

BUSITEMA UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF COMPUTER ENGINEERING

TOPIC:

**AN AUTOMATIC FRESH AND CONSUMABLE MEAT DETECTION
SYSTEM**

BY

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BU/UG/2015/31



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**A Final Year Project report submitted to the Department of Computer Engineering
in partial fulfilment for the award of Bachelor's Degree in Computer Engineering at
Busitema University**

May, 2019

DECLARATION

I, **Ssenninde Emmanuel**, do hereby declare that this project proposal is my original work and has not been submitted for any other degree award to any other University before.


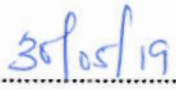
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APPROVAL

This certify that the project under the title” An Automatic Fresh and Consumable Meat Detection System” has been done under my supervision and is ready for examination.

Ms. ASINGWIRE BARBARA KABWIGA

Signature  Date: 

ACKNOWLEDGEMENT

I give glory to God and the Holy Spirit for the great help and guidance throughout this project. My Supervisor, Ms. Asingwire Barbra Kabwiga who has continuously guided me throughout this project. She has been a parent to me and provided where necessary. May God bless you madam. Finally, great thanks to my mother Mrs. Nansubunga Margaret and my brothers Robert and Paul for the financial, material and spiritual help you have provide to me until the completion of this project, may God bless them abundantly.

DEDICATION

I dedicate this report to my supervisor, Ms. Asingwire Barbara Kabwiga and my beloved mother Mr. Nansubunga Margaret. Your contribution to my education has been wonderful, encouraging and promising a bright future in my life.

Table of Contents

DECLARATION.....	i
APPROVAL.....	ii
ACKNOWLEDGEMENT.....	iii
DEDICATION.....	iv
LIST OF ACRONYMS.....	viii
LIST OF FIGURES.....	ix
LIST OF TABLES.....	x
ABSTRACT.....	xi
CHAPTER ONE: INTRODUCTION.....	1
1.1 BACKGROUND.....	1
1.2 PROBLEM STATEMENT.....	2
1.3 OBJECTIVES.....	2
1.3.1 Main objective.....	2
1.3.2 Specific objectives.....	2
1.4 JUSTIFICATION.....	3
1.5 SCOPE.....	3
1.5.1 Technical scope.....	3
1.5.2 Time scope.....	3
CHAPTER TWO: LITERATURE REVIEW.....	4
2.1 INTRODUCTION.....	4
2.2 KEY TERMS.....	4
2.2.1 Meat quality.....	4
2.2.2 Automation.....	4
2.2.3 Arduino.....	4
2.2.4 Database.....	5
2.3 RELATED SYSTEMS.....	5
2.3.1 Smart RFID System with Gas Sensor for Meat Freshness Monitoring.....	5
2.3.2 The Meat Freshness Monitoring System Using the Smart RFID Tag.....	6
2.3.3 Meat and Fish Freshness Inspection System Based on Odor Sensing.....	7
2.3.4 Meat freshness identification system using gas sensor array and color sensor in conjunction with neural network pattern recognition.....	8
2.3.5 Proposed system.....	9
2.3.6 Related Systems Comparison Table.....	9
CHAPTER THREE: METHODOLOGY.....	11
3.1 Methods Used in Data Collection.....	11
3.1.1 Documents and literature review.....	11

3.1.2 Consultations	11
3.1.3 Interview	11
3.1.4 Observations	11
3.2 Data analysis.....	11
3.3 Components Used in Hardware Design.....	12
3.3.1 Arduino Uno microcontroller	12
3.3.2 Liquid Crystal Display.....	12
3.3.3 Resistors.....	12
3.3.4 Potentiometer.....	13
3.3.5 Diodes.....	13
3.3.6 Capacitors and Ceramic Capacitor.....	13
3.3.7 Crystal Oscillator	13
3.3.8 Connectors	14
3.3.9 GSM module.....	14
3.3.10 pH sensor module	14
3.3.11 Gas sensor modules	14
3.3.12 LM2596 DC-DC Converter	14
3.4 Software in software design of systems.....	14
3.4.1 Arduino IDE	14
3.4.2 Proteus.....	14
3.4.3 Fritzing software.....	15
3.4.4 Visual studio code.....	15
3.4.5 Sublime text editor.....	15
3.4.6 Wamp server.....	15
3.4.7 Now SMS	15
CHAPTER FOUR: SYSTEM ANALYSIS AND DESIGN.....	16
4.1 REQUIREMENT ANALYSIS	16
4.1.2 Functional requirements	16
4.1.3 Non-functional requirements	16
4.2 SYSTEM DESIGN.....	16
4.2.1 Block diagram for the system	17
4.2.2 Physical diagram of the system	18
4.2.3 Schematic diagram.....	19
4.2.4 System Data Flow Chart	20
CHAPTER FIVE: IMPLEMENTATION AND TESTING	21
5.1 TESTING.....	21
5.1.1 Unit testing.....	21

5.1.2 Integrated testing	21
5.2 System Verification	21
5.3 System Validation.....	21
5.4 System Evaluation	22
CHAPTER SIX: DISCUSSION AND RECOMMENDATIONS	23
6.1 SUMMARY OF WORK DONE	23
6.2 RECOMMENDATIONS.....	23
6.3 CONCLUSION	23
References	24
Appendices	26
Appendix 1: Arduino code for hand held device	26
Appendix 2: code for connection between hardware system and database system	33
Appendix 3: Picture of the implemented system	35

LIST OF ACRONYMS

ADC	Analog Digital Converter
CPU	Central Processing Unit
GSM	Global System for Mobile
IDE:	Integrated Development Environment
LCD	Liquid Crystal Display
LED	Light Emitting Diode
MCU	Microcontroller Unit
MQ	Mǐngǎn Qǐ lai
RFID	Radio-frequency identification
SMS	Short Message Service
UNBS	Uganda National Bureau of Standards
VOC	Volatile Organic Compound

LIST OF FIGURES

Figure 2.1: Smart RFID System with Gas Sensor for Meat Freshness Monitoring 6

Figure 2.2: The Meat Freshness Monitoring System Using the Smart RFID Tag 7

Figure 2.3: Meat and Fish Freshness Inspection System Based on Odor Sensing 8

Figure 2.4: Meat freshness identification system using gas sensor array and color sensor in conjunction with neural network pattern recognition 8

Figure 4.1: Block diagram for the system..... 17

Figure 4.2: Physical diagram of the system 18

Figure 4.3: Schematic diagram 19

Figure 4.4: System Data Flow Chart..... 20

LIST OF TABLES

Table 2.1: Related Systems Comparison

ABSTRACT

Meat freshness level is an important factor to determine meat quality for consumption. This system has been designed to automatically detect fresh and consumable meat in a very fast and non-destructive way. The system is implemented into an ATmega238p microcontroller equipped with a pH sensor and gas sensors as the freshness identifier tools to replace the human olfaction and vision in determining fresh meat. The combination of the readings from the sensors is used to identify the meat's freshness. The system's inputs are the smell sensed by the gas sensors that's MQ-7, MQ-4 and, MQ-3 and a pH sensor for the acidity or alkalinity of the meat. Two meat samples have been tested, such as fresh meat or rotten meat. The usage of the three gas sensors and a pH sensor is capable of acquiring two distinct categories of meat quality statuses. The system has a high percentage of success but the small errors are due to the incremental in the gas sensor reading mostly in fresh meat and this is because the sensors are very sensitive to natural and organic compound smell. Thus, it may be concluded that the system has is successful in identification of fresh meat and rotten meat and the implementation of this system is expected to replace the traditional methods by the human senses that is the nose and eyes.

CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

Meat is one of the main sources in Uganda and all over the world. It is very rich in proteins which are one of the very important food nutrients in human body. It is sold in very many places like butchers, supermarkets and even on the road side and it is sold in many forms that is to say raw, cooked or fried and roasted. In most cases people want to buy it in its raw form and prepare it themselves and are very considerate of the standard and quality of the meat before they buy it.

The quality of meat is entirely dependent on its level of freshness. It is this quality that determines whether the meat is good for human consumption or not. The meat's smell, color texture and taste are some of the attributes that can be used to determine the freshness level of meat[1]. The taste quality of meat is influenced by volatile organic compound (VOC) content. The pH of meat is also a major factor to consider as for the quality of meat[2]. The pH is a measure of the acid or alkaline level of the meat. MSA (MEAT STANDARDS AUSTRALIA) research has found beef with pH levels above 5.70 is not good for consumption. Accordingly, 5.70 has been set as the maximum pH level for MSA grading. In line with eating quality, a slight adjustment is made within the acceptable 5.30–5.70 range[3].

In Uganda today, direct contact to a meat sample through visual inspection and odor assessment by human nose is the mostly used traditional way of identifying whether the is fresh and consumable or not. This method is prone to error because some people are color blind and different people have different kind of judgement about the same subject matter. Moreover, meat freshness quality assessment by human sense such as in food industry is difficult to be quantified due to inconsistent, error prone, expensive and labor-intensive measurement or routine quality application[1]. More modern technique is also used through the help of chemical method. However, this process requires a long-time inspection, and it is relatively complex and destructive meaning that the meat sample will be broken or unconsumable due to the chemical substance during testing[1].

In the proposed system, an automatic fresh and consumable meat detection system will help to solve the problems associated with traditional ways and the chemical methods because the meat

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