



DEVELOPMENT OF SMART ABLUTION SYSTEM PROTOTYPE

FOR SAVING WATER USING SOLAR PANEL



BACHELOR OF ELECTRICAL ENGINEERING TECHNOLOGY

(Industrial Automation & Robotics) WITH HONOURS

2020



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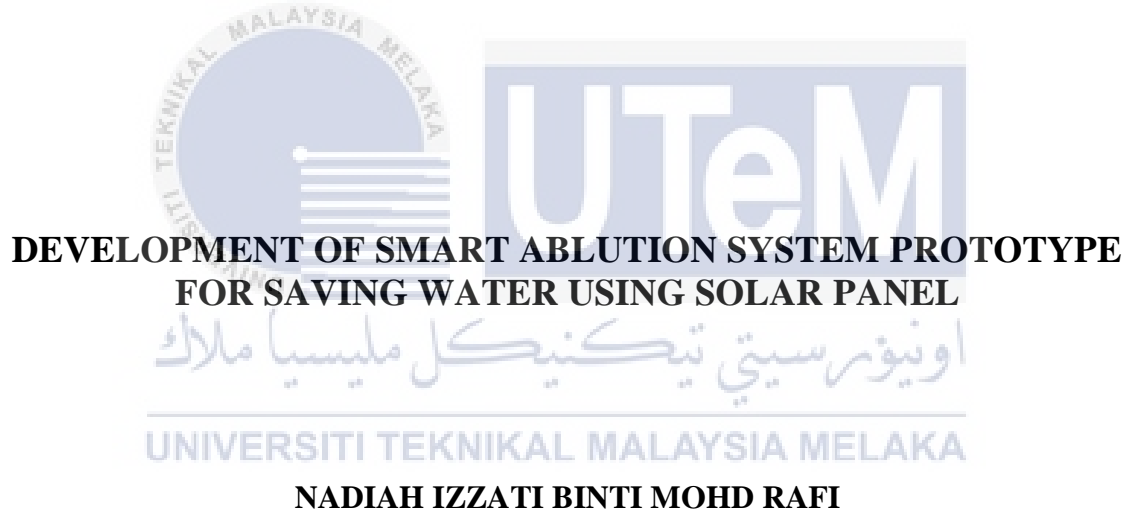


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**FACULTY OF ELECTRICAL AND ELECTRONIC
ENGINEERING TECHNOLOGY**



**DEVELOPMENT OF SMART ABLUTION SYSTEM PROTOTYPE
FOR SAVING WATER USING SOLAR PANEL**

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**BACHELOR OF ELECTRICAL ENGINEERING TECHNOLOGY
(INDUSTRIAL AUTOMATION & ROBOTICS) WITH HONOURS**

2020

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Tajuk: DEVELOPMENT OF SMART ABLUTION SYSTEM PROTOTYPE FOR
SAVING WATER USING SOLAR PANEL

Sesi Pengajian: 2019

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اونيورسيتي تيكنيكل مليسيا ملاك

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APPROVAL

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electrical Engineering Technology (Industrial Automation and Robotics) with Honours. The member of the supervisory is as follow:



ABSTRAK

Projek ini bertajuk “Pembangunan Sistem Wuduk Pintar untuk Menjimatkan Air Menggunakan Panel Suria”. Kekurangan masalah air di Malaysia terutama Selangor menunjukkan bahawa bekalan air yang berterusan tidak terjamin walaupun Malaysia mempunyai kadar hujan yang tinggi. Masalah ini membantu idea mencadangkan projek ini. Oleh itu, projek ini membangunkan sistem wuduk pintar untuk menjadikan sebelum berwuduk dan selepas berwuduk lebih menjimatkan. Pembaharuan projek ini adalah mengenai automasi sistem pengaliran air menggunakan panel suria sebagai sumber tenaga. Projek ini bertujuan untuk menjimatkan sumber air dan melaksanakan penggunaan tenaga yang boleh diperbaharui seperti suria. Untuk memenuhi keperluan projek ini, sistem wuduk pintar menggunakan paip air automatik dan sistem untuk mengguna semula lebih air wuduk. Komponen utama yang digunakan dalam projek ini ialah panel suria yang digunakan sebagai sumber tenaga untuk sistem ini dan sensor ultrasonik yang dapat mengesan kehadiran tangan dan kaki. Penyelidikan telah dilakukan untuk menentukan fungsi dan kemampuan panel suria serta sensor ultrasonik. Pengguna mesti meletakkan tangan atau kaki mereka di bawah sensor ultrasonik untuk menggerakkan pam air DC untuk mengepam keluar air untuk aktiviti berwuduk.

ABSTRACT

This project is titled Development of Smart Ablution System for Saving Water Using Solar Panel. The lack of water problem in Malaysia especially Selangor shows that continuous supply of water is not guaranteed even though Malaysia has high rainfall. This problem aids the idea of proposing this project. Hence, this project proposed on developing smart abluion system to make it more water saving during abluion and after abluion. The novelty of this project is about automation of water flowing system with solar panel as power source. This project aims to save water resources and implemented the use of renewable energy like solar energy. In order to fulfil the requirement of this project, a smart abluion system with automated water tap and system for reusing the wastewater from abluion activities is built. The main components of developing this project such as solar panel that will be used as power source for the system and ultrasonic sensor that can detect the presence of hands and feet. The research has been done to determine the function and capability of solar panel and ultrasonic sensor. The users must put their hands or feet under the ultrasonic sensor in order to trigger the DC water pump to pump out the water for abluion activities.

DEDICATION

I dedicated my work to my beloved parents and also my sister, who have never left my side and very special. Thank you for showering me with your continuous love and devotion. It will always be remembered and kept in my heart. For my supervisor and lecturer, thank you for all the knowledge and support. Your patience, support and words of encouragement gave me enormous strength throughout the whole project. To all my friends, thank you for your advices, supports and motivations.



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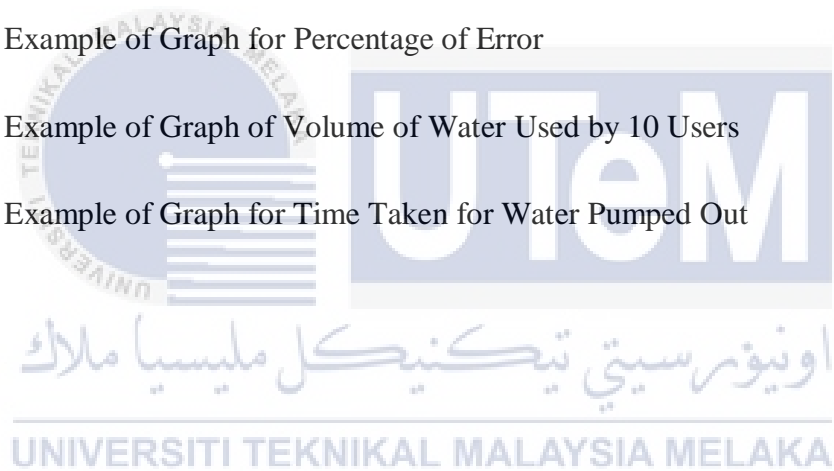
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LIST OF SYMBOLS

cm	-	Distance / Height
Mg/L	-	Concentration by weight of a substance per unit volume
L	-	Volume of water
V	-	Voltage
mA	-	Miliampere
W	-	Power
%	-	Percentage



LIST OF ABBREVIATIONS

COD	Chemical Oxygen Demand
TSS	Total Suspended Solids
TDS	Total Dissolved Solids
TN	Total Nitrogen



CHAPTER 1

INTRODUCTION

1.1 Introduction

This first chapter introduces the subject matter and problems being studied for Development of Smart Ablution System for Saving Water Using Solar Panel including project background, problem statement, objectives, and scope of the project. The problem statement is the problem related to the current issues and problems faced in everyday life while the objectives are the targets or purposes for this developing this project in solving the problems. The limitation in developing this project will also be discussed in this chapter.

1.2 Background

Development of Smart Ablution System for Saving Water Using Solar Panel is related to Muslims ritual activity in daily life which is ablution or also known as Wudhu'. Now days most people forgot that ablution also one of the sources of water waste because of excessive water usage during ablution. Ablution is the activity of washing selected parts of the body such as face and feet using clean water. Muslim men and women need to clean certain parts of the body in preparation for the prayers or other religious activity. The ablution activity usually carry out in a few minutes and large volume of water go to waste when only handfuls of water are collected and used at each step of the activity.

In most arid and semi-arid countries, the concern in reusing ablution wastewater has been enhanced due to the increase of water demand and water shortage. The wastewater from ablution need to be recycled and collected for another application to conserve and reuse our limited resources like water. It can also help us to be more responsible and wise person to save the water resources for our next generation. Early awareness about the importance of saving water is needed to guide us to be more committed and smart in using water in our daily life.

Wastewater produced from the ablution activity is nearly clean as it contains no solid contamination or soap. Since ablution activity does not cause the quality of water to deteriorate beyond judicious reuse. Hence by collecting this wastewater from ablution activity and channelling it to the storage tank, the water can be recycled and reused for another water application like one of the aims in this smart ablution system. The wastewater can be used indoor for flushing toilet bowls and general washing, while outdoor applications include irrigation of plant nurseries and car-washing.

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1.3 Problem Statement

In the beginning of this year, Malaysia especially in Klang Valley faced lack of water problem and resulted in the depletion of water level at Sungai Selangor dam. It shows that continuous supply of water is not guaranteed even though Malaysia has high rainfall. The lack of water problem in Malaysia concerned people in the whole country. Lack of treated water, increase in request from time to time and suspension of capex programmes for example like maintenance work, upgrading or changing of asset and the

current water distribution can extend these problems. The country is heading towards a water crisis due to rising demand, unmatched water supply, less management for wastewater and bigger population. So from this current issue, the Development of Smart Ablution System for Saving Water Using Solar Panel can help to reduce shortage of water and save the water resources.

1.4 Objectives

The objectives of this project consist of these three targets which are:

1. To develop a smart abluion system prototype for saving water using solar panel.
2. To design a reusing wastewater system for reuse the abluion water residue.
3. To analyze the effectiveness of the proposed method for the smart abluion system.

1.5 Scope

The project is focused on developing the prototype requirement that had translated based on industry revolution 4.0 categories which is system integration for community needs. In general, the abluion system consists of automatic water tap, abluion wastewater collection in collection bay and delivering the water for another application. The source energy for all the system like automated water tap and water pump is using solar energy from solar panel that been converted to electrical energy and stored in a battery as source of energy for the system. The primary source of water is the abluion area, where wastewater from the abluion is collected in the collection bay. Once the water flowed into collection bay, the water will be collected in the collection bay and the water will flow out from the collection bay when the water tank is considered full and distributed for other