SMART LIGHT CONTROL WITH NOTIFICATION ALERT FOR SMALL SCALE FARM

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BORANG PENGESAHAN STATUS LAPORAN

JUDUL: [SMART LIGHT CONTROL WITH NOTIFICATION ALERT FOR SMALL SCALE FARM]

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

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2021

DECLARATION

I hereby declare that this project report entitled

SMART LIGHT CONTROL WITH NOTIFICATION ALERT FOR SMALL SCALE FARM

is written by me and is my own effort and that no part has been plagiarized without citations.

STUDENT: yadd Date: 3/9/2021

(NURHAYATI BINTI NORDIN)

I hereby declare that I have read this project report and found this project report is sufficient in term of the scope and quality for the award of Bachelor of [Computer Science (Computer Networking)] with Honours.

SUPERVISOR: Date: 4/9/2021

(TS. DR. NAZRUL AZHAR BIN BAHAMAN)

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.

In memory of

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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 dicetuskan. 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.

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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**

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

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.