UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF AUTO LOG SHEET SWITCH FOR ENERY MANAGEMENT

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor's Degree in Electrical Engineering Technology (Telecommunications Electronics) with Honours

By

MOHAMAD AZYWAN BIN SAPINGAI
B071410153
921107146111

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APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfilment of the requirements for the degree of Bachelors of Electronics Engineering Technology (Telecommunication) with Honours. The members of the supervisor committee are as follow:

………………………………………….
MOHD KHANAPIAH BIN NOR

ABSTRAK

Raspberry Pi adalah satu sistem computer yang besaiz kecil yang mampu menghasilkan prestasi berkelajuan tinggi, ketepatan yang baik, fleksbiliti yang baik dan penyelesaian kos yang rendah untuk pembuatan sistem berasaskan elektronik. Selain itu, sistem computer ini seiring dengan penggunaan internet yang pelbagai (IoT) yang menjadi tapak penggunaan dalam pelbagai aplikasi. Di dalam laporan ini juga penggunaan perkakasan dan perisian juga turut dibicangkan secara terperinci dalam melaksanakan penyimpanan maklumat bersama penggunaan Raspberry Pi 3 Model B. Penyimpanan maklumat adalah alatan elektronik yang merakam maklumat dalam tempoh masa yang tertentu. Tujuannya utama menyimpan maklumat dan merakamkanya suppaya dapat membantu memberi maklumat semasa ianya diperlukan. Lembaran log adalah idea yang wujud di pelbagai tempat seperti di sebuah institusi, organisasi mahupun di pasaran yang kebiasaanya digunakan dalam mencatat seseorang yang bertugas dan mencatat masa serta tarikh. Sehingga hari ini, lembaran log ini digunakan secara manual untuk mencatat dan keputusannya berlaku pembaziran masa serta tenaga manusia. Kesannya membawa kearah kenaikan harga penggunaan tenaga elektrik yang tidak disangka serta maklumat yang tidak lengkap. Pembuatan projek ini mengutamakan pengumpulan dan penyimpanan maklumat yang mengandungi masa dan tarikh semasa suis dalam keadaan berfungsi atau tidak berfungsi bersama penggunaan raspberry pi. Malahan, pembuatan projek ini turut menggunakan M2X portal sebagai tapak dalam menggunakan internet pelbagai dan ini juga boleh gariskan sebagai tujuan yang utama dalam menghasilkan peranti mudah alih serta menyediakan sistem pemantauan secara dalam talian. Sebagai hasil daripada pembuatan projek ini adalah dapat menyelesaikan masalah kenaikan harga penggunaan tenaga elektrik yang tidak sangka dan maklumat yang tidak lengkap. Akhir sekali penyimpanan maklumat berasaskan penggunaan internet pelbagai (IoT) adalah cara yang terbaik dalam pemantuan dan pengawalan kepada persekitaran seterusnya sesuai untuk digunakan dalam sektor industri.

ABSTRACT

Raspberry Pi board provide high speed, better accuracy, good flexibility and low cost solution for development of embedded system. Besides that, this hardware board is an economical Internet of Things (IoT) hardware platform that could be used for wide variety of applications. This paper discusses the hardware, software platforms and implementation details about the data logger using Raspberry PI 3 Model B. A data logger is an electronic instrument that records data with certain time interval. A major goal of keeping documents and records is to find information whenever it is needed. Log Sheet is an idea that exists in different places such as institutions, organizations, markets and etc. which is usually used to record a person's presence (who in charge) and to record a time that include time and date. Nowadays, the Log Sheet is recorded manually and as a result, a lot of time and human efforts is wasted. Therefore, this indirectly leads to the unexpected of electricity bill and incomplete data. This development is mainly focus to collect and store the data that consist time and date since the switch is an on/off by using a raspberry pi. Besides that, this development also combined with the M2X portal that is a platform to the Internet of Things (IoT) and it is to be highlighted that the main objective to produce a portable devices also portable online monitoring system. The project outcome is to overcome the unexpected of electricity bill and incomplete data. Lastly, data logger based on IoT is an excellent way to monitor and control the environmental condition as well as equipment working status in industry.

DEDICATION

This thesis is dedicated to my dad, who showed me that the best sort of information to have is what is found out for its own purpose. It is likewise dedicated to my mom, who showed me that even the biggest assignment can be refined on the off chance that it is done with extra special care. They likewise helped me fiscally and bolstered all through completing this project report.

ACKNOWLEDGMENT

First of all, I would like to thank my supervisor, Sir Mohd Khanapiah Bin Nor for giving me this chance to have my final year project under his supervision. I would also like to express my appreciation towards him by giving me the motivation, guidance and discussion along with this project. He still managed to guide me along by suggesting me the solutions for every challenge that I had faced despite they are being busy with their jobs and duties.

The most important one, I wish to express my deepest appreciation to my family for the unceasing support and attention in my entire study. Their endless support has encouraged me to face any challenge throughout these four years' study in UTeM.

Last but not least, I would like to express my sense of gratitude to those who directly or indirectly have lent their hand for helping me to finish this project. Through this final year project, I had gained valuable knowledge and I hope that I am able to apply in in the future.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

IOT	-	Internet of Thing
DAQ	-	Data Acquisition
LCD	-	Liquid Crystal Display
PCB	-	Printed Circuit Board
RTC	-	Real Time Clock
IR	-	Infrared
SD	-	Secure Digital
I/O	-	Input or Output
IDE	-	Integrated Development Environment
GUI	-	Graphical User Interface
AC	-	Alternating Current
DC	-	Direct Current
GND	-	Ground
SPI	-	Serial Peripheral Interface
CSV	-	Comma separated value
GPS	-	Global System for Mobile Communication
GSM	-	Global System for Mobile Communication
GPRS	-	General Packet Radio Service
ADC	-	Analog to Digital Converter
PIC	-	Peripheral Interface Controller
ROM	-	Read Only Memory
RAM	-	Random Access Memory
LED	-	Light Emitting Diodes
MBps	-	Megabytes Per Second
IDLE	-	Integrated Development Learning Environment
GPIO	-	General Purpose Input Output
LDR	-	Light Dependent Resistors
HTTP	-	Hypertext Transfer Protocol
ARM	-	Advanced RISC Machines

WI-FI	-	Wireless Fidelity
CPU	-	Central Processing Unit
GB	-	Gigabyte
USB	-	Universal Serial Bus
>	-	More than

69

CHAPTER 1
INTRODUCTION

1.1   Introduction

This chapter will present all the description of this research, which is about the Development of Auto Log Sheet Switch for Energy Management system using Raspberry Pi by declaring the background and the objectives and the scope of this project. The objectives of this project are to solve the problem statement of high consumption electrical equipment such as floodlight at a stadium, chiller etc. that declared in this chapter.

1.2   Background of Project

Log Sheet is an idea that exists in different places such as institutions, organizations, markets and etc. which is usually used to record a person's presence (who in charge) and to record a time that include time and date of high consumption electrical equipment such as spotlight at a stadium being used. Nowadays, the Log Sheet is recorded manually and as a result, a lot of time and human efforts is wasted. For example, in educational institutions such as colleges or universities, the most common way of tracking the person who was in charge by writing their name and sign the log sheet manually including time and date. However, there are some weakness as the person who was in charge can write the wrong information about the log sheet switch and this will cause an unexpected of electricity bill increase. Moreover, by filling the information manually it will cause problems for some people when they want to make a review of an electrical instrument because of an incomplete data. To prevent this problem, a solution is

1

made in which a system to record the data automatically. As a result, the Development of Auto Log Sheet Switch for Energy Management is the title of project name is present which could be used to record the data that consist time and date since the switch is an on/off switch.

1.3   Problem Statement

The most common way of tracking log sheet book is either by calling out the person names who was in charge or by asking them to provide the log sheet where the data or the information that was filled manually. There is some highlight the drawbacks in the next sentence to using the system when the book is used as a log sheet to record data such as time and date. Besides that, this may occur to someone is capable to write the wrong information, and this will cause an unexpected of electricity bill increase[1]. Furthermore, this log sheet book may have lost as it is in a hardcopy. Because of that, this log sheet cannot be managed properly and will cause a problem to some organization in order to have a review or do the monitoring[2].

1.4   Objectives

a) To study and develop a portable Auto Log Sheet Switch System

b) To collect and store the data that consist time and date since the switch is an on/off switch.

1.5   Scope of work

This project will involve several steps in work scope in order to achieve the stated objective. Firstly, an Auto Log Sheet Switch System is used for energy management which are able to record the data which is consist of time and date since   the switch is an on/off switch[2]. It comprises of three processes which are the data is recorded and stored in the internal memory thus the data can be seen

through the M2X which is a platform to the *Internet of Things* (IoT). For example, the situation in stadium Kompleks Sukan UTeM, when the switch for high voltage spotlight as known as 'Flood Light' is on and it will trigger the relay module that recommended for the future study. By using the LED that act as an output result and at the same time after the switch is turning on or off the data will be recorded in the internal storage Raspberry Pi. After that, the data will be sent to the portal M2X for the public reviews as a reference. Next, this system is fully controlled by using Raspberry Pi and as described previously, the recorded data can be extract from the Raspberry Pi internal storage and M2X portal that can viewed via computer.

1.6 Thesis Outline

This report consists of four chapters that will describe the flow of this project. The first chapter consists of the background of this project, problem statement, objectives and the work scope of this project.

Whilst for the second chapter consists of the literature review in which this part is used to compare the ideas of other researcher and to do some analysis on possible hardware and software to be used in this project.

The third chapter is about the methodology that will explain the method that will be used to do the analysis of this research project.

Fourth chapter will reveal the result that had obtained from the analysis and the discussion made through the output that obtained from the analysis that had made.

Last chapter will be covered on the overall progress from the beginning until the end of this project.

CHAPTER 2

LITERATURE REVIEW

2.1   Introduction

This chapter will discuss about the concept and the method to be used in this project based on the information and the sources gathered from books, journals or website. Auto Log Sheet Switch System is a method for data recoded as known data logger. In addition, another research from other data logger also will be discussed.

2.2   Previous Related Work

2.2.1   IOT Based Data Logger for Monitoring and Controlling Equipment Working Status and Environmental Conditions

This research paper was written by Keyur K. Patel and Sunil Patel in April 2016. From this research, the idea that had been presented is to design and develop a data logger for monitoring and controlling by using IOT platform. This research also focused for controlling the environmental condition, which included the equipment working status in industry and home from any places in the world. The records data were collected and stored to database server using GSM module by added the GPRS capability[3].

Furthermore, the purpose for this research is to having data loggers that its capability to help in keep database consists of past information, equipment failure graph analysis also maintenance recorded. In order to archive this objective of this purpose by online real time monitoring of

equipment working status and environmental condition as well as controlling will ensure that the equipment running in safety zone and under environmental protection that mentioned before as well as in energy saving mode[1]. By creating a log file, it will help to analyse the causes of the faulty equipment that stored in the database and the log file are able to become as a references for other department to ensure the reliable operation of the equipment that suitable environmental condition[4]. By this log file, it will extend equipment life and equipment maintenance cycle as well as reduces equipment failure rate.
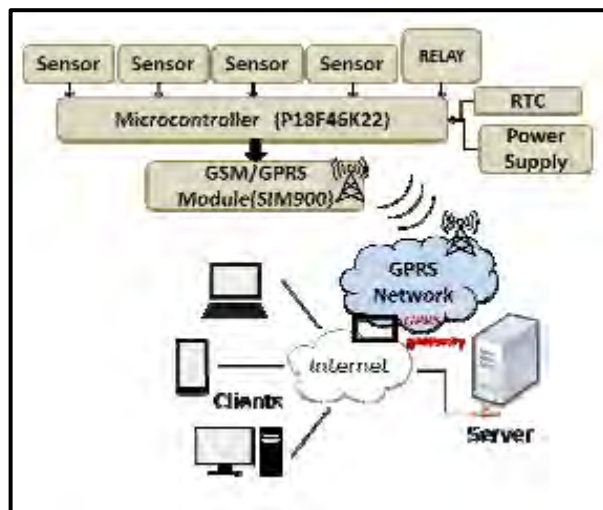

Figure 2.1: System hardware basic building blocks

(Keyur K. Patel and Sunil Patel in April 2016)

Based on the figure 2.1 that shows by using the block diagram as a methodology to represent the hardware and flow that used in this project to develop a data logger system. From the block diagram observation, this developed product consists of several module that included Real Time Clock (RTC), GSM sim 900 module and GPS module that connected to the controller unit. In addition, PIC microcontroller (P18F46K22) having five input/output ports with 10 bit ADC module and operating frequency of 64MHz. Besides that, the data terminals of analogue, digital sensors are interfaced with the ADC module and digital I/O of PIC microcontroller

5

respectively as shown in figure 2.2 and figure 2.3. Thus, the information collected by the sensors is transmitted to controlling unit. P18F46K22 has transmitting and receiving capability on it serial port[5].
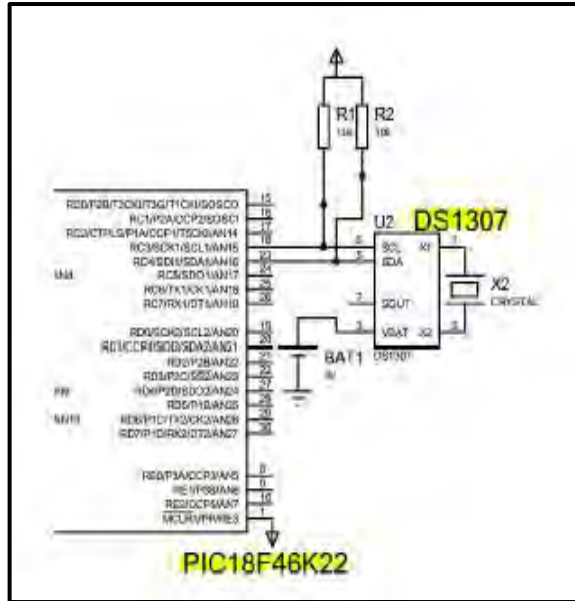

Figure 2.2: Microcontroller (P18F46K22) schematic diagram connection between Real Time Clock (RTC)

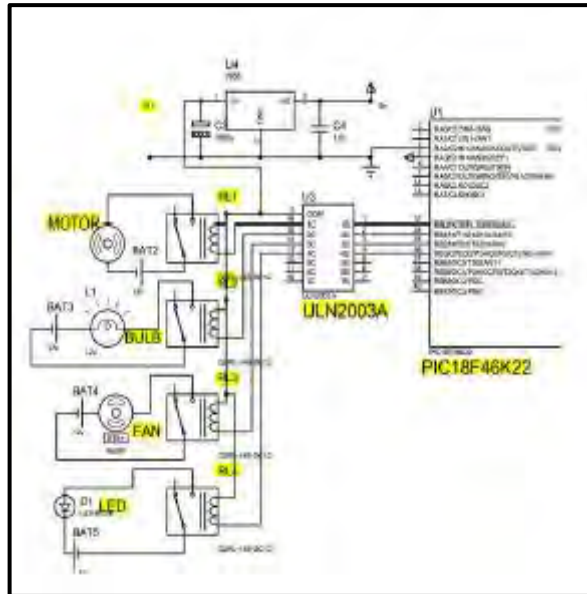(Keyur K. Patel and Sunil Patel in April 2016)

Figure 2.3: Microcontroller (P18F46K22) schematic diagram connection
between several sensors

(Keyur K. Patel and Sunil Patel in April 2016)

For the operation of this system involves two steps which is
hardware and software has been implemented in order to develop data
monitoring as well as data logging[2]. This concept is implemented using
microcontroller (P18F46K22) and sensor circuits that are developed and
are custom designed as per the physical data to be captured. The system
developed is shown in the figure 2.1 and tested by installing sensing units
and setting up a GSM based GPRS network over the internet. Beside the
requirement, for data transfer to the internet from controlling unit via GSM
modem is create text file on web server using AT commands. By using
software serial connection established between PIC and GSM, above
feature are implemented by executing different AT commands[3].

7