous water quality checkers at the Department of Fisheries and Aquaculture necessary to screen the quality of water not explicitly water of fish ponds.

Research indicates that projects of this nature are developed on a large scale with generous funding from reputable organizations. There is little indication of small-scale and inexpensive projects that have a similar role in places like marine jetties, cities and industrial rivers to preserve aquaculture and public health. By applying a strategic, cheap and methodical technique this project hopes to achieve this in an effort to sanitize our fish ponds.

**Evolution of internet of things (IoT)**

The internet of Things (IoT) is a revolutionary new concept that has the potential to turn virtually anything “smart”. A Thing in this context could be defined as an object such as a cardiac monitor to a temperature sensor. This extraordinary event has captured the attention of millions. Why is this so big today? So imagine a world where machines function without any notion of human interaction. A future where machines communicate with other machines and make decisions based on the data collected and all independent of an end user. IoT is determined as the network of environmental objects or items which includes devices, vehicles, buildings which are embedded with sensor, micro-controller, and network associativity. It enables these items to get together and interchange data to the various environment.

To understand how this revolution took shape we have to travel back to the 1900’s with a profound prediction from a well renowned inventor Nicolas Tesla in which he stated that the world will be wirelessly connected to a single brain. Every invention starts with a simple thought, that’s all it takes to define history. Alan Turing, the inventor of the computer, spoke about machines having sensors and humans teaching the machines, what we know today as Artificial Intelligence (AI). Then came the World Wide Web (www), the flow of information that is available to the public and this was exactly what was missing to realise Teslas’ prediction. The term itself “internet of things” was coined in 1999 by Kevin Ashton for linking the idea of sensors with the internet. His definition of IoT was based on reinventing RFID as a networking technology by linking objects to the internet using the RFID tag.

The IoT journey has taken over a century to see light and it will undoubtedly not stop here. By 2020 it says that 50 billion ‘things’ will be connected to the internet. In this guest, we tend to build a smart water quality checker.

It might be difficult to see the significance of the IoT but every advancement made is to make everyday life simpler and safer. Examples of these are a baby monitor to keep track of a baby’s health in real time [6], an IoT for caregivers which collects behavioral data to improve care and a heart monitoring system that collects biometrics data to track an aging patient’s health. These are just a few examples of how IoT projects can improve the way of life. In this guest, we tend to build a smart water quality checker.

**Statement of Problem**

For the past recent years, the consumption of fishes in Ghana is on the rise. According to graphic.com.gh, Ghana consumes over 950,000 metric tons of fish annually, currently imports more than 60 per cent of its fish. While in 2016 the country imported 192,131.47 tons of fish, the figure increased by 2.57 per cent in 2017 to 197,063.45 tons.  
Expectedly, the value of fish imports also rose from $131 million in 2016 to $146 million in 2017, representing 11.22 per cent increase.       
  
The government, in an effort to reduce fish imports and boost the country’s production, has begun the development of a commercially viable aquaculture industry. As one of the fastest growing food-producing sectors in the world, aquaculture holds abundant job creation opportunities, while addressing the fish production deficit.  
  
Imagine a device that screens the water and gives update of the chemical and physical properties. Water quality should be ensured so that no contaminants exceed levels that would affect the health of the fishes. A simplified technical procedure for monitoring and assessing water quality in the aquaculture is been developed. The system utilises low cost, portable instrumentation that can largely be used by non-specialist fish farmers and reduces the need for costly analysis.

**Purpose of the study:**

The purpose of the study of this project is design and implement a water quality monitoring and notification system for fish farmers to determine the physio-chemical parameters of aqua-cultured sites such as fish ponds.

**Significant of the study**

The significant of the study will help fish farmers to have a serene ecosystem for the fishes and create awareness to prevent further harm to the pond.

**Objective**

Water quality infers physical and compound that guarantee support and sustain the biological system in order to attain the wholesomeness of the water body under study. Water quality checking therefore comprises of periodic and systematic observations to enable its assessment covering physical, chemical and biological parameters. This project is designed to accomplish the following objectives:

* Monitoring the level of water.
* Checking the temperature of the water and its surrounding
* Checking the turbidity of the water (how clean the water is)
* Monitoring the PH levels of the water
* Check the physio-chemical characteristics

**Limitations**

Cost: The components used for this project are very expensive. The cost involving in requesting these components are very high. This adds as a limitation to us for the flawlessness of this project.

Time: Components used for the projects are not available in Ghana. Since majority of the project components must be shipped from abroad it takes a significant lot to get our reach. Because the department likewise has due date for finishing this task, so we couldn't meet our objective for making the project within the time frame.

**Project Justification**

There has been an increment in the world’s demand for fishes. This occasion has required the need to take proper care of fish ponds. Due to change of water qualities brought about by high temperature, low water level, turbidity of the water among others. With more interest in fish farming there is a need to screen.

In the course of recent years knowledge in electronics and computation has been utilised to solve present day problems. In the forefront of the electronics revolution has been internet of things. Sensors has been used to measure and control object. Maintaining water quality in fish pond can and has been automated. This solves the challenge brought about by the unreliability of climate changes thus need for water optimization. Fishes grown under controlled conditions tend to be healthier and thus give more yields.

**Organisation of the study:**

The Content of the work is assembled into five parts.

* Chapter One gives the introduction to the project, background to the study, problem statement, the purpose of our study, the significance of the study, our project objectives, the justification of the, limitation of our study and the organisation of our project.
* Chapter two is largely concentrated on the literature review. In detailed the historical background of our project was examined. The project was dug into analysing the literature, theoretical perspective to present study and limitation relating to similar works of our project.
* Chapter three captures the methodology. Here we introduced our approach for developing the system. We reinstate our objective of the proposed system, some research or design questions, data collection instruments, sampling plan and data analysis. Furthermore, various methods of the test are administered
* Chapter four Chapter four is about implementation and testing. The findings are explained in detail and discussion is made along the development of this project.
* Chapter five is about summary, conclusion and recommendation of the work.