ICEAIST-24
International Conference on Exploring AI, IOT, Science & Technology-24
ESP Journal of Engineering Technology Advancements / ISSN: 2583-2646

Original Article

Back Stepping Algorithm Used By Electrical Vehicle Photovoltic Charge Controller

M. Sangeetha[1], K. Nageswari Rosy [2]
[1.] *Department of EEE , M.A.M. School Of Engineering, Siruganur (AUTONOMOUS),Trichy-621105.*
[2.] *Department of MATHAMATICS , M.A.M. School Of Engineering, Siruganur (AUTONOMOUS),Trichy-621105.*

Abstract: *The electric vehicles are widely used in transport system in present day. It is pollution less and cost effective transport method. The ultimate aim of the project is to design and development of solar charge controller for electric vehicle. The battery is the primary source of electric vehicle since the proposed method is to charge the battery properly by using back stepping algorithm. The pic16f877a microcontroller used to measure photo voltaic (PV) panel output and boost converter output and generate pulse width modulation (PWM) signal to control boost converter for proper charging of battery.*

Keywords: *Solar, Boost Converter, Pic16f877a and PWM.*

INTRODUCTION

The performance of smart charge controller system is used to extend the life time of battery for electric vehicle. When the battery energy is deficient then the energy is importing from solar PV panel. When the battery energy is excess then energy is exporting to the electric vehicle.

PROPOSED METHOD

The proposed system is uses pic16f877a microcontroller because it has built in analog to digital converter (ADC) and pulse width modulator (PWM). Generally the boost converter placed at the load side but in our proposed system uses boos converter in between solar PV array and battery. Because of the battery should charge properly for increases battery life.

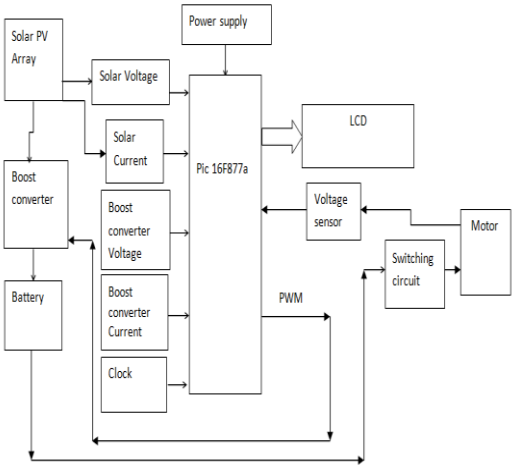

Fig.1. Block diagram of charge controller

The voltage and current sensor connected with ADC channel of Pic16f877a micro controller. The 16 character and 2 line alphanumeric display is used for monitoring the solar voltage, solar current, boost converter output voltage , boost converter output current. The Fig.1 shows the block diagram of proposed charge controller system. The Fig. 2 shows the circuit diagram of project. It has reset circuit, oscillator circuit, boost converter circuit, and LCD circuit.

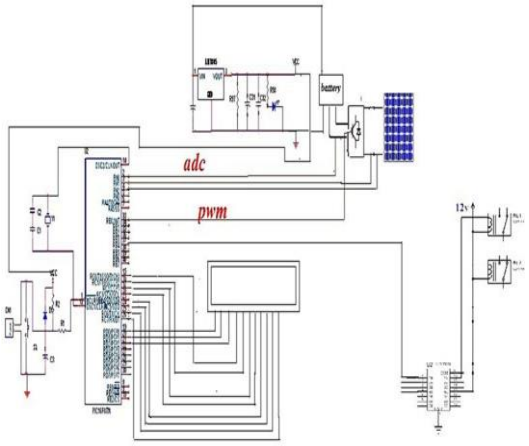

Fig.2. Circuit diagram of charge controller

The algorithm measures the error between output power and required power. The PWM adjust the boost converter output due to required power

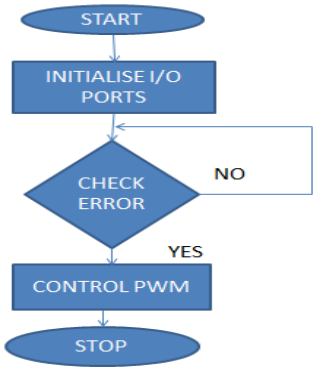

Fig.3. Flow of charge controller

$$I_{PV}=N_P I_{PV}-N_P I_S \exp\left(\frac{V_{PV}+R_S I_{PV}}{}\right)-1-N_P q\left(\frac{V_{PV}+R_S I_{PV}}{}\right)$$

Parameter	Name	Value
P_{MAX}	Maximum Power	100Wp
V_{mp}	Voltage at maximum power	18.7V
I_{mp}	Current at maximum power	5.39A
V_{OC}	Open circuit voltage	21.6V
I_{SC}	Short circuit current	5.87A
k_i	Temperature coefficient of I_{SC}	1.73mA/°C
n_s	Number of cells per module	60

ADVANTAGES

- It uses renewable energy source
- Less cost
- Emission less
- It completely reduces pollution.
- SIMULATION AND RESULT

- The simulation result of this concept is verified by proteus 8 professional software.

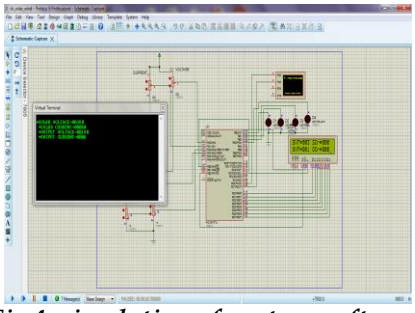

Fig.4. simulation of proteus software

The software has built in library for pic16f877a, LCD, serial terminal, analog and digital inputs/ outputs. The micro controller embedded c code is converted into .hex file format. The pot connected to the ADC channel for voltage and current analog input simulation.

Fig.5. experimental charge controller

The experimental hardware has same .hex file loaded into the pic16f877a. It has relay driver ic (ULN2003) for driving electromagnetic relay. The electromagnetic relay used for driving dc motor. The experimental hardware has 12V/2.5A battery with 6W solar panel.

CONCLUSION

The EV charging controller is proposed and its performance is analyzed by experimental output. The proposed controller examined the output power requirement of boost converter for proper charging. The back stepping algorithm is better to adjust the PWM for required output. The PWM is controls the boost converter for required output power.

REFERENCES

[1] Mauri G, Bertini D, Fasciolo E, Fratti S. The impact of EV's fast charging stations on the MV distribution grids of the Milan metropolitan area. In: 22nd International conference and exhibition on electricity distribution (CIRED 2013); 10–13 June 2013, pp. 1–3.

[2] Marra F, Traholt C, Larsen E, Qiuwei W. Average behavior of battery-electric vehicles for distributed energy studies. In: Innovative smart grid technologies conference Europe (ISGT Europe); 2010 IEEE PES, pp. 1–7.

[3] Messalti, S.; Harrag, A.; Loukriz, A. A new variable step size neural networks MPPT controller:Review, simulationandhardwareimplementation.*Renew.Sustain.EnergyRev.***2017**,*68*,221–233.

[4] Mhamed, F.; Mohamed Larbi, E.; Smail, Z. Hardware implementation of the fuzzy logic MPPT in an Arduino card using a Simulink Support Package for photovoltaic application.*IET Renew. Power Gener.* **2018**,*13*, 510–518.

[5] Reddy, K.J.; Sudhakar, N. ANFIS-MPPT control algorithm for a PEMFC system used in electric vehicle applications.*Int.J.HydrogenEnergy***2019**,*44*,15355–15369.

[6] Cicconi P, Germani M, Landi D. Analytical thermal model for characterizing a Li-ion battery cell. In: 27th International electric vehicle symposium & exhibition. Barcelona, Spain; November 17–20, 2013.

[7] Erdinc O, Vural B, Uzunoglu M. A dynamic lithium-ion battery model considering the effects of temperature and capacity fading. In: International conference on clean electrical power; 2009, pp. 383–86.

[8] Masoum A, Deilami S, Moses P, Abu-Siada A. Impacts of battery charging rates of Plug-in Electric Vehicle on smart grid distribution systems. In: Innovative smart grid technologies conference Europe (ISGT Europe). IEEE PES; 2010, pp.1–6.

[9] Putrus G, Suwanapingkarl P, Johnston D, Bentley E, Narayana M. Impact of electric vehicles on power distribution networks. In: IEEE vehicle power and propulsion conference VPPC2009, pp. 827–31.

[10] Naresh Kumar Miryala, Divit Gupta, "Data Security Challenges and Industry Trends" IJARCCE International Journal of Advanced Research in Computer and Communication Engineering, vol. 11, no.11, pp. 300-309, 2022, Crossref https://doi.org/10.17148/IJARCCE.2022.111160

[11] Akhilandeswari, P., George, J.G. (2014). Secure Text Steganography. In: Sathiakumar, S., Awasthi, L., Masillamani, M., Sridhar, S. (eds) Proceedings of International Conference on Internet Computing and Information Communications. Advances in Intelligent Systems and Computing, vol 216. Springer, New Delhi. https://doi.org/10.1007/978-81-322-1299-7_1

[12] Ashween. Ganesh, *Critical Evaluation of Low Ergonomics Risk Awareness among Early Product Development Stage of the Medical Device Industry*, pp. 15, 2022. | Google Scholar

[13] Kushal Walia, 2024. "*Accelerating AI and Machine Learning in the Cloud: The Role of Semiconductor Technologies*" *ESP International Journal of Advancements in Computational Technology (ESP-IJACT)* Volume 2, Issue 2: 34-41. | Google Scholar

[14] Julian, Anitha , Mary, Gerardine Immaculate , Selvi, S. , Rele, Mayur & Vaithianathan, Muthukumaran (2024) Blockchain based solutions for privacy-preserving authentication and authorization in networks, *Journal of Discrete Mathematical Sciences and Cryptography*, 27:2-B, 797–808, DOI: 10.47974/JDMSC-1956

[15] Sridhar Selvaraj, 2024. "*Futuristic SAP Fiori Dominance*" *ESP International Journal of Advancements in Computational Technology (ESP-IJACT)* Volume 2, Issue 1: 32-37. | Google Scholar

[16] Bhattacharya, S. (2024). Securing the Gatekeeper: Addressing Vulnerabilities in OAuth Implementations for Enhanced Web Security. *International Journal of Global Innovations and Solutions (IJGIS)*. https://doi.org/10.21428/e90189c8.af381673

[17] Venkata Sathya Kumar Koppisetti, "Automation of Vendor Invoice Process with OpenText Vendor Invoice Management," *International Journal of Computer Trends and Technology*, vol. 71, no. 8, pp. 71-75, 2023. Crossref, https://doi.org/10.14445/22312803/IJCTT-V71I8P111

[18] Sumanth Tatineni, Anirudh Mustyala, 2024. "*Enhancing Financial Security: Data Science's Role in Risk Management and Fraud Detection*" *ESP International Journal of Advancements in Computational Technology (ESP-IJACT)* Volume 2, Issue 2: 94-105.

[19] Arnab Dey, 2021. *"Implementing Latest Technologies from Scratch: A Strategic Approach for Application Longevity"* European Journal of Advances in Engineering and Technology, 2021, 8 (8): 22-26. | PDF

[20] Dhamotharan Seenivasan, Muthukumaran Vaithianathan, 2023. "Real-Time Adaptation: Change Data Capture in Modern Computer Architecture" ESP International Journal of Advancements in Computational Technology (ESP-IJACT) Volume 1, Issue 2: 49-61

[21] Chanthati, S. R. (2024). Artificial Intelligence-Based Cloud Planning and Migration to Cut the Cost of Cloud. Sasibhushan Rao Chanthati. American Journal of Smart Technology and Solutions, 3(2), 13–24. https://doi.org/10.54536/ajsts.v3i2.3210

[22] "Optimizing Wiring Harness Minimization through Integration of Internet of Vehicles (IOV) and Internet of Things (IoT) with ESP-32 Module: A Schematic Circuit Approach", International Journal of Science & Engineering Development Research (www.ijrti.org), ISSN:2455-2631, Vol.8, Issue 9, page no.95 - 103, September-2023, Available : http://www.ijrti.org/papers/IJRTI2309015.pdf

[23] Vijay Panwar, "AI-Powered Data Cleansing: Innovative Approaches for Ensuring Database Integrity and Accuracy," *International Journal of Computer Trends and Technology*, vol. 72, no. 4, pp. 116-122, 2024. Crossref, https://doi.org/10.14445/22312803/IJCTT-V72I4P115

[24] Dixit, A., Sabnis, A. and Shetty, A., 2022. Antimicrobial edible films and coatings based on N, O-carboxymethyl chitosan incorporated with ferula asafoetida (Hing) and adhatoda vasica (Adulsa) extract. *Advances in Materials and Processing Technologies*, *8*(3), pp.2699-2715.

[25] Amit Mangal, 2024. *Role of Enterprise Resource Planning Software (ERP) In Driving Circular Economy Practices in the United States, ESP Journal of Engineering & Technology Advancements* 4(3): 1-8. [Link]

[26] Chanthati, Sasibhushan Rao. (2021). Second Version on A Centralized Approach to Reducing Burnouts in the IT industry Using Work Pattern Monitoring Using Artificial Intelligence using MongoDB Atlas and Python. 10.13140/RG.2.2.12232.74249.

[27] Pandiya, D. K. (2022). Performance Analysis of Microservices Architecture in Cloud Environments. International Journal on Recent and Innovation Trends in Computing and Communication, 10(12), 264–274. Retrieved from https://ijritcc.org/index.php/ijritcc/article/view/10745

[28] Venkata Sathya Kumar Koppisetti, 2024. "*Robotic Process Automation: Streamlining Operations in the Digital Era*" *ESP International Journal of Advancements in Computational Technology (ESP-IJACT)* Volume 2, Issue 2: 74-81. [Link]

[29] Next-Generation Decision Support: Harnessing AI and ML within BRMS Frameworks (N. R. Palakurti, Trans.). (2023). International Journal of Creative Research in Computer Technology and Design, 5(5), 1-10. https://jrctd.in/index.php/IJRCTD/article/view/42
[30] Pratiksha Agarwal, Arun Gupta, "Harnessing the Power of Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) Systems for Sustainable Business Practices," International Journal of Computer Trends and Technology, vol. 72, no. 4, pp. 102-110, 2024. Crossref, https://doi.org/10.14445/22312803/IJCTT-V72I4P113
[31] "Optimizing Wiring Harness Minimization through Integration of Internet of Vehicles (IOV) and Internet of Things (IoT) with ESP-32 Module: A Schematic Circuit Approach", International Journal of Science & Engineering Development Research (www.ijrti.org), ISSN:2455-2631, Vol.8, Issue 9, page no.95 - 103, September-2023, Available : http://www.ijrti.org/papers/IJRTI2309015.pdf
[32] Borra, Praveen; Exploring Microsoft Azure's Cloud Computing: A Comprehensive Assessment International Journal of Advanced Research in Science, Communication and Technology 2 8, 897-906, 2022 .IJARSCT.
[33] Kalla, Dinesh and Smith, Nathan and Samaah, Fnu and Polimetla, Kiran, Facial Emotion and Sentiment Detection Using Convolutional Neural Network (January 2021). Indian Journal of Artificial Intelligence Research (INDJAIR), Volume 1, Issue 1, January-December 2021, pp. 1–13, Article ID: INDJAIR_01_01_001, Available at SSRN: https://ssrn.com/abstract=4690960
[34] S. E. Vadakkethil Somanathan Pillai and K. Polimetla, "Analyzing the Impact of Quantum Cryptography on Network Security," 2024 International Conference on Integrated Circuits and Communication Systems (ICICACS), Raichur, India, 2024, pp. 1-6, doi: 10.1109/ICICACS60521.2024.10498417.
[35] D. A. Hassan, “Software Security - Threats, Vulnerabilities, and Countermeasures: Investigating common security threats, vulnerabilities, and countermeasures in software systems to enhance security posture”, Australian Journal of Machine Learning Research & Applications, vol. 4, no. 1, pp. 35–45, May 2024, Accessed: Jul. 18, 2024. [Online]. Available: https://sydneyacademics.com/index.php/ajmlra/article/view/12
[36] Palakurti, N. R. (2023). Governance Strategies for Ensuring Consistency and Compliance in Business Rules Management. Transactions on Latest Trends in Artificial Intelligence, 4(4).
[37] M., Arshey and Daniel, Ravuri and Rao, Deepak Dasaratha and Emerson Raja, Joseph and Rao, D. Chandrasekhar and Deshpande, Aniket (2023) Optimizing Routing in Nature-Inspired Algorithms to Improve Performance of Mobile Ad-Hoc Network. International Journal of Intelligent Systems and Applications in Engineering, 11 (8S). pp. 508-516. ISSN 2147-6799
[38] Gaayathri, R. S., Rajest, S. S., Nomula, V. K., & Regin, R. (2023). Bud-D: enabling bidirectional communication with ChatGPT by adding listening and speaking capabilities. FMDB Transactions on Sustainable Computer Letters, 1(1), 49-63.
[39] Yadav, A. B. (2023). GEN AI-DRIVEN ELECTRONICS: INNOVATIONS, CHALLENGES AND FUTURE PROSPECTS. International Congress on Models and Methods in Modern Investigations, 113–121. Retrieved from https://conferenceseries.info/index.php/congress/article/view/1609
[40] V. Kakani, B. Kesani, N. Thotakura, J. D. Bodapati and L. K. Yenduri, "Decoding Animal Emotions: Predicting Reactions with Deep Learning for Enhanced Understanding," 2024 IEEE 9th International Conference for Convergence in Technology (I2CT), Pune, India, 2024, pp. 1-6, doi: 10.1109/I2CT61223.2024.10543616.
[41] A. B. Yadav and P. S. Shukla, "Augmentation to water supply scheme using PLC & SCADA," 2011 Nirma University International Conference on Engineering, Ahmedabad, India, 2011, pp. 1-5, doi: 10.1109/NUiConE.2011.6153314
[42] Naga Ramesh Palakurti, 2023. "*Evolving Drug Discovery: Artificial Intelligence and Machine Learning's Impact in Pharmaceutical Research*" *ESP Journal of Engineering & Technology Advancements* 3(3): 136-147. [Link]
[43] Naga Ramesh Palakurti, 2022. "*AI Applications in Food Safety and Quality Control*" ESP Journal of Engineering & Technology Advancements 2(3): 48-61. [Link]
[44] Chanthati, S. R. (2024). An automated process in building organic branding opportunity, budget Intensity, recommendation in seasons with Google trends data. Sasibhushan Rao Chanthati. https://doi.org/10.30574/wjaets.2024.12.2.0326
[45] Jacopo Pianigiani, Manish Krishnan, Anantharamu Suryanarayana, Vivekananda Shenoy, 2020. *Cloud Network Having Multiple Protocols Using Virtualization Overlays across Physical and Virtualized Workloads*, US10880210B2. [Link]
[46] Kumar Shukla, Nimeshkumar Patel, Hirenkumar Mistry, 2024.” A COMPARATIVE STUDY OF INTERPRETABLE MACHINE LEARNING MODELS FOR ANALYZING HEALTHCARE DATA", International Journal of Emerging Technologies and Innovative Research (www.jetir.org), ISSN:2349-5162, Vol.11, Issue 4, page no.i45-i52, April-2024, Available : http://www.jetir.org/papers/JETIR2404807.pdf
[47] Chandrakanth Lekkala 2022. “Automating Infrastructure Management with Terraform: Strategies and Impact on Business Efficiency”, European Journal of Advances in Engineering and Technology, 2022, 9(11): 82-88. [Link]
[48] Patel, N. (2024, March). SECURE ACCESS SERVICE EDGE(SASE): “EVALUATING THE IMPACT OF CONVEREGED NETWORK SECURITYARCHITECTURES IN CLOUD COMPUTING.” Journal of Emerging Technologies and Innovative Research. https://www.jetir.org/papers/JETIR2403481.pdf

[49] Ayyalasomayajula, Madan Mohan Tito, Sathishkumar Chintala, and Sandeep Reddy Narani. "Optimizing Textile Manufacturing With Neural Network Decision Support: An Ornstein-Uhlenbeck Reinforcement Learning Approach." Journal of Namibian Studies: History Politics Culture 35 (2023): 335-358.
[50] Vishwanath Gojanur , Aparna Bhat, "Wireless Personal Health Monitoring System", IJETCAS:International Journal of Emerging Technologies in Computational and Applied Sciences,eISSN: 2279-0055,pISSN: 2279-0047, 2014. [Link]
[51] Ayyalasomayajula, Madan Mohan Tito, et al. "Proactive Scaling Strategies for Cost-Efficient Hyperparameter Optimization in Cloud-Based Machine Learning Models: A Comprehensive Review." ESP Journal of Engineering & Technology Advancements (ESP JETA) 1.2 (2021): 42-56.
[52] Mistry, H., Shukla, K., & Patel, N. (2024). Transforming Incident Responses, Automating Security Measures, and Revolutionizing Defence Strategies throughAI-Powered Cybersecurity. Journal of Emerging Technologies and Innovative Research, 11(3), 25. https://www.jetir.org/
[53] Ayyalasomayajula, M., & Chintala, S. (2020). Fast Parallelizable Cassava Plant Disease Detection using Ensemble Learning with Fine Tuned AmoebaNet and ResNeXt-101. Turkish Journal of Computer and Mathematics Education (TURCOMAT), 11(3), 3013–3023.
[54] Aparna Bhat, "Comparison of Clustering Algorithms and Clustering Protocols in Heterogeneous Wireless Sensor Networks: A Survey," 2014 INTERNATIONAL JOURNAL OF SCIENTIFIC PROGRESS AND RESEARCH (IJSPR)-ISSN : 2349-4689 Volume 04- NO.1, 2014. [Link]
[55] Ayyalasomayajula, Madan Mohan Tito, et al. "Implementing Convolutional Neural Networks for Automated Disease Diagnosis in Telemedicine." 2024 Third International Conference on Distributed Computing and Electrical Circuits and Electronics (ICDCECE). IEEE, 2024.
[56] Shashikant Tank Kumar Mahendrabhai Shukla, Nimeshkumar Patel, Veeral Patel, 2024." AI BASED CYBER SECURITY DATA ANALYTIC DEVICE", 414425-001, [Link]
[57] Ayyalasomayajula, Madan Mohan Tito, Akshay Agarwal, and Shahnawaz Khan. "Reddit social media text analysis for depression prediction: using logistic regression with enhanced term frequency-inverse document frequency features." International Journal of Electrical and Computer Engineering (IJECE) 14.5 (2024): 5998-6005.
[58] Aparna Bhat, Rajeshwari Hegde, "Comprehensive Study of Renewable Energy Resources and Present Scenario in India," 2015 IEEE International Conference on Engineering and Technology (ICETECH), Coimbatore, TN, India, 2015. [Link]
[59] Ayyalasomayajula, Madan Mohan Tito. "Innovative Water Quality Prediction For Efficient Management Using Ensemble Learning." Educational Administration: Theory and Practice 29.4 (2023): 2374-2381.
[60] Sarangkumar Radadia Kumar Mahendrabhai Shukla ,Nimeshkumar Patel ,Hirenkumar Mistry,Keyur Dodiya 2024." CYBER SECURITY DETECTING AND ALERTING DEVICE", 412409-001, [Link]
[61] Ayyalasomayajula, Madan Mohan Tito, Srikrishna Ayyalasomayajula, and Sailaja Ayyalasomayajula. "Efficient Dental X-Ray Bone Loss Classification: Ensemble Learning With Fine-Tuned VIT-G/14 And Coatnet-7 For Detecting Localized Vs. Generalized Depleted Alveolar Bone." Educational Administration: Theory and Practice 28.02 (2022).
[62] Aparna K Bhat, Rajeshwari Hegde, 2014. "Comprehensive Analysis Of Acoustic Echo Cancellation Algorithms On DSP Processor", International Journal of Advance Computational Engineering and Networking (IJACEN), volume 2, Issue 9, pp.6-11. [Link]
[63] Ayyalasomayajula, M. M. T., Chintala, S., & Sailaja, A. (2019). A Cost-Effective Analysis of Machine Learning Workloads in Public Clouds: Is AutoML Always Worth Using? International Journal of Computer Science Trends and Technology (IJCST), 7(5), 107–115.
[64] Nimeshkumar Patel, 2022." QUANTUM CRYPTOGRAPHY IN HEALTHCARE INFORMATION SYSTEMS: ENHANCING SECURITY IN MEDICAL DATA STORAGE AND COMMUNICATION", Journal of Emerging Technologies and Innovative Research, volume 9, issue 8, pp.g193-g202. [Link]
[65] Bhat, A., & Gojanur, V. (2015). Evolution Of 4g: A Study. International Journal of Innovative Research in ComputerScience & Engineering (IJIRCSE). Booth, K. (2020, December 4). How 5G is breaking new ground in the construction industry. BDC Magazine.https://bdcmagazine.com/2020/12/how-5g-is-breaking-new-ground-in-the-constructionindustry/. [Link]
[66] Nimeshkumar Patel, 2021." SUSTAINABLE SMART CITIES: LEVERAGING IOT AND DATA ANALYTICS FOR ENERGY EFFICIENCY AND URBAN DEVELOPMENT", Journal of Emerging Technologies and Innovative Research, volume 8, Issue 3, pp.313-319. [Link]
[67] Bhat, A., Gojanur, V., & Hegde, R. (2014). 5G evolution and need: A study. In International conference on electrical, electronics, signals, communication and optimization (EESCO)—2015.[Link]
[68] Chintala, S. ., & Ayyalasomayajula, M. M. T. . (2019). OPTIMIZING PREDICTIVE ACCURACY WITH GRADIENT BOOSTED TREES IN FINANCIAL FORECASTING. Turkish Journal of Computer and Mathematics Education (TURCOMAT), 10(3), 1710–1721. https://doi.org/10.61841/turcomat.v10i3.14707
[69] A. Bhat, V. Gojanur, and R. Hegde. 2015. 4G protocol and architecture for BYOD over Cloud Computing. In Communications and Signal Processing (ICCSP), 2015 International Conference on. 0308-0313. Google Scholar. [Link]

[70] M. Hindka, "Securing the Digital Backbone: An In-depth Insights into API Security Patterns and Practices", Computer Science and Engineering, Vol. 14, No. 2, pp. 35-41, 2024.

[71] M. Hindka, "Design and Analysis of Cyber Security Capability Maturity Model", International Research Journal of Modernization in Engineering Technology and Science, Vol. 6, No. 3, pp. 1706-1710, 2024.

[72] Hindka, M. (2024, June). Optimization Accuracy of Secured Cloud Systems Using Deep Learning Model. In 2023 4th International Conference on Intelligent Technologies (CONIT) (pp. 1-5). IEEE.

[73] Ankitkumar Tejani, Vinoy Toshniwal, 2023. "Enhancing Urban Sustainability: Effective Strategies for Combining Renewable Energy with HVAC Systems" ESP International Journal of Advancements in Science & Technology (ESP-IJAST) Volume 1, Issue 1: 47-60. [Link]

[74] Ankitkumar Tejani, Rashi Khandelwal, 2023. "Enhancing Indoor Air Quality through Innovative Ventilation Designs: A Study of Contemporary HVAC Solutions" ESP International Journal of Advancements in Science & Technology (ESP-IJAST) Volume 1, Issue 2: 35-48. [Link]

[75] Mihir Mehta, 2024," *A Comparative Study Of AI Code Bots: Efficiency, Features, And Use Cases*", International Journal of Science and Research Archive, volume 13, Issue 1, 595–602, [Link]

[76] Dhameliya, N. (2022). Power Electronics Innovations: Improving Efficiency and Sustainability in Energy Systems. Asia Pacific Journal of Energy and Environment, 9(2), 71-80. [Link]

[77] Vikramrajkumar Thiyagarajan, 2024. "*Financial Transformation: Redefining Consolidation Processes with Oracle FCCS*", International Journal of Innovative Research of science, Engineering and technology (IJIRSET), Volume 13, Issue 9, [Link]

[78] Radhika Kanubaddhi, Ramakanth Damodaram, Prasad Gandham, Ramu Pedada, "Perspectives On Solving Cybersecurity Using AI Techniques," International Journal of Computer Trends and Technology, vol. 72, no. 9, pp. 131-136, 2024. Crossref, https://doi.org/10.14445/22312803/IJCTT-V72I9P120

[79] Suman Chintala, Vikramrajkumar Thiyagarajan, 2023." AI-Driven Business Intelligence: Unlocking the Future of Decision-Making", ESP International Journal of Advancements in Computational Technology (ESP-IJACT), Volume 1,Issue 2, PP 73-84. [Link]

[80] Radhika Kanubaddhi, 2022. "Designing an Enterprise-Grade, Cloud-Native Chatbot Solution for the Hospitality Industry Using Azure QnA Maker and Azure LUIS", ESP Journal of Engineering & Technology Advancements, 2(1): 56-62. https://espjeta.org/jeta-v2i1p108

[81] Suman Chintala, "Next - Gen BI: Leveraging AI for Competitive Advantage", International Journal of Science and Research (IJSR), Volume 13 Issue 7, July 2024, pp. 972-977, https://www.ijsr.net/getabstract.php?paperid=SR24720093619

[82] Radhika Kanubaddhi, "Real-Time Recommendation Engine: A Hybrid Approach Using Oracle RTD, Polynomial Regression, and Naive Bayes," SSRG International Journal of Computer Science and Engineering , vol. 8, no. 3, pp. 11-16, 2021. Crossref, https://doi.org/10.14445/23488387/IJCSE-V8I3P103

[83] Chintala, Suman. (2024). Emotion AI in Business Intelligence: Understanding Customer Sentiments and Behaviors. INTERNATIONAL JOURNAL OF COMPUTER SCIENCE AND MATHEMATICAL THEORY E-ISSN. 06. 8.

[84] Gokul Ramadoss , 2022." Care and Disease Management: Why Managed Care Organizations (MCOs) Need to have an Inclusive Approach to Patient Care", Progress in Medical Science, VOL 6, NO. 3, PAGE 1 – 5, [Link]

[85] Gokul Ramadoss , 2022." EHR & EMR - A Wholesome View on its Impact in EDI Transaction", Progress in Medical Science, VOL 6, NO. 5, PAGE 1 – 4, [Link]

[86] Suvvari, S. K. (2024). Ensuring security and compliance in agile cloud infrastructure projects. *International Journal of Computing and Engineering, 6*(4), 54–73. https://doi.org/10.47941/ijce.2222

[87] Sunil Kumar Suvvari (2024). Building an architectural runway: Emergent practices in agile methodologies. *International Journal of Science and Research (IJSR), 13*(9), 140-144. https://www.ijsr.net/getabstract.php?paperid=SR24828021739

[88] Sunil Kumar Suvvari & DR. VIMAL DEEP SAXENA. (2024). Innovative Approaches to Project Scheduling: Techniques and Tools. *Innovative Research Thoughts*, *10*(2), 133–143. https://doi.org/10.36676/irt.v10.i2.1481