



FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL ENGINEERING

FINAL YEAR PROJECT REPORT

**DESIGN OF SMART RAIN WATER HARVESTING CONTROL AND TREATMENT
SYSTEM FOR SAFE DRINKING WATER**

CASE STUDY: BUSITEMA UNIVERSITY

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*A FINAL YEAR PROJECT REPORT SUBMITTED TO THE FACULTY OF ENGINEERING AND TECHNOLOGY IN
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ABSTRACT

Scarcity and contamination pose significant challenges to sustainable development, necessitating innovative solutions for efficient water management. This project focuses on the design of a smart rainwater harvesting, control, and treatment system, incorporating real-time monitoring and thermal treatment. A review of existing technologies highlights the effectiveness of sensor-based automation, thermal sterilization, and filtration in improving water quality. The system is developed using water level and quality sensors, an Arduino Mega microcontroller, heating elements, and a filtration unit, with data displayed on an LCD and logged for analysis. The methodology involves testing the system's response to varying water quality parameters, with temperature thresholds optimized for microbial elimination. Results demonstrate a significant water improvement in water purity post-treatment, with efficiency exceeding 80% in most trials. The economic analysis confirms the system's feasibility, with a projected payback period of less than four years. This solution presents a scalable and cost-effective approach to enhancing water security in urban and rural environments. (rainwatermanagemen, 2025).

DEDICATION

I dedicate this report to my parents who have always supported me in every step I take and continuously encouraged me through various situations I also extend this dedication to my fellow classmates who challenged me to broaden my knowledge and improve the quality of this project.

Finally, with deep appreciation. I dedicate this work to the staff and department of electrical and electronics engineering, Busitema University, for granting us the opportunity to undertake innovative projects and supporting me in successful execution of this final year project

ACKNOWLEDGEMENT

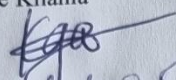
I take this opportunity to thank the almighty GOD for the gift of life, good health and the ability to research and gather information that is integrated in this report

I am deeply indebted to my dear supervisors: Mr: George Kilama and Ms: Patience Tusiimire for the time, support, guidance, knowledge, and advice provided to me. May the almighty reward you abundantly.

APPROVAL

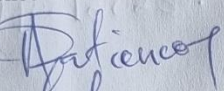
This is to approve that this report is submitted by Mukasa Nasuru to the department of electrical engineering, Busitema university, in partial fulfillment of the requirement for the award of a diploma in electrical and electronics engineering under supervision of

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Date: 28/10/2025

DECLARATION

I Magezi Aziizi declare that this final year project proposal report is my own research work and has not been previously submitted to any institution of higher learning for any kind of award to be achieved

Signature *Magezi*

Date 6 / 6 / 2025

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LIST OF ACRONYMS

LCD>Liquid Chrystal display

LED>Light emitting diode

SDW>Safe drinking water

RTMS>Real time monitoring sensor

Ph>Potential hydrogen

TDS>Total dissolved solids

WHO>World Health Organisation

UV>Ultraviolet

RWH>Rain water harvesting

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