BUSITEMA UNIVERSITY
Pursuing Excellence

P.O. Box 236, Tororo, Uganda
Gen: +256 - 45 444 8838
Fax: +256 - 45 4436517
Email: info@adm.busitema.ac.ug
www.busitema.ac.ug

FACULTY OF ENGINEERING

DEPARTMENT OF CHEMICAL AND PROCESS ENGINEERING

FINAL YEAR PROJECT REPORT

DEPARTMENT OF CHEMICAL AND PROCESS ENGINEERING

MAIN PROJECT TITLE: DEVELOPMENT OF AN ARDUINO CONTROLLED REFRACTANCE WINDOW DRYER

SUB ASEMBLY: INDUSTRIAL DESIGN AND ESTHETICS

BY: JAKONY JEREMY

REG NUMBER: BU/UG/2017/20

SUPERVISOR: Mr. SHAFFIC SSENYIMBA

Email: jeremyjakony@gmail.com

Tel: +256 784 104 197/+256 754 491 704

A FINAL YEAR PROJECT REPORT SUBMITTED TO THE DEPARTMENT OF CHEMICAL AND PROCESS ENGINEERING IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF THE BACHELOR'S DEGREE IN AGRO-PROCESSING ENGINEERING OF BUSITEMA UNIVERSITY

DECLARATION

I **JAKONY JEREMY** declare to the best of my knowledge that work presented in this project proposal report is my own and has never been presented to any University or institute of higher learning for any academic award.

SIGNATURE: ……...

DATE: …….....

ACKNOWLEDGEMENT

My sincere thanks go to the Almighty God for giving me strength, good health, wisdom, and protection throughout the preparation of this work

A big thanks goes to my dear supervisor; **Mr. SSENYIMBA SHAFFIC,** for their selfless guidance, knowledge and encouragement given to me throughout coming up with the information in this report of this report.

Special honor goes to the lecturers of Agro-processing engineering for the theoretical and practical knowledge they have imparted in me throughout the during this time of pursuing the program.
May the gracious lord reward you all.

Finally, I thank all my friends and fellow project group members, that is Kyagera Musa, Machari Peter and Kibet Godwin for all the support and advice they have given me during my proposal report writing.

APPROVALS

This final year project proposal report has been submitted to the Department of Chemical and Process Engineering for examination with approval from the main project supervisor.

Mr. SSENYIMBA SHAFIC

SIGNATURE……

DATE……

DEDICATION

With great pleasure and gratitude, I would like to dedicate this report to my Father Mr. Oyirwoth Albert and my Mother Mrs. Oyirwoth Agnes for the great unimaginable contribution they have made towards my studies, mentorship in life.

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ABSTRACT

Reliance on low-level post-harvest handling technology in Uganda, is one of the key constraints to reducing postharvest losses and producing high value processed products that can fetch good prices not only locally but also in the export markets. Refractance Window Dryer (RWD) system, therefore, is one of the novels drying technologies that have been identified to reduce postharvest losses in Uganda. This technology has gained much attention for the production of quality dry products in powder form without affecting the nutrient content of the product and while maintaining the product's color and aroma. The purpose of the study was to develop and carry out a performance evaluation of a cost-effective RWD miniature that was focused on the functional aspect rather than the display aspect of the full-scale RWD machine. Using SolidWorks 2020 CAD software, the machine was simulated and meshed using the finite element method (FEM). The system was simulated and analyzed for stress, displacement simulated and meshed using the finite element method (FEM). The machine's throughput was 1 kg/hr at an evaporative energy of 171 kJ/kgH2O. The drying time was 55 minutes for mango pulp from 85% to 7 % MC wb at a pre-heating temperature of 95℃. The machine consumed 4.41 kWh while drying mango pulp. The machine's thermal efficiency was 23.81%. The machine was efficient, economically viable and a suitable unit for dehydrating moist materials for laboratory use (pilot-scale study) and medium-scale industries for drying of bio-products.