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REVIEWER'S REPORT

Manuscript No.: IJAR-59749

Title: An Integrative Design Approach for Adapting Open-Source Medical Devices to Resource-Limited Settings: Design, Local Manufacture and Technical Evaluation of the LAAFI-RESPIR Ventilator in Burkina Faso.

Recommendation:
Accept

Rating	Excel.	Good	Fair	Poor
Originality	Yes			
Techn. Quality	Yes			
Clarity	Yes			
Significance		Yes		

Reviewer's ID: JPR- 015

Detailed Reviewer's Report

Reviewer's Comment for Publication.

Acceptance Comment are mentioned below suitable for the paper titled "**An Integrative Design Approach for Adapting Open-Source Medical Devices to Resource-Limited Settings: Design, Local Manufacture and Technical Evaluation of the LAAFI-RESPIR Ventilator in Burkina Faso "**

Reviewer Comments: Accept

Reviewer Comments –

1. Introduction

The manuscript addresses a highly relevant and socially significant challenge concerning the adaptation of open-source medical devices for resource-limited healthcare settings. The study focuses on the limitations associated with the availability, manufacturing, maintenance and sustainability of medical equipment in low-income countries. The proposed integrative design approach provides a practical framework for contextualizing existing open-source technologies. The development of the LAAFI-RESPIR ventilator in Burkina Faso demonstrates the importance of locally driven engineering solutions. Overall, the introduction establishes a clear research motivation and highlights the practical significance of the study.

2. Literature Review

The manuscript provides a relevant foundation by considering open-source medical devices, frugal innovation, functional analysis and local manufacturing capabilities. The comparison of five existing open-source ventilator projects provides a meaningful basis for selecting an appropriate design solution. The study effectively connects existing technological developments with the specific operational and maintenance requirements of resource-constrained environments. The literature discussion supports the

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need for context-specific adaptation rather than direct replication of existing designs. The research offers a valuable contribution to the growing body of knowledge on sustainable and accessible medical technology.

3. Solution Approach

The proposed six-step design approach is systematic, practical and well structured. The selection of the OxyGEN project using five evaluation criteria provides a logical foundation for developing the LAAFI-RESPIR prototype. Functional analysis incorporates eleven additional constraint functions addressing manufacturing, maintenance, energy availability, safety and mobility. The integration of locally available materials, photovoltaic power and battery operation demonstrates the effectiveness of the proposed contextualization strategy. The approach is sufficiently detailed and reproducible to support its application in other resource-limited settings.

4. Results and Discussion

The experimental results demonstrate promising technical performance, with approximately 90% of the prototype manufactured using locally available materials. The ventilator achieves an adjustable respiratory rate of 12–45 breaths per minute and tidal volumes ranging from 419 to 645 ml. The reported coefficient of determination ($R^2 = 0.993$) indicates a strong linear relationship between the respiratory rate setting and actual performance. Furthermore, the low coefficient of variation and compliance with the specified MHRA tolerance demonstrate encouraging repeatability and measurement performance. The discussion appropriately identifies remaining functional requirements, including alarms, positive end-expiratory pressure and FiO_2 control, before proceeding towards preclinical evaluation.

5. Conclusion

The manuscript successfully demonstrates an integrative approach for adapting open-source medical technologies to resource-limited environments. The LAAFI-RESPIR ventilator represents a meaningful contribution to local manufacturing, frugal innovation and sustainable medical device development. The proposed methodology provides a reproducible framework that integrates technical design with local manufacturing and maintenance capabilities. The findings highlight the potential of locally manufactured medical equipment to improve technological accessibility in resource-constrained healthcare systems. The study is technically relevant, methodologically sound and contributes valuable practical insights to the field.

Overall, the manuscript meets the expected standards for publication and is recommended for acceptance.