

**BUSITEMA
UNIVERSITY**
Pursuing Excellence

**FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF COMPUTER ENGINEERING AND
INFORMATICS**

**FINAL YEAR PROJECT REPORT
AUTOMATED DUST CLEANING ROBOTIC ROVER**

BY

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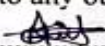
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**This Final Year Project Report submitted to the Department of
Computer Engineering and Informatics in a partial fulfillment of
the requirement for the award of the degree of Bachelor of
Science in Computer Engineering of Busitema University**

MAY, 2025

DECLARATION

We, AJOKA PRISCILLA PEACE and MUSINGUZI MUSHARRAH declare that this final year project report is our original work and has never been published or submitted for any other degree award to any other university or institution of higher learning for any academic award.

Signature: 

Date: 20th 05 2025

Signature: 

Date: 20th 05 2025

APPROVAL

This is to certify that this project report was carried out under my supervision. It is now ready for submission to the Board of Examiners of Busitema University with my due approval.

Signature

Date... 28/05/2025

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DEDICATION

We dedicate this project report to God Almighty/Allah, and to our parents for their unwavering support and encouragement throughout our academic journey. Special thanks also go to our supervisor who guided and rendered us great support through this journey.

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We would like to express our deep gratitude to Allah/God for blessing us with good health, wisdom, knowledge, and guidance throughout our academic journey. We are also thankful to the administration, staff, and our colleagues who has made the academic experience conducive. Furthermore, we extend our sincere appreciation to our project supervisor for his valuable time, guidance, expertise, and hospitality during our final year project. Special thanks also go to the entire community at Busitema University's Department of Computer Engineering for imparting knowledge, guidance, and skills that have enriched our learning experience.

We are grateful to our peers with whom we have exchanged ideas and shared experiences, contributing significantly to our personal and academic growth.

ABSTRACT

The increasing demand for convenient and efficient household maintenance solutions necessitates automated cleaning devices. This project presents the development and design of an automated dust cleaning robot, enhanced with a mobile application for remote control. The robot utilizes an ultrasonic sensor for intelligent navigation and obstacle avoidance within its environment. A dedicated dust sensor identifies areas requiring cleaning by detecting dust concentration levels. Upon detecting dust, a suction pump is activated to efficiently collect and store debris. Furthermore, a companion mobile application allows users to remotely control the robot's movement, initiate cleaning cycles, and monitor its status. This integrated system enables both autonomous and user-directed cleaning operations. The combination of ultrasonic and dust sensing for automated cleaning, the suction mechanism for debris collection, and the mobile app for remote interaction provides a versatile and user-friendly solution for automated floor maintenance. This design offers a hands-free approach with added control and monitoring capabilities, improving convenience and efficiency in maintaining clean floor surfaces across various environments.

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LIST OF ACRONYMS

AI: Artificial Intelligence

API: Application Programming Interface

CNN: Convolutional Neural Network (a type of deep learning algorithm)

CPU: Central Processing Unit

CSA: Canadian Standards Association

GPS: Global Positioning System

GPU: Graphics Processing Unit

GUI: Graphical User Interface

HVAC: Heating, Ventilation, and Air Conditioning

IMU: Inertial Measurement Unit

IoT: Internet of Things

IR: Infrared

LIDAR: Light Detection and Ranging

MEMS: Micro-Electro-Mechanical Systems

ML: Machine Learning

MLP: Multilayer Perceptron (a type of neural network)

PM2.5: Particulate Matter less than 2.5 micrometers

Roomba: Robotic Operating Base Model Autonomous

ROS: Robot Operating System

SLA: Service Level Agreement

SLAM: Simultaneous Localization and Mapping

UL: Underwriters Laboratories

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