UNIVERSITI TEKNIKAL MALAYSIA MELAKA

RESIDENTIAL METER MONITORING SYSTEM

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

by

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APPROVAL

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ABSTRAK

Elektrik adalah keperluan asas bagi manusia pada masa kini kerana teknologi semakin berkembang dan berpusat serta ciptaan alat elektronik baru yang berteknologi sedang berkembang. Para pengguna mengalami kesukaran untuk mengawal penggunaan elektrik kerana tidak ada petunjuk atau pengukuran yang dapat membantu mereka untuk mengetahui tentang jumlah kuasa yang telah digunakan dan kos yang perlu dibayar untuk penggunaan. Tujuan utama bagi perkembangan projek ini adalah untuk memantau penggunaan kuasa kediaman. Paparan caj untuk kuasa yang digunakan mengikut kadar tarif TNB juga merupakan tujuan kedua untuk perkembangan projeck ini. Untuk mencapai matlamat projek ini, sistem pemantauan kuasa dengan 220V dan 100A dikembangkan. Hasil yang dijangkakan adalah untuk memaparkan jumlah kuasa dan jumlah penggunaan kuasa bil dengan menggunakan alat elektronik IoT supaya para pengguna boleh memantau penggunaan kuasa dan caj yang dikenakan dengan menggunaka telefon bimbit.

ABSTRACT

Electricity is a fundamental necessity for humans as technologies are growing and electronic gadgets have increasingly become an essential part of our daily life. However, consumers have difficulties to control the high usage of electricity because there is no any indicator to show the exact amount of power consumed and the cost of charges for consumption. This thesis describes the development of a residential monitoring system to monitor the power consumption of residential according to TNB tariff rates. The system has a voltage rating of 240V and a current rating up to 100A are developed. The system allows the user to set a limit for daily power consumption so that the system will alert the user by sending a notification through a mobile app when the daily consumption exceed the target limit of each day. RMMS able displays the total power and total power consumption in terms of Ringgit Malaysia (RM) on LCD so that users also can monitor their power consumption during the system is in online mode or offline mode.

DEDICATION

To my beloved parents.

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LIST OF SYMBOLS

kWh	-	kilowatt hour
W	-	Watt
A	-	Ampere
V	-	Voltage

LIST OF ABBREVIATIONS

PIC	Programmable Interface Controllers
TNB	Tenaga Nasional Berhad
IoT	Internet of Things
IC	Integrated Circuit
IDE	Integrated Development Environment
ESD	Electrostatic Discharge
LCD	Liquid Crystal Display
RTC	Real-Time Clock
PWM	Pulse Width Modulation
ADC	Analog-to-Digital Converter
RMS	Root Mean Square
ROM	Read-only Memory
RAM	Random-access Memory
EEPROM	Erasable Programmable Read-only Memory

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter explains the background and the motivation of this project are stated in the problem statement. The three objectives of this project are listed and also explained. This is followed by the scope of work and thesis outline. Lastly, the summarization of this chapter will be explained in the conclusion section.

1.2 Background

According to the recent study of Malaysia Energy Information Hub (MEIH) the electrical energy consumption in Malaysia have been increasing yearly ((*Home - Malaysia Energy Information Hub*, no date). With the rapid advancement of technologies, electricity has become the most important source of energy for mankind. It is undeniable that electricity is the most important aspect in our lifestyle because they make our lives easier such as smartphones, computers, smart home systems, electric car, and many more.

Energy crisis has always been a critical agenda to the world. Practicing good power management is needed to control massive usage of electrical energy in industrial, commercial, public and everyday household uses. Since energy has become the prime contributor to the rapid growth of the Malaysian economy**,** the utility management emerge as an important thing in order to ensure that the utility is not burden to the public especially to pay the rate of electricity bills.

The awareness of managing power consumption efficiently brings forth the idea of a device that could help to monitor the usage of the electricity. The development of this project consists of hardware and software elements. The electricity usage in kilowatt-hour (kWh) and the amount of current usage in Malaysia Ringgit (RM) is displayed on an LCD and on smartphone using Blynk App. Users are able to set daily limit and once the limit is reached, device sends a notification to users. Users can also monitor electricity usage remotely. The developed system measure the amount of current used over time and converts it into the amount cost. The calculation of total energy consumed in RM is based on tariff rates of Tenaga Nasional Berhad (TNB).

1.3 Problem statement

Electricity is a fundamental necessity for humans nowadays as technologies are growing and new electronic gadgets have become an essential part of our daily life. Uncontrolled daily usage of electricity leads to an increase in the monthly electricity bill. The present power energy meter at the residential building will only show the energy consumption in kWh rather than showing the cost of energy that has been spent. Many consumers could not understand the readings in kWh. A meter that displays the cost of usage in RM is seen to be more suitable. Real-time pricing in power meter gives a real cost-controlling opportunity to the consumers. Consumers have difficulties to control the high usage of electricity because there is no indicator or measurement that helps them to know about the amount of power consumed and the cost of charges for consumption. Hence, this home appliances meter monitoring system is developed to cultivate the awareness about power consumed in order to overcome the electricity wastage and decrease the monthly electricity bill.