

**SMART LIGHT CONTROL WITH NOTIFICATION ALERT FOR
SMALL SCALE FARM**



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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Alamat tetap: NO.95 JALAN RU.7,
TAMAN REMBAU UTAMA, 71300
REMBAU, NEGERI SEMBILAN

Tarikh: 3/9/2021

Dr. Nazrulazhar Bin Bahaman

(TANDATANGAN PENYELIA)

TS. DR.NAZRULAZHAR BIN
BAHAMAN

Nama Penyelia

Tarikh: 4 / 9 / 2 0 2 1

SMART LIGHT CONTROL WITH NOTIFICATION ALERT FOR SMALL
SCALE FARM

NURHAYATI BINTI NORDIN



This report is submitted in partial fulfillment of the requirements for the Bachelor of [Computer Science (Computer Networking)] with Honours.

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2021

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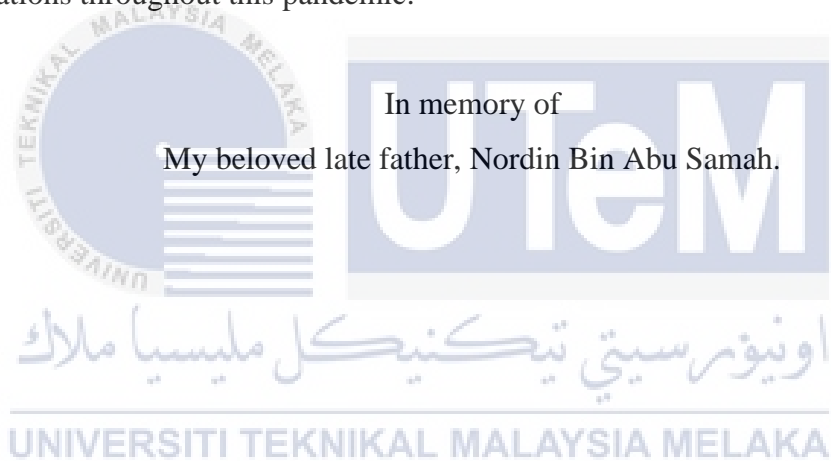
SUPERVISOR:

(TS. DR. NAZRULAZHAR BIN BAHAMAN)

Date: 4/9/2021

DEDICATION

From the bottom of my heart, I dedicated this thesis to my beloved mother, Hamidah Binti Hasan, my siblings (Norfarahin Nordin and Norhamiera Nordin), family members that always be by my side. I am so thankful for the guidance that they showed to me, the comments and suggestions over the past few years. I hope this achievement will make them happy. Not to forget to my lecturer and supervisor, Ts. Dr. Nazrulazhar bin Bahaman who always give a lot of guidance and advices throughout this journey in Universiti Teknikal Malaysia Melaka (UTeM). Last but not least to all my dear friends who have encouraged, guided and inspired me with a lot of motivations throughout this pandemic.



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ABSTRACT

Smart Light Control with Notification Alert form small-scale farm is a project that being developed using NodeMCU ESP8266 with the integration of IoT technology for the farmer that has small-scale farm that need a proper simple and low-cost management system to ease their farming daily activity. In this project, the user will can control and monitor their farm condition easily through the mobile application developed. The problem that they usually faced when managing the farm manually is in terms of the farm crop yields that often to damage due to the intrusion from the wild animal and also being stolen by any irresponsible anonymous person who illegally entered the farm. Hence, this can cause loss towards the farmer in the aspects of money, resources and energy in maintaining the farm condition. Next, the farmer somehow facing difficulties in control the light source in the farm area where they at one point might be hard for them to leave the work area with a troubling feeling or maybe to control their business and track it when they are out of the work region. So at least, by turning the light at the farm could reduce the uneasy feeling where people will not be easily intended to enter the farm to do damage. So, this project will use NodeMCU ESP8266 as the main component hardware to be connect with PIR motion sensor as to detect motion where it also can produce buzzer alert sound after being triggered. In addition, a literature review is required to gather all relevant information regarding the hardware, software, language, and approach employed in this project. All of the components must be appropriate for the project at hand. Then, to construct a prototype, combine all of the hardware and software. Finally, test and verify the prototype to ensure that all of the components are working together.

ABSTRAK

Kawalan Cahaya Pintar dengan Notifikasi Pemberitahuan untuk kebun berskala kecil adalah projek yang dibangunkan menggunakan NodeMCU ESP8266 dengan integrasi teknologi IoT untuk pekebun yang mempunyai kebun berskala kecil yang memerlukan sistem pengurusan kos mudah dan rendah untuk meringankan aktiviti harian pertanian mereka. Dalam projek ini, pengguna akan dapat mengawal dan memantau keadaan kebun mereka dengan mudah melalui aplikasi mudah alih yang dibangunkan. Masalah yang biasanya mereka hadapi ketika menguruskan kebun secara manual adalah dari segi hasil tanaman kebun yang sering dirosakkan akibat pencerobohan dari haiwan liar dan juga dicuri oleh mana-mana individu yang tidak bertanggungjawab yang memasuki kawasan kebun secara haram. Oleh itu, ini boleh menyebabkan kerugian kepada petani dalam aspek wang, sumber dan tenaga dalam mengekalkan keadaan kebun. Seterusnya, pekebun juga sering menghadapi kesukaran untuk mengawal sumber cahaya di kawasan kebun di mana mereka pada satu ketika mungkin sukar bagi mereka untuk meninggalkan kawasan kerja dengan perasaan yang menyusahkan atau mungkin untuk mengawal perniagaan mereka dan mengesannya apabila mereka berada di luar rantau kerja. Jadi sekurang-kurangnya, dengan menghidupkan cahaya di kebun dapat mengurangkan perasaan yang tidak selesa di mana orang tidak akan mudah bertujuan untuk memasuki ladang untuk melakukan kerosakan. Jadi, projek ini akan menggunakan NodeMCU ESP8266 sebagai perkakasan komponen utama untuk berhubung dengan sensor gerakan PIR untuk mengesan pergerakan di mana ia juga boleh menghasilkan bunyi amaran *buzzer* selepas dicituskan. Di samping itu, kajian literatur diperlukan untuk mengumpul kesemua maklumat yang relevan mengenai perkakasan, perisian, bahasa, dan pendekatan yang digunakan dalam projek ini. Semua komponen mestilah sesuai untuk projek yang bakal dibangunkan bagi memenuhi tujuan untuk membina prototaip, menggabungkan semua perkakasan dan perisian. Akhirnya, uji dan sahkan prototaip untuk memastikan semua komponen bekerjasama.

TABLE OF CONTENTS

	PAGE
DECLARATION.....	II
DEDICATION.....	III
ACKNOWLEDGEMENTS.....	IV
ABSTRACT.....	V
ABSTRAK.....	VI
TABLE OF CONTENTS.....	VII
LIST OF TABLES.....	XII
LIST OF FIGURES.....	XIII
LIST OF ABBREVIATIONS.....	XVI
CHAPTER 1: INTRODUCTION.....	1
1.1 Introduction.....	1
1.2 Problem Statement.....	2
1.3 Project Question.....	3
1.4 Project Objectives.....	3
1.5 Project Scope.....	4
1.6 Problem Contribution.....	4
1.7 Report Organization.....	5
1.8 Conclusion.....	7
CHAPTER 2: LITERATURE REVIEW AND PROJECT METHODOLOGY.....	8

2.1	Introduction.....	8
2.2	Related Work	9
	2.2.1 NodeMCU ESP8266.....	10
	2.2.2 Sensor Detection	12
2.3	Critical Review of the current problem and justifications	13
	2.3.1 Introduction.....	13
	2.3.2 Importance of project.....	14
	2.3.3 Previous Existing Product.....	14
	2.3.4 SMS Notifications On-Off Room Lights with Body Detection Using Microcontrollers	15
	2.3.5 Smart Intrusion Detection System for Crop Protection by Arduino	16
	2.3.6 Smart farmland using Raspberry Pi Crop Prevention and Animal Intrusion Detection System.....	17
2.4	Proposed Solutions.....	20
2.5	Conclusion	21
CHAPTER 3: PROJECT METHODOLOGY		22
3.1	Introduction.....	22
3.2	Methodology	23
	3.2.1 Literature Review	24
	3.2.2 Component and Project Design	25
	3.2.3 Development and Simulation	27
	3.2.4 Testing and Verification	28
3.3	Project Milestone	28
3.4	Gantt Chart.....	31
3.5	Conclusion	31

CHAPTER 4: ANALYSIS AND DESIGN.....	32
4.1 Introduction.....	32
4.2 Problem Analysis	32
4.3 Requirement Analysis	33
4.4 Data Requirement	33
4.5 Functional Requirement.....	34
4.5.1 Notification Process	34
4.5.2 Motion Detection Process.....	35
4.5.3 Light Control Process	35
4.6 Non-Functional Requirement.....	36
4.7 Other Requirement.....	36
4.7.1 Hardware Requirement.....	36
4.7.2 Software Requirement	43
4.8 High-Level Design.....	45
4.8.1 System Architecture.....	46
4.8.2 User Interface Design	47
4.9 Flowchart Design	50
4.9.1 Smart Light Control Application Flowchart.....	51
4.9.2 System Implementation Flowchart	52
4.10 Conclusion	53
CHAPTER 5: IMPLEMENTATION.....	54
5.1 Introduction.....	54
5.2 Development Environment Setup	54
5.2.1 Hardware Development Environment Setup.....	55

5.2.2	Software Development Environment Setup	57
5.3	Arduino IDE Configuration Setup	68
5.4	Implementation Status	76
5.5	Conclusion	78
CHAPTER 6: TESTING		79
6.1	Introduction.....	79
6.2	Test Plan.....	79
6.2.1	Test Organization.....	80
6.2.2	Test Environment.....	80
6.2.3	Test Schedule	80
6.3	Test Strategy	81
6.3.1	Classes of Tests.....	81
6.4	Test Design	81
6.4.1	Test Description.....	82
6.4.2	Test Data	89
6.5	Test Result and Analysis.....	96
6.5.1	Test Result on Hardware	97
6.5.2	Test Result on Application	100
6.6	Conclusion	102
CHAPTER 7: CONCLUSION.....		103
7.1	Introduction.....	103
7.2	Project Summarization.....	103
7.3	Project Contribution.....	104
7.4	Project Limitation	104

7.5	Future Works	105
7.6	Conclusion	105
	REFERENCES	106
	APPENDICES	107



LIST OF TABLES

	PAGE
Table 1.1 Summary of Problem Statement.....	2
Table 1.2 Summary of Problem Questions	3
Table 1.3 Summary of Project Objectives	3
Table 1.4 Project Contribution	5
Table 2.1 Microcontroller Comparison	11
Table 2.2: Comparison of existing project research	19
Table 3.1 PSM 1 Milestone.....	28
Table 3.2: PSM 2 Milestone.....	30
Table 3.3 Gantt Chart.....	31
Table 4.1 NodeMCU ESP8266 specification details.....	37
Table 5.1: Implementation Status.....	76
Table 6.1: Microcontroller ESP8266 connectivity	82
Table 6.2: PIR Motion sensor function	83
Table 6.3: Buzzer function testing	84
Table 6.4: LED function testing.....	85
Table 6.5: ThingSpeak function.....	86
Table 6.6: Notification function testing.....	87
Table 6.7: Weather forecast testing.....	88
Table 6.8: Motion sensor result analysis	97
Table 6.9: Piezo Buzzer function result analysis	98
Table 6.10: LED light on/off function result analysis	98
Table 6.11: Brightness control function level analysis.....	99
Table 6.12: Application test function	100
Table 6.13: Notification function result analysis.....	101

LIST OF FIGURES

	PAGE
Figure 2.1: Taxonomy Structure	9
Figure 2.2: NodeMCU ESP8266 V2 board Hardware.....	12
Figure 2.3: PIR motion sensor	12
Figure 2.4: Sensing activity details overview	13
Figure 2.5: Example prototype of the project	15
Figure 2.6: Block Diagram	16
Figure 2.7: Functional Block Diagram.....	17
Figure 2.8: RFID Pet Microchip	18
Figure 2.9: RFID Injector.....	18
Figure 2.10: Proposed Solution.....	20
Figure 3.1: Methodology block diagram.....	23
Figure 3.2: Literature Review	24
Figure 3.3: Main Hardware Component	25
Figure 3.4: Software Application.....	26
Figure 3.5: Development Project Process	27
Figure 4.1: Data requirement flow	33
Figure 4.2: Notification process	34
Figure 4.3: Motion detection process	35
Figure 4.4: Light Control process.....	35
Figure 4.5: Node MCUESP8266 module.....	37
Figure 4.6: USB cable A type	38
Figure 4.7: PIR sensor	38
Figure 4.8: Jumper wire	39
Figure 4.9: LED component	39
Figure 4.10: Piezo Buzzer	40

Figure 4.11: 220K ohm resistor.....	41
Figure 4.12: Breadboard	41
Figure 4.13: Huawei Nova 2i.....	42
Figure 4.14: Arduino IDE Software	43
Figure 4.15: MIT Apps Inventor	44
Figure 4.16: Fritzing Software	44
Figure 4.17: ThingSpeak Logo.....	45
Figure 4.18: System Architecture Diagram.....	46
Figure 4.19: First Interface	47
Figure 4.20: Second Interface	48
Figure 4.21: Third Interface.....	49
Figure 4.22: Fourth Interface.....	50
Figure 4.23: System Flowchart	51
Figure 4.24: System Implementation Flowchart.....	52
Figure 5.1: Details of the Node MCU ESP8266 board.....	55
Figure 5.2: Hardware Diagram	56
Figure 5.3: Hardware development prototype	56
Figure 5.4: Download Arduino IDE	57
Figure 5.5: IDE packages initialization.....	58
Figure 5.6: Arduino IDE interface	58
Figure 5.7: Configure and upload source code on IDE	59
Figure 5.8: Main page MIT App Inventor.....	60
Figure 5.9: Create a new project	60
Figure 5.10: Application name.....	61
Figure 5.11: Design the mobile application	61
Figure 5.12: Code block development	62
Figure 5.13: ThingSpeak main website	62
Figure 5.14: Create new channels for the project	63
Figure 5.15: ThingSpeak channels settings.....	63
Figure 5.16: ThingSpeak created channel view.....	64
Figure 5.17: The channel status	64
Figure 5.18: Search BotFather to generate a new bot	65
Figure 5.19: Project bot development	65
Figure 5.20: Insert start command	66

Figure 5.21: New bot command	66
Figure 5.22: Define name for the bot.....	66
Figure 5.23: Create a username for the bot.....	67
Figure 5.24: Bot successfully created	67
Figure 5.25: Microcontroller board selection	68
Figure 5.26: Include the outside library.....	68
Figure 5.27: Bot establishment code.....	69
Figure 5.28: Bot movement detection code	69
Figure 5.29: ThingSpeak declaration code	70
Figure 5.30: Pin declaration on microcontroller	70
Figure 5.31: Void Setup declaration.....	71
Figure 5.32: Wi-Fi connection coding	72
Figure 5.33: Motion sensor coding in void loop	73
Figure 5.34: Motion sensor code if no motion detected	73
Figure 5.35: Brightness level control code	74
Figure 5.36: Establish client connection	75
Figure 5.37: On/off LED light control code.....	75
Figure 6.1: Microcontroller connectivity testing.....	89
Figure 6.2: Serial Monitor port COM4.....	90
Figure 6.3: Connectivity console status.....	90
Figure 6.4: Component connectivity setup	91
Figure 6.5: Motion detection component response to the functionality	91
Figure 6.6: LED light response to its functionality	91
Figure 6.7: MIT Apps	92
Figure 6.8: Starting screen of the application	92
Figure 6.9: First Interface	93
Figure 6.10: Second Interface of the application	94
Figure 6.11: Third Interface of the application.....	94
Figure 6.12: Fourth Interface of the application.....	95
Figure 6.13: Notification Alert on Telegram	96

LIST OF ABBREVIATIONS

FYP	-	Final Year Project
CCTV	-	Closed-circuit Television
IoT	-	Internet of Things
API	-	Application Programming Interface
GUI	-	Graphical User Interface
SMS	-	Short Message Service
RFID	-	Radio Frequency Identification
GSM	-	Global System for Mobile Communication
Wi-Fi	-	Wireless Fidelity
USB	-	Universal Serial Bus

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CHAPTER 1: INTRODUCTION

1.1 Introduction

Farming is one of the usual activities that people used to fill in their leisure time as it brings a lot of benefits in terms of encouraging crop yields, productive energy, good body physical condition as it is maintaining an individual's health and many more benefits. Hence, people in the rural areas are also enjoying themselves in carrying out a small-scale farm activity. Despite a small-scale farm area, good control management is needed to ensure no harm and destructions towards their crop yields or any intrusions tragedy happening in their particular farm area.

Thus, as a result of the advancement of technology and people's dependence on smartphones to meet ever-increasing demands, it has become an easy and fast way to solve everyday life tasks. As a consequence, it is important to have a technology that can monitor applications through IoT. One of the IoT projects for low-cost solutions that can be used is Smart Light Control with Notification Alert for Small Scale Farm. Control smart lights and receive notifications Alert for small scale farm is one of the IoT projects for low-cost solutions that can be implemented specifically for small scale farmers in rural areas as an alternative to using CCTV, which is very expensive, in order to increase and improve the safety level of their farm.

In addition, this is an alternative approach to control, which is that accepting data from the sensors could give the farmers at least a small picture of what was happening on their farm. Hence, storing all of the data could help them analyze if there are any needed improvements.

1.2 Problem Statement

Smart Light Control with Notification Alert for Small Scale Farm is a project that enables users to ease their management activities in order to improve and maintain secure security levels for small-scale farms in particular, especially in rural areas, using a low-cost medium solution. The Internet has become a part and portion of human life with the exponential increase in the number of internet users over the past decade. This system can control the light and also detecting motion through the sensors for the specified farm area. Therefore, the established project consists of two parts, including a simple API, hardware and software such as devices, NodeMCU ESP8266 board, PIR sensor and many more.

This project approach in order to help ease some problems faced by the users, such as the high amount of Internet bandwidth consumption when using CCTV which is required to load the acquired footage videos from the CCTV where particularly might be very costly, especially for a small single scale farmer. In addition, there are more workloads needed to be hired, like the extra workers to facilitate the farmer in tracking for any intrusion issues at the specified working area. Thus, it might be hard for them to leave the work area with a troubling feeling or maybe control their business and track it when they are out of the work region.

Table 1.1 Summary of Problem Statement

PS	Problem Statement
PS1	CCTV installation for a single-scale farmer is quite costly and high-maintenance in order to manage the farm which is not worth it.

1.3 Project Question

Once the architecture is understood, how can this project solve the scenario of manually manage the small-scale farm? The project questions are as follows:

Table 1.2 Summary of Problem Questions

PS	PQ	Problem Questions
PS1	PQ1	What type of system will be developed?
	PQ2	How efficient is the prototype's sensor?
	PQ3	How to give a notification alert to the farmer?

1.4 Project Objectives

Based on project questions, this project consists three main objectives to ensure that the prototype can be fully implemented. Table 1.3 below is a summary of the project objectives.

Table 1.3 Summary of Project Objectives

PS	PQ	PO	Project Objective
PS1	PQ1	PO1	To develop a low-cost IoT solution prototype that can automatically detect motion based on light control
	PQ2	PO2	To notify the user through notification alert as a precaution
	PQ3	PO3	To test the functionality of the prototype

1.5 Project Scope

For this project, there are several scopes that are going to be focused on:

- 1) User: any small-scale farmer that needs a system to guard their farm
- 2) System: Develop a simple system for the user to manage their farm through light control with hardware utilization like NodeMCU ESP8266, led, PIR motion sensor and others.
- 3) The functionality of automatic on/off light primarily based totally on the movement sensor that stumbles on the movement presence of wild animals or intruders and also light brightness control
- 4) Real-time notification alert to let the user know the condition of their business area when detecting any motion indicates the light is automatically on in the specified area.
- 5) Implementing some modules like report modules for graph analysis

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1.6 Problem Contribution

This prototype is designed especially for people with a small-scale farm that need a low-cost solution approach in handling and keeping track of their farm state, which is a better solution in saving money, time, and resources. Table 1.4 below shows the summary of the project contribution.

Table 1.4 Project Contribution

PS	PQ	PO	PC	Project Contribution
PS1	PQ1	PO1	PC1	It proposed to develop a simple API system where users can easily monitor and control their farm conditions.
	PQ2	PO2	PC2	It proposed a prototype that able to strengthen the security level of a single small-scale farm with hardware and software utilization.
	PQ3	PO3	PC3	It proposed an appropriate notifications alert that notifies the user about the farm condition.

1.7 Report Organization

This report is divided into seven chapters: Chapter 1 contains the Introduction, Chapter 2 is for Literature review, Chapter 3 consists of Methodology, Chapter 4 is for the Design, Chapter 5 contains the Implementation, Chapter 6 contains the Testing and lastly, Chapter 7 for Conclusion.

Chapter 1: Introduction

This chapter will focus on the introduction, problem statements, project questions, project objectives, project scope, project contribution, report organization and conclusion.

Chapter 2: Literature review

This chapter will focus more on related or previous work on this project and a critical analysis of the current problem, reasoning, and suggested solution. This project's explanation and details are assisted by reading materials and a conference paper.

Chapter 3: Project Methodology

This chapter describes the methodology that will be used in this project as well as the project milestones.

Chapter 4: Analysis and Design

This chapter will deliberate over the project's problem analysis, requirement analysis, high-level design, database design, and comprehensive design.

Chapter 5: Implementation

This chapter will discuss the setup of a software development system, software configuration management, and the status of implementation.

Chapter 6: Testing

Beginning with microcontrollers and applications, Chapter 6 will begin the application testing and debugging phase. At this point, the findings are compared to the objectives in order to draw conclusions and make assumptions.

Chapter 7: Project Conclusion

For chapter 7 it will discuss the project summarization, project contribution, project constraints, and future work.