POLITEKNIK MELAKA

ECO - WUDU' : SUSTAINABLE WATERING SYSTEM BY USING WUDU' WATER

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(11DKA23F1026)

JABATAN KEJURUTERAAN AWAM

SESI I :2025/2026

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Laporan ini dikemukakan kepada Jabatan Kejuruteraan Awam
sebagai memenuhi sebahagian syarat penganugerahan
Diploma Kejuruteraan Awam

JABATAN KEJURUTERAAN AWAM

SESI II :2024/2025

AKUAN KEASLIAN DAN HAK MILIK

ECO-WUDU': SUSTAINABLE WATERING SYSTEM BY USING WUDU WATER

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2. Saya mengakui bahawa 'Projek tersebut di atas' dan harta intelek yang ada di dalamnya adalah hasil karya/reka cipta asli kami tanpa mengambil atau meniru mana-mana harta intelek daripada pihak-pihak lain.

3. Kami bersetuju melepaskan pemilikan harta intelek 'Projek tersebut' kepada 'Politeknik tersebut' bagi memenuhi keperluan untuk penganugerahan **Diploma Kejuruteraan Awam** kepada kami.

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CHAPTER 1
INTRODUCTIONS

1.1 INTRODUCTION

Water is an important part of our daily life and using it efficiently is really important to avoid wastage. Despite being an essential resource, water is often wasted in many ways. One example is wudu water, which is usually thrown away after use. In fact, this water can still be useful, for example, to water plants and help the environment. This project focuses on creating an automated plant watering system that uses recycled wudu water. By doing this, it is hoped that the community will become more aware of the importance of saving water and adopt better water-saving habits.

One of the main challenges in this project is the limited availability of equipment,which can affect how smoothly the system works. To address this, the system is designed to be low-cost, eco-friendly and efficient. Making it feasible even with minimal resources. The system uses a soil moisture sensor that detects when the soil is dry and automatically waters the plants only when needed. This ensures that water is used efficiently and reduces unnecessary wastage while also promoting a sustainable approach to irrigation.

1.2 BACKGROUND OF STUDY

Excessive water usage and wastage of clean water have become major concerns in daily life especially in areas experiencing water shortages. In Malaysia, it is estimated that an average person uses about 2–3 litres of water for each ablution (wudu), and since wudu is performed several times a day, the total daily wastage can reach up to 10 litres per person. Despite being clean and usable, wudu water is often discarded without being reused. This highlights the importance of finding practical ways to

recycle wudu water for beneficial purposes, such as plant irrigation.

This project aims to develop an automated plant watering system that collects and redistributes recycled wudu water to plants automatically based on soil moisture levels. By doing so, water wastage can be significantly reduced while promoting water recycling and environmental sustainability.

This study also has considers technological aspects and the efficiency of the developed system. Previous research has shown that utilizing recycled water for irrigation not only conserves water but also raises awareness about sustainable practices within communities. Therefore, this study aims to demonstrate the potential benefits for the environment and serve as a model for sustainable water management in mosques, prayer halls, and institutions where wudu is performed frequently.

1.3 PROBLEM STATEMENT

The core challenge addressed by this project is the substantial and unnecessary wastage of clean water during the ritual of wudu (ablution) at Surau Ar-Raudhah, Politeknik Melaka. A regrettable amount of water is consistently lost because the taps are often left running, resulting in a continuous flow even when users are not actively washing. This issue escalates significantly during peak prayer times, when the high volume of consecutive users performing wudu translates directly into a massive, avoidable drain on water resources. This inefficiency not only impacts the environment and raises the Surau's utility costs but, more profoundly, runs contrary to the fundamental Islamic principle of avoiding Israf (excess and wastefulness), a teaching that emphasizes conservation even when resources seem plentiful.

Further complicating this issue is the current manual and inefficient approach to watering the Surau's landscape. The clean municipal water, which is a valuable resource, is currently being used by hand to irrigate the plants and garden areas. This method is both laborious, requiring significant time and effort from personnel, and highly inefficient in its water delivery. Therefore, an urgent need exists to implement a sustainable and practical solution that addresses both areas of inefficiency

simultaneously. By developing a system to collect and recycle the used wudu water—a resource currently going to waste and directing it to a more efficient irrigation process, this project can champion both environmental sustainability and responsible water stewardship within the Politeknik community.

1.4 RESEARCH OBJECTIVES

This study aims to develop an automated irrigation system using recycled wudu' water to reduce water wastage and promote water recycling practices within the community. Through this project, the effectiveness of the system in optimizing water usage and supporting environmental sustainability will be evaluated. The main objectives of this study are as follows:

1.) To design and develop an automatic irrigation system using recycled wudu water.

2.) To evaluate system performance through soil moisture measurement

1.5 **SCOPE OF PROJECT**

This project specifically focuses on demonstrating the potential reuse of wudu water for plant irrigation, highlighting the principles of sustainability and efficient water management. The study involves direct observation, data collection, and analysis to thoroughly evaluate the functionality, feasibility, and practical benefits of repurposing wudu water.

The scope of this study is intentionally limited to a small-scale implementation and prototype testing at Surau Ar-Raudhah, Politeknik Melaka. Crucially, the technical scope is restricted to a low-cost, simplified system and utilizing components such as a 12V pump and an Arduino Uno for basic automation and control. The system is tested under controlled conditions to ensure its practicality and immediate usability without relying on complex filtration or purification technologies. Furthermore, this project does not include scientific testing of water quality (e.g., pH, bacterial content) or the development of large-scale recycling methods. Ultimately, this study aims to provide realistic and actionable insights that support practical water conservation efforts in everyday institutional settings where wudu is frequently performed.

1.6 SIGNIFICANCE OF STUDY

This study provides a practical and highly relevant solution by transforming wudu water, which is typically discarded, into a valuable resource for plant irrigation, thereby maximizing its utility and promoting efficient water management. The project's core contribution is the implementation and demonstration of a small-scale automated system. By utilizing readily available and cost-effective technology, such as a 12V pump and an Arduino Uno, the study effectively highlights how simple technological innovations can successfully support sustainable water usage within institutional settings, especially those where the ritual of wudu is performed frequently.

The findings hold significant potential for inspiring wider community adoption of simple water recycling practices, providing a tangible blueprint for mosques, schools, and community centers. This widespread adoption fosters environmental responsibility and raises crucial awareness about water conservation. Furthermore, the study emphasizes a profound social impact, proving that simple, low-cost innovations are sufficient to encourage communities to develop and maintain eco-friendly habits. Ultimately, the outcomes of this research will serve as a valuable and actionable reference point for future sustainable resource management initiatives, contributing realistic and implementable solutions to environmental conservation in everyday life.

1.7 SUMMARY

Chapter 1 is giving a general overview of the study. It has focusing on the development of an automated plant irrigation system that utilizes recycled wudu' water. This chapter has been starts by introducing the issue and problem of water wastage and highlight the potential of reusing wudu' water of supporting the sustainable water management practices.

The problem statement outlines is the main challenges in irrigation system such as the shortage of staff for manual watering, the lack of equipment and the need for a more efficient watering system. To address these problems, the study has proposes an automated system equipped with a soil moisture sensor also aiming to optimize the water used and minimize the wastage.

The objectives of this research include designing and developing an effective way for irrigation system by reducing water wastage and encouraging environmental sustainability. This study is expected to offer a several benefits such as improved irrigation efficiency, reduced reliance on manual labor and greater awareness of water conservation practices.

Furthermore, the significance of this study is highlight the particularly of promoting a sustainability efforts and showcasing the practical use of recycled wudu' water in places like mosques, prayer rooms, and others.

In summary, Chapter 1 sets the best groundwork for the research by clearly defining the study's aims, objectives, and significance. It's providing a solid foundation for the next stages of investigation and system development.