DESIGN OF CLOUD-INTEGRATED SMART SOCKET WITH MOBILE APP CONTROL FOR REDUCING ELECTRICITY WASTE

NURUL AFIQAH BINTI ZOLKAFLE

B071710237

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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

by

NURUL AFIQAH BINTI ZOLKAFLE

B071710237

950723-14-5094

FACULTY OF ELECTRICAL AND ELECTRONIC ENGINEERING

TECHNOLOGY

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

Tajuk: DESIGN OF CLOUD-INTEGRATED SMART SOCKET WITH MOBILE APP CONTROL FOR REDUCING ELECTRICITY WASTE

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☒ TIDAK TERHAD

Yang benar,

.....

NURUL AFIQAH BINTI ZOLKAFLE

Alamat Tetap:

No 20 Jalan PP/21,

Taman Pinggiran Putra,

43300 Seri Kembangan, Selangor

Tarikh: 14 February 2021

Disahkan oleh penyelia:

.....

Ts. SHAMSUL FAKHAR BIN ABD GANI

Cop Rasmi Penyelia

SHAMSUL FAKHAR BIN ABD GANI
Penyelaras Program BEEC / Pensyarah
Jabatan Teknologi Kejuruteraan Elektronik dan Komputer
Fakulti Teknologi Kejuruteraan Elektrik dan Elektronik
Universiti Teknikal Malaysia Melaka

Tarikh: 14 February 2021

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I hereby declare this report titled DESIGN OF CLOUD-INTEGRATED SMART SOCKET WITH MOBILE APP CONTROL FOR REDUCING ELECTRICITY WASTE is the result of my own research except as cited in the references.

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Author : NURUL AFIQAH BINTI ZOLKAFLE

Date: 14 February 2021

APPROVAL

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as partial fulfilment of the requirements for the degree of Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours. The supervisory members are as follows:

SHAMSUL FAKHAR BIN ABD GANI
Penyelaras Program BEEC / Pensyarah
Jabatan Teknologi Kejuruteraan Elektronik dan Komputer
Fakulti Teknologi Kejuruteraan Elektrik dan Elektronik
Universiti Teknikal Malaysia Melaka

Signature: .....

Supervisor: Ts. SHAMSUL FAKHAR BIN ABD GANI

Signature: .....

Co-supervisor: Ts. TG. MOHD FAISAL BIN TENGKU WOOK

ABSTRAK

IoT adalah aplikasi pintar yang membolehkan perlaksanaan pelbagai fungsi seperti mengumpul dan memindahkan data melalui rangkaian tanpa wayar serta tidak memerlukan pengawasan daripada manusia. Antara aplikasi yang menggunakan IoT adalah seperti soket pintar. Projek soket pintar ini bertujuan untuk membangunkan soket kuasa pintar yang mengawal suis peralatan elektrik melalui aplikasi mudah alih. Selain itu, ia juga untuk menganalisis prestasi sistem yang dibangunkan. Projek ini adalah aplikasi pengawasan sistem dengan menggunakan NodeMCU ESP32 Wi-Fi untuk mengakses dan mengendalikan peranti elektrik. Projek ini dirancang untuk soket pintar bersepadu awan dengan platform mudah alih untuk memantau pengurangan sisa elektrik dengan menggunakan aplikasi Blynk. Dengan menggunakan Wi-Fi rumah atau Hotspot mudah alih, soket pintar ini dapat dikawal dalam jarak yang tertentu. Merujuk kepada uji kaji yang dijalankan soket pintar ini terbukti telah berjaya mencapai jarak 30 meter apabila mengunakan Wi-Fi rumah dan 15 meter bagi Hotspot mudah alih. Berdasarkan penyelidikan dengan cara aplikasi mudah alih yang dibangunkan dapat membantu orang mengawal peralatan elektrik di rumah. Hasilnya, soket pintar ini dapat mengurangkan penggunaan tenaga elektrik sekiranya pengguna terlupa menutup suis setelah digunakan. Oleh itu, soket pintar ini mudah digunakan dan mesra pengguna.

ABSTRACT

IoT is a smart application that allows various functions such as collecting and transferring data over a wireless network and without requiring human oversight. The smart socket is one of the applications that use the IoT system. This smart socket project aims to develop a smart power socket that controls electrical appliances' switching via a mobile app. Besides, it is also to analyze the performance of the developed system. This project is a system monitoring application using NodeMCU ESP32 Wi-Fi to access and control electrical devices. The project is designed for a cloud-integrated smart socket with a mobile platform for monitoring a reduction of electrical waste using the Blynk app. Using home Wi-Fi or mobile Hotspot, this smart socket can be controlled at a certain distance. The experiment conducted by this smart socket proved to have successfully reached a distance of 30 meters when using home Wi-Fi and 15 meters for mobile Hotspot. Based on the research, mobile applications developed can help people operate electrical appliances at home. As a result, the smart socket can reduce electricity consumption if the user forgets to turn OFF the switch after use. Hence, the smart socket is easy to use and user friendly.

DEDICATION

I dedicate this project to my beloved parents for providing all the support and assistance that have made possible the fruition of our efforts. They have never given up and will always be remembered in this heart.

Next, I dedicate this project to my supervisor lecturer for all support and give full cooperation during *Projek Sarjana Muda*. Your patience, knowledge, and words of encouragement gave me immense strength throughout the project.

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LIST OF SYMBOLS

W	-	Power
V	-	Voltage
DC	-	Direct Current
AC	-	Alternate Current
I	-	Current
mA	-	milliAmpere
m	-	Distance
MHz	-	MegaHertz
GHz	-	GigaHertz
Kbps	-	Kilobits Per Second

LIST OF ABBREVIATIONS

IoT	Internet of Things
ADT	Android Developer Tool
RTOS	Real-Time Operating System
RAM	Random Access Memory
scmRTOS	Single-Chip Microcontroller Real-Time Operating System
OS	Operating System
APK	Android Package Kit (Installation file)
API	Application Programming Interface
RF	Radio Frequency
FPGA	Field-Programmable Gate Array (Computing)
SDR	Software Defined Radio
I/O	Input/output
IP	Internet Protocol
PC	Personal Computer
GSM	Global System for Mobile
IR	Infrared
SRAM	Static Random-Access Memory
EPROM	Erasable Programmable Read-Only Memory
SMS	Short Message Service
MMS	Multimedia Messaging Service

SIM	Subscriber Identification Module
USB	Universal Serial Bus
GHAS	General handicapped Attitude Scale
ASCII	American Standard Code for Information Interchange
Wi-Fi	Wireless Network
LED	Light Emitting Diode
GPU	Graphics Processing Unit
SSID	Service Set Identifier
ADSL	Asymmetric Digital Subscriber Line
GPIO	General Purpose Input/Output
NO	Normally Open
NC	Normally Closed
COM	Command

CHAPTER 1

INTRODUCTION

1.0 Introduction

Nowadays, technology is being introduced with the Revolution Industry 4.0. To realize this revolution, there are several technologies that are evolving towards innovation and smarter. In this day, everything can be translated as smart technology. For example, the smart socket is one of the applications that use the IoT system. This segment discussed the smart socket home system's background for reducing electricity waste. Therefore, this chapter also clarifies each section, such as the problem statement, project objectives, and project scope.

1.1 Project Background

In this era, the growing technological advances have influenced user lifestyles. We all know that technological advancements bring about many changes today. People will almost always use technology by controlling everything at their fingertips (Govindraj, Sathiyanarayanan and Abubakar, 2018). However, we also need to know that all activities are straightforward and user-friendly with technology.

Various technologies have introduced smart socket systems where homeowners can monitor the home environment and regulate electricity consumption by remotely using smartphones. For example, home appliances such as washing machines, air