FACULTY OF ENGINNEERING

DEPARTMENT OF COMPUTER ENGINEERING

AN AIR QUALITY MONITORING AND CONTROL SYSTEM IN AN INDUSTRY

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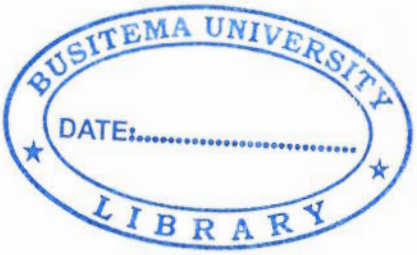

A PROJECT REPORT SUBMITTED IN THE PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF BACHELOR OF COMPUTER ENGINEERING OF BUSITEMA UNIVERSITY

DECLARATION

I **NAKILIJJA JALIA** BU/UP/2014/323 do hereby declare that this project report is my original work and has never been published and/or submitted for any other degree award to any other university or institution of higher learning.

Signature .....

Date ..6th June 2018.....

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APPROVAL

I certify that the project report entitled "Air quality monitoring and control system in an industry" has been done under my supervision and is submitted to the board of examiners with my approval.

Mr. LUSIBA BADRU

Department of Computer Engineering

Sign: .....

Date: 05/06/2018

DEDICATION

I dedicate this report to my beloved parents Mr. MABALE BUMBAKALI and Mrs.MIREMBE MAYI. Your contribution to my education has been wonderful, encouraging and promising a bright future in my life. They have always been there for me even when the going seems toughest, I love you all and may the almighty God reward you with unfathomable blessings, Glory be to God Almighty.

ACKNOWLEDGEMENT

My supervisor, Mr. Lusiiba Badru has been a vital requirement in helping me to accomplish this project report. Thank you so much for the aid offered to me. Also, I acknowledge all the other department lecturers who have always given me time for consultation regardless of whether they are my supervisors or not, thank you for the helping me out all the time I seeked for advice.

Fellow students offered help in form of advice and information and it is also greatly recognized.

Special thanks to my family for their never ending financial and advisory support. May the Almighty reward all of you abundantly.

Above all, I acknowledge the Almighty God for the gift of life, wisdom, knowledge and understanding for without Him, I would not have been able to accomplish this project report.

LIST OF ABBREVIATIONS

GSM	Global System for Mobile Communication
WHO	World Health Organization
CO	Carbon monoxide
PCB	Printed Circuit Board
SMS	Short Message Service
WSN	Wireless Sensor Network
PM	Particulate Matter
AAP	Ambient Air pollution
PPM	Parts Per Million
IAP	Indoor Air Pollution
NAAQS	National Ambient Air Quality Standard
NEMA	National Environment Management Authority

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ABSTRACT

Air pollution is one of the leading global public health risks but its magnitude in many developing countries' cities is not known. The level of air pollution has increased with times due to different factors such as increase in population, industrialization and urbanization which results in harmful effects on humans by directly affecting health of population exposed to it. The currently used systems however not in Uganda do not have an automated control mechanism, they are unreliable, expensive, hard to read and their main focus is on vehicles yet people spend most of their time working indoors in different factories hence their health is compromised. In this system, the carbon monoxide sensor, temperature and humidity sensor are used to detect increase or decrease in the different conditions then the system takes a control action by alerting both the industrial management through the use of the buzzer and National Environment Management Authority (NEMA) through messages by using a GSM modem. This system will reduce the health effects that arise from air pollution exposure.

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CHAPTER ONE: INTRODUCTION

1.0 Introduction

This chapter comprises of background, problem statement, objectives of the study, justification and the scope.

1.1 Background

In many cities, air is polluted by emissions from sources such as power plants, manufacturing processes among others. When gases and particles from those activities accumulate in the air in high enough concentrations, they are harmful to human health and environment [1]. Air pollution is a fast becoming grave threat as levels of toxicity in urban centers increase beyond safe limits [2]. The rapid industrialization, fast urbanization, rapid growth in population and other activities of human beings have disturbed the balance of natural atmosphere[3]. Air pollution is one of the most important factors affecting the quality of life and the health of the increasingly urban population of industrial societies. Health problems commonly Associated with air pollution exposure include: respiratory diseases such as the chronic obstructive pulmonary disease, asthma, lung cancer and acute respiratory infections in children and cardiovascular diseases such as ischemic heart disease and stroke [4].

According to the 2014 WHO Report, in 2012 about 3.7million premature deaths occurred across the globe due to exposure to particulate matter of 10 microns or less in diameter (PM10) [5].

On the 25 March 2014, WHO released new estimates of the Contribution of air pollution to global mortality showing that seven million deaths were attributable to air pollution worldwide in the year 2012, 3.7 million due to ambient air pollution (AAP) and 4.3 million due to indoor air pollution (IAP).This number represents a doubling from the air pollution mortality rates estimated by WHO in the year 2004 [4]. The United States (US) National Ambient Air Quality Standard (NAAQS) designates all of the above plus airborne lead (Pb) as criteria pollutants. WHO and the US Environmental Protection Agency (USEPA) have defined guideline limits for these pollutants that should not be exceeded in order to maintain and protect public health [4].

The WHO limits for PM2.5, PM10, NO2, SO2, and O3 are 25 µg/m3 (24-hour mean), 50 µg/m3 (24-hour mean), *12* **8077** µg/m3 (one-hour mean), 20 µg/m3 (24-hour mean), and 100 µg/m3 (eight-hour mean), respectively [4].

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