BUSITEMA UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING

FINAL YEAR PROJECT
A GSM Based Automatic Price and Dispensing Rate Change and
Monitoring System for Petro Fueling Stations

BY
NOKRACH HERBERT OCHAN
Reg No: BU/UG/2012/87
Email: nokyherbert6@gmail.com
Tel: 0752049563
Supervisor: MR. OCEN GILBERT

A final Year Project Report Submitted to the Department of Computer Engineering in Partial Fulfillment for the Award of Bachelor of Computer Engineering Degree of Busitema University

May, 2017

ACKNOWLEDGEMENT

I thank the almighty God for life and knowledge that helped me through this project.

Appreciation is rendered to my colleagues for their support through group discussions

Supervisor, lecturer Mr. Ocen Gilbert and the Department of Computer Engineering for guidance and insight into concepts of research and project management as well as technical knowledge applicable in the design of the system.

Neriko electronics for availing the components and training rendered used for the programming the system

DECLARATION

I, Nokrach Herbert Ochan do hereby declare that this Project Report is original and has not been submitted for any other degree award to any other University before.

Signature .... Date ....

Nokrach Herbert Ochan

Bachelor of Computer Engineering, (BU)

Department of Computer Engineering

Busitema University.

APPROVAL

This Dissertation Report has been submitted with the approval of the following supervisor.

Signature .... Date: ....

Mr Ocen Gilbert

Department of Computer Engineering

Faculty of Engineering

Busitema University.

DEDICATION

To my family and friends

LIST OF FIGURES AND TABLES

LIST OF ACRONYMS

GSM   Global System for Mobile communication

SMS   short message service

RF   radio frequency

LCD   liquid crystal display

TDMA   time division multiple access

SIM   subscriber identity module

SSD   Seven Segment Display

RISC   Reduced Instruction Set Computer

ADC   Analog to Digital Convertor

UART   Universal Asynchronous Receiver Transmitter

ABSTRACT

Petrol stations play a big role in the dispensing and retail sale of petrol, gasoline, diesel, kerosene, gas to motorists and other mechanical machine users, these products are the fundamental requirements for the operation of these machines. Managers and operators of these stations often face challenges in terms of losses that are related with individual management of stations leading to irregularities in pricing and dispensing rates.

The use of GSM in remote control and monitoring of systems is becoming a good tool in ensuring that resources are controlled and monitored simultaneously and uniformly.

This project aimed at making use of this available platform and existing technologies to help in remote control of petrol stations across the country and help reduce financial loss as well as implement automation in the sector of petrol dispensing.

This project has been implemented by designing a hardware system that can be installed at each petrol station and all operations involving dispensing and billing are controlled through the microcontroller. Price and dispensing rate changing is effected through GSM technology in line with the remote administrator.

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

The GSM based Automatic Price and Dispensing Rate Change System for Multiple Fuel Stations is a system designed to remotely adjust/calibrate the price and scale used when dispensing and billing on fuel pumps simultaneously. This chapter covers a background to the study, the problem statement, the objectives, justification and scope of the proposed project.

1.1 Background

Energy in form of fuel is a greatly demanded resource in many countries as a requirement for operation of machines and automobiles across the globe. Over the years demand for fuel, has risen as far as retail level thus leading to increased number of retail dispensers throughout many countries [1] including Uganda. Fuel companies use fuel stations for selling fuel and engine lubricants for motor vehicles. The most common fuels sold in the 2010s are gasoline and diesel. Fuel dispensers are used to pump petrol/gasoline, diesel, compressed natural gas, kerosene into the tanks within vehicles and calculate the financial cost of the fuel transferred to the vehicle [2]. Fuel dispensers are routinely refilled and readjusted basing on the price of fuel as well as government price regulations. These adjustments onto the dispenser pricing meter are done my individuals at the fuel stations as directed by the management. In present days, most fuel stations are manually operated which require more manpower and are time consuming. Fuel stations are also distributed throughout the country making it difficult and costly to carryout efficient station maintenance but use of technology in the delivery of service can bring change to service delivery such as through self-service and remote technologies.

Fuel companies in Uganda such as shell, Gapco, total face challenge of financial loss as well as loss of customers due to irregularities in pricing and operation of pumps and the different fuel stations. Fuel prices are subjected to constant change due to the global stand of the market in regard to their prices [2]. These changes subsequently push for the constant adjustment of both the billboard display and the dispenser scale (liter: price) used in the retail sale of the fuel. A failure to adjust the scale leads to financial loss for the company and miss matching rates at the different stations or between the billboard and the dispenser has caused loss of customers due to the inconsistency.

References

[1] J. Clemente, "Energy," 28 august 2016. [Online]. Available: www.forbes.com/sites/judeclemente/oil/2016.

[2] Australian Government, "Oil and Gas," Australia trade Commision, 2015.

[3] New Vision, "New Vision," Vision Group, November 2013. [Online]. Available: www.newvision.co.ug/tag/petrol-station/. [Accessed 2016].

[4] NACS Online - Your business, "History of Gasoline Dispensing," *NACS Retail Fuels Report,* 2011.

[5] A. Huurdemann, The world wide history of telecommunication, John Wiley & Sons, 2015, p. 529.

[6] H. Neuhaus, "Extension of the Sim card in gsm devices". USA Patent US 20060293082, 28 December 2006.

[7] S. &. B. GmbH, "Method for Operating a petrol pump of a petrol station". Patent EP2740709A1, 11 June 2014.

[8] Office of Primier . D. C. T. D. o. Baghdad, "Operation of Fuel Dispensers," Ministry of Oil, Baghdad.

[9] E. B. Richard, "Automotive Vehicle Fueling System". United States Patent 6032703, 2000.

[10] M. K. Andrews, Robotic Fueling System, Rhode Island: University of Rhode Island, Kingston, Rhode Island, 2001.

[11] O. O. Edward, "A Research using Remote Monitoring Technology for Pump Output Monitoring in Distributed Fuel Stations," Journal of Advances in Engineering & Technology, 2014.

[12] M. Rouse and S. Smith, "What is short message service," July 2007. [Online]. Available: http://searchmobilecomputing.techtarget.com/definition/Short-Message-Service.

[13] T. D. G. Frank Vahid, Embedded systems design, Carlifornia, 1999.

[14] "Techtarrget," [Online]. Available: http://searchmobilecomputing.techtarget.com/definition/GSM. [Accessed 7 November 2015].

[15] H. Kelly, "OMG, the text message turns 20. But has SMS peaked?," CNN, 3 December 2012. [Online]. Available: http://edition.cnn.com/2012/12/03/tech/mobile/sms-text-message-20/. [Accessed 3 November 2015].

[16] M. W. André ONCLIN, "HOW TO CHECK CALIBRATION OF DISPENSERS ON SITE," *Dynamic measuring systems for liquids,* 20012.

[17] E85 and Blender Pumps, "A Resource Guide to fuel infrastructure, USDA clean fuels," Nebraska, 2011.

[18] Genovese, Peter. "Full-service gas stations". In Lurie, Maxine N.; Mappen, Marc. Encyclopedia of New Jersey. Piscataway, New Jersey, 2004