



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

SMART GARDENING SYSTEM POWERED BY SOLAR

ENERGY

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

by

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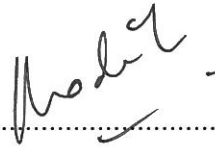
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APPROVAL

This report is submitted to the Fakulti Teknologi Kejuruteraan Elektrik dan Elektronik of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electrical Engineering Technology (Industrial Power) With Honours. The member of the supervisory is as follow:

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ABSTRAK

Sistem automasi telah digunakan dan diamalkan dalam sistem pertanian sejak 1990-an. Walau bagaimanapun, penggunaan sistem perkebunan rumah secara automatik masih berkurangan kerana orang ramai masih membimbangkan dan menerbalikkan hakikat bahawa sistem pengairan secara automatik dengan kos dan tenaga yang tinggi yang diperlukan untuk menghasilkan sayur-sayuran dalam jumlah yang besar dan penampilan yang baik. Mereka masih menggunakan kuasa tangan untuk menyiram dan mengairi tanaman. Projek ini dibangunkan untuk tujuan merancang sistem pintar bagi taman rumah, membina sistem berkebun pintar yang dikuasakan oleh tenaga suria dan menganalisis prestasi sistem berkebun pintar. Sistem ini disasarkan untuk kebun rumah yang berskala kecil untuk mengurangkan intervensi manusia dalam pengurusan dan penjagaan taman. Panel berasaskan matahari di bawah matahari boleh mengecas bateri sepanjang hari dan kemudian memberi kuasa bateri pam. Arduino UNO digunakan sebagai pengawal utama untuk memberi arahan kepada pam tenggelam air selepas sensor kelembapan tanah mengesan isipadu air yang lebih rendah di dalam tanah dan menghantar isyarat kepada komparator. Penyiraman manual menyediakan kelembapan yang tinggi apabila tumbuhan menyiram dan tahap kelembapan yang rendah apabila tumbuhan tanpa penyiraman. Voltan dan arus solar panel yang diterima adalah yang tertinggi pada sebelah petang. Penyiraman tumbuhan secara automatik menyediakan tahap kelembapan yang tetap dan sistematik. Secara ringkasnya, Sistem Pengendalian

Pintar yang dikuasai oleh Solar Energy dapat mengawal dan mengendalikan pengairan secara efisien dan berkesan untuk mengurangkan pembaziran air serta menghapuskan keperluan pengerjaan untuk jangka waktu penyiraman.

ABSTRACT

The automation system has been applied and practised in the farming system since the 1990s. However, the application of automation home gardening system still few as the people still concern on inverting the auto irrigation system to high cost and energy required to pursue a large number of vegetables with good yield and appearance. They still use the hand power to water and irrigate the plants. This project is developed for objective to design a smart system for the home garden, construct a smart gardening system powered by solar energy and analyse the performance of the smart gardening system. This system is targeted for small scale of home gardening in order to reduce the human intervention to manage and care of the garden. The sun-based panel under the sun can charge the battery all day and then the battery powers the pump. Arduino UNO is utilized as the main controller to give the command to the water submersible pump after the soil moisture sensor detects the lower volume of water in the soil and send the signal to the comparator. The manual watering provides a high level of moisture when the plant is watering and low level of moisture when the plant without watering. The voltage and current of the solar panel received is the highest in the afternoon. The automatic watering of the plant provides a regular and constant level of moisture. Conclusively, Smart Gardening System Powered by Solar Energy can control and manage the irrigation efficiently and effectively in order to reduce the wastage of water as well as remove the requirement of workmanship for the watering intervals.

DEDICATION

I dedicate my treatise work to my beloved family and friends. A special recognition is delivered to my caring and loving parents, Mr. Tang Chok Ping and Mrs Chiu Mee Ing for their assistance towards me to complete my final year project.

I likewise devote this treatise to my companions and societies who have bolstered me all through the progress of this project. I will always appreciate for all their sacrifices and their time for managing me in this task, particularly Chong Wei Nin and Muhammad Fikri Bin Hamzah.

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LIST OF SYMBOLS

P	-	Power
V	-	Voltage, Volts
I	-	Current
V_{mp}	-	Voltage at maximum power point
%	-	Percent
μC	-	Microcontroller
A	-	Ampere
mA	-	Milli-ampere
MHz	-	Mega-Hertz
GHz	-	Giga-Hertz
L	-	Litre
min	-	Minute
m	-	Metre
W	-	Watt
mm	-	Millimetre
<	-	Less than
d	-	Distance
L	-	Length
W	-	Width
kB	-	Kilobyte
AH	-	Ampere hour

\pm	-	Plus-minus
$^{\circ}\text{C}$	-	Degree Celsius
ft	-	Feet
L/H	-	Litre per hour
+ve	-	Positive
\bar{X}	-	Average
n	-	Number of measurements