Faculty of Electrical and Electronic Engineering Technology

A DEVELOPMENT OF PLANT WATERING DEVICE USING SOLAR ENERGY WITH MICROCONTROLLER

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Bachelor of Electronics Engineering Technology with Honours

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A DEVELOPMENT OF PLANT WATERING DEVICE USING SOLAR ENERGY WITH MICROCONTROLLER

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I declare that this project report entitled “A Development Of Plant Watering Device Using Solar Energy With Microcontroller” is the result of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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APPROVAL

I hereby declare that I have checked this project report and in my opinion, this project report is adequate in terms of scope and quality for the award of the degree of Bachelor of Electrical Engineering Technology with Honours.

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DEDICATION

My dissertation is dedicated to my family and many friends. I am very grateful to my loving parents, En. Zulkifli and Pn. Azlina, whose words of support and push for persistence continue to ring in my ears. My precious brothers and sisters who have never left my side.

I also dedicate this dissertation to my numerous friends and family members who have been there for me throughout the process. I will be eternally grateful for everything they have done for me, especially my fellow friends who have assisted me in developing my technological abilities, as well as the many hours of proofreading and technical competence.

ABSTRACT

The watering plants using solar panel works on the principal of conductivity within the soil. The moisture content or wetness of the soil also plays a vital function in plant growth. As a result, it is critical to keep the moisture contained. The use of adequate watering systems, such as irrigation, is critical in the agricultural field since the major cause is a lack of rain and a scarcity of land reservoir water. To address agriculture sector irrigation system difficulties using available water resources, new technological technologies are being explored to allow agricultural automation to increase crop productivity. The project's goal is to reduce the agriculturist's manual intervention. The automated irrigation system will be used for the following purposes. The solar panels are estimated to generate at least 12W for the system to function. The microcontroller will be monitored using blynk application when the moisture of the soil is lower. The water pump will be controlled by using a smartphone to switched on or off. This system will be easily adjusted with the mobile application. As result, this system will be functioning independently and also reducing the consumption of energy.

ABSTRAK

Menyiram tumbuhan menggunakan panel solar berfungsi berdasarkan prinsip kelembapan tanah. Kandungan lembapan atau kebasahan tanah juga memainkan fungsi penting dalam pertumbuhan tumbuhan. Oleh itu, adalah penting untuk mengekalkan kelembapan yang terkandung. Penggunaan sistem pengairan yang mencukupi, seperti pengairan, adalah kritikal dalam pertanian kerana punca utama adalah kekurangan hujan dan kekurangan air takungan tanah. Untuk menangani kesukaran sistem pengairan dalam sektor pertanian menggunakan sumber air yang ada, teknologi teknologi baharu sedang diterokai untuk membolehkan automasi pertanian meningkatkan produktiviti tanaman. Matlamat projek ini adalah untuk mengurangkan campur tangan manual petani. Sistem pengairan automatik akan digunakan untuk tujuan berikut. Panel solar dianggarkan menjana sekurang-kurangnya 12W untuk sistem berfungsi. Kemudian mikropengawal akan memantau menggunakan aplikasi blynk apabila kelembapan tanah lebih rendah. Pam air boleh dikawal dengan menggunakan telefon pintar untuk menghidupkan atau mematikannya. Sistem ini akan disepadukan dengan mudah dengan aplikasi mudah alih. Akibatnya, sistem bukan sahaja akan berfungsi secara bebas tetapi mengurangkan penggunaan tenaga.

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δ	-	Voltage angle
	-	
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LIST OF ABBREVIATIONS

V	-	Voltage
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CHAPTER 1

INTRODUCTION

1.1 Background of study

Plants are essential for human survival and the survival of the entire world because they produce oxygen, which has been required for life on the planet from the beginning of time. The earth's surface is covered in luxuriant flora, regardless of location or area. Plants growing within or near a house help to filter the air. They were confirmed by NASA and the Associated Landscape Contractors of America (ALCA).

Planting without water irrigation may harm certain gardens, while over-watering will harm others much more. The problem is that owners utilize far too much water in their irrigation system, endangering their plants and gardens. Some gardeners harm their plants by just watering them once a week because they are too consumed with their daily activities. Some gardeners harm their plants by just watering once a day because they are too absorbed with their daily responsibilities. The plant must be adequately watered to remain productive. The key environmental demands for plant development, according to the previous researcher, include area and canopy, as well as physiologic processes for optimal temperature.

During the summer, the agriculturist's main concern is a day's water. Because water is so important in plant development, the agriculturist should have been implementing some modern agricultural technologies and equipment. Electricity plays an important role in agriculture. Solar energy will be used to supply more and efficient energy. Solar, which really is unlimited and continuous, may be harnessed by installing solar panels. Solar panels (an array of photovoltaic cells) are increasingly being applied to power streetlights, water heaters, and other household loads. Solar panels are becoming more affordable, which stimulates their application in several businesses.

The installation of solar panels is a one-time investment that requires little maintenance, which is a huge relief for agriculturists or farmers. As a result of the use of modern methods such as the automatic plant watering system in their farms, this new technology can keep the moisture content of the plants in good condition, which aids in the development of the plants.

In the existing energy situation, a solar high-powered irrigation may be a viable option for farmers. Water pumps that carry water from a bore well to a tank are powered by alternative energy in the autonomous irrigation system. The tank's output valve serves as an automated exploitation controller. A wet detector controls the flow of water from the tank to the irrigation area, therefore optimizing water utilization because our country ranks second in agriculture and has daylight all year, solar energy may be used for irrigation.

Renewable energy is perfect for use with irrigation systems in gardens, flats, greenhouses, and other settings. Improving irrigation capacity will drastically lower agricultural production costs, allowing for more effective demand-supply responsiveness. Using proper irrigation systems, average vegetable yields can be maintained or enhanced [1].

1.2 Problem Statement

Watering plants can be a problem if it is not properly done. If pore spaces in wet soils are filled with water, they have poor aeration. Poor design and planting procedures, such as inappropriate irrigation system functioning, can result in far more water in the soil. Moreover, a big challenge towards this solar photovoltaic power is when the unavailability of sunlight, means there is no light radiance to operate the solar panel. Meanwhile, there is still a demand for the supply either during the night or the changes of weather in days. Then, irrigation system relies on-grid electricity to supply the power. So far as all known, the irrigation system typically located far away in a rural or secluded area. Hence, the on-grid electricity supply cannot be depended anymore.

Thus, to solve the problem, the irrigation system must be equipped with an off-grid or standalone electrical generator. In this situation, solar energy as a renewable energy has taken an important role. This situation will lead to the implementation of solar energy storage which is battery or capacitor as a reserve in supply.

1.3 Project Objective

a) To analyze the saving energy by using smart watering system.

b) To design and develop a plant watering device using solar energy.

c) To evaluate the effectiveness of a plant watering device using solar energy developed in this project.

1.4 Scope of Project

To achieve the objective, several scopes were outlined:

a) The soil moisture sensor is used to check the moisture of the plant soil.

b) The solar panel is used for supplying electricity.

c) The type of microcontroller used in this project is NodeMCU ESP8266.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter discusses the related studies by other researchers about watering plants using solar system as a power source. In addition, this chapter also explains the overview of solar panels, microcontrollers, and moisture sensors. In comparison, this chapter also discusses a variety of previous related articles, works, and journals that relate to this project.

2.2 Overview of Existing Project System

This section will analyze some previous existing project implementation that has been applied related with this project system. Some great researchers have done their research in developing the best method to watering plants using solar.

2.2.1 Watering Plants using Solar System from a River

Solar energy may be converted into electricity in two ways: immediately after conversion or by storing the energy in an external battery. The second module would be made up of motors that would run on the electricity stored from the electric generator. The technique might be automated by incorporating a few sensors. Agriculture would be chosen, and moisture sensors would be set in the soil to constantly monitor the moisture level of the soil. If the moisture content fell below a certain level, the motors would automatically turn on and begin pumping water to the field. For this reason, we use a microcontroller. A microprocessor is used for this purpose, which monitors the sensors and controls the motors [2]. Figure 2.1 shows how the automatic watering plants system working.

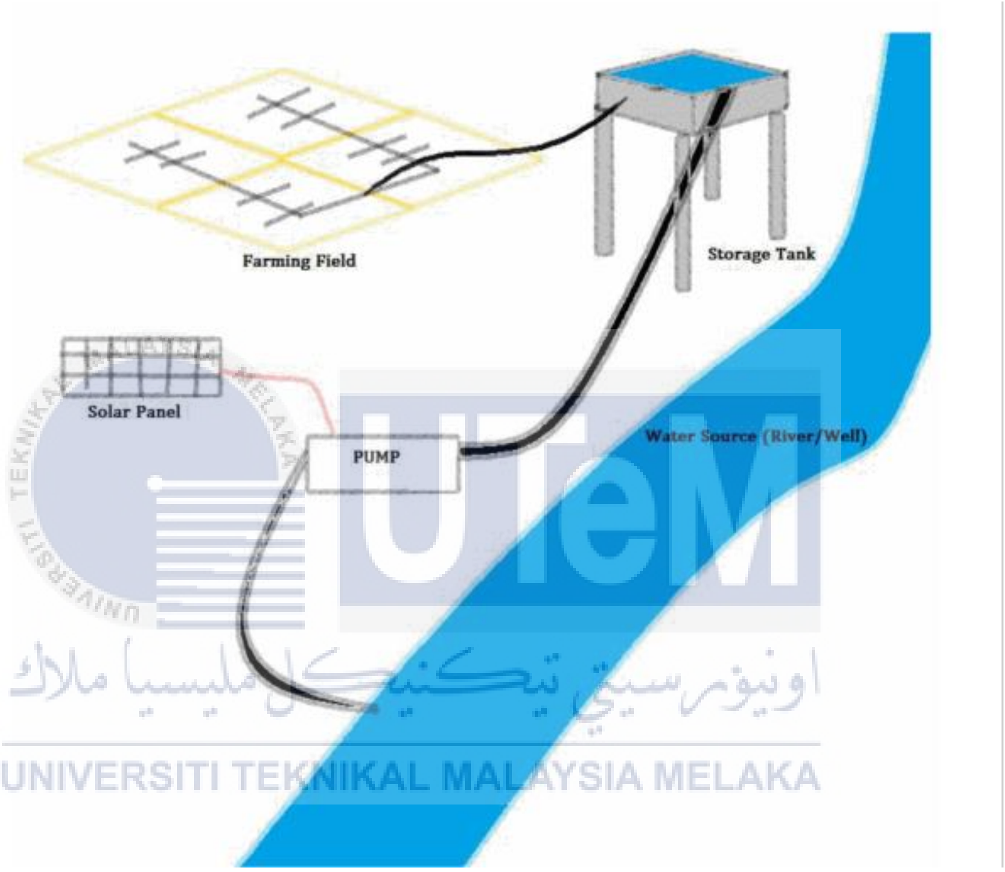

Figure 2.1 Sample of watering plants using solar system

The system architecture is designed with the community's geographical location and practicality in mind. There is a river that serves as the community's principal source of water and may also be utilized for agriculture. As previously noted, few farmers utilize diesel-powered pumps to obtain river water. So, using solar energy to replace this, we develop a motor system that draws water from the river and is powered by solar energy stored in a battery. This method can also be used to recover groundwater [2].

2.2.2 Solar water Irrigation System with Wireless Control

There are two types of PV-powered water pumping systems: battery-coupled and direct-coupled. In our study, the proposed pumping system is battery-linked because it presents a fee option by storing excess electricity generated. Rechargeable batteries PV water pumping systems are selected because they are used both during day and night without causing a power outage. In our work, we employ PV panels, a potential power regulator, batteries, an inverter, humidity sensors, a GSM module, a tank, and a water pump. The Pv systems are in charge of producing electricity and charging the battery. The pump uses batteries to move water from beneath to the surface.

Humidity sensors and a GSM module are put in agricultural fields for automation and wireless control in this project. The humidity sensor gathers data on soil humidity and sends it to the control room through the GSM module. Based on sensor data, the microcontroller automatically turns on or off the pump. The GSM modules also provide information to the farmer and keep him up to date on weather conditions [3]. Figure 2.2 shows the block diagram for produce solar water irrigation system.