



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**“DEVELOPMENT OF HOME ELECTRIC USAGE
NOTIFICATION & MONITORING SYSTEM USING
NODEMCU**

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

by
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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 Electronics Engineering Technology (Telecommunications) with Honours. The member of the supervisory is as follow:



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ABSTRAK

Penggunaan elektrik di Malaysia meningkat secara mendadak setiap tahun kerana penggunaan elektrik dalam peralatan rumah lebih tinggi. Tujuan kertas ini adalah untuk membangunkan prototaip sistem pemberitahuan & pemantauan penggunaan elektrik rumah menggunakan Nodemcu. Sistem yang dicadangkan boleh memaklumkan dan memantau pemakaian penggunaan tenaga elektrik pengguna dari segi arus, kuasa, kilowatt jam dan penukaran Riggitt Malaysia mengikut Tarif TNB. Bill elektrik yang sedia ada dengan semua maklumat akan dipaparkan melalui LCD pada peranti prototaip itu sendiri dan juga ciri pemantauan dalam talian melalui telefon pintar. Sistem ini terdiri daripada Arduino Mega yang dipasangkan dengan sensor di mana sensor akan mengesan arus beban yang melalui kabel hayat. Bahagian pengaturcaraan dicipta untuk penukaran maklumat dari sensor kepada ampere. Tarif TNB akan digunakan sebagai rujukan untuk menghasilkan bil elektrik dan kuasa yang akan ditambah dalam struktur pengaturcaraan. Untuk memudahkan pengguna memantau penggunaan tenaga, modul Nodemcu akan digunakan untuk membuat peranti IoT. Di samping itu, Relay akan ditambah ke sistem di mana pengguna dapat mengawal peralatan apabila penggunaan kuasa tinggi untuk peralatan rumah. Sistem ini membantu pengguna menyedarkan jumlah peralatan rumah tertentu dan menguruskan penggunaannya untuk menjimatkan elektrik. Selain itu, ia dapat membantu pengguna untuk merancang belanjawan mereka pada bulan yang akan datang kerana tanpa mengetahui jumlah tenaga elektrik yang digunakan, sukar bagi pengguna tertentu merancang belanjawan mereka.

ABSTRACT

The consumption of electricity in Malaysia rapidly rises every year because of higher utilization of electricity in home appliances. The aim of this paper is to develop a prototype of a home electric usage notification & monitoring system using Nodemcu. The proposed system can notify and remotely monitor the energy usage consumption of the consumer in current, power, kilowatt hour and conversion of RM according to TNB Tariff. The existing electricity bill with all the information will be display through LCD on a prototype device itself and online monitoring features through smartphone. The system consists of Arduino Mega which interface with the current sensor where the sensor will detect the load current that went through the life cable. A programming part is created for the conversion from the sensor to the ampere. TNB tariff will be used as a reference to produce an electric bill and power which will be added in programming structure. The efficient way for the consumer to monitor their energy consumption, Nodemcu module will be used to make IoT device. Additionally, a relay will be added to the system where consumer able to control the appliances whenever the power usage is high for home appliances. This system helps the user to realize the amount of certain household appliances and manage the usage of it to save electricity. Furthermore, it would able to help users to plan their budget on coming month because without knowing the amount of electricity been used it will be hard for certain users to plan their budget.

DEDICATION

I dedicate this project report to my beloved parents and friends. A special thanks to my mother Mrs. Kogilam A/P Muniandy and father Mr. Tangarajan A/L Venoo who both always being support my ideas and give encourage to do this project. I also being grateful to thanks my supervisor TS. Fakhrullah bin Idris who give lot of ideas and share her knowledge on doing report. I will always appreciate the help and knowledge shared especially by Mr Kishen, Mr Sureian and Mr Loga.



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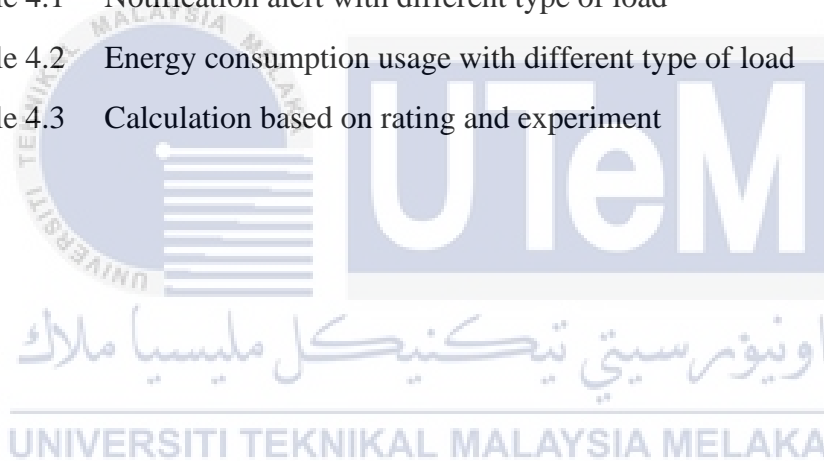
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CHAPTER 1

INTRODUCTION

1.0 Background

The power consumption and savings become the big issues nowadays. The uses of the electricity in Malaysia are increasing day by day. The domestic user such as residential customers is not aware about the total power used in daily life. This happen for the user that use air conditioner in their house. As all know the uses of air conditioner may increase the tariff.

Generally, bills are often prepared by assuming and if it is a digital energy meter user are unlikely to know the amount of usage because the lack in tariff calculation. Therefore, to overcome this problem a home electric usage notification & monitoring system is designed to monitor and notify the energy usage consumption in household's appliances most probably to air conditioner. The home electric usage notification & monitoring system which has an ability to notify and alert the consumer regarding usage energy consumption and at the simultaneously the consumer keeps track of the electric bill via app.

The main reason beyond developing this system is to empower the customer on the most proficient method, which effectively reduce energy utilization. Expanding and squandering of power utilization had given bad impact on the world. Arduino is use as an interface with current sensor where the sensor will detect the current charge that went pass to life wire. A programming part was developed into a transformation from a sensor into ampere unit. Moreover, an equation to pick up the energy and sum of all for obtain a power invoice with the recommendation by TNB tariff would be added in a programming construction.

The consumption of power and current charge can be detected by used of ACS712 Current sensor, which have the capability to show up electricity invoice with each and every information can be lay out via LCD on a prototype device itself and online monitoring features through smartphone. NodeMCU module will be utilized to make IoT device to make a good method for user to look up their energy expenditure. The main controller will apply these modules to forward all information into cloud storage server. The architecture of system will give access to the consumer to monitor their energy meter online through smartphone application. Additionally, when the consumer exceeds the limit of their energy usage and it operates in offline mode too the Blynk application send notification to the consumer. Meanwhile, a buzzer sound heard when the limit is reach and the consumer need to off the home appliances for temporary action.

The monitoring and control process of the appliances whenever the power usage is high for home appliances, a relay will be added to the system. It helps the user

to realize the amount of certain household appliances and manage the usage of it to save electricity. This system will be able to help users to plan their budget on coming month because without knowing the amount of electricity been used it will be hard for certain users to plan their budget.

1.1 Problem Statement

When the consumption energy become wide these energy meter has been introduced for residential and industrial section. The main function of energy meter is to detect energy and display it in kw/h. Energy meter is widely used in the world, when it is widely used proportionally along the growth of energy a lot of problems occur (Clenitiaa and Ilakya, 2017). Hence, this project implements in Malaysia, Tenaga Nasional Berhad (TNB) print out the bill which we can never figure out the amount of usage. When it comes to the festive season or during MCO during covid-19 the electricity usage will rise, and high electricity bill will be the big burden for customers itself.

There is no proper alerting system to the consumer and monitoring device that help the consumer to track the energy consumption in daily life. These contribute to the key problems of the current world that is the excessive energy consumption. Daily production of vast amounts of energy underwrites to the pollution that primes to the ozone hole, which has a great deal with the greenhouse effect, that prompts the liquefying of ice. Therefore, user should not quit utilizing energy sources that make our live more comfortable or facilitate the replacement of older appliances with new. This action may contribute to reduce energy consumption.

Additionally, this will help the user to concern about advantages of decrease the amount of energy were utilized system able to display and notify the total energy used. Hence, user also can trace out the total monthly electricity consumption to get a simple view on how often electricity they were used. By using the Home Electric Usage Notification and Monitoring system a user can record and view the power and current charge consumption in kilowatt-hour and RM value according to TNB tariff in the LCD and cloud server. The consumer will able to get a notification regarding the energy consumption through smart phone once the set limit was exceeded.

1.2 Objective

- To develop the Home Electric Usage Notification & Monitoring system mechanism via NODEMCU.
- To alert and notify consumer the utilized electric bill once set limit of ringgit Malaysia (RM) has reached.
- To measure and calculate the electric current usage based on tariff set by TNB.

1.3 Scope

The scope for this project is mainly introducing smart advance technology to residential houses for notify and monitor their usage. Arduino Uno shall be used in this project for monitoring, notify and calculating the usage of energy.

This model project was restricted to the charge test current that is not more than 30A because of utilization of the 30A current load sensor. The Blynk Application use in this project to alert consumer when the set limit by the user has reached. The limit for the RM can be set according to the user preference. Basically, this product can be beneficial for the low-income consumers especially B40 group.

1.4 Summary

This chapter has covered the background of the project, problem statement, objectives, and scope of the project. The background of this project is about home electric usage notification & monitoring system. This project is designed to improve recent energy meter which can help users to conserve and use electricity wisely in their daily life. The objectives had been explained briefly and the scope discuss the software and hardware that been was utilized in these projects.

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CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

Electricity is the main essential necessities for human being for their life. This is non- renewable energy source therefore we must use it judiciously for its sustainable utilization (Tan, Lee, & Mok, 2007). As the innovation develops day by day the Electric energy meter developed from the customary mechanical energy meter until the purpose that the innovation booked into GSM and GPRS. This part basically for the background, statistics and theory, previous research and relationship between techniques used by the journalist. The source of information related to the proposed system is obtained from journal, articles, research paper and Internet. The sources have been read, reviewed, analyses and compared in order the identify the technology been used, the working principle and methods that been applied to implement their projects. The related topics were collected and will be discussed on these chapter. All The pattern of source used can be clearly seen and explained.

2.1 The History of Electricity

In Malaysia, Electric at first seemed on the role of the 20th century, then most dependable record of energy age can be pursued back to a bit of mining town in Rawang, Selangor. The two tycoons had been important in Rawang's history Loke Yew and K. Thamboosamy Pillai who were stated to be the first to install electric powered generator pumps to perform their mines inside the town. At a similar time, modern deliver for avenue lighting expectancies related to Rawang city, and in 1895 the railroad stations in Kuala Lumpur were given its first power supply. In 1900, the Sampan Hydroelectric Power Station in Raub, laboured with the aid of the Rabu Australian Gold Mining Company transformed to the energy station in Malaysia. Electricity stand as an advancement industry today, despite political encroaching on the area, nation, and authorities' level.

On 1st September 1949, Central Electricity Board (CEB) was set up and start to perform. This board became re-established in April 1946 under National grid and heir to three essential initiatives consider with the aid of the Electricity Department. CEB on that time can generate potential of 39.88 MW and end up the owner of 34 energy station in Malaysia. This board most effective worked on until 22 June 1965, because Central Electricity Board became renamed to National Electricity Board (NEB). By the year 1980 this board can supply the electricity to the entire peninsular of Malaysia and after two years of operation this board had replaced Perak River Hydro Electric company. Then Malaysia Prime Minister Mahathir Mohamad have announced that new legislation was approved and replaced the Electricity Act and carry out the brand-new organization. To be succeed the National Electricity board (NEB), Tenaga