



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

FTK EMERGENCY LIGHT MONITORING SYSTEM USING WIFI

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

By

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DECLARATION

I hereby, declared this report entitled “FTK Emergency Light Monitoring System Using WIFI” is the results of my own research except as cited in references.

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APPROVAL

This report is submitted to the Faculty of 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:

.....

(EN MOHD SAAD BIN HAMID)

ABSTRAK

Kemudahan lampu kecemasan biasanya dipasang di kawasan awam seperti pejabat, industri dan lain-lain. Berdasarkan peraturan kebakaran di kebanyakan negara kemudahan seperti ini perlu dipasang dan diperiksa secara berkala untuk memastikan lampu dalam keadaan normal. Pada asasnya, tugas pemeriksaan dan penyelenggaraan yang dijalankan oleh manusia dan mengambil masa lebih kurang 30 minit untuk setiap peranti. Dalam sistem lampu kecemasan yang sebelum ini, kerosakan dalaman lampu kecemasan biasa mesti dikesan dan dibaiki oleh pekerja-pekerja penyelenggaraan. Sebagai contoh cas bateri berlebihan, masalah lampu atau mentol tidak berfungsi dan sebagainya kerosakan. Dalam usaha untuk memastikan thap lampu kecemasan dalam keadaan baik, sistem kecemasan perlu keadaan operasi dan kebolehcaayaan yang tinggi. Sistem ini boleh beroperasi dengan sendiri dan boleh memeriksa keadaan lampu tersebut. Dengan peningkatan ciri-ciri baru dalam dalam sistem keselamatan, dalam masa yang sama kos penyelenggaraan dapat dikurangkan. Dengan menggunakan modul Wi-Fi daripada NodeMCU ESP8266, yang membolehkan peranti elektronik untuk bertukar-tukar data atau menghubungkan dengan Arduino melalui pin komunikasi bersiri (Tx dan Rx). Lampu kecemasan berfungsi untuk memantau dan memberi keadaan status lampu semasa penyelenggaraan menggunakan peranti wifi dan mudah untuk memantau untuk keselamatan atau bilik kawalan. Modul NodeMCU akan menghantar data-data yang diberikan oleh lampu kecemasan. Konsep sistem ini, pengguna boleh memeriksa keadaan lampu bila-bila masa jika mempunyai masalah atau tidak dengan menggunakan komputer dan telefon pintar. Node MCU akan mengeluarkan alamat Internet Protokol (IP Address) bagi setiap lampu sebagai nombor identiti untuk di paparkan di paparan pelayar internet melalui protocol HTTP. Jadi ia boleh menjimatkan wang, tenaga dan masa. Tambahan pula, penyelenggaraan sistem ini akan menjadi lebih sistematik.

ABSTRACT

The Emergency lighting facilities are usually installed in public areas such as offices, industrial, etc. Based on building safety regulations contained in the nation, this facility should be installed and checked regularly to make sure the lights under normal conditions. Basically, the task of checking and maintenance undertaken by human only and usually takes around 30 minutes for each device. In the traditional emergency light systems, the common internal damage an effect and repaired by maintenance workers. For example battery overcharging, lighting problem or led not function and so on damage. In order to ensure the emergency light level in good condition, the emergency system needs to operate with high reliability. This system needs to be independent or capable to test themselves, display internal damages and check their functional state. With the improvement of the new features in security systems, at the same time, maintenance costs will be reduced. The hardware section consists of smart phones as the controlling device, the power supply module and the control module. By using the Wi-Fi module of node mcu, which is allowing an electronic device to exchange data or connects with Arduino through transmit and received a pin (Tx and Rx). An emergency light functioning to monitor and give status condition of lamp during maintenances using the wifi device and easy to monitor for security or server room. The transmitter of Node MCU Wi-Fi module and transmit the data given by the emergency light. This system concept, the user can check anytime the conditions of emergency light if have a problem or not by using computer and smart phone. The node MCU will display IP Address for every light as identity part number and then display at webserver (HTTP). So that can save money, energy and time. Furthermore, this system maintenance became more systematic.

DEDICATION

Dedicated to my beloved mother, Hamisah binti Imas who always there for me, my respectful father, Jamaludin bin Ismail and my beloved siblings for whom after all might ALLAH I owe my success, always praying for me, encouraging me and always being there for me. To my lecturer and supervisor, for his guidance and encouragement, Mr. Saad bin Hamid. To all my friends, for their unconditionally support. From my heart I say THANK YOU.

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I love to say thank you to my family for continuous support given to me morally or technically especially to my parents, Jamaludin Bin Ismail and Hamisah Binti Imas for nonstop support.

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LIST ABBREVIATIONS, SYMBOLS AND NOMENCLATURES

Tx	Transmit
Rx	Received
IP	Internet Protocol
RFID	Radio Frequency Identification
IDE	Integrated Development Environment
HTTP	Hypertext Transfer Protocol
LDR	Light Diode Resistor
USB	Universal Serial Bus
I/O	Input Output
DC	Direct Current
AC	Alternate Current
IrDA	Infrared Data Association
Adc	Analog Digital Converter
PCB	Printed Circuit Diode
GND	Ground
V	Voltage
mV	Milivolt

CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter will describe the project background, objectives, problem statement, and scope of the project, general flowchart and project outlines in order to give an overall view of the project.

1.1 Background

In the traditional emergency light systems, the common internal device broken or damages will be repaired by maintenance workers and check it using manual method such as go through one by one and press the button to check. By using this method doesn't relevant and efficient and have certain company not maintenance it properly because need spend many costing for a session. In order to ensure the emergency light level in good condition, the emergency light must be checked and tested at least two times per month to make sure zero problem that will happened and the emergency system also needs to operate with high reliability. This system needs to be independent or capable to test themselves, display internal damages, for example battery overcharging, lighting problem or LED not function and check their functional state. With the improvement of the new features in security systems or emergency system at the same time, maintenance costs will be reduced. This system concept, the user can check anytime the conditions of emergency light have a problem or not by using a computer. So that can save money, energy and time.

1.2 Objective

The objective of the project can be outlined as follow:

- To study the function and operation of emergency light for diagnostic purpose.
- To design an emergency light monitoring system based on WIFI.
- To develop a prototype device that can be connected between emergency light and WIFI.

1.3 Problem Statement

This project is about to create a new system for the emergency light. Firstly, this system needs to be changed because the previous system is hard to properly maintain and other features is there are too many emergency lights to be checked. The old system also exposed to high risk if there is any fire if it is not maintain properly. Other than that, much cost to spend to maintain at all buildings and must spend long time when performing the maintenance activity. The emergency light monitoring system using WIFI can solve that problem. This project develops for saving the cost when needs the maintenance and can check. This system can monitor all emergency light from the centre maintained building.

1.4 Scope of project

This system is built based on the previous model and in order to build this we use hardware and software. The important part that we use is computer, from computer we get to know whether the light functioning or not. From computer we control and monitor all emergency light at all departments and building. When something happens at emergency light the system detectthe error and signal or data will be processed in Arduino and then transmit the signal using a WIFI module to computer monitoring. In hardware part we use the WIFI module to transmit the

signal to a computer. This is for monitoring the emergency light and to determine whether it is functioning or not. Without having to check all the emergency lights physically. In the software part we use the Arduino software to program the circuit to detect the condition of emergency light have a failure and need to be maintenance.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

In this chapter, the literature review will be explained and focused about the ideas or some information to completing the project. The resource that will refer such as books, journal or website and all source included the operation of the circuit in term of hardware and software. Other than that, in this chapter also make a study about several projects that related to make some improvement or take some idea from the other project. It is useful to complete a project that has created and we compared this project from the previous project to make this project more efficient and systematic.

2.1 Research from Previous Project

Based on the previous project was needed to complete this project successfully. The project must be upgrade and modified the system that has been demonstrated before. Other than that, according to current developments, the latest technology used in this project to solve the problems faced at present.

One for system is a development of cloud based light intensity monitoring system using Raspberry Pi by (Jatoth, 2015). The system was implemented by using Raspberry Pi for monitoring the light intensity compare, then this project we use the Arduino to save the cost and easy to develop. Other than that, the Raspberry Pi program more complex compare than Arduino because the Arduino had already specific program and just to modify the program to build another program. For

example, by using the WIFI connection to import the coding, need to search it from the library which is easy to modify compared to Raspberry which is it need to build it manually. The next project is emergency lighting control by DALI (Patil, 2012). DALI stands for Digital Addressable Lighting Interface protocol has enabled the development of centralized assessment of all emergency lighting fitting. The wiring connects each emergency light back to a DALI bridge connected using USB, RS232 or Ethernet port to a resident computer. The concept of this project, there uses cable to communicate all the system. The disadvantage of this project is the connection using a cable This concept using a lot of money because uses the cable and the costing of maintenance more expensive.

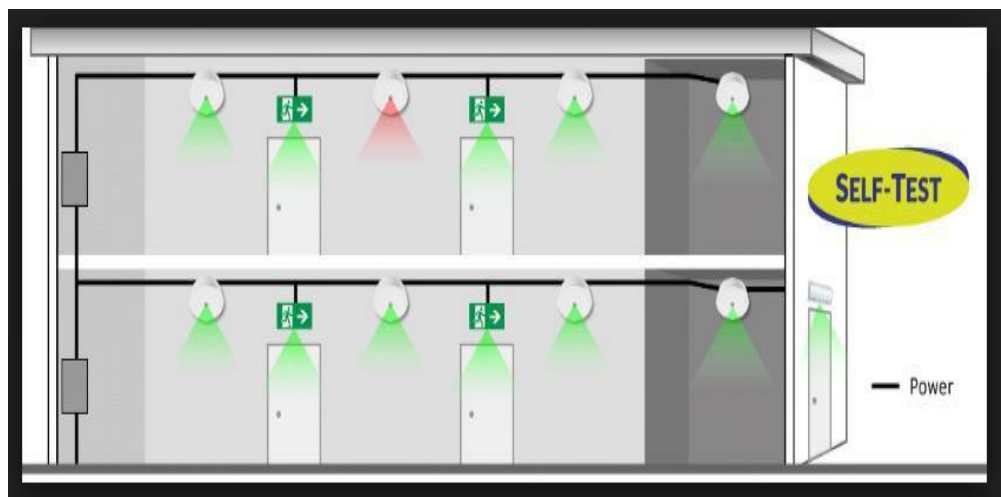


Figure 2.1: Example Concept of Design Emergency Light (Emergency Light Product, 2016)

From the previous project a smart lighting, emergency system for fluorescent lamps (Alonso, 1993) there are methods to detect and checking the functional state and displaying an internal damages. This project uses the microcontroller to control the performance of emergency light. The output of this project is LED when the microcontroller will detect the functioning of the lamp the data will process directly and display output. There are several failures can be detected using microcontroller such as overcharges, inverter and lamp.

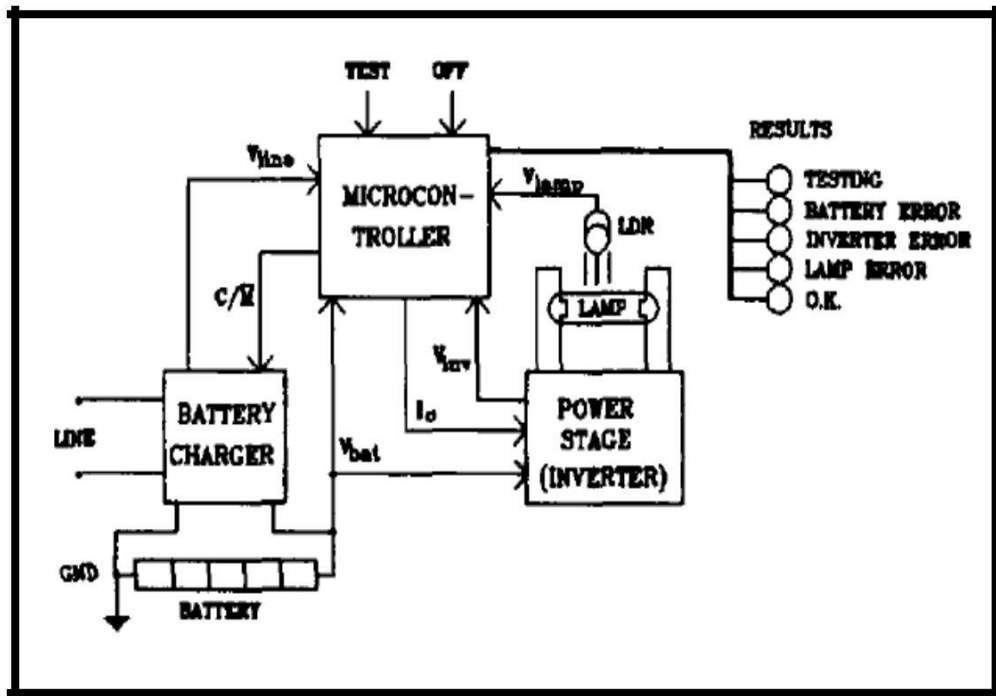


Figure 2.2: Example Concept from Previous Project (Alonso,1993).

2.2 Hardware and Software Review

In this part is to review the hardware and software equipment that is used in this project. Some explanation about functioning and information regarding parts and components for the hardware to observe the difference between the specifications to develop this project.

2.2.1 Wireless Networking

Currently, the wireless communication technology is the important part of our life to communicate with each other. Many advantages of development technology because users can handle all of things with the same time. The example of device that used technology wireless to communicate with each other for example cordless telephones, mobiles, and many more part in computer wireless. Technology of wireless communication can be

describe such as transferred signal or data between two or more device means that not an electrical conductor. Example of wireless technologies commonly used is at radio. The user can hear the voice from anywhere, even millions, of kilometres because the signal that transfers using the satellite. There are many advantages comparatively then the disadvantages of using wireless technology because wireless is the important things that must have for everyone to communicate. One of them is enhancing of technology in conveying the information quickly to the consumer from anywhere and can save the time. Other than that, in this time working people and professionals communicate with each other using internet because internet can connect that person anywhere and anytime without cables. There also helps to increase some person in side their performance of work and improves the productivity or systematic (Kumar, 2014).

Figure 2.3 shown a few types of wireless technologies that uses which is widely spread all spaces without limitation, allowing users to communicate with each other.



Figure 2.3: Types of Wireless Communication Technologies.

2.2.1.1 The Advantage of Using WIFI

The advantages of using WIFI are further elaborated as follows:

- **Connect easier.**
The wireless technology of such as network allows users to access network resources from anywhere and can save the time.
- **Mobility**
With the emergence of public wireless networks, user can access and serve the internet even anywhere and the services can communicate faster.

2.2.2 WIFI Module NodeMCU ESP8266

NodeMCU ESP8266 is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The term "NodeMCU" by default refers to the firmware rather than the dev kits. The firmware uses the Lua scripting language. It is based on the eLua project, and built on the Espressif Non-OS SDK for ESP8266.

The NodeMCU ESP8266 is an open-source firmware and development kit that helps you to Prototype your IOT product within a few Lua script lines. Features:

- Open-source
- Interactive
- Programmable
- Low cost
- Simple

- Smart
- WI-FI enabled
- Arduino-like hardware IO: Advanced API for hardware IO, which can dramatically reduce the redundant work for configuring and manipulating hardware. Code like Arduino, but interactively in Lua script.
- Nodes style network API: Event-driven API for network applications, which facilitates developers writing code running on a 5mm*5mm sized MCU in Nodes style. Greatly speed up IOT application development process.

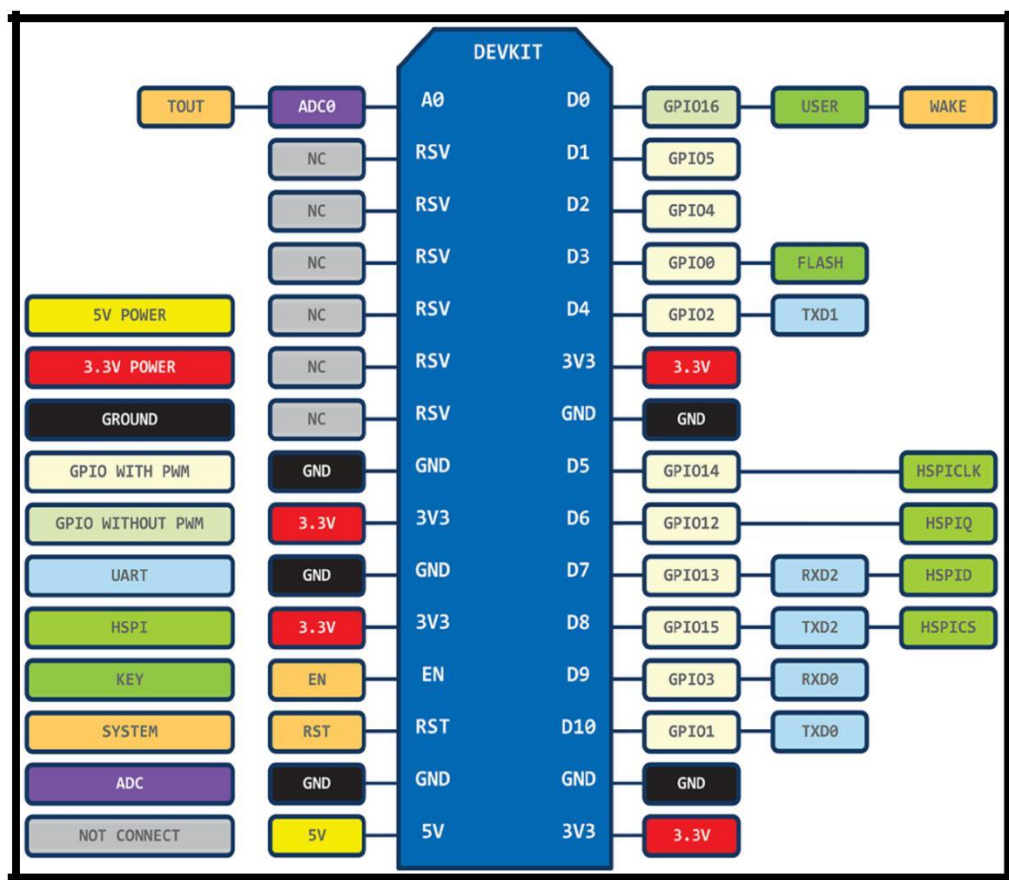


Figure 2.4: NodeMCU ESP8266 WIFI.