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Solar-powered boost-fly back converter for efficient warehouse monitoring with flack droid

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ABSTRACT

Warehouses serve as essential infrastructure for storing a wide array of goods and are utilized by various entities. Implementing a sophisticated warehouse management system (WMS) represents a pinnacle of technological advancement. Effective warehouse maintenance is paramount, benefiting both consumers and producers alike. Typically, warehouses store items such as medicine, chemicals, food, and electronics, requiring controlled conditions of temperature and humidity. Monitoring these factors is essential to comply with regulations and maintain internal quality standards. This paper focuses on optimizing warehouse management to meet customer demands and streamline processes for packaging and production teams. Additionally, it proposes the integration of droid technology within warehouses to monitor the parameters and mitigate fire hazards, thereby enhancing the efficiency and safety of goods storage. This proactive approach not only ensures the integrity of stored products but also contributes to cost-saving measures within the warehouse. This paper introduces an innovative method to achieve a substantial increase in voltage output in a DC-DC converter while avoiding the need for excessively high duty ratios. The converter's operation is governed by a single pulse width modulation (PWM) signal, employing a fractional-order proportional-integral-derivative controller (FOPID) for regulating the power switch. By merging boost-forward-fly back (BFF) converter topologies, the design achieves a remarkable voltage gain. Moreover, the converter efficiently recycles energy stored in the leakage inductance of the coupled inductor, thereby reducing voltage stress and minimizing power losses and thus enhancing overall converter efficiency.

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1. INTRODUCTION

In various industrial sectors, warehouses play a critical role in storing goods and preventing damage to products by maintaining them in stock. Warehouse management encompasses receiving, tracking, and storing inventory, managing shipping, workload planning, and monitoring the movement of goods to prevent damages, which can result from poor management, electrical issues, or prolonged storage leading to product expiration. This study investigated the effects of minimization of errors and optimize productivity. While earlier studies have explored the impact of execution failures due to inadequate planning. An additional disadvantage of the conventional warehouse configurations is the lack of emphasis placed on multi-parameter monitoring. A warehouse environment monitoring and control information system is therefore necessary, and it must have features like affordability, user-friendliness, accurate measurement, remote auto monitoring, etc. Multi-parameter monitoring is essential for the warehousing environment. After the data are gathered and analyzed, regulations and controls must be made. But as of right now, manual parameter measurement is the primary means of monitoring the warehousing environment. Additionally, they are rarely able to perform multi-parameter monitoring and instead use a basic environmental monitoring system to gather parameter information. Thus, a solution leveraging a smart wireless monitoring system employing internet of things (IoT) and renewable energy source (RES) technologies is proposed here for warehouse environments. This advanced system aims to introduce flexibility and real-time adaptability to operational plans, ensuring their proper execution. By harnessing IoT and RES technologies, the system provides dynamic insights and optimization capabilities, enabling proactive decision-making and responsive adjustments to evolving warehouse conditions. Boost-forward-fly back (BFF) converter topology design is proposed to achieve a remarkable voltage gain. Also, they have not explicitly addressed its influence on the analytical modeling of photovoltaic (PV) modules for PV power systems. This encompasses the development of maximum power point tracking (MPPT) control algorithms aimed at extracting the maximum power output from PV systems amidst fluctuating insolation levels, temperature variations, and other environmental conditions. Furthermore, it involves the design and implementation of boost-fly back DC-DC converters to achieve super boost and double boost high-gain configurations, which are pivotal for system efficiency. The simulation of proposed topologies using MATLAB/ Simulink and subsequent experimental validation of simulated results are critical steps within this process.

2. METHOD

2.1. Literature review

Siddiqui *et al.* [1] provided a critical review of data warehouses in the context of warehouse management. This paper discussed the role of data warehouses in aggregating and analyzing operational data to support decision. Ramírez-Faz *et al.* [2] highlighted the use of IoT for real-time temperature monitoring in retail refrigerated cabinets. Sathya *et al.* [3] presented an intelligent warehouse monitoring system (WMS) utilizing IoT. This system provided real-time data on inventory levels, equipment status, and environmental conditions. Zhen and Li [4] provided a detailed examination of technologies transforming warehouse operations into smart environments. A novel approach using the boosted mutation-based Harris Hawks optimizer (BMHHO) was proposed by Ridha *et al.* [5] for parameter identification of single-diode solar cell models. Joseph *et al.* [6] described a robotic manipulator system equipped with computer vision and IoT technologies for automated material handling in warehouses. In 2019 [7] a significant contribution in the field of power electronics with their study on a switched-capacitor interleaved bidirectional converter tailored for super capacitors in electric vehicles (EVs) was presented. Zoleikhaei *et al.* [8] contributed to this domain with their study on the design and implementation of an interleaved switched-capacitor DC-DC converter for energy storage systems. A study focused on food waste prevention along the food supply chain, employing a multi-actor approach to identify effective solutions was presented [9]. Ashique and Salam [10] contributed to this field with their study on a high-gain, high-efficiency non-isolated bidirectional DC-DC converter featuring sustained zero voltage switching (ZVS) operation. A WMS was proposed to reduce the waste and improve the quality of the corn products [11]. In the year 2017 [12] proposed the high gain boost converter system to enhance the performance of the system. Recent studies [13]–[15] explored the integration of solar photovoltaic systems with hybrid energy storage in warehouse microgrids. Various studies [16]–[23] focused on the analysis and simulation of various topologies of DC-DC converters and approaches to improve the performance of the system. Kim and Park [24] discussed an IoT-based approach for managing warehouses, integrating sensor networks and radio frequency identification (RFID) technology to track inventory movement and optimize logistics operations. Patil *et al.* [25] contributed to this field with their study on an automated robot for warehouses utilizing image processing techniques. In the studies [26]–[30] detailed approach on tracking transport vehicles using a wireless sensor network (WSN) and energy yield simulations of interconnected solar PV arrays were presented.

2.2. Warehouse monitoring with flack droid

The proposed method in this study tended to have an inordinately higher proportion of monitoring warehouse operations to minimize wastage and ensure products are maintained in accordance with seasonal requirements. The warehouse monitoring system’s block diagram is displayed in Figure 1. The flack droid prevents the fire accident occurring inside the warehouse that may be caused due to improper maintenance or due to electrical problem. The flack droid is assembled on a platform with a thickness of 6 mm, in the front end of the platform it is shaped like arc so the flame sensor can cover the range of 180-degree. At bottom of the platform four DC motors with wheel are placed in each corner for the movement of the flack droid and a pair of batteries are placed at bottom to power up the flack droid. Flame sensors, smoke sensors, and fire alarms are part of a safety equipment that help the warehouse monitoring with flack droid in keeping our warehouses safe from fire accidents. A flame sensor is a device that can be used to detect presence of a fire source or any other bright light sources. DC powered pumps use direct current from motor, battery or solar power to move fluid in a variety of ways. A analytical model for PV module is made for a solar photovoltaic (SPV) power system and Perturb and observe MPPT control algorithm is introduced to maximize the PV system's power output in response to changes in temperature, insolation, and other environmental factors. Here, high gain for the DC-DC converter is achieved by the analysis, design, and implementation of boost-flyback DC-DC converters. The block diagram of the boost-fly back converter for the WMS based on SPV modules is displayed in Figure 2.

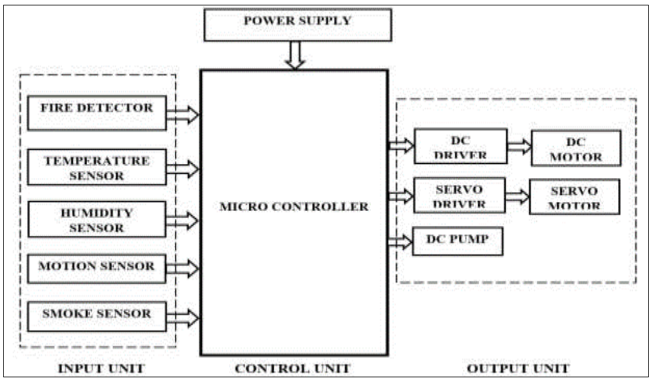

Figure 1. Block diagram of warehouse monitoring system

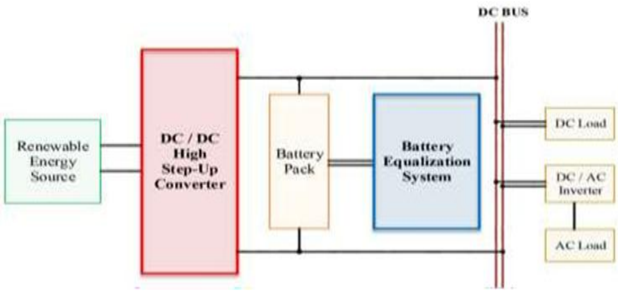

Figure 2. Block diagram of SPV module-based boost-fly back converter for warehouse monitoring system

2.3. Hardware description

The flowchart shown in Figure 3 depicts the operational flow of a Flack Droid system, starting with initialization where boot parameters are set to false and input/output components are specified. The main process involves a loop that checks if all tasks are complete, and if not, it proceeds through a series of decision points.

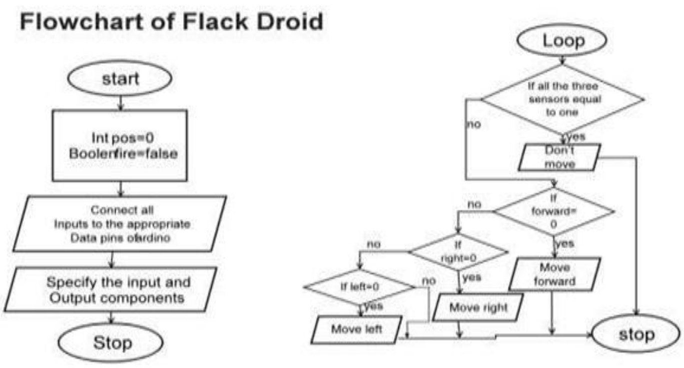

Figure 3. Flow chart of the flack droid

3. RESULTS AND DISCUSSION

3.1. Hardware and software realization of warehouse monitoring flack droid

The vital step in making sure a design complies with specifications is design verification. The concept of hardware design verification is discussed in this section, which also briefly discusses the various verification techniques and their advantages. Figures 4 and 5 shows the chassis platform and arrangement. At the top of flack droid all sensors and container are placed in proper position to maintain the center of gravity of the flack droid.

Figure 4. Top view of the chassis

Figure 5. Front view of the chassis

The flame sensor can detect the fire at a maximum range of 100 cm, with an angle of 60 degree. In our paper we placed three flame sensors in an arc design to detect the fire with the maximum angle of 180 degree. Figure 6 displays the flame sensor's schematic diagram. The flak droid moves independently in the direction of the fire after the flame sensor detects it. The droid stops when the fire zone is within three to five centimeters. The flame sensor produces an output in digital form, which is then sent to the Arduino board. The water pump activates in accordance with programming uploaded to the Arduino when the flak droid enters the fire zone. The water in the flak droids container keeps the fire from spreading and preserves water in the fire zone. Figure 7 displays the flame sensor output graphically.

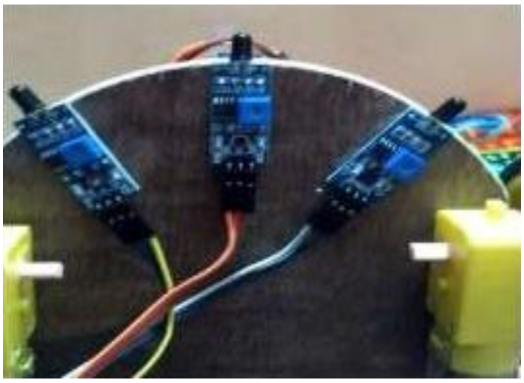

Figure 6. Schematic diagram of flame sensor

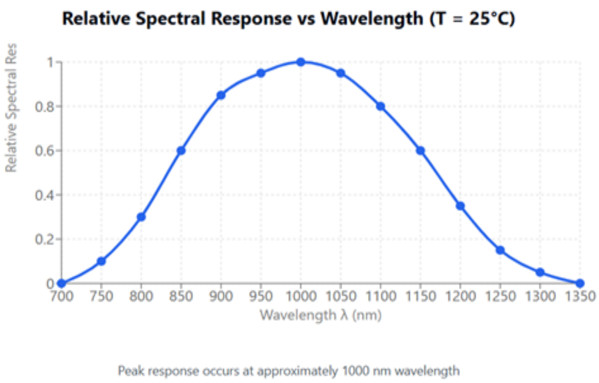

Figure 7. Flame sensor output graph

The software simulation is done in Proteus software. Here two simulations are done, first simulation is done for the flack droid and Figure 8 shows the simulation of warehouse parameters and second is for monitoring the warehouse parameters like temperature, humidity, and smoke sensor and Figure 9 shows the simulation of temperature and humidity sensor. Here the algorithm is used to get the tally to appropriate evaluation of the warehouse parameter to monitor the product in the warehouse. Linear regression and mean absolute error is used for getting the parametric values for monitoring the warehouse. The wastage caused in the warehouse can be reduced and the inventory of the warehouse can be obtained at any time.

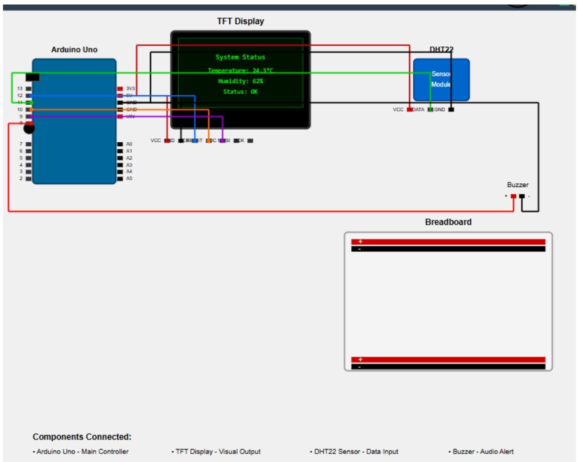

Figure 8. Simulation of warehouse parameters

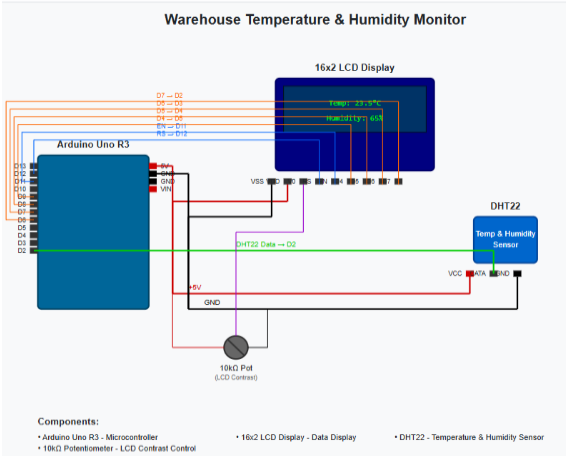

Figure 9. Simulation of temperature and humidity

3.2. Hardware implementation SPV based boost-fly back converter

The study explored a comprehensive approach that use boost fly back DC-DC converter using the FOPID controller is demonstrated. The Figure 10 gives the hardware implementation of fly back converter. Figure 11 gives the hardware output display of fly back converter. The efficiency comparison with and without controller is done and recorded. The Table 1 shows the comparison of Boost fly back converter with and without controller.

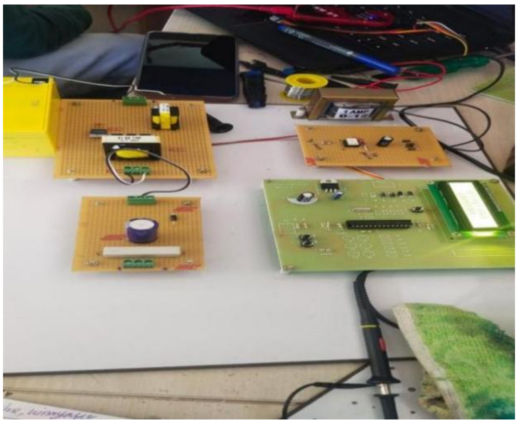

Figure 10. Hardware kit

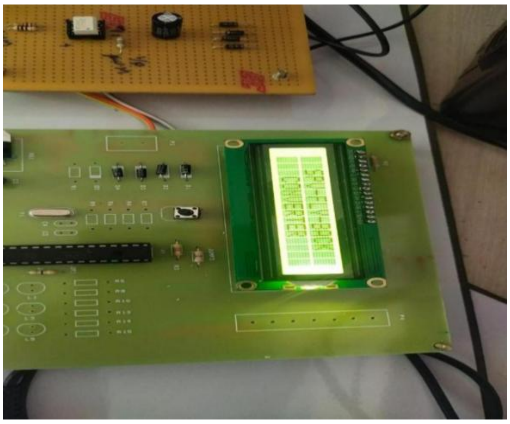

Figure 11. Output in display

Table 1. Comparison of the converter with and without controller

Switches	Without controller	With controller
Total losses	405	184
Output power	1,250 w	1,250 w
Input power	2,520	2,520
Battery power	1,051	1,051
Efficiency	84.2%	92.6%

3.3. Simulation results of SPV based boost-fly back converter

The simulation results are shown in Figure 12. For the simulation, solar PV module with the open circuit voltage of 18 V, short circuit current of 1 A and the output power of 18 W is considered. Battery storage system with the capacity of 1.6 kVA, 100 V, and 2 A is used. The output of solar with battery backup is shown in Figure 13. The results depict that the the proposed system provides better results even if the atmospheric variations are foreseen. However, the optimization algorithm may be incorporated to improve the performance of the system further.

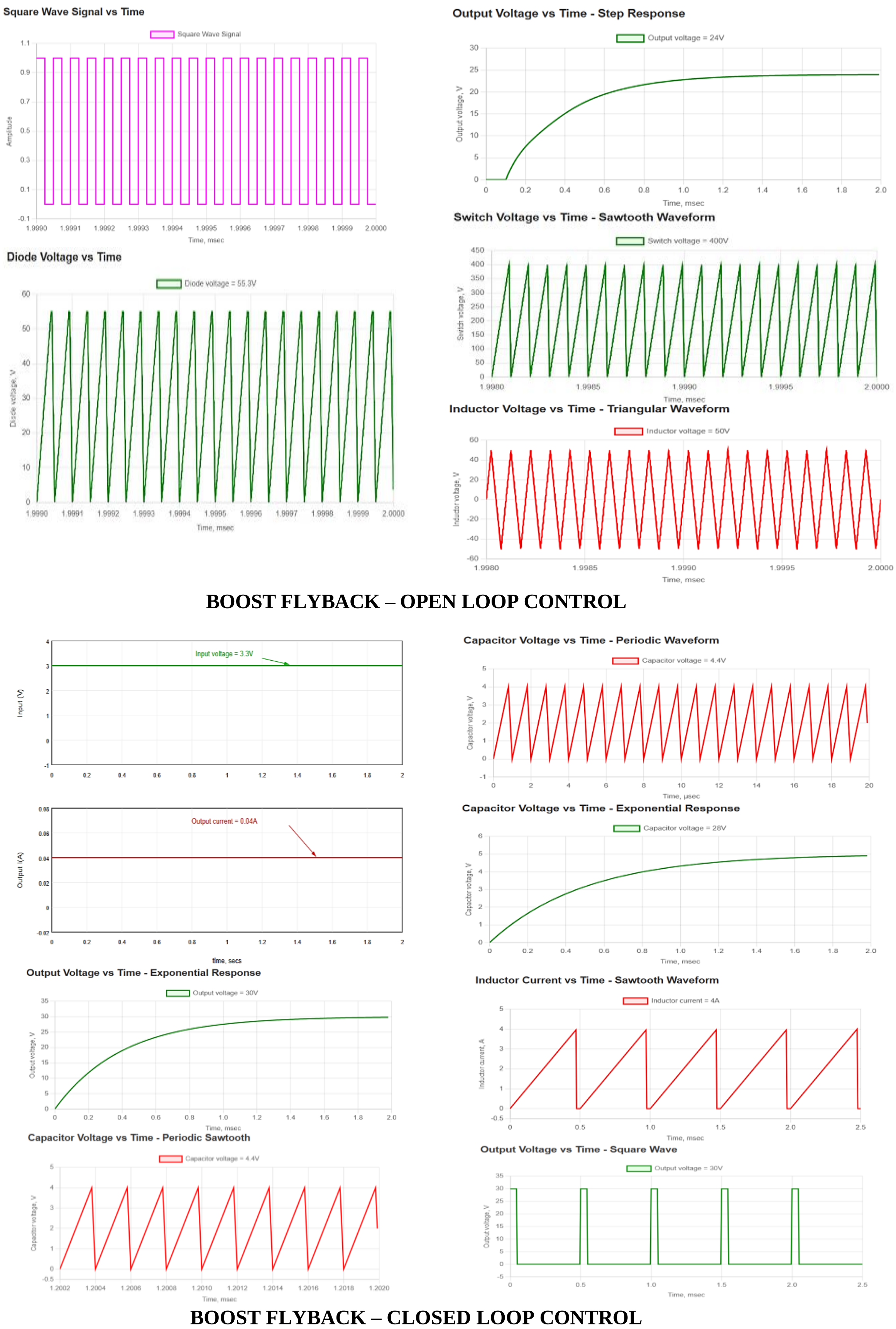

Figure 12. Simulation results

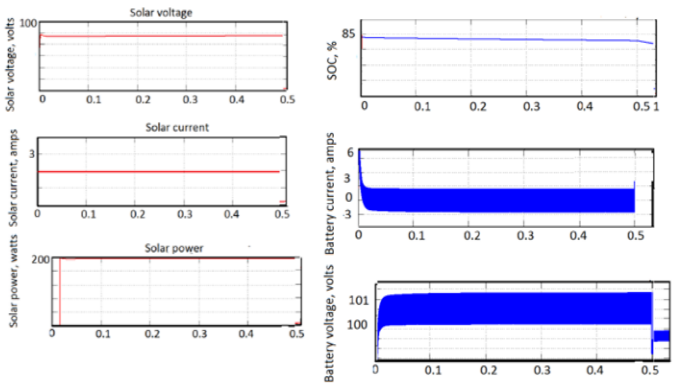

Figure 13. Output of solar with battery backup

4. IMPLICATIONS FOR FUTURE RESEARCH

With the development of technology, warehouse monitoring prospects for fire safety appear to be improving. Artificial intelligence, wireless networks, and sensor advancements have made it possible for fire alarms to identify fires earlier and with greater accuracy. Our paper demonstrates that in the event of a fire, this could minimize damage and preserve lives. Furthermore, there is a growing tendency in the field of fire alarm system integration's, which facilitates smooth communication with other safety systems in a building, such as access control, emergency lighting, and fire suppression.

5. CONCLUSION

Thus, by implementing the autonomous flak droid, authorized in charges shall reach the fire accident zone faster and shall eliminate the fire. The damage caused by the fire present in the warehouse shall be minimized. Automatic inventory of the warehouse will give information of the product that is present and not present. Our findings provide conclusive evidence that this phenomenon is associated with maintenance of the warehouse and the information about the product shall be obtained easily. Also, the coordinated control of a solar source integrated boost-flyback converter using an embedded controller brings several advantages to industrial applications. It enables efficient and reliable operation by seamlessly switching between power sources and regulating the output voltage. High step-up voltage gain is achieved without the need for an exceptionally high duty ratio by utilizing a new DC-DC converter. Using a FOPID for the power switch, a pulse width modulation (PWM) signal controls the converter. Boost, forward, and fly back components are integrated into the circuit construction. As a result, switches with low conduction resistance and low voltage rating are used to increase converter efficiency. A detailed analysis is made by the efficiency curves, theoretical analysis, experimental wave forms, and operating principles.

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This research was conducted as a self-initiated project without any external funding support. The work was motivated by personal interest and a desire to contribute to the existing body of knowledge. All resources, including equipment, materials, and time, were provided independently by the researchers. This autonomous approach allowed for complete creative freedom in methodology and research direction.

AUTHOR CONTRIBUTIONS STATEMENT

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
S. Sivajothi Kavitha	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓
D. Usha	✓		✓	✓	✓		✓			✓	✓		✓	✓
V. Jamuna		✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

The authors declare no competing interests or conflicts of interest in relation to this work. No financial support, grants, or funding were received from any organization or commercial entity for the conduct of this research. The authors have no financial relationships, consulting agreements, or business associations that could potentially influence the research outcomes or create bias in the interpretation of results. This work was conducted independently without any external pressures or obligations that might compromise the objectivity of the research findings.

DATA AVAILABILITY

Data availability is not applicable to this paper as no new data were created or analyzed in this study.

REFERENCES

[1] M. F. Siddiqui, R. Saxena, S. Gupta, and Tanya, "A critical review of data warehouse," *Internation Journal Of Advance Research And Innovative Ideas In Education (IJARIIE)*, vol. 8, no. 3, pp. 1765–1772, 2022.

[2] J. Ramírez-Faz, L. M. Fernández-Ahumada, E. Fernández-Ahumada, and R. López-Luque, "Monitoring of temperature in retail refrigerated cabinets applying IoT over open-source hardware and software," *Sensors*, vol. 20, no. 3, p. 846, Feb. 2020, doi: 10.3390/s20030846.

[3] R. Sathya, M. Thilagaraj, G. A. Francis, and R. Kottaimalai, "IoT based intelligent warehouse monitoring and alerting system," in *2023 International Conference on Sustainable Communication Networks and Application (ICSCNA)*, Nov. 2023, pp. 402–406, doi: 10.1109/ICSCNA58489.2023.10370588.

[4] L. Zhen and H. Li, "A literature review of smart warehouse operations management," *Frontiers of Engineering Management*, vol. 9, no. 1, pp. 31–55, 2022, doi: 10.1007/s42524-021-0178-9.

[5] H. M. Ridha, A. A. Heidari, M. Wang, and H. Chen, "Boosted mutation-based Harris hawks optimizer for parameters identification of single-diode solar cell models," *Energy Conversion and Management*, vol. 209, p. 112660, Apr. 2020, doi: 10.1016/j.enconman.2020.112660.

[6] A. Z. Joseph, R. Joseph, D. Harikrishnan, and A. P. Sudheer, "Automated warehouse material handling using 3-Dof robotic manipulator based on computer vision and IoT," *International Journal of Innovative Technology and Exploring Engineering (IJITEE)*, no. 8, pp. 2447–2453, 2019.

[7] Y. Zhang, W. Zhang, F. Gao, S. Gao, and D. J. Rogers, "A switched-capacitor interleaved bidirectional converter with wide voltage-gain range for super capacitors in EVs," *IEEE Transactions on Power Electronics*, vol. 35, no. 2, pp. 1536–1547, 2020, doi: 10.1109/TPEL.2019.2921585.

[8] A. Zoleikhaei, M. R. Banaei, and S. G. Sani, "Design and implementation of an interleaved switched-capacitor DC-DC converter for energy storage systems," *Journal of Power Technologies 99*, vol. 99, no. 1, pp. 1–9, 2019.

[9] R. Diaz-Ruiz, M. Costa-Font, F. López-i-Gelats, and J. M. Gil, "Food waste prevention along the food supply chain: a multi-actor approach to identify effective solutions," *Resources, Conservation and Recycling*, vol. 149, pp. 249–260, Oct. 2019, doi: 10.1016/j.resconrec.2019.05.031.

[10] R. H. Ashique and Z. Salam, "A high-gain, high-efficiency nonisolated bidirectional DC-DC converter with sustained ZVS operation," *IEEE Transactions on Industrial Electronics*, vol. 65, no. 10, pp. 7829–7840, 2018, doi: 10.1109/TIE.2018.2802457.

[11] Y. Chen and J. Wang, "A corn warehouse monitoring system based on IoT," *DEStech Transactions on Materials Science and Engineering*, no. mmme, 2017, doi: 10.12783/dtmse/mmme2016/10154.

[12] S. Sasikala and J. Venugopal, "Performance enhancement of photo voltaic system using ant colony optimization modus operandi with high voltage gain boost converter," *Journal of Computational and Theoretical Nanoscience*, vol. 14, no. 9, pp. 4406–4415, 2017, doi: 10.1166/jctn.2017.6753.

[13] S. Sinha, A. K. Sinha, and P. Bajpai, "Solar PV fed standalone DC microgrid with hybrid energy storage system," in *2017 6th International Conference on Computer Applications In Electrical Engineering-Recent Advances (CERA)*, Oct. 2017, pp. 31–36, doi: 10.1109/CERA.2017.8343296.

[14] G. S. Cheng, "A solar power microgrid with or without batteries," *North American Clean Energy*, vol. 8, no. 4, 2016.

[15] S. Bacha, D. Picault, B. Burger, I. Etxeberria-Otadui, and J. Martins, "Photovoltaics in microgrids: an overview of grid integration and energy management aspects," *IEEE Industrial Electronics Magazine*, vol. 9, no. 1, pp. 33–46, Mar. 2015, doi: 10.1109/MIE.2014.2366499.

[16] Y. Zhang, Y. Gao, J. Li, and M. Sumner, "Interleaved switched-capacitor bidirectional DC-DC converter with wide voltage-gain range for energy storage systems," *IEEE Transactions on Power Electronics*, vol. 33, no. 5, pp. 3852–3869, 2018, doi: 10.1109/TPEL.2017.2719402.

[17] G. R. Broday, C. B. Nascimento, L. A. C. Lopes, and E. Agostini, "Analysis and simulation of a buck-boost operation in a bidirectional ZVS DC-DC converter," in *2016 International Conference on Electrical Systems for Aircraft, Railway, Ship Propulsion and Road Vehicles & International Transportation Electrification Conference (ESARS-ITEC)*, Nov. 2016, pp. 1–7, doi: 10.1109/ESARS-ITEC.2016.7841431.

[18] E. I. Batzelis and S. A. Papathanassiou, "A method for the analytical extraction of the single-diode PV model parameters," *IEEE Transactions on Sustainable Energy*, vol. 7, no. 2, pp. 504–512, 2016, doi: 10.1109/TSTE.2015.2503435.

[19] M. Suthar, G. K. Singh, and R. P. Saini, "Comparison of mathematical mdels of photo-voltaic (PV) module and effect of various parameters on its performance," in *2013 International Conference on Energy Efficient Technologies for Sustainability*, Apr. 2013, pp. 1354–1359, doi: 10.1109/ICEETS.2013.6533584.

[20] G. Rohini and V. Jamuna, "Dynamic analysis of positive output super lift converter," in *2012 IEEE International Conference on Power Electronics, Drives and Energy Systems (PEDES)*, Dec. 2012, pp. 1–5, doi: 10.1109/PEDES.2012.6484493.

[21] J. R. Hernanz, J. C. Martín, I. Z. Belver, J. L. Lesaka, E. Z. Guerrero, and E. P. Pérez, "Modelling of photovoltaic module," *International Conference on Renewable Energies and Power Quality (ICREPQ'10)*, vol. 8, no. 1, Jan. 2010, doi: 10.24084/repqj08.619.

[22] M. G. Villalva, J. R. Gazoli, and E. R. Filho, "Comprehensive approach to modeling and simulation of photovoltaic arrays," *IEEE Transactions on Power Electronics*, vol. 24, no. 5, pp. 1198–1208, May 2009, doi: 10.1109/TPEL.2009.2013862.
[23] M. D. Rahman, M. N. Rabbi, and G. Sarowar, "Development of DC-DC converters – a review," in *2021 International Conference on Computational Performance Evaluation (ComPE)*, Dec. 2021, pp. 341–347, doi: 10.1109/ComPE53109.2021.9752028.
[24] J.-Y. Kim and D.-J. Park, "Internet-of-things based approach for warehouse management system," *International Journal of Multimedia and Ubiquitous Engineering*, vol. 11, no. 10, pp. 159–166, Oct. 2016, doi: 10.14257/ijmue.2016.11.10.15.
[25] V. Patil, K. Dighe, B. Landage, and V. Bhope, "Automated robot for warehouse using image processing," *International Journal of Engineering Research and*, vol. V5, no. 03, 2016, doi: 10.17577/ijertv5is030670.
[26] C. Rohrig and S. Spieker, "Tracking of transport vehicles for warehouse management using a wireless sensor network," in *2008 IEEE/RSJ International Conference on Intelligent Robots and Systems*, Sep. 2008, pp. 3260–3265, doi: 10.1109/IROS.2008.4650719.
[27] W. Xiao, W. G. Dunford, and A. Capel, "A novel modeling method for photovoltaic cells," in *2004 IEEE 35th Annual Power Electronics Specialists Conference (IEEE Cat. No.04CH37551)*, 2004, pp. 1950–1956, doi: 10.1109/PESC.2004.1355416.
[28] A. Woyte, J. Nijs, and R. Belmans, "Partial shadowing of photovoltaic arrays with different system configurations: literature review and field test results," *Solar Energy*, vol. 74, no. 3, pp. 217–233, Mar. 2003, doi: 10.1016/S0038-092X(03)00155-5.
[29] N. D. Kaushika and N. K. Gautam, "Energy yield simulations of interconnected solar PV arrays," *IEEE Power Engineering Review*, vol. 22, no. 8, pp. 62–62, Aug. 2002, doi: 10.1109/MPER.2002.4312475.
[30] B. I. Zisk, "New developments in automatic warehouse and material handling control," *IEEE Transactions on Industry and General Applications*, vol. IGA-6, no. 2, pp. 180–185, Mar. 1970, doi: 10.1109/TIGA.1970.4181159.

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