

**FACULTY OF ENGINEERING**

**DEPARTMENT OF COMPUTER ENGINEERING**

**WEB BASED TRANSFORMER MONITORING SYSTEM**

**BY**

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**A FINAL YEAR PROJECT REPORT SUBMITTED TO THE DEPARTMENT OF  
COMPUTER ENGINEERING AS A PARTIAL FULFILLMENT OF THE  
REQUIREMENTS FOR THE AWARD OF A BACHELOR OF COMPUTER  
ENGINEERING DEGREE AT BUSITEMA UNIVERSITY.**

**MAY 2018**



## ACKNOWLEDGMENT

I would like to appreciate my supervisor, Mr. Arineitwe Joshua who has continuously guided me throughout this project. He has been a parent to me and provided where necessary, may God bless you and reward you abundantly. Not forgetting my late father Mr. Oryang Charles, mother Mrs. Auma Esther, my aunt Ayat Christine Kibwota, my uncle Abara Patrick, my brothers, sisters and friends who have provided financially, materially, spiritually until the completion of this project, may God bless you. I do also appreciate Mr. Pinyi Eria Othieno for his guidance may God bless you abundantly. Most important of all, the almighty God, he has worked both indirectly and directly to see to it that I am successful, I will serve you forever.



## DEDICATION

I dedicate this work to my late father Mr. Oryang Charles, mother Mrs. Auma Esther, my aunt Ayat Christine Kibwota, and my uncle Abara Patrick, my brothers, sisters and friends. Your contribution to my education has been wonderful, encouraging and promising a bright future in my life. You 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

## DECLARATION

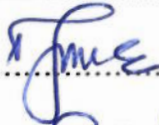
I OKETA FRED do hereby declare that this project report is my original work and has never been published and/or submitted for any other degree award to any other university or institution of higher learning.

SIGN: Oketa Fred

DATE: 05/06/2018

## APPROVAL

This is to certify that the project report titled "Web Based Transformer Monitoring System" has been done under my supervision and is now ready for examination.

SIGN: .....  .....

DATE: .....  .....

**Mr. ARINEITWE JOSHUA**

Department of Computer Engineering

## LIST OF ACRONYMS

GSM	Global System for Mobile communication
PC	Personal Computer
RF	Radio Frequency
SMS	Short Messaging Service
SQL	Structured Query Language
DB	Database
PCB	Print Carbon Board
ADC	Analog to Digital Converter
DTRMS	Distributed Transformer Network Remote Monitoring System
RTD	Resistance Temperature Detector
LCD	Liquid Crystal Display
API	Application Programming Interface
IDE	Integrated Development Environment
MODEM	Modulator Demodulator

## ABSTRACT

Transformer is one of the important electrical equipment that is used in power system. Monitoring transformer for the problem before they occur can prevent faults that are costly to repair and result in a loss of electricity. The main aim of the project is to acquire real-time data of transformer remotely over the internet falling under the category of Internet of Things (IOT). For this real-time aspect, remote monitor the transformer parameters including transformer oil temperature, transformer oil level, voltage input and voltage output of the transformer. These three analog values are taken in multiplexing mode and connected to Atmega 328 microcontroller families through an ADC 0808. Then the values of all the sensors are sent sequentially as per the frequency of multiplexing of the ADC by Microcontroller. The transformer parameter values are then sent to the Router through the Ethernet Shield under TCP IP protocol to a dedicated IP that stores the transformer parameters in a MySQL database and display the data in real-time on the web application with the help of AJAX.

The main objective of the project was to designed and developed a web based transformer monitoring system, the system allows real time monitoring of transformer parameters like transformer oil temperature, transformer oil level, voltage input and voltage output of the transformer.

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## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Background**

A transformer is a static electromagnetic device consisting of two or more windings which link with a common magnetic field. The main purpose of power or distribution transformer is to transfer electric power from one voltage level to another. It works on the principal of electromagnetic induction. The main components of the transformer are core, windings, insulation (solid or liquid) and tank. The purpose of the transformer core is to provide a low reluctance path of magnetic flux linking the primary and secondary windings. The primary and secondary windings are arranged as to reduce the leakage flux in the transformer [1].

Like other machines, a transformer too has limited life. However, unlike other machines, it does not have any moving parts, except tap changers or cooling fan or pump motors. The outage, therefore, is not due to wear out. The transformer may become faulty because of deterioration of insulation overtime. The cellulose paper and mineral oil form bulk of insulation in the transformer. The insulation is subjected to a variety of stress such as thermal, mechanical, electromagnetic etc. Under the influence of the said stress and the presence of oxygen and moisture, the insulation deteriorates continuously over a period of time, eventually leading to failure [2]. If these failures can be predicted with some degree of confidence, sudden failures can be minimized.

Efforts are being made to understand and analyze factors responsible for determining the life of a transformer. Broadly ageing of insulating materials can be looked upon as a chemical reaction, which takes place at a rate that is influenced by thermal, electric and mechanical stresses. All chemical reactions lead to product(s), which have physical and chemical characteristics different from the parent material [3]. Therefore, chemical and physical characterization of the reaction product(s) may assist in monitoring the health of the insulation and hence transformer.

Over the years a number studies, involving monitoring of one or more parameters has been carried out to predict the impending health of the transformer. However the results are not conclusive. Laboratory studies have been carried out to study ageing behavior of cellulose paper and oil. Mostly the studies are confined to thermal ageing and thus do not stimulate the real life situation. Alongside the ageing studies, efforts have been directed to develop sensors and instrumentation to monitor some of the parameters [4].

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