



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**DEVELOPMENT OF SMART WATER BILLING
MONITORING SYSTEM USING IOT**

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronic Engineering Technology (Telecommunications) with Honours.

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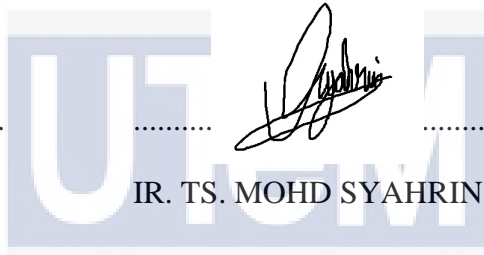
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APPROVAL

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electronic Engineering Technology (Telecommunications) with Honours. The member of the supervisory is as follow:


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ABSTRAK

Projek ini adalah tentang Pembangunan Sistem Pemantauan Pintar Bil Air di rumah dengan menggunakan sistem 'Internet of Things (IOT)'. Projek ini membolehkan pengguna untuk memantau penggunaan air menggunakan sensor pengaliran air, juga dapat merekod dan memantau bil air bagi setiap penggunaan secara tanpa wayar dengan memarkannya secara terus pada aplikasi di telefon pintar melalui komunikasi Wi-Fi dan juga internet. Matlamat utama bagi projek ini dibina adalah bertujuan untuk memudahkan pengguna mengawal dan memantau penggunaan air di rumah serta untuk memajukan lagi teknologi pemantauan bil air yang sedia ada pada masa kini. Selain itu, dengan menggunakan teknologi sistem 'Internet' pada masa kini dapat meningkatkan lagi pemindahan data secara cepat dan berkesan dalam tempoh masa yang singkat. Aplikasi yang dibangunkan adalah dengan menggunakan perisian 'MIT App Inventor' secara atas talian dan dihubungkan dengan pengawal utama iaitu Arduino Uno.

ABSTRACT

This project is about the development of a smart water billing monitoring system using the 'Internet of Things (IoT)' system. The project allows users to monitor water usage using a water-flow sensor, as well as record and monitor water bills for each use wirelessly by displaying the information directly on applications in the smartphones via Wi-Fi and internet communications. The main objective of the project was to facilitate consumers' control and monitoring of water use at home and to further develop the current water billing monitoring technology. In addition, using today's internet technology can improve data transfer faster and effectively in a short period of time. The application developed was to use the 'MIT App Inventor' software online and was connected to the main controller, the Arduino Uno.

DEDICATION

To my beloved parent,

Abdullah Bin Che Ahmad and Zuriah Binti Usman who always there with me and instilled in me the virtues of perseverance and relentlessly encouraged me to strive for excellence in completing this report.

To my siblings that always generates and giving idea for me to complete this report, I would like to say thank you for always support and help me with their full of love that make me feel motivated and always in high spirits to finish my report.

To my great supervisor IR. TS. Mohd Syahrin Amri Bin Mohd Noh and my co-supervisor Amar Faiz Bin Zainal Abidin, thank you for the guidance and encouragement for me to make sure my report is done well and always keep reminds me to complete my task and always motivate me with some brilliant idea and positive vibes also never lets any sadness dominate into my heart.



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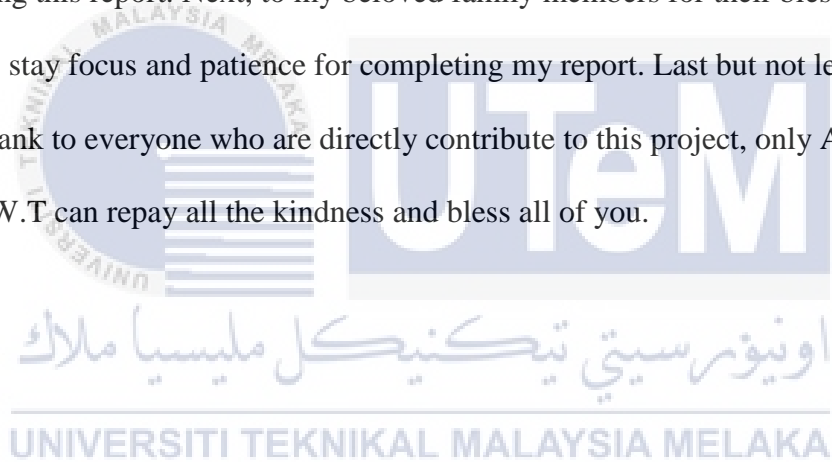


TABLE OF CONTENTS

| | PAGE |
|---|--------------|
| TABLE OF CONTENTS | x |
| LIST OF TABLES xiv | |
| LIST OF FIGURES | xv |
| LIST OF APPENDICES | xxi |
| LIST OF SYMBOLS | xxii |
| LIST OF ABBREVIATIONS | xxiii |
| CHAPTER 1 INTRODUCTION | 25 |
| 1.1 Background | 25 |
| 1.2 Problem Statement | 25 |
| 1.3 Objective | 26 |
| 1.4 Scope of Project | 26 |
| 1.5 Expected Result | 27 |
| 1.6 Cost estimating in creating the project | 28 |
| Table 1.1 : Estimated Cost for Project | 28 |
| 1.7 Thesis Organizing | 28 |
| CHAPTER 2 LITERATURE REVIEW | 29 |

| | | |
|---------------------------------------|--|-----------|
| 2.1 | Introduction | 29 |
| 2.2 | Water Billing History | 30 |
| 2.3 | Manual Water Billing System | 30 |
| 2.4 | Existing System in Malaysia | 32 |
| 2.5 | Past related Works | 32 |
| 2.6 | Smart Water Monitoring System | 35 |
| 2.7 | Technologies within Internet of Things (IoT) | 37 |
| 2.7.1 | Theory of Arduino | 37 |
| 2.7.2 | Wi-Fi Module Technology | 38 |
| 2.7.3 | GSM Technology | 39 |
| 2.8 | Comparison of The Water Tariff Among State in Malaysia | 41 |
| 2.9 | Comparison of past related works | 43 |
| 2.10 | Summary | 47 |
| CHAPTER 3 METHODOLOGY | | 48 |
| 3.1 | Introduction | 48 |
| 3.2 | Software | 48 |
| 3.2.1 | MIT App Inventor | 49 |
| 3.2.2 | Arduino IDE | 52 |
| 3.2.3 | Website Database | 58 |
| 3.2.4 | Fritzing Software | 60 |

| | | |
|------------------|-------------------------------------|-----------|
| 3.3 | Hardware | 62 |
| 3.3.1 | Arduino UNO | 62 |
| 3.3.2 | ESP8266-01 Wi-Fi Module | 63 |
| 3.3.3 | LCD 16x2 I2C | 64 |
| 3.3.4 | SEN-HZ21WA Water Flow Sensor | 64 |
| 3.4 | Project Planning | 66 |
| 3.4.1 | Gantt Chart | 66 |
| 3.4.2 | Flowchart of the project | 67 |
| 3.4.3 | Block Diagram of the Project | 70 |
| 3.5 | Summary | 71 |
| CHAPTER 4 | RESULTS & DISCUSSION | 72 |
| 4.1 | Introduction | 72 |
| 4.2 | Analysis | 72 |
| 4.2.1 | Design of Experiment (DoE) | 72 |
| 4.2.1.1 | Pulse Frequency | 74 |
| 4.2.1.2 | Flow Rate of Water | 74 |
| 4.2.1.3 | Water Pressure of Sensor | 74 |
| 4.3 | MIT APP INVENTOR | 75 |
| 4.3.1 | MIT App Inventor | 75 |
| 4.4 | ARDUINO UNO REV 3 | 102 |

| | | |
|-------------------|--|------------|
| 4.4.1 | Arduino Uno Rev 3 Coding | 102 |
| 4.5 | Hardware Development and Experiment Work | 108 |
| 4.5.1 | Working of Smart Water Billing Monitoring System | 108 |
| 4.5.2 | Physical Layout of the Project | 109 |
| 4.5.3 | Final Design of the Project | 111 |
| 4.6 | PARAMETERS VERSUS | 114 |
| 4.6.1 | Time Taken for Smart Water Billing Monitoring System Versus Time Taken for Conventional Method | 114 |
| 4.6.2 | Labour Workload of Smart Water Billing Monitoring System Versus Typical Labour Workload for Conventional Method | 114 |
| 4.7 | ACTUAL RESULT | 115 |
| 4.8 | DISCUSSION | 116 |
| CHAPTER 5 | COCNLUSION & FUTURE WORK | 117 |
| 5.1 | Introduction | 117 |
| 5.2 | Conclusion | 117 |
| 5.3 | Recommendation of Future Work | 119 |
| REFERENCES | 120 | |
| APPENDIX | 123 | |

LIST OF TABLES

| TABLE | TITLE | PAGE |
|-------------|--|------|
| Table 1.1 : | Estimated Cost for Project | 28 |
| Table 2.1: | Features of the Arduino | 38 |
| Table 2.2 : | Water Tariff of The State in Malaysia | 41 |
| Table 2.3 : | Comparison of Previous Works | 44 |
| Table 3.1 : | Gantt Chart | 66 |
| Table 4.1 | This table shows the parameters value for this project | 73 |
| Table 4.2 : | Parameter Versus (Time Taken) | 114 |
| Table 4.3 : | Parameter Versus (Labour Workload) | 114 |

LIST OF FIGURES

| FIGURE | TITLE | PAGE |
|---------------|-------------------------------------|-------------|
| Figure 2.1 | Meter Pipe Used in Malaysia | 31 |
| Figure 2.2 | ESP8266 Wi-Fi Module | 39 |
| Figure 2.3 | SIM900 GSM/GPRS Module | 40 |
| Figure 3.1 | App Inventor's design editor. | 50 |
| Figure 3.2 | App Inventor's blocks editor. | 50 |
| Figure 3.3 | Main page of the apps | 51 |
| Figure 3.4 | User Profile page | 51 |
| Figure 3.5 | Tariff info page | 52 |
| Figure 3.6 | The Arduino IDE' layout | 53 |
| Figure 3.7 | Arduino board connected to COM Port | 54 |
| Figure 3.8 | Board type selection | 55 |
| Figure 3.9 | Port selection | 55 |
| Figure 3.10 | Verify button checked | 56 |
| Figure 3.11 | Verify completed | 56 |
| Figure 3.12 | Uploading the program to the board | 57 |
| Figure 3.13 | Progress status | 57 |

| | |
|--|-----------|
| Figure 3.14 : Program is running perfectly | 57 |
| Figure 3.15 : ThingSpeak Channel Interface | 58 |
| Figure 3.16 : Channel configuration | 59 |
| Figure 3.17 : Data monitored of the project | 59 |
| Figure 3.18 : API Requests codes | 60 |
| Figure 3.19 : Fritzing Software | 61 |
| Figure 3.20 : Cicruit design using Fritzing | 61 |
| Figure 3.21 : Arduino UNO | 63 |
| Figure 3.22 : ESP8266-01 Wi-Fi Module | 63 |
| Figure 3.23: Front view of LCD 16x2 I2C | 64 |
| Figure 3.24 : Back view of LCD 16x2 I2C | 64 |
| Figure 3.25 : SEN-HZ21WA Water Flow Sensor | 65 |
| Figure 3.26: Back view of Water Flow Sensor | 65 |
| Figure 3.27 : Flowchart of the Bachelor Degree Project (BDP) | 68 |
| Figure 3.28: Flowchart of the Project | 69 |
| Figure 3.29 : Block Diagram of the Project | 70 |
| Figure 4.1 This figure is showing main page design used in this application | 75 |
| Figure 4.2 The code block used for the main page | 76 |
| Figure 4.3 This figure shows the User Profile page in the application | 76 |
| Figure 4.4 This figure shows the data entered by the user in application | 77 |
| Figure 4.5 The code block used for User Profile page in this application | 77 |

| | |
|---|-----------|
| Figure 4.6 The code block used for User Profile page in this application | 78 |
| Figure 4.7 The code block used for User Profile page in this application | 78 |
| Figure 4.8 The code block used for User Profile page in this application | 79 |
| Figure 4.9 The code block used for User Profile page in this application | 79 |
| Figure 4.10 The code block used for User Profile page in this application | 80 |
| Figure 4.11 The code block used for User Profile page in this application | 80 |
| Figure 4.12 This figure shows the reading of the meter in the Consumption page of this application | 81 |
| Figure 4.13 This figure shows the State List on the Consumption Page in the application | 81 |
| Figure 4.14 The code block used for Consumption page in this application | 82 |
| Figure 4.15 The code block used for Consumption page in this application | 82 |
| Figure 4.16 The code block used for Consumption page in this application | 83 |
| Figure 4.17 The code block used for Consumption page in this application | 83 |
| Figure 4.18 The code block used for bill calculation of Malacca | 84 |
| Figure 4.19 The code block used for bill calculation of Selangor | 84 |
| Figure 4.20 The code block used for bill calculation of Kelantan | 85 |
| Figure 4.21 The code block used for bill calculation of Terengganu | 85 |
| Figure 4.22 The code block used for bill calculation of Negeri Sembilan | 86 |
| Figure 4.23 The code block used for bill calculation of Perak | 86 |
| Figure 4.24 The code block used for bill calculation of Kedah | 87 |

| | | |
|--------------------|--|-----------|
| Figure 4.25 | The code block used for bill calculation of Perlis | 87 |
| Figure 4.26 | The code block used for bill calculation of Pahang | 88 |
| Figure 4.27 | The code block used for bill calculation of Johore | 88 |
| Figure 4.28 | The code block used for bill calculation of Penang | 89 |
| Figure 4.29 | The code block used for bill calculation of Sabah | 89 |
| Figure 4.30 | The code block used for bill calculation of Labuan | 90 |
| Figure 4.31 | The code block used for bill calculation of Sarawak (Kuching-Sibu) | 90 |
| Figure 4.32 | The code block used for bill calculation of Sarawak (Sri Aman-Miri-Limbang-Sarikei-Kapit) | 91 |
| Figure 4.33 | The code block used for bill calculation of Sarawak (Bintulu) | 91 |
| Figure 4.34 | The code block used for bill calculation of Sarawak (lain-lain) | 92 |
| Figure 4.35 | This figure shows the Tariff Info of states page in the application | 92 |
| Figure 4.36 | The code block used for Tariff Page in this application | 93 |
| Figure 4.37 | The code block used for Tariff Page in this application | 93 |
| Figure 4.38 | The code block used for Tariff Page in this application | 94 |
| Figure 4.39 | This figure shows the Tariff Page of Johore | 94 |
| Figure 4.40 | This figure shows the Tariff Page of Kedah | 95 |
| Figure 4.41 | This figure shows the Tariff Page of Kelantan | 95 |
| Figure 4.42 | This figure shows the Tariff Page of Malacca | 96 |
| Figure 4.43 | This figure shows the Tariff Page of Negeri Sembilan | 96 |
| Figure 4.44 | This figure shows the Tariff Page of Pahang | 97 |

| | | |
|--------------------|---|------------|
| Figure 4.45 | This figure shows the Tariff Page of Penang | 97 |
| Figure 4.46 | This figure shows the Tariff Page of Perak | 98 |
| Figure 4.47 | This figure shows the Tariff Page of Perlis | 98 |
| Figure 4.48 | This figure shows the Tariff Page of Selangor | 99 |
| Figure 4.49 | This figure shows the Tariff Page of Terengganu | 99 |
| Figure 4.50 | This figure shows the Tariff Page of Sabah | 100 |
| Figure 4.51 | This figure shows the Tariff Page of Sarawak | 100 |
| Figure 4.52 | This figure shows the Tariff Page of Labuan | 101 |
| Figure 4.53 | This figure shows the Tariff Page of Putrajaya | 101 |
| Figure 4.54 | This figure shows the coding used for this project | 102 |
| Figure 4.55 | This figure shows the coding used for this project | 103 |
| Figure 4.56 | This figure shows the coding used for this project | 103 |
| Figure 4.57 | This figure shows the coding used for this project | 103 |
| Figure 4.58 | This figure shows the coding used for this project | 104 |
| Figure 4.59 | This figure shows the coding used for this project | 104 |
| Figure 4.60 | This figure shows the coding used for this project | 105 |
| Figure 4.61 | This figure shows the coding used for this project | 105 |
| Figure 4.62 | This figure shows the coding used for this project | 106 |
| Figure 4.63 | This figure shows the coding used for this project | 106 |
| Figure 4.64 | This figure shows the coding used for this project | 107 |
| Figure 4.65 | This figure shows the coding used for this project | 107 |

| | |
|--|------------|
| Figure 4.66 Hardware Development of Smart Water Billing Monitoring System | 108 |
| Figure 4.67 : This Figure Shows the Internal Layout of the Project | 109 |
| Figure 4.68 : The Physical Layout of the Project | 110 |
| Figure 4.69 : The Physical Layout of the Project | 110 |
| Figure 4.70 : The Smart Meter Installed to the Current Piping | 111 |
| Figure 4.71 : The Smart Meter Installed to the Current Piping | 112 |
| Figure 4.72 : The Smart Meter Installed to the Current Piping | 112 |
| Figure 4.73 : The volume of water flow monitored using the mobile application | 113 |



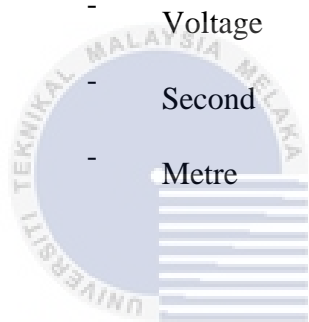
LIST OF APPENDICES

| APPENDIX | TITLE | PAGE |
|---------------|---|------|
| Appendix 0-1 | Example of constructed component | 123 |
| Appendix 0-2 | Example of constructed component | 123 |
| Appendix 0-3 | Example of the testing result | 124 |
| Appendix 0-4 | Example of measured result in Arduino IDE | 124 |
| Appendix: 0-5 | Gantt Chart for BDP 2 | 125 |



LIST OF SYMBOLS

| | | |
|----------------------|---|------------------|
| MHz | - | Mega Hertz |
| KB | - | Kilo Byte |
| mm | - | Millimetre |
| M³ | - | Meter Cube |
| RM | - | Ringgit Malaysia |
| MPa | - | Megapascal |
| V | - | Voltage |
| s | - | Second |
| m | - | Metre |



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LIST OF ABBREVIATIONS

| | |
|-----------------------|---|
| IoT | Internet of Things |
| Wi-Fi | Wireless Fidelity |
| GSM | Global System for Mobile communications |
| GPRS | General Packet Radio Service |
| SIM | Subscriber Identity Module |
| USB | Universal Serial Bus |
| IDE | Integrated Drive Electronics |
| MIT | Massachusetts Institute of Technology |
| pH | Potential Hydrogen |
| CO₂ | Carbon Dioxide |
| SRAM | Static Random Access Memory |
| SOC | Security Operation Center |
| TCP/IP | Transmission Control Protocol/Internet Protocol |
| AT | ATtention |
| GPIOs | General-Purpose Input/Output |
| VoIP | Voice over Internet Protocol |
| ASPD | Automatic Power Save Delivery |
| RF | Radio Frequency |
| TDMA | Time Division Multiple Access |
| CDMA | Code Division Multiple Access |
| HSCSD | High-speed Circuit-switched |

| | |
|-------------|-------------------------------------|
| EDGE | Enhanced Data GSM Environment |
| SMT | Surface-mount Technology |
| M2M | Machine-to-Machine |
| IC | Integrated Circuit |
| NFC | Near Field Communication |
| LCD | Liquid Crystal Display |
| SMS | Short Message Service |
| UI | User Interface |
| PWR | Power |
| COM | Communication port |
| HTTP | Hypertext Transfer Protocol |
| MQTT | Message Queuing Telemetry Transport |
| API | Application Programming Interface |
| PCB | Printed Circuit Board |
| AC | Alternating Current |
| DC | Direct Current |
| VCC | Voltage Common Collector |
| SDA | Serial Data Line |
| SCL | Serial Clock Line |
| BDP | Bachelor Degree Project |
| GND | Ground terminal |
| VDC | Voltage Direct Current |