BUSITEMA UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING

DOMESTIC WATER USAGE MONITORING AND CONTROL SYSTEM

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A Project report submitted in partial fulfillment of the requirements for the degree of a Bachelor of Computer Engineering of Busitema University

June, 2016

Declaration

I **ISOOBA SANON** Reg. No **BU/UG/2012/62** hereby declare that this project report is my original work except where explicit citation has been made and it has not been presented for a degree in any other University or any other award.

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Approval

The undersigned certify that he has read and hereby recommend for acceptance of Busitema University a Project report entitled " ***Domestic Water Usage Monitoring and Control System"***

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Department of Computer Engineering

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Date: 07/06/2016.....

Dedication

I dedicate this project report to my dear dad Mr.Dhikaali Patrick piido, mum Ms.Nairuba Juliet and all my dear siblings.

I am very grateful for the support. May the Almighty richly bless you.

Acknowledgement

Great appreciation goes to my family members especially Dad and mum, friends and relatives for the support and encouragement.

I heart willingly thank Mr. LUSIBA BADRU and entire staff of Department of Computer Engineering, Busitema University for the knowledge, guidance and support during the preparation of this report.

May the ALMIGHTY GOD bless the works of your hands.

Thanks.

Abstract

This project combines a Hall-effect water flow gauge with an Atmel chip the 8-bit ATMega328PU microcontroller in 28 pin DIP package, with double flash space and an HD44870 character based LCD- JHD162A to make it easy for you to measure water consumption in your shower, bath, or other parts of the house. The overarching goal of this project is to motivate more sustainable water use behaviour and raise awareness about global water issues because many people waste a lot of water hence leading to increase in the home's daily expenses. Measuring cumulative volume makes it easy to determine total consumption across a period and is accurate in terms of total usage. Both the flow rate and the cumulative volumes are displayed on an LCD. This project was therefore aimed at developing a GSM based system that would solve the above problem through the following ways; displaying the amount of water being used and left to be automatically cutoff , automatic cutoff of water flow if maximum set volume of water reaches and notifications to the user about the state of water usage at home. The work is arranged mainly in six chapters, Chapter one includes the introduction of a GSM based domestic water usage monitoring and control system. Chapter two discusses the literature related to the system, Chapter three illustrates the methodologies used in coming up with the working prototype of the system, Chapter four includes system design and analysis, Chapter five is contains the implementation and testing of the system and chapter six contains the summary of the work, , discussions and recommendations.

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List of Abbreviations

AMI	Advanced Metering Infrastructure
AMR	Automatic Meter Reading
DC	Direct Current
GSM	Global System for mobile communication
IP	Internet Protocol
LCD	Liquid Cathode Display
NGOs	Non-Government Organizations
NWSC	National Water and Sewerage Corporation
PD	Positive Displacement
PLC	Power Line Communication
UCC	Uganda Communications Commission
WHO	World Health Organization
HEF	Hall Effect Sensor

three interlinking arrows in the recyclable materials symbol, reduction of waste is the first of the several means of resource conservation (the other means being reuse and recycling).

It is far trickier to determine the consumption of a resource that is controlled in units of volume. Use of resources such as water, fuel, gas, and even electricity is typically measured by gauges that determine either instantaneous flow rate or cumulative volume over time. Measuring flow rate at frequent intervals allows the user to do time-based reporting and generate a graph of how the flow rate varies over time, but to determine the total consumption by volume across a specific time period, then integration of the data has to be performed.

Currently, water usage monitor and control is on behavior changes which have the potential to halve house hold consumption, however assuming rational actors, people will only change when it is to their benefit [4] , and this still leaves a burden on the head of the home responsible of ensuring that water is available. Still more, there are water meters which enable the user to know the volume of water being used but this leaves a problem with the household head as he/she cannot remotely monitor the water usage.

Technology has advanced so much in the last decade or two that it has made life more efficient and comfortable. The comfort of being able to take control of devices from one particular location has become imperative as it saves a lot of time and effort. Therefore there arises a need to do so in a systematic manner through the proposed system, which is an extended approach to automating a control system.

According to Pode & Kale [6],wireless technology in recent years has become very useful in the field of control and automation especially in remote control operations. The merits of embedded system are now being utilized into remote monitoring and control systems because of lots of advantages. Remote monitoring is an effective method in order to avoid interfering with the environment and improve efficiency.

Wireless communication has announced its arrival on big stage and the world is going mobile. We want to control everything and without moving an inch [6]. According to UCC [7], Uganda boasts of a geographical coverage and population coverage of 65 and 75 percent respectively for their GSM network, not just for mobile telephony, but also for other mobile applications that exploit the mature GSM infrastructure. Uganda's mobile subscribers have continued to grow over the past years. According to UCC, there were 8.5 million subscribers

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