



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**DEVELOPMENT OF SMART WATER USAGE MONITORING
SYSTEM TO MONITOR AND COLLECT WATER BILLING IN
REAL TIME**

by

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APPROVAL

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours. The member of the supervisory is as follow:

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ABSTRAK

Pembangunan Sistem Pemantauan Penggunaan Air Pintar untuk Memantau dan Mengumpul Pengebilan Air dalam Masa Nyata yang diperkenalkan berdasarkan Malaysia mencatatkan jumlah penggunaan air tertinggi yang menyebabkan pembaziran air. Ia diperkenalkan untuk memantau penggunaan air dan juga mengumpul pengebilan air supaya penggunaan air dan bacaan bil di rumah akan dapat dalam masa nyata. Melalui pemantauan penggunaan air dan sistem pengumpulan air mengumpul, ia membantu untuk mengesan penggunaan air daripada tinggi yang boleh menyumbang kepada peningkatan bil air. Projek ini diwujudkan dengan menggunakan sensor aliran air sebagai sensor untuk mengukur aliran air dan kemudian data tersebut diproses menggunakan pemproses data Node MCU ESP8266. Sebagai peranti komunikasi, modul WI-FI digunakan untuk menghantar data ke platform IoT yang platform Blynk IoT di telefon pintar pengguna. Jadi melalui sistem analisis ini, sistem ini dapat membantu pengguna memantau penggunaan air dan pengebilan air di rumah mereka bila-bila masa dan di mana sahaja.

ABSTRACT

Development of Smart Water Usage Monitoring System to Monitor and Collecting Water Billing in Real Time being introduced based on Malaysia recorded the highest amount of water usage that cause water excessive. It is introduced to monitor the water usage and also collect the water billing so the water consumption and bill reading at the households will get in real time. Through the monitoring water usage and collecting water billing system, it helps to track the water usage from become highest which can contribute to the increased water bill. This project was created by using the water flow meter sensor as the sensor to measure the water flow and then the data being processed using the data processor Node MCU ESP8266. As the communication device, the WI-FI module is used to send the data to IoT platform which Blynk IoT platform in the users' smartphones. So through this analysis system, this system can help consumers to monitor water usage and water billing at their house anytime and anywhere.

DEDICATION

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LIST OF SYMBOLS

L	-	Litre
min	-	Minute
Q	-	Flow Rate
V	-	Average Velocity of Flow
A	-	Cross – sectional Area of the Pipe
Hz	-	Frequency

LIST OF ABBREVIATIONS

UN	United Nations
IOT	Internet Of Things
WIFI	Wireless Fidelity
IDE	Integrated Development Environment

CHAPTER 1

INTRODUCTION

1.1 Background

In this chapter will be explain the title of the project that included project background, problem statement, project objective, project scope and expected result.

1.2 Project Background

Water is scarce resource and every person need to be in charge to utilize it without excessive. Even though, Malaysians always been revealed toward the benefits of saving the water and escape from water excessive, our country, Malaysia still one of the country that have the highest amount of water usage. Due to this, in a day the average of water that Malaysians use between 220 and 240 litres (Ismail, 2019). In facts, 165 litres that had recommended by the United Nations (UN) (Esther, 2018) because 100 to 120 litres of water is actually enough for per person per day to meet their basic needs (Jye, 2017) . Moreover, in this country there are two states that have recorded highest water usage which are Penang and Selangor. It is because Penang recorded the highest water usage with 290 litres per capita follow by Selangor as the second highest water usage at 234 litres per capita (Rizanizam & Awaina, 2018). 290 litres need to be handle in efficient way in order to reduce the water usage per a day so it can avoid from other water usage excessive.

Existing system that have, the water usage reading at every house recorded by the meter is manually collected for every month and then the bill will generate (Vd *et al.*, 2018). Due to this, costumers need to wait for a month to know their water consumption and also cannot track of their usage or get the notices. Malaysians use the highest amount of water usage clearly can be seen after knowing Malaysia one of country with the highest amount of water usage. So, the effective way for the costumers to track and also monitor the water consumption at their every water outlets at household and avoid from high billing by using the smart water usage monitoring system that use to monitor and also collect the bill for the every water consumption that had been used in real time (Yang *et al.*, 2015). If installing the smart water usage monitoring system, the water consumption will be monitor using the IOT technology. After the reading of usage recorded from the water meter, the data will be wirelessly send to the IOT platforms which is the costumers smartphones and for sure the reading can be track and monitor by the customer in real time. So this way allow the customers to monitor every time customer want to monitor it consumption without waiting for a month but can monitor anytime and anywhere.

1.3 Problem Statement

Nowadays, the excessive water usage issue in Malaysia become crucial in several states due to highest amount of water consumption by Malaysians. Due to this, user keep using the water at every water outlet at home without knowing how much that had been used. The user cannot allow to continuously monitor and control the usage of water from time to time. So, the best way is the user need the system that can allow them to monitor their water usage at every water outlets by using their smartphone because the smartphone is really portable.

Next, the reading of water consumption and bill reading will be provide only after one month by the water utility company. The consumers need to wait for a month to obtain the generated bill reading that come with the water bill reading in Ringgit Malaysia and also the

water consumption for a month. Due to this, presently the water usage that has recorded by the meter is manually collected for every month. So, it is effective if the water consumption and bill reading can obtain in real time because the consumer can monitor and track the water consumption of each of their water outlets.

Based on the problem statements, this project is created to help the user to monitor and track the water usage and bill reading in real time at their water outlets in order to know their water consumption after used it.

1.4 Objectives

Thus this project includes several objectives and aims:

- i) To study the usage of water using water flow meter sensor and nodeMCU ESP8266 Microcontroller.
- ii) To develop a system that can help monitor the water usage and water bill reading via blynk apps.
- iii) To analyse the accuracy of measuring water usage for the water usage monitoring system.

1.5 Scopes of Project

The scope of the project is limited to design the system to monitor the water usage and display the water bill reading in real time using IOT only for the house that have WI-FI modem. The water usage monitoring system will be monitoring the water usage at water outlets that home. There are wireless sensor node is placed at each of water outlets to sense the water flow. The flow of water will use to obtain the value of water usage and at the same time the water bill reading also will be obtain.

All the data of the flow rate, water usage and water bill reading actually been process by using the controller and sent wirelessly via WI-FI to the server. After that, the server will communicate with the IOT platform in smartphones. So, lastly the data will be display at the user smartphones. Smartphones is really portable and easy for the user to monitor and track the water usage and also the water bill reading from time to time.

1.6 Expected Result

There are few problem that will be overcome by developing this project. Firstly, the amount of water usage at each water outlets can be knowing right after the water at the water outlets had been used by using the smartphones. For the next problem that can be overcome is the user will able to obtain their water billing in real time without need to wait for a month. Other than that, the consumers can monitor their usage and track their water bill reading from time to time because it able to be access anytime and anywhere when there are Wi-Fi connection.