Prof. Adarsh Kumar Arya

Professor, Department of Chemical Engineering
Harcourt Butler Technical University (HBTU), Kanpur, Uttar Pradesh, India
Email: aarya@hbtu.ac.in
Google Scholar: scholar.google.com/citations?user=nXuSelYAAAAJ
ORCID: [0000-0002-2378-3832]

PROFILE SUMMARY

Professor of Chemical Engineering at HBTU Kanpur with nearly 20 years of teaching and research experience. Research focuses on natural gas pipeline optimization, hydrogen blending in gas networks, pipeline corrosion and integrity, and biomass and wastewater valorization. Included in the World's Top 2% Scientists list (Stanford University–Elsevier) [2026]; recipient of the HBTU Research Excellence Award in 2024, 2025 and 2026 by Governor Uttar Pradesh and Vice Chancellor HBTU. Author of more than 70 publications, 15 patents, 3 authored books, and consultancy for Indraprastha Gas Grid Limited (IGGL).

RESEARCH INTERESTS

Gas pipeline network optimization · Hydrogen-blended natural gas transportation · Pipeline corrosion, AC interference and integrity management · Metaheuristic optimization (ant colony, MOGA, NSGA-II) · Biomass and algae valorization · Wastewater treatment · LNG cold energy · AI/ML in energy systems. Hydrogen Production. Waste to Energy Carbon capture and utilization

RECOGNITION AND AWARDS

- **Included in the World's Top 2% Scientists list (Stanford University–Elsevier), [2026] [link to list: https://www.topscinet.com/].**
- **Research Excellence Award, Harcourt Butler Technical University, Kanpur, in 2024, 2025 and 2026, presented by the Vice Chancellor and the Hon'ble Governor of Uttar Pradesh**
- Annual Research Award, UPES, Dehradun, 2021 and 2022

ACADEMIC POSITIONS

Professor, Department of Chemical Engineering, HBTU Kanpur, [from: June 2025]–present.

Associate Professor, Department of Chemical Engineering, HBTU Kanpur, [from: June 2022] – [to: June 2025].

Assistant Professor (Selection Grade), Department of Chemical Engineering, University of Petroleum and Energy Studies, Dehradun, July 2008 – June 2022.

Lecturer, Chemical Engineering, I.M.S.E.C., Ghaziabad, September 2005 – June 2008.

Administrative and Professional Responsibilities

- Associate Dean, Incubation and Startups, HBTU Kanpur
- Coordinator, Prime Minister's Uchchatar Shiksha Abhiyan (PM-USHA), Uttar Pradesh.
- Coordinator, M.Tech. Chemical Engineering, HBTU Kanpur.
- Project and Placement Coordinator, M.Tech. Chemical and M.Tech. Pipeline Engineering (Spl. Process Design), UPES, Dehradun.
- Faculty Convenor, Indian Institute of Chemical Engineers (IIChE); Member and Faculty Advisor, IIChE student chapter, UPES.

EDUCATION

- Ph.D. (Chemical Engineering), University of Petroleum & Energy Studies, Dehradun, 2015. Thesis: Multi-objective Optimization of a Multi-nodal Gas Pipeline.
- Piping Engineering, I.I.T. Bombay (Mumbai), 2008.
- M.Tech. (Chemical Engineering), H.B.T.I., Kanpur, 2005 (First Division with Honors).
- GATE 2004: percentile 93.31, All India Rank 381.
- B.Tech. (Chemical Engineering), B.I.E.T., Jhansi, 2002 (First Division).

RESEARCH SUPERVISION

Ph.D. Guided (Completed)

- S. S. Gupta (main supervisor): Optimizing maintenance and inspection practices to minimize third-party damage probability in liquefied petroleum gas (LPG) pipelines in India. Ph.D. awarded [2018].
- Ajit Thakur (main supervisor): Alternating current-induced corrosion in pipelines. Ph.D. awarded [2023].
- Devanshi Srivastava (sole supervisor): Computational studies in hydrogen-blended natural gas transportation. Ph.D. awarded [2026].

Ph.D. in Progress

- Anshika Gupta: Hydrogen production using biomass and fermentation technology.
- Soni Kandpal: Waste to energy.
- Ajit Sarkar (Oil India Limited, Guwahati): Optimization of multi-crude pipeline networks.
- Gaurav Yadav: Carbon capture and utilization.
- Rishikesh Mishra: Machine Learning in Hydrogen transportaion

TEACHING

Oil and Gas Pipeline Transportation (M.Tech. Pipeline Engineering, seven years); Fluid Mechanics; Heat Transfer; Mass Transfer; Chemical Reaction Engineering; Material and Energy Flow Computation; Mechanical Operations; Mass and Material Balances. Experience in curriculum development at undergraduate, postgraduate and Ph.D. levels.

PATENTS

Total: 15 patents [granted: 7; published: 9].

CONSULTANCY, PROJECTS AND INDUSTRY EXPERIENCE

- Consultancy to Indraprastha Gas Grid Limited (IGGL): compatibility study on transporting hydrogen in natural gas pipeline networks [2023].
- Project: Production of anhydrous ethanol using salt.
- Worley Parsons, Mumbai: live project work on the T.A.N.A.P. Gas Pipeline Project

PROFESSIONAL ACTIVITIES

- Editorial roles: [Recent Innovations in Chemical Engineering]
- Professional memberships: Indian Institute of Chemical Engineers (IIChE).
- Selected training: Defect Assessment & Maintenance in Pipelines (PETROFED, 2010); Transportation of Oil and Gas Through Pipelines (Petroleum Federation of India, 2009); Faculty Development Programme, NITTTR Bhopal

PUBLICATIONS (65; LATEST TO OLDEST)

Journal Articles

Srivastava, D., & Arya, A. K. (2026). A multi-objective model to improve the profitability and reduce carbon emissions in a natural gas pipeline network. Indian Chemical Engineer, 68(4), 783–817.

Arya, A. K., Kapoor, A., de Jesus Pacheco, D. A., Pujari, M., Shingan, B., et al. (2026). Progress in the application of carbon nanotubes for wastewater treatment: a bibliometric analysis. Carbon Letters, 36(2), 617–641.

Shingan, B., Bahukhandi, K. D., Arya, A. K., & Singh, V. P. (2026). A review of LNG cold energy for power generation: hybrid thermodynamic cycles, hydrogen integration and carbon capture. Applied Thermal Engineering, 306, 133073.

Srivastava, D., & Arya, A. K. (2026). Innovative solutions for micropollutant removal in wastewater: A review of current challenges and technological advances. Water, Air, & Soil Pollution, 237(16), 917.

Srivastava, D., Arya, A. K., Pujari, M., & Shingan, B. (2026). Optimized computational framework for hydrogen blending in natural gas pipeline networks: analyzing hydrogen injection algorithms and operational parameters. Clean Technologies and Environmental Policy, 28(1), 3.

Kotni, T. R., Sampath, M. K., Seepana, M. M., & Arya, A. K. (2026). A review on corrosion characteristics of bulk metallic glasses. Journal of Materials Engineering and Performance, 1–19.

Mzili, T., Mzili, I., Abatal, A., Oughannou, Z., Arya, A. K., & Kurdi, M. (2026). AI hallucinations in retrieval-augmented and generative systems: A rigorous review of definitions, failure mechanisms, evaluation, and mitigation strategies. EDRAAK, 2026, 41–51.

Kapoor, A., Venkatesan, D., Arya, A. K., Rathoure, A. K., Balasubramanian, S., et al. (2026). Circular bioeconomy using artificial intelligence: valorizing agri-food waste into sustainable bioplastics. Journal of Chemical Technology & Biotechnology.

Shingan, B., Arya, A. K., Mahapatra, D. M., & Singh, V. P. (2026). A novel hybrid cryogenic LNG cold energy system integrating ORC, direct expansion, and CO_2 capture for power generation.

Pujari, M., Shingan, B., Arya, A. K., & Naga Chaitanya, G. (2025). Review on synthesis of ceramic membranes to mitigate membrane fouling in oil–water separation. Chemical Engineering & Technology, 48(2), e202400273.

Mzili, T., Mzili, M., Bouderba, S. I., Abatal, A., Aribowo, W., & Arya, A. K. (2025). Interoperability in Internet of Things: Taxonomies and open challenges. Babylonian Journal of Internet of Things, 2025, 101–112.

Mzili, T., Mzili, M., Abatal, A., Arya, A. K., & Bacanin, N. (2025). A spotted hyena algorithm for quadratic allocation problems: a novel bio-inspired solution. Annals of Operations Research, 1–34.

Pal, D. B., Kapoor, A., Arya, A. K., Arya, R. K., & Tiwari, A. K. (2024). Characterization and sustainable utilization of Punica granatum and Citrus limetta peels: Insights for biomass valorization. Biomass Conversion and Biorefinery. https://doi.org/10.1007/s13399-024-05553-x

Shingan, B., Pujari, M., Arya, A. K., & Singh, V. (2024). Optimizing air separation and LNG cold utilization: Energy savings, exergy efficiency, and system reliability. Chemical Engineering & Technology, 47(9), e202400085. https://doi.org/10.1002/ceat.202400085

Arya, A. K., Katiyar, R., Senthil Kumar, P., Kapoor, A., Pal, D. B., & Rangasamy, G. (2023). A multi-objective model for optimizing hydrogen injected-high pressure natural gas pipeline networks. International Journal of Hydrogen Energy, 48(76), 29699–29723. https://doi.org/10.1016/j.ijhydene.2023.04.133

Arya, A. K., Kumar, A., Pujari, M., & Pacheco, D. A. d. J. (2023). Improving natural gas supply chain profitability: A multi-methods optimization study. Energy, 282, 128659. https://doi.org/10.1016/j.energy.2023.128659

Pujari, M., P, R., Manyam, S. R., & Arya, A. K. (2023). Lead adsorption by fly ash geopolymer: Isotherm, kinetic, and thermodynamic studies. Chemical Engineering & Technology, 47(2), 283–288. https://doi.org/10.1002/ceat.202300259

Tiwari, A. K., Prasad, N., Kapoor, A., Arya, A. K., & Pal, D. B. (2023). Sustainable valorization of Cascabela thevetia fruit peel and seed waste biomass: characterization and thermo-kinetic analysis. Biomass Conversion and Biorefinery. https://doi.org/10.1007/s13399-023-05066-z

Arya, A. K. (2022a). A comparison of the MOGA and NSGA-II optimization techniques to reduce the cost of a biomass supply network. Materials Today: Proceedings, 57, 1553–1558. https://doi.org/10.1016/j.matpr.2021.12.161

Arya, A. K. (2022b). A critical review on optimization parameters and techniques for gas pipeline operation profitability. Journal of Petroleum Exploration and Production Technology, 12(11), 3033–3057. https://doi.org/10.1007/s13202-022-01490-5

Arya, A. K., Jain, R., Yadav, S., Bisht, S., & Gautam, S. (2022). Recent trends in gas pipeline optimization. Materials Today: Proceedings, 57, 1455–1461. https://doi.org/10.1016/J.MATPR.2021.11.232

Pujari, M., Srikanth, K., Sunil, K., & Arya, A. K. (2022). Equilibrium, kinetic, and thermodynamic study on biosorption of indigo carmine using Hypnea musciformis algae. Environmental Progress & Sustainable Energy, 42(2). https://doi.org/10.1002/ep.13990

Thakur, A. K., Arya, A. K., & Sharma, P. (2022a). Analysis of cathodically protected steel pipeline corrosion under the influence of alternating current. Materials Today: Proceedings, 50, 789–796. https://doi.org/10.1016/j.matpr.2021.05.548

Thakur, A. K., Arya, A. K., & Sharma, P. (2022b). Prediction and mitigation of AC interference on the pipeline system. Corrosion Reviews, 40(2), 149–157. https://doi.org/10.1515/corrrev-2021-0061

Arya, A. K. (2021). Optimal operation of a multi-distribution natural gas pipeline grid: an ant colony approach. Journal of Petroleum Exploration and Production Technology, 11(10), 3859–3878. https://doi.org/10.1007/s13202-021-01266-3

Thakur, A. K., Arya, A. K., & Sharma, P. (2021). Corrosion of pipe steels under alternating currents. International Journal of Electrochemical Science, 16. https://doi.org/10.20964/2021.12.22

Thakur, A. K., Arya, A. K., & Sharma, P. (2020). The science of alternating current-induced corrosion: a review of literature on pipeline corrosion induced due to high-voltage alternating current transmission pipelines. Corrosion Reviews, 38(6), 463–472. https://doi.org/10.1515/corrrev-2020-0044

Gupta, S. S., Arya, A. K., & Vijay, P. (2019). Designing a model for optimization of maintenance and inspection efforts against third party damage to cross country pipelines in India. International Journal of Innovative Technology and Exploring Engineering, 8(12). https://doi.org/10.35940/ijitee.L3209.1081219

Gupta, S. S., Arya, A. K., Vijay, P., & Kumar, S. (2019). Control of microbial induced corrosion in an oil pipeline—A case study. Journal of the Gujarat Research Society, 21(2), 355–361.

Gupta, S. S., Arya, A. K., & Vijay, P. (2019). An approach to determine probability of third-party damage to cross-country pipelines in India. Journal of Emerging Technology and Innovative Research, 6(6), 290–304.

Arya, A. K., Vijay, P., & Gupta, S. S. (2019). Implementation of pipeline integrity management in a large pipelines network in India. Journal of Emerging Technology and Innovative Research, 8(12), 4529–4539.

Arya, A. K., & Honwad, S. (2018). Optimal operation of a multi source multi delivery natural gas transmission pipeline network. Chemical Product and Process Modeling, 13(3), 20170046.

Gupta, S. S., Vijay, P., & Arya, A. K. (2018). Reducing failure probability of cross country pipeline from 3rd party interference through optimization of maintenance and inspection program. Journal of Emerging Technology and Innovative Research, 5(10), 212–223.

Arya, A. K., & Honwad, S. (2017). Multiobjective optimization of a gas pipeline network: an ant colony approach. Journal of Petroleum Exploration and Production Technology, 8(4), 1389–1400. https://doi.org/10.1007/s13202-017-0410-7

Arya, A. K., & Honwad, S. (2016). Modeling, simulation, and optimization of a high-pressure cross-country natural gas pipeline: Application of an ant colony optimization technique. Journal of Pipeline Systems Engineering and Practice, 7(1). https://doi.org/10.1061/(ASCE)PS.1949-1204.0000206

Arya, A. K., Shingan, B., & Vara, P. C. (2015). Seismic design of continuous buried pipeline. International Journal of Engineering and Science, 1(1), 6–17.

Arya, A. K., & Shingan, B. (2012). Scour-mechanism, detection and mitigation for subsea pipeline integrity. International Journal of Engineering Research & Technology, 1(3), 1–14.

Books and Book Chapters

Books authored: 3

Optimization, Machine Learning, and Fuzzy Logic: Theory, Algorithms, and Applications: Theory, Algorithms, and Applications, IGI Global. 2026].

Srivastava, D., & Arya, A. K. (2026). Artificial intelligence and machine learning applications in hydrogen-blend natural gas pipeline transportation. In Recent Innovations in Chemical Engineering.

Srivastava, D., Arya, A. K., Shukla, G., Shingan, B., & Pujari, M. (2026). Software framework for tiny machine learning. In Tiny Machine Learning: Next-Generation Artificial Intelligence (pp. 169–196).

Srivastava, D., & Arya, A. K. (2026). Building neuromorphic systems for medicine. In Brain-Inspired Artificial Intelligence and Neuromorphic Computing in Medicine.

Srivastava, D., & Arya, A. K. (2026). Optimizing workflows with digital tools.

Kumar, A., Arya, A. K., Yadav, S., Tiwari, A. K., Jana, S. K., & Pal, D. B. (2026). Carbon-based nanomaterials utilization in biofuel cells. In Smart Energy Technologies Towards a Sustainable Future (pp. 271–289).

Srivastava, D., Arya, A. K., & Mzili, T. (2026). Hydrogen transport and distribution. In Hydrogen Energy Systems: Advancing Sustainable Power Solutions (pp. 231–249).

Srivastava, D., & Arya, A. K. (2026). Artificial intelligence for flow optimization in renewable energy systems. In Artificial Intelligence and Computational Modeling in Heat Transfer and Fluid Flow.

Mzili, T., Benlalia, Z., Waga, A., Arya, A. K., & Mijwil, M. M. (2026). Deep learning for emerging applications: Innovations and challenges. In Applied AI for Sustainable and Intelligent Systems (pp. 1–14).

Mzili, T., Arya, A. K., Pamucar, D., & Shaheen, M. (2025). Optimization, Machine Learning, and Fuzzy Logic: Theory, Algorithms, and Applications. IGI Global.

Srivastava, D., & Arya, A. K. (2025). Advanced studies on hydrogen energy using computational chemistry. In Practical Applications of Machine Learning and AI: Medicine, Environmental Sciences and Engineering.

Arya, A. K., Kapoor, A., & Kapoor, A. (2025). Surface-functionalized MXenes for adsorptive wastewater treatment applications. In Surface Engineering of MXenes (pp. 479–503).

Srivastava, D., Arya, A. K., Mzili, T., & Pujari, M. (2025). Recent trends in optimizing hydrogen supply networks. In Practical Applications of Machine Learning and AI: Medicine, Environmental Sciences and Engineering.

Arya, A. K. (2025). Artificial intelligence as a sustainable tool for optimizing the wastewater treatment plant. In Practical Applications of Machine Learning and AI: Medicine, Environmental Sciences and Engineering.

Arya, A. K., Shreya, Ponnuchamy, M., Pal, D. B., & Kapoor, A. (2024). Algae biomass valorization for wastewater remediation. In Sustainable Clean Energy Production Using Waste Biomass: Sustainable Energy Production and Utilization (pp. 251–271). Springer Nature Singapore. https://doi.org/10.1007/978-981-97-0840-6_10

Kapoor, A., Kumar, S., Arya, A. K., Nishad, V., Fatma, H., Gupta, A., & Singh, S. (2024). Microfluidic biosensors for the detection of foodborne pathogens. In Biosensors for Foodborne Pathogens Detection (pp. 223–246). Elsevier. https://doi.org/10.1016/b978-0-323-95586-7.00010-1

Arya, A. K., Kapoor, A., Pal, D. B., Awasthi, A., Sastry, S. V. A. R., & Kumar, S. (2024). Molten salt thermal storage systems for solar energy concentrators. In Solar Energy Concentrators: Essentials and Applications (pp. 219–234).

Arya, A. K., & Kapoor, A. (2024). Environmental consequences of wind energy technologies. In Wind Energy Storage and Conversion: From Basics to Utilities (pp. 17–32).

Arya, A. K., Sastry, S. V. A. R., Sneha, S., Gupta, B., & Pujari, M. (2024). Recent developments in leak detection techniques for pipelines: A critical evaluation. In Sustainability in Chemical Processes through Digitalization and Green Chemistry Approaches.

Arya, A. K., Kapoor, A., Mzili, T., & Srivastava, D. (2024). Artificial intelligence for hunger monitoring and mitigation. In Smart Technologies for Sustainable Development Goals (pp. 143–158).

Arya, A. K., Kapoor, A., Sridhar, A., Srivastava, D., & Raina, A. (2023). Smart healthcare infrastructure. In Smart Technologies for Sustainable Development Goals (pp. 130–145).

Arya, A. K., Srivastava, D., & Kapoor, A. (2024). Multi-objective optimization enabled improved feature selection. In Advancing Healthcare through Data-driven Innovations (pp. 121–139).

Arya, A. K. (2022c). Application and challenges of “Blockchain Technology” in the oil and gas industry. In Blockchain Technology: Exploring Opportunities, Challenges, and Applications (pp. 181–202). https://doi.org/10.1201/9781003138082-11

Conference Proceedings

Arya, A. K., Gautam, V., & Kumar, A. (2024). Comparative studies of stochastic techniques to minimize the cost of biomass supply networks. In Communications in Computer and Information Science (pp. 383–392). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-53085-2_30

Srivastava, D., & Arya, A. K. (2023). Hydrogen injection in natural gas pipeline networks. In Indian Chemical Engineering Congress (pp. 115–128).

Arya, A. K., Gautam, S., & Yadav, S. (2022). Impact of hydrogen embrittlement in pipeline structures—A critical review. In Springer Proceedings in Materials (Vol. 15). https://doi.org/10.1007/978-981-19-2572-6_31

Sarkar, A., & Arya, A. K. (2022). A survey on optimization parameters and techniques for crude oil pipeline transportation. In Smart Innovation, Systems and Technologies (Vol. 292). https://doi.org/10.1007/978-981-19-0836-1_43

Arya, A. K., Jain, R., & Bisht, S. (2022). Corrosion inhibitors in oil and gas industry—A critical review. In Tailored Functional Materials: Select Proceedings of MMETFP 2021 (pp. 355–369).

Mylapilli, L. K., Gogula, P. V. R., & Arya, A. K. (2016). Hydraulic and surge analysis in a pipeline network using Pipeline Studio. Midstream.