Faculty of Electrical and Electronic Engineering Technology

DEVELOPMENT OF SMART WATER BILLING MONITORING SYSTEM USING MOBILE APPLICATION

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Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours

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DEVELOPMENT OF SMART WATER BILLING MONITORING SYSTEM USING MOBILE APPLICATION

NORADILAH AZWIN BINTI MOHD GHAZALI

A project report submitted
in partial fulfillment of the requirements for the degree of
Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours

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APPROVAL

I hereby declare that I have checked this project report and in my opinion, this project report is adequate in terms of scope and quality for the award of the degree of Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours.

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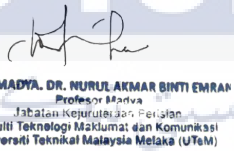
Signature : 

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DEDICATION

This research is dedicated to our respective parents, Noor Hijah Binti Yak and Mohd Ghazali Bin Johari, who has inspired us throughout our lives. They have equipped us withthe motivation and discipline necessary to approach a task with enthusiasm and determination. This project would not have been possible without their love and support.

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ABSTRACT

Water is a major factor in influencing a person's daily life. Therefore, various problems often occur in Malaysia, namely the lack of water, water theft, damage and so on; until now, these problems still occur. In addition, there are also problems in paying bills. This is due to the new norms that hit the world, and people should do all online to reduce the epidemic that is Covid - 19 that can not leave the house. Happening in the country now is undeniably this project is very necessary for the time and age of technology now. With this project, there are many benefits for consumers in managing payments, damage, epidemic reduction. For example, in terms of payment of water bills, you do not have to go to the payment counter to pay bills; all pay online easy and fast, all just there at your fingertips. In addition, if there is damage in terms of damage, this application will warn or 'remark' to let users know there is a problem. Users can immediately dam report to the appropriate party such as water theft, pipe damage, etc. This causes consumers' water bills will increase because they do not know, and it is slow to take action on this problem. Next, in the event of a lack of water, will be notified through this application. With this, this project very helpful to users in terms of project manufacturing costs is very cheap. The data used there is a large space for users has an interesting application, and is easy to understand. Next, there is the uniqueness and make the processing of this project that is this project uses solar in the absence of solar electricity can helps store user data safely. This project for daily, weekly and monthly inflow and outflow effects covers all at once. With this, there is no reason to say no to modern-day technology Internet of Things (IoT) technology is highly used and needed regardless of age; all need to use this Internet of Things(IoT).

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ABSTRAK

Air adalah faktor utama dalam menpengaruhi kehidupan seharian seseorang.Justeru itu,terdapat pelbagai pemasalahan yang sering belaku di negara Malaysia iaitu ketiadaan air,kecurian air,berlaku kerosakan dan sebagainya sehingga sekarang pemasalah ini masih berlaku.Selain itu,terdapat juga pemasalahan dalam pembayaran bill hal ini kerana berlakunya norma baru yang melanda seluruh dunia dan semua harus dilakukan secara online dalam semua aspek bagi pengurangan wabak iaitu Covid - 19 iaitu tidak boleh keluar rumah.Oleh itu,tujuan dalam melaksanakan projek pembangunan sistem pemantauan bil air smart menggunakan aplikasi telefon dapat mengurangkan masalah yang berlaku di negara sekarang tidak dinafikan lagi projek ini sangat diperlukan untuk masa dan zaman teknologi sekarang.Dengan adanya projek ini,terdapat banyak manfaat bagi pengguna dalam mengurusan pembayaran,kerosakan,pengurangan wabak.Contohnya,dari segi aspek pembayaran bil air tidak perlu pergi ke kaunter pembayaran untuk menbayar bil semua hanya membayar melalui online mudah dan pantas semua hanya ada dihujung jari.Selain itu,dari segi aspek kerosakan jika terdapat berlaku kerosakan aplikasi ini akan memberi amaran atau 'remark' untuk memberi tahu pengguna ada masalah berlaku dan pengguna boleh mengambil tindakan dengan segara dam melaporkan kepada pihak sepatutnya seperti berlaku kecurian air,kerosakan paip dan sebagainya ini menyebabkan bil air pengguna akan meningkat kerana tidak tahu dan lambat untuk mengambil tindakan terhadap masalah ini .Seterusnya, sekiranya berlaku ketiadaan air akan di beritahu melalui aplikasi ini.Dengan ini,projek ini sangat membantu pengguna dari segi kos pembuatan projek sangat murah, data yang digunakkan terdapat ruang besar bagi pengguna dan mempunyai aplikasi yang menarik dan mudah untuk difahami.Seterusnya terdapat keunikkan dan membuat pemprosesan projek ini iaitu projek ini menggunakan solar jika berlaku ketiadaan arus elektrik solar ini dapat membantu menyimpan data pengguna dengan selamat.Projek ini untuk kesan air masuk dan air keluar harian,mingguan dan bulanan merangkumi semua sekaligus.Dengan ini,tiada alasan berkatakan tidak kepada teknologi zaman sekarang teknologi internet (IoT) sangat digunakan dan diperlukantidak kira peringkat usia semua perlu menggunakan internet (IoT) ini.

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First To begin, to express my gratitude to Almighty Allah for allowing me to complete this report on "Developing a Smart Water Billing Monitoring System Using a Mobile Application."

Completing any project successfully requires assistance from a variety of people. Additionally, I enlisted the assistance of several individuals in preparing this report. Now, there is a small effort to express my profound gratitude to that helpful individual.

To express my heartfelt appreciation to my Supervisor, IR.TS. MOHD SYAHRIN AMRI BIN MOHD NOH, and my Co-Supervisor, PM. DR. NURUL AKMAR.Without his foresight and guidance, this study would have been a failure—his supervision and guidance throughout the project shaped this report to perfection.

Finally, to express my gratitude to all of my colleagues, classmates, faculty members, and other individuals who are not listed here for their cooperation and assistance.

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TABLE OF CONTENTS

PAGE

DECLARATION

APPROVAL

DEDICATIONS

ABSTRACT ..... **I**

ABSTRAK ..... **II**

ACKNOWLEDGEMENTS ..... **III**

TABLE OF CONTENTS ..... **IV**

LIST OF TABLES ..... **VI**

LIST OF FIGURES ..... **VII**

LIST OF SYMBOLS ..... **VIII**

LIST OF ABBREVIATIONS ..... **IX**

LIST OF APPENDICES ..... **X**

CHAPTER 1 INTRODUCTION **1**
1.1 Background 1
1.2 Problem Statement 1
1.3 Project Objective 2
1.4 Scope of Project 3

CHAPTER 2 LITERATURE REVIEW **4**
2.1 Introduction 4
2.2 Proposed System 4
2.3 Hardware 5
2.3.1 Raspberry Pi 5
2.3.2 Arduino UNO 6
2.3.3 Sensor 7
2.3.4 Water Flow Sensor 7
2.3.5 LCD (Liquid Crystal Display) 8
2.3.6 GSM Modem 9
2.3.7 Water Level Sensor 9
2.3.8 Water Flow Meter 10
2.3.9 Flat – Plate Collector 10
2.3.10 Turbine Flow Sensor 11
2.3.11 Database 11
2.3.12 Oracle 10G 12

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2.3.13 MySQL....12
2.3.14 Thing Speak....12
2.3.15 XAMPP....13
2.4 Application....13
2.4.1 Android....13
2.5 Summary of Related Work....14

CHAPTER 3 METHODOLOGY....28
3.1 Introduction....28
3.2 Project Overview....28
3.3 Project Planing....31
3.4 Software Project....34
3.4.1 XAMPP....34
3.4.2 Arduino IDE....34
3.5 Hardware used in the project....35
3.6 Limitation of Proposed Methodology....39
3.7 Conclusion....39

CHAPTER 4 RESULTS AND DISCUSSIONS....40
4.1 Introduction....40
4.2 Results and Analysis....40
4.2.1 Simulation Circuit Project....40
4.2.2 Database Real -Time....48
4.2.3 Layout application mobile....53
4.2.4 Design item project....55
4.3 Analysis Table Project....61
4.4 Conclusion....69

CHAPTER 5 CONCLUSION AND RECOMMENDATIONS....70
5.1 Introduction....70
5.2 Project Achievement....70
5.3 Project Limitation....71
5.4 Recommendation of Future Work....72

REFERENCES....73

APPENDICES....76

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

LIST OF TABLES

TABLE	TITLE	PAGE
Table 2.5.1	Summary of Related Work	14
Table 3.3.2	Gantt Chart PSM 1	32
Table 3.3.3	Gantt Chart PSM 2	33
Table 3.5.2	Specification Water Flow Sensor	36
Table 3.5.4	Specification LCD with I2C Module	37
Table 3.5.6	SpecificationESP-01 Serial WiFi Wireless Adapter Module	37
Table 3.5.8	Specification ESP01 USB Programmer Adapter	38
Table 4.3	Analysis Table Project	61

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

LIST OF FIGURES

FIGURE	TITLE	PAGE
Figure 2.3.1	Raspberry Pi	5
Figure 2.3.2	Arduino UNO	
Figure2.3.3	Sensor	7
Figure 2.3.4	Water Flow Sensor	7
Figure2.3.5	LCD (Liquid Crystal Display)	8
Figure 2.3.6	GSM Modem	9
Figure 2.3.7	Water Level Sensor	9
Figure2.3.8	Water Flow Meter	10
Figure2.3.9	Flat – Plate Collector	10

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

LIST OF SYMBOLS

V	-	Volatage
℃	-	Celsius
mm	-	Millimeter
g	-	Gram

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LIST OF ABBREVIATIONS

V	-	Volatage
A	-	Current
TXD	-	Transmit Data
UART	-	Universal asychoronous receiver transmitter
RXD	-	Receive Data
LCD	-	Liquid Crystal Display

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
Appendix A	Coding Arduino	76

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

CHAPTER 1

INTRODUCTION

1.1 Background

Humanity owes it to the world to save water through effective management. Humans utilising water is frequently a source of constraint for residential or commercial water management systems. For the time being, a priceless resource is being closely monitored. However, the old method of manual metre reading is inefficient and wasteful of resources. The traditional or manual water flow metre is periodically examined. Thus, individuals want a real-time, daily, and monthly monitoring system to detect and prevent unnecessary waste that would otherwise go unnoticed. Next, must determine the purpose to guarantee that the system is user friendly, such as a wireless system. A system that is Internet of Things (IoT) enabled enables the user to retrieve data from any location in the world. The Internet of Things system is in charge of real-time, daily, and monthly monitoring. Following that, our project assists in identifying water leakage in tanks and preparing billing by tracking daily and monthly usage and the related bill generated after that for commenting on the issue as long as it exists.

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1.2 Problem Statement

For the time being, water bill systems rely on a manual method and a check meter system in each house, which may cause some users discomfort, such as waiting for the water bill using a manual technique. When a user cannot detect a problem, their account

rises because they consume at a low rate and cannot act. Following that, they are prone to criminal activity and property damage.

Most consumers are unaware of the damage that litre of water can sustain, and individuals can take advantage of this ignorance to steal water without permission. Then there is the waste of paper and the pollution that results. Due to the old technique being used for each house's receipts each month can cause pollution to the earth and increase the likelihood of open burning while wasting money on receipts.

As a result, it is necessary to revamp overtime to accommodate users and more advanced systems.

1.3 Project Objective

The The following objectives must be reached in this project:

a) To develop a water billing system based on IoT monitoring.

b) To monitor real - time water billing performance and water interruption (no water supply) occurrence .

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1.4 Scope of Project

The scope of this project are as follows:

a) This scope project cover data billing real - time only.

b) This scope project cover component Arduino UNO only.

c) This scope project cover water billing performance and no water supply history.

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

By 2021, Malaysians living in developing countries will have access to water billing systems. There are numerous types of water management companies in Malaysia. Indeed, each state in Malaysia has its definition of water billing. In the new pandemic's life or norms, most manual systems have been replaced by IoT (Internet of Things) reforms, including water billing systems. It is necessary to enable users to access data without interacting face-to-face to combat epidemics easily. IoT (Internet of Things) is a term that refers to supercomputer chips, wireless networks for connecting to the internet, and all users collecting and sharing data.

Certain channels are utilized to acquire materials and data for research purposes. This includes periodicals and the internet. Due to the pandemic and the fact that I work from home, I can obtain online papers through websites such as Google Scholar, Mendeley, Sci-Hub, and IEEE Xplore.

2.2 Proposed System

To monitor the water supply. Manish Kumar Jha has agreed that a water monitoring system is necessary for real-time monitoring of water quality and usage [1]. The system is an SWMS (Safe Work Method Statement) that ensures the amount of water flow to households to calculate the total monthly bill for water based on the water tariff and then notifies the consumer via SMS and email. It also checks the level

stage purity of water that the consumer received based on the sensor for the standard value range. Additionally, that can provide a web portal for access to data generated by monitoring systems [1].

Following that, Naman Satiya's research focuses on water consumption-based smart water management systems [2]. The Internet of Things (IoT) is monitoring all building usage, collecting data on water flow, calculating tariffs for each, and storing data in the cloud via a Wi-Fi module for the controller. There are numerous advantages, including cost savings and advancing the country technologically [2].

2.3 Hardware

2.3.1 Raspberry Pi

Observe the conducted Manish Kumar Jha. Raspberry Pi Figure 2.3.1 is the primary component for creating a system to collect sensor data input and produce output such as an LCD. Calculations are then performed from the Raspberry Pi under standard quality values and each tariff and benefit. Raspberry Pi is a cost-effective platform [1]. Gaurav Gosavi's research focuses on water flow monitoring and forecasting systems [3]. Refer to the journal programmed in Python for comparison to Arduino programming [3]. Rajan Sarraf has such a module that can detect water leakage in pipelines and prepare billing by tracking daily and monthly water usage.(4). The display The Raspberry Pi is fearful of handling automatic utility usagereadings. People can use wireless communication to transmit data to M.H. Hassan's utility- backed system [5].

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Figure 2.3.1.1 Raspberry Pi

2.3.2 Arduino UNO

Manish Kumar conducted Jha, Arduino is a sensor Analog to Digital Converter (ADC) that collects data for direct connection to the Raspberry Pi's main component [1]. Gaurav Gosavi's research focuses on water flow monitoring and forecasting systems [3]. The Arduino IDE is a programming platform for easily accessible applications, as illustrated in Figure 2.3.2 Arduino Uno. Once installed on a PC, the upload programme is directly connected to the PC via the Universal Serial Bus. The Arduino reads data and converts the programmed and received analogue data to a digital pulse signal [3]. The Arduino subtracts this amount from the credit and displays the remaining water and total consumption in millilitres (ml) on the LCD[6].

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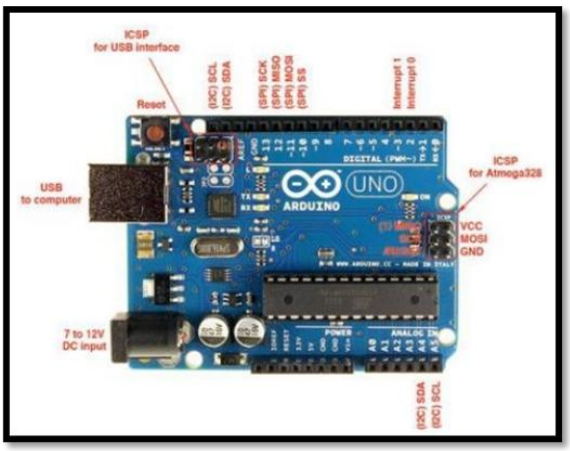

Figure 2.3.2.1 Arduino Uno

2.3.3 Sensor

Observe Kumar Manish Jha, there are numerous types of sensors available, but there are three commonly used pH sensors, turbidity sensors, and temperature sensors. Because the sensor's primary purpose is to collect data on water quality, the sensor transmits information and measures the temperature flow of water [1].

2.3.4 Water Flow Sensor

Conducted by Manish Kumar Jha, when the speed of the water flow changes, the sensor output will correspond to the pulse signal and measure the amount of water flow using a direct flow sensor [1]. Tanvir Rahman refers to a system for monitoring and billing water supply [7]. Refer to Figure 2.3.4 water flow sensor, where water flow is allocated using a type plastic valve body, a rotating water rotor, and a half- effect sensor [7]. Abdul Hakeem Khalifa Saleh Al Saidi conducted the refereeing [8]. Water flow sensor with function for detecting water flow and converting it to flow rate [8]. Khaleel Agail Mohamed refers [6]. The water flow sensor generates electrical pulses directly sent to the Arduino, which determine how much water the user has absorbed [6]. According to M. Kalimuthu's journal, the YF-S201 is a low-cost sensor that operates on a power supply, operates between -25 and 80 °C, and measures 1-30 l/min at 2.0 MPa[9].

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Figure 2.3.4.1 Water Flow Sensor

2.3.5 LCD (Liquid Crystal Display)

Nusrat Sharmin Islam researched remote water metering [10]. The output result is displayed on the LCD on the output. Refer to figure 2.3.5 LCD (Liquid Crystal Display); the LCD is then connected to the microcontroller's port using a 16 x 2 character LCD (HD44780) [10]. According to Tanvir Rahman, LCDs can display data representations such as water usage, water levels, and so on [7]. Then, Fariha Ahmad conducted purified water supply and bill generation in the context of [11]. Consult the information LCD that is being used to determine the fixed time[11].

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Figure 2.3.5.1 LCD (Liquid Crystal Display)