

**FACULTY OF ENGINEERING**  
**DEPARTMENT OF COMPUTER ENGINEERING**

**A REAL TIME WATER QUALITY MONITORING SYSTEM USING IOT**

**By**

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## **DECLARATION**

I OGUTI VICTORIA of Reg No. BU/UP/2015/353, do hereby declare that this project report is my original work except where explicit citation has been made and it has not been submitted for any other degree award to any other university before.

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## **APPROVAL**

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## LIST OF ACRONYMS

IOT	Internet of Things
RS	Remote Sensing
PH	Potential Hydrogen
WHO	World Health Organization
DO	Dissolved Oxygen
COD	Chemical Oxygen Demand
BOD	Biochemical Oxygen Demand
NWSC	National Water and Sewerage Cooperation
EC	Electrical Conductivity
Wi-Fi	Wireless Fidelity
USEPA	US Environmental Protection Agency
GSM	Global System for Mobile communications
HTTP	Hypertext Transfer Protocol
TCP/IP	Transfer Control Protocol
LCD	Liquid Crystal Display
RD1	Recommended Daily intake
TDS	Total Dissolved Solids
WLAN	Wireless Local Area Network
WPA	Wi-Fi Protected Access
WPS	Wi-Fi Protected Setup
M2M	Machine to Machine
NEMA	National Environment Management Authority

## **ABSTRACT**

With the rapid development of the economy, more and more serious problems of environment arise. Water contamination is one of these problems. Routinely monitored parameters of water quality are temperature, pH, turbidity, conductivity, dissolved oxygen (DO), chemical oxygen demand (COD), biochemical oxygen demand (BOD), ammonia nitrogen, nitrate, nitrite, phosphate, various metal ions and so on.

The most common method to detect these parameters is to collect samples manually and then send them to laboratory for detecting and analyzing. This method wastes too much man power and material resource, and has the limitations of the samples collecting, long-time analyzing, the aging of experiment equipment and other issues. Sensor is an ideal detecting device to solve these problems. It can convert no power information into electrical signals. It can easily transfer process, transform and control signals, and has many special advantages such as good selectivity, high sensitivity, fast response speed and so on. According to these characteristics and advantages of sensors, Monitoring of Turbidity, PH & Temperature of Water is designed and developed.

The model developed is used for testing water samples and the data uploaded over the Internet are analyzed. The system also controls the supply of water when there is a deviation of water quality parameters from the pre-defined set of standard value.

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# CHAPTER ONE: INTRODUCTION

## 1.1: Background

Ensuring the safety of water is a challenge due the excessive sources of pollutants, most of which are man-made. The main causes for water contamination are over-exploitation of natural resources due to rapid pace of industrialization and greater emphasis on agricultural growth combined with latest advancements, agricultural fertilizers and non-enforcement of laws have led to water pollution to a large extent(Central Ground Water Board, 2017). The problem is sometimes aggravated due to the non-uniform distribution of rainfall. Individual practices also play an important role in determining the quality of water.

Water quality is affected by both point and non-point sources of pollution, which include sewage discharge, discharge from industries, run-off from agricultural fields and urban run-off. Other sources of water contamination include floods and due to lack of awareness and education among users. The need for user involvement in maintaining water quality and looking at other aspects like hygiene, environment sanitation, storage and disposal are critical elements to maintain the quality of water resources.

Routinely monitored parameters of water quality are temperature, pH, turbidity, conductivity, dissolved oxygen (DO), chemical oxygen demand (COD), biochemical oxygen demand (BOD), ammonia nitrogen, nitrate, nitrite, phosphate, various metal ions and so on (Based on extensive experimental evaluation carried out by US Environmental Protection Agency (USEPA)).

The most common method to detect these parameters is to collect samples manually and then send them to laboratory for detecting and analyzing. This method wastes too much man power and material resource, and has the limitations of the samples collecting, long-time analyzing, the aging of experiment equipment and other issues.

## 1.2: Problem statement:

Waters in and around Uganda have gradually succumbed to a fair degree of pollution. Chemical waste and oil spills being the major causes of water contamination. sewage discharge, discharge from industries, run-off from agricultural fields and urban run-off are other primary forms of

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