World Journal of Advanced Engineering Technology and Sciences
eISSN: 2582-8266
Cross Ref DOI: 10.30574/wjaets
Journal homepage: https://wjaets.com/

(Review Article)

Systematic literature review on the evolution of human-machine collaboration in the workplace

Firoz Mohammed Ozman *

Solutions Architect, Anecca Ideas Corp, Toronto, Canada.

World Journal of Advanced Engineering Technology and Sciences, 2025, 15(03), 1981-1999

Publication history: Received on 09 May 2025; revised on 14 June 2025; accepted on 16 June 2025

Article DOI: https://doi.org/10.30574/wjaets.2025.15.3.1043

Abstract

The inclusion of advanced technology within workplaces has significantly transformed human-machine collaboration. From the initial stage of industrial automation to the modern artificial intelligence-based decision-making process, business organizations have depended heavily on machines to improve their accuracy, efficiency, and productivity. Human-machine collaboration has extended beyond basic automation, facilitating synergy where human and intelligent tools work together to perform complex tasks. The rapid development of artificial intelligence, machine learning and robotics has redefined job responsibilities and has reshaped workforce dynamics. It has been observed that though technology promises to provide efficiency gains, it has also pointed out specific concerns regarding ethical considerations, the evolving nature of the work environment and job displacement.

Keywords: Human-machine collaboration; AI; Workplace automation; Ethical AI; Workforce transformation

1. Introduction

Considering the past era, it has been observed that machines have taken a crucial role in reducing human workload, which has been marked by the advent of mechanical manufacturing during the Industrial Revolution and the installation of computers in the 20th century.

The recent advancements observed in terms of robotics and AI have brought acceleration to the transformation process, contributing to human-machine collaboration in decision-making, operational execution, and data analysis. Collaborative robots, commonly known as cobots, have been designed to work alongside humans in industries like healthcare, logistics, and manufacturing, enabling the maintenance of productivity and safety (Chiurco et al., 2022). AI-powered systems have been responsible for guiding professionals in finance, creative industries and education. It has been accountable for augmenting human expertise rather than replacing it (Tóth et al., 2023). Since business organizations have accepted Industry 4.0, gaining a significant understanding of how human-machine collaboration has evolved will enable them to navigate its challenges and opportunities.

1.1. Problem statement

Regardless of the benefits of human-machine collaboration, numerous business organizations have been experiencing challenges in integrating automation and AI within workflow without disrupting workforce stability (Adel, 2023). The primary concern is to maintain a balance between the human side and machine intelligence to ensure workplace inclusivity and ethical decision-making accessibility, and resistance from the employees that might hamper the seamless collaboration process (Cross & Ramsey, 2021) The limited number of clear policies governing AI-human interaction has

* Corresponding author: Firoz Mohammed Ozman.

raised concerns about accountability, skill transformation, and job security. Addressing these issues is imperative for optimizing human-machine collaboration without widening socioeconomic inequalities.

Research aim

This study explores the evolution of human-machine collaboration in the workplace, focusing on technological advancements, workforce adaptation, and the socioeconomic impact of AI-driven systems.

Research objectives

- To analyze the historical progression of human-machine collaboration and its impact on workforce dynamics.
- To examine the role of AI, robotics, and automation in reshaping workplace interactions.
- To identify key challenges and opportunities arising from increased machine integration.
- To assess the implications of human-machine collaboration on job roles, productivity, and decision-making processes.

1.2. Significance of the study

Understanding how human-machine collaboration has evolved is crucial for business leaders, employees, and policymakers to navigate the increasingly automated workplace. This study will present insight on how AI-human interaction can be optimized to ensure ethical consideration and address risks such as job displacement (Nagy, Ruppert & Abonyi, 2022). It will also highlight the strategies required to upskill the workforce to address the future advancement of human and machine intelligence. By developing a collaborative environment, organizations focus on leveraging technology while maintaining human-centric values.

1.3. Research Gap

The existing studies have primarily used automation to replace human labour rather than presenting it as a potential to augment human proficiency. While the studies have addressed Robotics implementation and AI adoption, limited information has been available regarding the nuances of human-machine synergy in decision-making and creative problem-solving (Nderitu, 2023). Hence, a significant lack of a comprehensive framework has been visible in guiding the ethical implementation of AI within the workplace. This study will focus on filling the gap by analyzing how human-machine collaboration has brought optimization to ensure fairness, productivity and long-term sustainability.

2. Literature review

The evolving nature of human-machine interaction has been a vital aspect of technology and advancement, shaping the efficiency and effectiveness of industrial processes. The transition from Industry 4.0 to Industry 5.0 marks a significant shift from automation-driven systems to a human-centric, collaborative environment.

2.1. Evolution of human-machine interaction

Industry 4.0 has been featured by increased data exchange, automation, and cyber-physical systems. A study by Nardo et al. (2020) opines that humans played a significant role within the Industry 4.0 paradigm, focusing on the need for adaptive interfaces for improving human decision-making. With the progress of the industries towards Industry 5.0, the focus has moved to harmonious human collaboration, where human capability is being complemented by machinery features rather than replacing them. As Pizoń and Gola (2023) argued, Industry 5.0 has provided a future road map where primary emphasis has been given to humans and intellectual approaches within industry. The study has pointed out the importance of designing systems correctly aligned with human cognitive and ergonomic requirements. Similarly, Mourtzis et al. (2023) have analyzed the advancements in human-machine interfaces (HMI), enabling intuitive interaction and reducing cognitive overload among workers.

2.2. Human-Machine Collaboration and Workforce Transformation

Incorporating AI-driven systems within the industrial sector has brought significant implications to workforce dynamics. As Krishnan et al. (2024) stated, man-machine collaboration has been significant within the IT industry and has had a major influence on employee engagement levels. The findings have highlighted that AI-enabled tools improve efficiency; however, they need strategic implementation for maintaining job satisfaction and addressing resistance towards technology change. Habib et al. (2021) have analyzed the shift from human-human cooperation to human-machine cooperation within Industry 4.0. This study has narrated the significance of designing systems that support seamless collaboration, thereby ensuring that machines can properly augment human roles rather than replacing them. It has also been observed that Kaasinen et al. (2022) have given measures to stress the challenges faced in exercising resilient and smooth teamwork within Industry 5.0, which advocates for an adaptive AI model for improving collaborative efficiency.

2.3. Emerging Technology and Human-Machine Partnerships

The emergence of collaborative robots and intelligent automation has created a broad transformation within workplace interactions. Cheon et al. (2021) investigate the role of emerging technologies in shaping future workplaces, identifying key factors such as AI, augmented reality, and machine learning. On the other hand, Lu et al. (2021) have argued regarding anthropocentric human-machine symbiosis, where adaptability and flexibility are prioritized over a rigid automation framework. The establishment of innovative manufacturing techniques has further helped in practising real-time collaboration. However, the review of Yang et al. (2022) shows that human-machine interaction within Industry 5.0 has prioritized human-centric innovative manufacturing solutions. The article has pointed out that adaptive interfaces and predictive analytics significantly improve workplace productivity. At the same time, Rani et al. (2024) discussed that additive manufacturing is a significant enabler of Industry 5.0, showing that AI-driven design processes can effectively improve manufacturing efficiency.

2.4. Ethical and Organizational Considerations

It has been observed that human-machine collaboration has provided numerous benefits but has also resulted in significant organizational and ethical challenges (Ozman, 2025). Lin et al. (2022) evaluated the influence of abusive management in AI-integrated workplaces, thereby extracting the significant findings that unevenly implemented automation is responsible for employee disengagement. On the other hand, Jha et al. (2024) propose human-machine interaction within humanoid robotics when the primary focus has been on ethical concerns regarding data privacy and job displacement. La Torre et al. (2021) have proposed the goal of developing a programming model for AI-human team formation, advocating for balanced decision-making frameworks to help optimize human expertise and machine efficiency.

3. Material and methods

This chapter will outline the research methodology used to investigate the evolution of human-machine collaboration within the workplace. The study employed a systematic approach to ensure validity and reliability while incorporating a well-organized search strategy and focused inclusion and exclusion criteria.

3.1. Search strategy

This study has conducted a comprehensive literature search from academic databases, including Google Scholar, IEEE Xplore, ScienceDirect, Scopus, and Web of Science, where peer-reviewed journal articles, conference papers, and industry reports relevant to human-machine collaboration have been identified. For searching relevant and topic-centric documents and materials, the keywords used are "human-machine collaboration," "AI in the workplace," "automation and jobs," "cobots," "workforce transformation," "human-AI synergy," and "ethical AI implementation". A Boolean operator, which includes AND/OR, was used to refine the search results and retrieve related studies. To improve the credibility of the sources, a significant focus has been given to the articles published in reputable conference proceedings and high-impact journals. The search has been limited to studies published in English to maintain consistency in accessibility within interpretation.

3.2. Exclusion and inclusion criteria

Studies have been obtained based on the following inclusion and exclusion criteria:

Table 1 Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Language	Studies published in English	Non-English studies without accessible translations
Publication Type	Peer-reviewed journal articles, conference papers, and industry reports	Opinion pieces, non-peer-reviewed sources, non-academic blogs

Relevance	Research focused on AI, robotics, automation, and human-machine collaboration in the workplace.	Studies on AI applications outside the workplace (e.g., healthcare, autonomous vehicles)
Timeframe	Studies published between 2010 and 2024 (older papers included if foundational)	Studies before 2010 unless they provide a significant theoretical context
Content Focus	Papers discussing AI's impact on jobs, decision-making, and productivity	Studies focusing solely on automation without human involvement
Empirical Evidence	Papers providing empirical data, theoretical models, or case studies	Papers lacking empirical evidence or theoretical contribution

(Source: Self-Developed)

3.3. Time Horizon

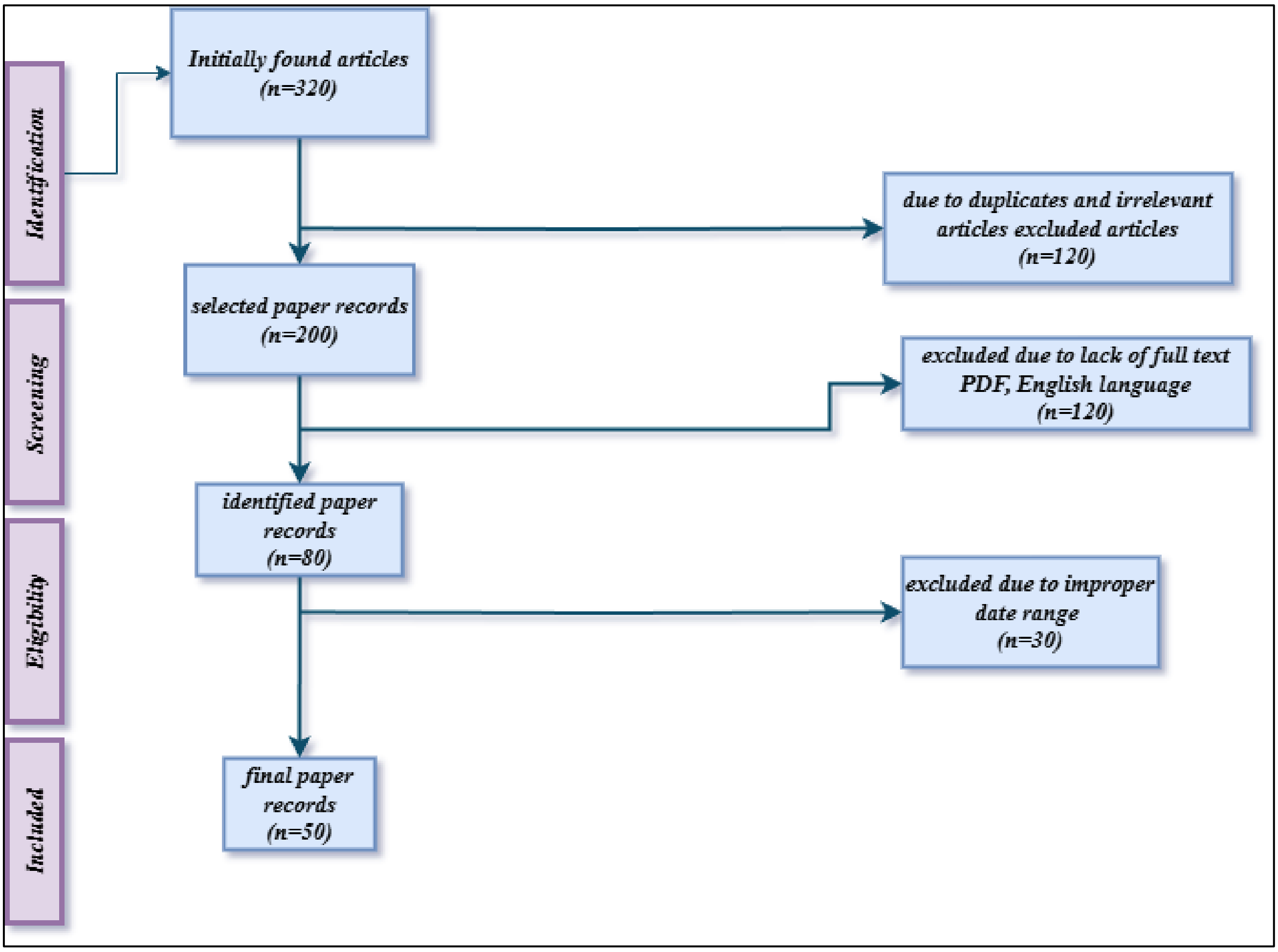
The study primarily emphasizes the studies published between 2019 and 2024, covering recent advancements in automation and artificial intelligence. The selection of the period has been significantly justified due to the rapid technological advancement evident in the past 5 years in terms of robotics, machine learning and workplace automation, specifically before introducing the industry 4.0 concept.

3.4. Prisma

The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA have been followed to maintain a transparent and structured review process. The following measures have been taken to finalize the 50 papers selected.

- ***Identification:*** The initial database search retrieved 320 papers based on the defined keywords.
- ***Screening***: After removing duplicates and non-relevant titles, 200 papers remained.
- ***Eligibility***: Abstracts and full texts were screened based on the inclusion and exclusion criteria, reducing the number of papers to 80.
- ***Final Selection***: A detailed assessment of quality, relevance, and contribution to the research topic led to the selection of 50 papers for in-depth review and analysis.

The rigorous methodological approach has ensured that the study is grounded on relevant, high-quality, and updated literature, maintaining a strong foundation for evaluating the evolution of human-machine collaboration within the workplace.



(Source: Self-Developed)

Figure 1 PRISMA Framework

4. Results and discussion

The evolution observed in human-machine collaboration has altered workplace dynamics as automation and artificial intelligence have increasingly augmented human tasks rather than replacing them (Brynjolfsson & McAfee, 2021). The findings have highlighted that AI-driven technologies have facilitated job redesign, which has helped human workers focus on higher-order cognitive activities and improve their productivity level (Wilson & Daugherty, 2023).

4.1. Impact on Workforce Productivity

The most prominent theme from the collective data is the influence of human-machine collaboration on workforce productivity. AI-driven automation techniques are suitable for streamlining repetitive tasks, improving efficiency, and minimizing human errors (Davenport & Ronanki, 2022). In manufacturing, collaborative robots (cobots) have improved assembly-line speed and precision, reduced workplace injuries while increasing production rates (Bessen, 2022). Simultaneously, AI-powered algorithms have improved the finance sector's risk assessment and data analysis, enabling financial analysts to make more strategic decisions (Acemoglu & Restrepo, 2022). Regardless of the benefits, significant concerns have been raised regarding employee displacement. While AI has helped improve efficiency, it has also demanded an experienced and advanced skill set, which has resulted in a growing need for upskilling and reskilling programs (Autor, 2021). Organizations that have failed to introduce workforce training programs have widened the risk of skill gaps, thereby hampering the process of workforce adaptation and AI adoption.\

4.2. Job evolution and role redefinition

The findings have pointed out that AI-driven transformation has not aimed at causing job displacement purposely, but has focused on redefining job responsibilities. It has been observed that within customer services, AI-powered chatbots are beneficial in handling routine enquiries, which enables human representatives to concentrate on customer engagement and complex problem-solving. Even in the Healthcare sector, AI has provided guidance regarding administrative tasks and diagnostics, allowing nurses and doctors to provide more time for patient care. However, the central issue in this aspect is the fear of job insecurity, which is evident among the employees. Studies show that workers in industries with high AI penetration often experience anxiety regarding job stability, which can lead to resistance to AI adoption (Tambe et al., 2022). Resolving these issues will require the introduction of structured training programs and transparent communication, enabling employees to easily transition to the new rules where human skills are highly needed (Westerman et al., 2023).

4.3. Ethical and social implications

The inclusion of AI within the workplace has increased ethical and social concerns (Ozman, 2025). In this aspect, it is observed that the significant issue is the rise of algorithmic bias, where AI systems reinforce societal prejudice because of biased training data. In specific scenarios, AI-based recruitment systems have demonstrated tendencies to prefer selected demographic groups over others, leading to concerns about fairness and inclusivity (Raghavan et al., 2022).

4.4. Future trends and challenges

The emerging technologies, including neuro-symbolic AI, generative AI and edge computing, have widened the integration of machine Intelligence with human cognition (Bryson, 2023). Business organizations must implement a balanced approach combining human entry policies with technology adoption (Ford, 2023).

5. Conclusion

Human-machine collaboration has evolved within the workplace and transformed the industry by redefining job roles, improving decision-making processes, and enhancing efficiency. While AI-driven automation has enabled streamlining repetitive tasks, it has also pointed out the necessity of upskilling the workforce to bridge the emerging skill gap. The findings of this analysis have highlighted that AI has not been responsible for replacing jobs completely but has focused on augmenting human capabilities, specifically within the healthcare, finance and manufacturing industries. The major ethical issues that might arise are data privacy and algorithmic bias, which must be addressed by maintaining transparency and fairness within AI integration.

Recommendations

The recommendations provided are as follows:

- Companies should invest in training programs to equip employees with AI-related skills and ensure they can adapt to evolving job roles (Manyika et al., 2021).
- Organisations must establish ethical guidelines and bias mitigation strategies to ensure AI-driven decisions are fair and inclusive (Floridi & Cowls, 2023).
- Businesses should implement hybrid work models emphasizing AI as an enabler of human efficiency rather than a replacement (Westerman et al., 2023).

References

[1] D., Angelopoulos, J., & Panopoulos, N. (2023). The future of the human–machine interface (HMI) in society 5.0. Future Internet, 15(5), 162. https://www.mdpi.com/1999-5903/15/5/162/pdf

[2] Aceta, C., Fernández, I., & Soroa, A. (2022). KIDE4I: A generic semantics-based task-oriented dialogue system for human-machine interaction in Industry 5.0. Applied Sciences, 12(3), 1192. https://www.mdpi.com/2076-3417/12/3/1192/pdf

[3] Adel, A. (2023). Unlocking the future: fostering human–machine collaboration and driving intelligent automation through industry 5.0 in smart cities. Smart Cities, 6(5), 2742–2782. https://www.mdpi.com/2624-6511/6/5/124

[4] Altrock, S., Mention, A. L., & Aas, T. H. (2023). Being human in the digitally enabled workplace: Insights from the robo-advice literature. IEEE Transactions on Engineering Management, 71, 7876–7891. https://ieeexplore.ieee.org/iel7/17/4429834/10188389.pdf

[5] Borch, C., & Hee Min, B. (2022). Toward a sociology of machine learning explainability: Human–machine interaction in deep neural network https://journals.sagepub.com/doi/pdf/10.1177/20539517221111361

[6] Carfì, A., & Mastrogiovanni, F. (2021). Gesture-based human–machine interaction: Taxonomy, problem definition, and analysis. IEEE Transactions on Cybernetics, 53(1), 497-513. https://arxiv.org/pdf/2201.10186

[7] Cheon, E., Zaga, C., Lee, H. R., Lupetti, M. L., Dombrowski, L., & Jung, M. F. (2021, October). Human-machine partnerships in the future of work: exploring the role of emerging technologies in future workplaces. In Companion Publication of the 2021 Conference on Computer Supported Cooperative Work and Social Computing (pp. 323–326). https://scholarworks.iupui.edu/bitstream/1805/31400/1/Cheon2021Human-NSFAAM.pdf

[8] Chiurco, A., Frangella, J., Longo, F., Nicoletti, L., Padovano, A., Solina, V., ... & Citraro, C. (2022). Real-time detection of worker's emotions for advanced human-robot interaction during collaborative tasks in smart factories. Procedia Computer Science, 200, 1875-1884. https://www.sciencedirect.com/science/article/pii/S1877050922003970/pdf?md5=7e3a70ec270f0dad811aee8ba4614199&pid=1-s2.0-S1877050922003970-main.pdf\

[9] Cross, E. S., & Ramsey, R. (2021). Mind meets machine: Towards a cognitive science of human–machine interactions. Trends in cognitive sciences, 25(3), 200–212. https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(20)30297-7?dgcid=raven_jbs_etoc_email

[10] De Cremer, D., & Kasparov, G. (2021). AI should augment human intelligence, not replace it. Harvard Business Review, 18(1), 1–8. https://www.daviddecremer.com/wp-content/uploads/HBR2021_AI-Should-Augment-Human-Intelligence-Not-Replace-It.pdf

[11] Ed-Driouch, C., Mars, F., Gourraud, P. A., & Dumas, C. (2022). Addressing the challenges and barriers to the integration of machine learning into clinical practice: An innovative method to hybrid human–machine intelligence. Sensors, 22(21), 8313. https://www.mdpi.com/1424-8220/22/21/8313

[12] Gammulle, H., Ahmedt-Aristizabal, D., Denman, S., Tychsen-Smith, L., Petersson, L., & Fookes, C. (2023). Continuous human action recognition for human-machine interaction: a review. ACM Computing Surveys, 55(13s), 1–38. https://arxiv.org/pdf/2202.13096

[13] Geng, B., & Varshney, P. K. (2022, December). Human-machine collaboration for smart decision making: current trends and future opportunities. In 2022 IEEE 8th International Conference on Collaboration and Internet Computing (CIC) (pp. 61–67). IEEE. https://arxiv.org/pdf/2301.07766

[14] Guo, C., Dou, Y., Bai, T., Dai, X., Wang, C., & Wen, Y. (2023). ArtVerse: a paradigm for parallel human–machine collaborative painting creation in metaverses. IEEE Transactions on Systems, Man, and Cybernetics: Systems, 53(4), 2200–2208. https://www.researchgate.net/profile/Chao-Guo-25/publication/366871689_ArtVerse_A_Paradigm_for_Parallel_Human-Machine_Collaborative_Painting_Creation_in_Metaverses/links/63d7a64b64fc860638fc6a81/ArtVerse-A-Paradigm-for-Parallel-Human-Machine-Collaborative-Painting-Creation-in-Metaverses.pdf

[15] Guo, H., Wan, J., Wang, H., Wu, H., Xu, C., Miao, L., ... & Zhang, H. (2021). Self-powered intelligent human-machine interaction for handwriting recognition. Research. https://spj.science.org/doi/full/10.34133/2021/4689869

[16] Gupta, P., Nguyen, T. N., Gonzalez, C., & Woolley, A. W. (2023). Fostering collective intelligence in human–AI collaboration: laying the groundwork for COHUMAIN. Topics in cognitive science. https://onlinelibrary.wiley.com/doi/pdfdirect/10.1111/tops.12679

[17] Habib, L., Pacaux-Lemoine, M. P., Berdal, Q., & Trentesaux, D. (2021). From human-human to human-machine cooperation in manufacturing 4.0. Processes, 9(11), 1910. https://www.mdpi.com/2227-9717/9/11/1910/pdf

[18] Jha, P., Yadav, G. P. K., Bandhu, D., Hemalatha, N., Mandava, R. K., Adin, M. Ş., ... & Patel, M. (2024). Human–machine interaction and implementation on the upper extremities of a humanoid robot. Discover Applied Sciences, 6(4), 152. https://link.springer.com/content/pdf/10.1007/s42452-024-05734-3.pdf

[19] Kaasinen, E., Anttila, A. H., Heikkilä, P., Laarni, J., Koskinen, H., & Väätänen, A. (2022). Smooth and resilient human–machine teamwork as an industry 5.0 design challenge. Sustainability, 14(5), 2773. https://www.mdpi.com/2071-1050/14/5/2773/pdf

[20] Kanarik, K. J., Osowiecki, W. T., Lu, Y., Talukder, D., Roschewsky, N., Park, S. N., ... & Gottscho, R. A. (2023). Human–machine collaboration for improving semiconductor process development. Nature, 616(7958), 707-711. https://www.nature.com/articles/s41586-023-05773-7.pdf

[21] Krishnan, D. L., Kakada, D. P., & Sundarrajan, P. (2024). Analysis of Man-Machine Collaboration, on the Employee Engagement Process: IT Industry Perspective. International Journal of Research and Innovation in Social Science, 8(8), 983-997. https://www.researchgate.net/profile/Lrk-Krishnan/publication/383607894_Analysis_of_Man-Machine_Collaboration_on_the_Employee_Engagement_Process_IT_Industry_Perspective/links/66d58dfd64f7bf7b194d8d9b/Analysis-of-Man-Machine-Collaboration-on-the-Employee-Engagement-Process-IT-Industry-Perspective.pdf

[22] Krupas, M., Kajati, E., Liu, C., & Zolotova, I. (2024). Towards a human-centric digital twin for human–machine collaboration: A review on enabling technologies and methods. Sensors, 24(7), 2232. https://www.mdpi.com/1424-8220/24/7/2232/pdf

[23] La Torre, D., Colapinto, C., Durosini, I., & Triberti, S. (2021). Team formation for human-artificial intelligence collaboration in the workplace: A goal programming model to foster organizational change. IEEE Transactions on Engineering Management, 70(5), 1966-1976. https://diversityatlas.io/wp-content/uploads/2023/08/2023-Team-Formation-for-Human-Artificial-Intelligence-Collaboration-in-the-Workplace_-A-Goal-Programming-Model-to-Foster-Organizational-Change.pdf

[24] Lan, B., Wu, F., Cheng, Y., Zhou, Y., Hossain, G., Grabher, G., ... & Sun, J. (2022). Scalable, stretchable and washable triboelectric fibers for self-powering human-machine interaction and cardiopulmonary resuscitation training. Nano Energy, 102, 107737. https://papers.ssrn.com/sol3/Delivery.cfm?abstractid=4162755

[25] Lin, S., Döngül, E. S., Uygun, S. V., Öztürk, M. B., Huy, D. T. N., & Tuan, P. V. (2022). Exploring the relationship between abusive management, self-efficacy and organizational performance in the context of human–machine interaction technology and artificial intelligence, with the effect of ergonomics. Sustainability, 14(4), 1949. https://www.mdpi.com/2071-1050/14/4/1949

[26] Lin, Z., Zhang, G., Xiao, X., Au, C., Zhou, Y., Sun, C., ... & Chen, J. (2022). A personalized acoustic interface for wearable human–machine interaction. Advanced Functional Materials, 32(9), 2109430. https://www.researchgate.net/profile/Xiao_Xiao149/publication/356411952_A_Personalized_Acoustic_Interface_for_Wearable_Human-Machine_Interaction/links/619b883b07be5f31b7a985e6/A-Personalized-Acoustic-Interface-for-Wearable-Human-Machine-Interaction.pdf

[27] Lu, Y., Adrados, J. S., Chand, S. S., & Wang, L. (2021). Humans are not machines—anthropocentric human–machine symbiosis for ultra-flexible smart manufacturing. Engineering, 7(6), 734-737. https://www.sciencedirect.com/science/article/pii/S2095809921001612

[28] Luo, H., Du, J., Yang, P., Shi, Y., Liu, Z., Yang, D., ... & Wang, Z. L. (2023). Human–machine interaction via dual modes of voice and gesture enabled by triboelectric nanogenerator and machine learning. ACS Applied Materials & Interfaces, 15(13), 17009-17018. https://pubs.acs.org/doi/pdf/10.1021/acsami.3c00566

[29] Lv, C., Li, Y., Xing, Y., Huang, C., Cao, D., Zhao, Y., & Liu, Y. (2021). Human–Machine Collaboration for Automated Driving Using an Intelligent Two-Phase Haptic Interface. Advanced Intelligent Systems, 3(4), 2000229. https://onlinelibrary.wiley.com/doi/pdf/10.1002/aisy.202000229

[30] Mohd, T. K., Nguyen, N., & Javaid, A. Y. (2022). Multi-modal data fusion in enhancing human-machine interaction for robotic applications: a survey. arXiv preprint arXiv:2202.07732. https://arxiv.org/pdf/2202.07732

[31] Muller, M., & Weisz, J. (2022, June). Extending a human-ai collaboration framework with dynamism and sociality. In Proceedings of the 1st Annual Meeting of the Symposium on Human-Computer Interaction for Work (pp. 1–12). https://www.researchgate.net/profile/Michael-Muller-12/publication/367125237_Extending_a_Human-AI_Collaboration_Framework_with_Dynamism_and_Sociality/links/63dd3fb4c465a873a2850fc0/Extending-a-Human-AI-Collaboration-Framework-with-Dynamism-and-Sociality.pdf

[32] Nagy, L., Ruppert, T., & Abonyi, J. (2022, September). Human-centred knowledge graph-based design concept for collaborative manufacturing. In 2022 IEEE 27th international conference on emerging technologies and factory automation (ETFA) (pp. 1-8). IEEE. https://www.researchgate.net/profile/Laszlo-Nagy-14/publication/365119907_Human-centered_knowledge_graph-based_design_concept_for_collaborative_manufacturing/links/649193038de7ed28ba3f873f/Human-centered-knowledge-graph-based-design-concept-for-collaborative-manufacturing.pdf

[33] Nardo, M., Forino, D., & Murino, T. (2020). The evolution of man–machine interaction: The role of human in Industry 4.0 paradigm. Production & manufacturing research, 8(1), 20-34. https://www.tandfonline.com/doi/pdf/10.1080/21693277.2020.1737592

[34] Nderitu, J. H. (2023). Mental State Adaptive Interfaces as a Remedy to the Issue of Long-term Continuous Human Machine Interaction. Journal of Robotics Spectrum, 1, 078-089. https://anapub.co.ke/journals/jrs/jrs_pdf/2023/jrs_volume01/JRS202301008.pdf

[35] Noble, S. M., Mende, M., Grewal, D., & Parasuraman, A. (2022). The Fifth Industrial Revolution: How harmonious human–machine collaboration is triggering a retail and service [r] evolution. Journal of Retailing, 98(2), 199-208. https://www.sciencedirect.com/science/article/pii/S0022435922000288

[36] Ozman, F.M. (2025). Systematic literature review on ‘secure document management systems (DMS)’. World Journal of Advanced Engineering Technology and Sciences, 15(1), pp.1460–1469. doi: https://doi.org/10.30574/wjaets.2025.15.1.0146.

[37] Ozman, F.M. (2025). Systematic literature review on the rise of agentic AI in enterprise operations. International Journal of Frontiers in Science and Technology Research, 8(2), pp.001–015. doi: https://doi.org/10.53294/ijfstr.2025.8.2.0025.

[38] Pizoń, J., & Gola, A. (2023). Human–machine relationship—perspective and future roadmap for industry 5.0 solutions. Machines, 11(2), 203. https://www.mdpi.com/2075-1702/11/2/203/pdf

[39] Rani, S., Jining, D., Shoukat, K., Shoukat, M. U., & Nawaz, S. A. (2024). A human–machine interaction mechanism: additive manufacturing for Industry 5.0—design and management. Sustainability, 16(10), 4158. https://www.mdpi.com/2071-1050/16/10/4158/pdf

[40] Sapienza, A., Cantucci, F., & Falcone, R. (2022). Modelling interaction in human–machine systems: A trust and trustworthiness approach. Automation, 3(2), 242-257. https://www.mdpi.com/2673-4052/3/2/12/pdf

[41] Shi, H., Yang, M., & Jiang, P. (2021). Social production system: A three-layer smart framework for implementing autonomous human-machine collaborations on the shop floor. Ieee Access, 9, 26696-26711. https://ieeexplore.ieee.org/iel7/6287639/6514899/09317837.pdf

[42] Simmler, M., & Frischknecht, R. (2021). A taxonomy of human–machine collaboration: capturing automation and technical autonomy. Ai & Society, 36(1), 239-250. https://www.alexandria.unisg.ch/server/api/core/bitstreams/a6c8985d-8314-4769-9ea3-68e68a064d6a/content

[43] Te’eni, D., Yahav, I., Zagalsky, A., Schwartz, D., Silverman, G., Cohen, D., ... & Lewinsky, D. (2023). Reciprocal human-machine learning: A theory and an instantiation for the case of message classification. Management Science. https://pubsonline.informs.org/doi/full/10.1287/mnsc.2022.03518

[44] Tóth, A., Nagy, L., Kennedy, R., Bohuš, B., Abonyi, J., & Ruppert, T. (2023). The human-centric Industry 5.0 collaboration architecture. MethodsX, 11, 102260. https://www.sciencedirect.com/science/article/pii/S2215016123002571

[45] Urlaub, P., & Dessein, E. (2022). From disrupted classrooms to human-machine collaboration? The pocket calculator, Google Translate, and the future of language education. L2 Journal: An electronic refereed journal for foreign and second language educators, 14(1). https://escholarship.org/content/qt97s0t7wj/qt97s0t7wj.pdf

[46] Vinchon, F., Lubart, T., Bartolotta, S., Gironnay, V., Botella, M., Bourgeois-Bougrine, S., ... & Gaggioli, A. (2023). Artificial intelligence & creativity: A manifesto for collaboration. The Journal of Creative Behaviour, 57(4), 472-484. https://onlinelibrary.wiley.com/doi/pdfdirect/10.1002/jocb.597

[47] Weiss, A., Wortmeier, A. K., & Kubicek, B. (2021). Cobots in industry 4.0: A roadmap for future practice studies on human–robot collaboration. IEEE Transactions on Human-Machine Systems, 51(4), 335-345. https://ieeexplore.ieee.org/iel7/6221037/6340045/09490032.pdf

[48] Wilhelm, J., Petzoldt, C., Beinke, T., & Freitag, M. (2021). Review of digital twin-based interaction in smart manufacturing: Enabling cyber-physical systems for human-machine interaction. International journal of computer integrated manufacturing, 34(10), 1031-1048. https://www.tandfonline.com/doi/pdf/10.1080/0951192X.2021.1963482

[49] Xiong, Y., Tang, Y., Kim, S., & Rosen, D. W. (2023). Human-machine collaborative additive manufacturing. Journal of Manufacturing Systems, 66, 82-91. https://www.researchgate.net/profile/Yi-Xiong-18/publication/366051033_Human-

machine_collaborative_additive_manufacturing/links/6397d155095a6a77742507a5/Human-machine-collaborative-additive-manufacturing.pdf

[50] Yang, C., Zhu, Y., & Chen, Y. (2021). A review of human–machine cooperation in the robotics domain. IEEE Transactions on Human-Machine Systems, 52(1), 12–25. https://ieeexplore.ieee.org/iel7/6221037/6340045/09653727.pdf

[51] Yang, J., Liu, T., Liu, Y., & Morgan, P. (2022, August). Review of human-machine interaction towards industry 5.0: human-centric smart manufacturing. In International design engineering technical conferences and computers and information in engineering conference (Vol. 86212, p. V002T02A060). American Society of Mechanical Engineers. https://orca.cardiff.ac.uk/id/eprint/149084/1/Review%20of%20human-machine%20interaction%20towards%20....pdf

[52] Zhou, L., Paul, S., Demirkan, H., Yuan, L., Spohrer, J., Zhou, M., & Basu, J. (2021). Intelligence augmentation: Towards building human-machine symbiotic relationship. AIS Transactions on Human-Computer Interaction, 13(2), 243–264. https://www.researchgate.net/profile/Lingyao-Yuan/publication/352860132_Intelligence_Augmentation_Towards_Building_Human-_machine_Symbiotic_Relationship/links/6213b97eeb735c508ae7b4bb/Intelligence-Augmentation-Towards-Building-Human-machine-Symbiotic-Relationship.pdf

Appendices

Appendix 1: Systematic Literature Review Table

Topic	DOI	Authors	Codes/Themes	Key Findings	Recommendations
The evolution of man–machine interaction: The role of human in the Industry 4.0 paradigm	10.1080/21693277.2020.1737592	Nardo, M., Forino, D., & Murino, T. (2020)	Industry 4.0	Human role in automation; evolving man-machine interaction	Enhance human-centric tech integration
The Fifth Industrial Revolution: How harmonious human–machine collaboration is triggering a retail and service [r] evolution	10.1016/j.jretai.2022.03.001	Noble, S. M., Mende, M., Grewal, D., & Parasuraman, A. (2022)	Industrial Revolution	Harmonious human-machine collaboration reshaping retail & services	Develop AI-human synergy models
Human–machine relationship—perspective and future roadmap for industry 5.0 solutions	10.3390/machines11020203	Pizoń, J., & Gola, A. (2023)	Industry 5.0	Future roadmap for human-machine relationships	Foster sustainable automation strategies
Analysis of Man-Machine Collaboration on the Employee Engagement Process: IT Industry Perspective	https://www.researchgate.net/profile/Lrk-Krishnan/publication/383607894_Analysis_of_Man-Machine_Collaboration_on_the_Employee_Engagement_Process_IT_Industry_Perspective/links/66d58dfd64f7bf7b194d8d9b/Analysis-of-Man-Machine-Collaboration-on-the-Employee-Engagement-Process-IT-Industry-Perspective.pdf	Krishnan, D. L., Kakada, D. P., & Sundarrajan, P. (2024)	Employee Engagement	Impact of collaboration on IT workforce engagement	Improve digital skills training
From human-human to human-machine cooperation in manufacturing 4.0	10.3390/pr9111910	Habib, L., Pacaux-Lemoine, M. P., Berdal, Q., & Trentesaux, D. (2021)	Manufacturing 4.0	Shift from human-human to human-machine cooperation	Optimise cooperative AI tools

Human-machine partnerships in the future of work: exploring the role of emerging technologies in future workplaces	https://scholarworks.iupui.edu/bitstream/1805/31400/1/Cheon2021Human-NSFAAM.pdf	Cheon, E., Zaga, C., Lee, H. R., Lupetti, M. L., Dombrowski, L., & Jung, M. F. (2021)	Future Workplaces	Emerging tech shaping work environments	Strengthen AI integration policies
The future of the human–machine interface (HMI) in society 5.0	10.3390/fi15050162	Mourtzis, D., Angelopoulos, J., & Panopoulos, N. (2023)	HMI & Society 5.0	Evolution of human-machine interfaces	Enhance adaptive interfaces
Humans are not machines—anthropocentric human–machine symbiosis for ultra-flexible smart manufacturing	10.1016/j.eng.2021.06.018	Lu, Y., Adrados, J. S., Chand, S. S., & Wang, L. (2021)	Smart Manufacturing	Anthropocentric human-machine symbiosis	Prioritise human adaptability in AI design
A human–machine interaction mechanism: additive manufacturing for Industry 5.0—design and management	10.3390/su16104158	Rani, S., Jining, D., Shoukat, K., Shoukat, M. U., & Nawaz, S. A. (2024)	Additive Manufacturing	Industry 5.0 design & management impact	Integrate human-centered AM systems
Review of human-machine interaction towards industry 5.0: human-centric smart manufacturing	https://orca.cardiff.ac.uk/id/eprint/149084/1/Review%20of%20human-machine%20interaction%20towards%20....pdf	Yang, J., Liu, T., Liu, Y., & Morgan, P. (2022)	Smart Manufacturing	Human-centric HMI towards Industry 5.0	Promote ergonomic AI design
Smooth and resilient human–machine teamwork as an industry 5.0 design challenge	10.3390/su14052773	Kaasinen, E., Anttila, A. H., Heikkilä, P., Laarni, J., Koskinen, H., & Väätänen, A. (2022)	Teamwork & AI	Resilient human-machine teamwork	Strengthen AI collaboration frameworks
Human-machine collaborative additive manufacturing	https://www.researchgate.net/profile/Yi-Xiong-18/publication/366051033_Human-machine_collaborative_additive_manufacturing/links/6397d155095a6a77742507a5/Human-machine-collaborative-additive-manufacturing.pdf	Xiong, Y., Tang, Y., Kim, S., & Rosen, D. W. (2023)	Additive Manufacturing	Collaborative AI in manufacturing	Implement AI-driven optimisation

Team formation for human-artificial intelligence collaboration in the workplace: A goal programming model to foster organisational change	https://diversityatlas.io/wp-content/uploads/2023/08/2023-Team-Formation-for-Human-Artificial-Intelligence-Collaboration-in-the-Workplace_-A-Goal-Programming-Model-to-Foster-Organizational-Change.pdf	La Torre, D., Colapinto, C., Durosini, I., & Triberti, S. (2021)	AI Team Formation	AI collaboration in workplace dynamics	Use AI for team optimisation
Human–machine interaction and implementation on the upper extremities of a humanoid robot	10.1007/s42452-024-05734-3	Jha, P., Yadav, G. P. K., Bandhu, D., Hemalatha, N., Mandava, R. K., Adin, M. Ş., ... & Patel, M. (2024)	Robotics	HMI for humanoid robot development	Advance AI-driven robotics
Human-machine collaboration for smart decision making: current trends and future opportunities	https://arxiv.org/pdf/2301.07766	Geng, B., & Varshney, P. K. (2022)	Smart Decision-Making	AI-human collaboration trends	Invest in AI-assisted decision models
ArtVerse: a paradigm for parallel human–machine collaborative painting creation in metaverses	https://www.researchgate.net/profile/Chao-Guo-25/publication/366871689_ArtVerse_A_Paradigm_for_Parallel_Human-Machine_Collaborative_Painting_Creation_in_Metaverses/links/63d7a64b64fc860638fc6a81/ArtVerse-A-Paradigm-for-Parallel-Human-Machine-Collaborative-Painting-Creation-in-Metaverses.pdf	Guo, C., Dou, Y., Bai, T., Dai, X., Wang, C., & Wen, Y. (2023)	Metaverse & AI	AI-powered human-machine painting collaboration	Expand creative AI applications
Exploring the relationship between abusive management, self-efficacy and organisational performance in	10.3390/su14041949	Lin, S., Döngül, E. S., Uygun, S. V., Öztürk, M. B., Huy, D. T. N., & Tuan, P. V. (2022)	AI & Management	Abusive management & self-efficacy in AI environments	Improve ergonomic AI integration

the context of human–machine interaction technology and artificial intelligence with the effect of ergonomics					
Towards a human-centric digital twin for human–machine collaboration: A review on enabling technologies and methods	10.3390/s24072232	Krupas, M., Kajati, E., Liu, C., & Zolotova, I. (2024)	Digital Twins	Human-centric digital twins for collaboration	Develop adaptive simulation models
A review of human–machine cooperation in the robotics domain	10.1109/THMS.2021.3059342	Yang, C., Zhu, Y., & Chen, Y. (2021)	Robotics & AI	Human-machine cooperation in robotics	Design intuitive robotics systems
Human–machine interaction via dual modes of voice and gesture enabled by triboelectric nanogenerator and machine learning	10.1021/acsami.3c00566	Luo, H., Du, J., Yang, P., Shi, Y., Liu, Z., Yang, D., ... & Wang, Z. L. (2023)	HMI & AI	Voice-gesture control for human-machine interaction	Enhance multimodal AI interfaces
A personalised acoustic interface for wearable human–machine interaction	https://www.researchgate.net/profile/Xiao_Xiao149/publication/356411952_A_Personalized_Acoustic_Interface_for_Wearable_Human-Machine_Interaction/links/619b883b07be5f31b7a985e6/A-Personalized-Acoustic-Interface-for-Wearable-Human-Machine-Interaction.pdf	Lin, Z., Zhang, G., Xiao, X., Au, C., Zhou, Y., Sun, C., ... & Chen, J. (2022)	Wearable Tech	Acoustic interfaces for personalised HMI	Optimise wearable HMI usability
Modeling interaction in human–machine systems: A trust and trustworthiness approach	https://www.mdpi.com/2673-4052/3/2/12/pdf	Sapienza, A., Cantucci, F., & Falcone, R. (2022)	Trust in AI	Trust-based human-machine interaction	Strengthen AI reliability protocols
Gesture-based human–machine interaction: Taxonomy, problem definition, and analysis	https://arxiv.org/pdf/2201.10186	Carfì, A., & Mastrogiovanni, F. (2021)	Gesture Recognition	Taxonomy & analysis of gesture-based HMI	Improve real-time gesture AI systems

Intelligence augmentation: Towards building human-machine symbiotic relationship	https://www.researchgate.net/profile/Lingyao-Yuan/publication/352860132_Intelligence_Augmentation_Towards_Building_Human-_machine_Symbiotic_Relationship/links/6213b97eeb735c508ae7b4bb/Intelligence-Augmentation-Towards-Building-Human-machine-Symbiotic-Relationship.pdf	Zhou, L., Paul, S., Demirkan, H., Yuan, L., Spohrer, J., Zhou, M., & Basu, J. (2021)	AI Augmentation	Human-machine symbiosis through intelligence augmentation	Advance AI-powered cognitive tools
KIDE4I: A generic semantics-based task-oriented dialogue system for human-machine interaction in Industry 5.0	https://www.mdpi.com/2076-3417/12/3/1192/pdf	Aceta, C., Fernández, I., & Soroa, A. (2022)	Industry 5.0	Semantic task-oriented AI for HMI	Enhance AI-driven task automation
Continuous human action recognition for human-machine interaction: a review	https://arxiv.org/pdf/2202.13096	Gammulle, H., Ahmedt-Aristizabal, D., Denman, S., Tychsen-Smith, L., Petersson, L., & Fookes, C. (2023)	Human Action Recognition, HMI	Continuous recognition enhances interaction efficiency.	Develop robust real-time recognition models.
Fostering collective intelligence in human–AI collaboration: laying the groundwork for COHUMAIN	10.1111/tops.12679	Gupta, P., Nguyen, T. N., Gonzalez, C., & Woolley, A. W. (2023)	Human-AI Collaboration, Collective Intelligence	Effective AI integration fosters teamwork.	Establish structured collaboration models.
Being human in the digitally enabled workplace: Insights from the robo-advice literature	10.1109/TEM.2023.10188389	Altrock, S., Mention, A. L., & Aas, T. H. (2023)	Robo-Advice, Digital Workplaces	Human trust in robo-advisors influences adoption.	Improve AI transparency and explainability.
Social production system: A three-layer smart framework for implementing autonomous human-machine collaborations in a shop floor	10.1109/ACCESS.2021.30717837	Shi, H., Yang, M., & Jiang, P. (2021)	Smart Factories, Autonomous Systems	Three-layer framework for seamless automation.	Implement adaptive control mechanisms.

Human–Machine Collaboration for Automated Driving Using an Intelligent Two-Phase Haptic Interface	10.1002/aisy.202000229	Lv, C., Li, Y., Xing, Y., Huang, C., Cao, D., Zhao, Y., & Liu, Y. (2021)	Automated Driving, Haptic Interfaces	Two-phase haptic feedback enhances driving safety.	Enhance human feedback mechanisms in AI systems.
Addressing the challenges and barriers to the integration of machine learning into clinical practice	https://www.mdpi.com/1424-8220/22/21/8313	Ed-Driouch, C., Mars, F., Gourraud, P. A., & Dumas, C. (2022)	Machine Learning, Clinical Integration	Barriers to ML adoption in healthcare.	Develop hybrid human-machine intelligence models.
From disrupted classrooms to human-machine collaboration?	https://escholarship.org/content/qt97s0t7wj/qt97s0t7wj.pdf	Urlaub, P., & Dessein, E. (2022)	AI in Education, Language Learning	AI tools reshape classroom interactions.	Integrate AI with teacher-guided learning.
Mental State Adaptive Interfaces as a Remedy to the Issue of Long-term Continuous Human Machine Interaction	https://www.nature.com/articles/s41586-023-05773-7.pdf	Nderitu, J. H. (2023)	Mental State Interfaces, HMI	Adaptive interfaces improve long-term engagement.	Incorporate real-time mental state monitoring.
Human–machine collaboration for improving semiconductor process development	https://www.nature.com/articles/s41586-023-05773-7.pdf	Kanarik, K. J., Osowiecki, W. T., Lu, Y., Talukder, D., Roschewsky, N., Park, S. N., ... & Gottscho, R. A. (2023)	Semiconductor Industry, AI Collaboration	AI enhances process efficiency.	Foster human oversight in AI-driven processes.
A taxonomy of human–machine collaboration: capturing automation and technical autonomy	https://www.alexandria.unisg.ch/server/api/core/bitstreams/a6c8985d-8314-4769-9ea3-68e68a064d6a/content	Simmler, M., & Frischknecht, R. (2021)	Taxonomy, Automation Levels	Defines human-machine collaboration levels.	Standardise automation autonomy classifications.
Unlocking the future: fostering human–machine collaboration and driving intelligent automation through Industry 5.0 in smart cities	https://www.mdpi.com/2624-6511/6/5/124	Adel, A. (2023)	Industry 5.0, Smart Cities	Intelligent automation enhances urban efficiency.	Promote human-centric smart city designs.
Mind meets machine: Towards a cognitive science of human–machine interactions	https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(20)30297-7?dgcid=raven_jbs_etoc_email	Cross, E. S., & Ramsey, R. (2021)	Cognitive Science, AI-Human Interaction	Cognitive load impacts AI usability.	Optimise AI interfaces for cognitive efficiency.

AI should augment human intelligence, not replace it	https://www.daviddecremer.com/wp-content/uploads/HBR2021_AI-Should-Augment-Human-Intelligence-Not-Replace-It.pdf	De Cremer, D., & Kasparov, G. (2021)	AI Augmentation, Intelligence	AI should enhance, not replace, human decision-making.	Balance AI autonomy with human oversight.
Self-powered intelligent human-machine interaction for handwriting recognition	https://spj.science.org/doi/full/10.34133/2021/4689869	Guo, H., Wan, J., Wang, H., Wu, H., Xu, C., Miao, L., ... & Zhang, H. (2021)	Self-Powered Interfaces, HMI	Energy-efficient handwriting recognition.	Develop self-powered AI-assisted interfaces.
Multi-modal data fusion in enhancing human-machine interaction for robotic applications: a survey	https://arxiv.org/pdf/2202.07732	Mohd, T. K., Nguyen, N., & Javaid, A. Y. (2022)	Multi-Modal Fusion, Robotics	Combining sensory inputs improves AI precision.	Integrate multimodal fusion in AI applications.
Reciprocal human-machine learning: A theory and an instantiation for the case of message classification	https://pubsonline.informs.org/doi/full/10.1287/mnsc.2022.03518	Te'eni, D., Yahav, I., Zagalsky, A., Schwartz, D., Silverman, G., Cohen, D., ... & Lewinsky, D. (2023)	Reciprocal Learning, AI	Human-AI co-learning enhances classification.	Apply bidirectional learning frameworks.
Human-centered knowledge graph-based design concept for collaborative manufacturing	https://www.researchgate.net/profile/Laszlo-Nagy-14/publication/365119907_Human-centered_knowledge_graph-based_design_concept_for_collaborative_manufacturing/links/649193038de7ed28ba3f873f/Human-centered-knowledge-graph-based-design-concept-for-collaborative-manufacturing.pdf	Nagy, L., Ruppert, T., & Abonyi, J. (2022)	Knowledge Graphs, Manufacturing	AI knowledge graphs optimise collaboration.	Develop AI-driven manufacturing workflows.
Review of digital twin-based interaction in smart manufacturing	https://www.tandfonline.com/doi/pdf/10.1080/0951192X.2021.1963482	Wilhelm, J., Petzoldt, C., Beinke, T., & Freitag, M. (2021)	Digital Twins, Smart Manufacturing	Digital twins enhance AI-human synergy.	Expand real-time AI-twin integration.

Cobots in Industry 4.0: A roadmap for future practice studies on human-robot collaboration	https://ieeexplore.ieee.org/iel7/6221037/6340045/09490032.pdf	Weiss, A., Wortmeier, A. K., & Kubicek, B. (2021)	Cobots, Industry 4.0	Collaboration improves efficiency in industrial AI.	Design ergonomic AI interfaces for workers.
Toward a sociology of machine learning explainability: Human-machine interaction in deep neural network	https://journals.sagepub.com/doi/pdf/10.1177/20539517221111361	Borch, C., & Hee Min, B. (2022)	AI Explainability, Deep Learning	ML transparency improves trust.	Standardise explainability frameworks.
Scalable, stretchable and washable triboelectric fibres for self-powering human-machine interaction	https://papers.ssrn.com/sol3/Delivery.cfm?abstractid=4162755	Lan, B., Wu, F., Cheng, Y., Zhou, Y., Hossain, G., Grabher, G., ... & Sun, J. (2022)	Stretchable Electronics, HMI	Washable triboelectric fibres enhance interaction.	Integrate AI-powered wearables.
Extending a human-ai collaboration framework with dynamism and sociality	https://www.researchgate.net/profile/Michael-Muller-12/publication/367125237_Extending_a_Human-AI_Collaboration_Framework_with_Dynamism_and_Sociality/links/63dd3fb4c465a873a2850fc0/Extending-a-Human-AI-Collaboration-Framework-with-Dynamism-and-Sociality.pdf	Muller, M., & Weisz, J. (2022)	AI Collaboration Frameworks	Social and dynamic AI enhances collaboration.	Adapt AI systems for social responsiveness.
Artificial intelligence & creativity: A manifesto for collaboration	https://onlinelibrary.wiley.com/doi/pdfdirect/10.1002/jocb.597	Vinchon, F., Lubart, T., Bartolotta, S., Gironnay, V., Botella, M., Bourgeois-Bougrine, S., ... & Gaggioli, A. (2023)	AI & Creativity, Innovation	AI expands creative collaboration potential.	Balance automation with human creativity.
The human-centric Industry 5.0 collaboration architecture	https://www.sciencedirect.com/science/article/pii/S2215016123002571	Tóth, A., Nagy, L., Kennedy, R., Bohuš, B., Abonyi, J., & Ruppert, T. (2023)	Industry 5.0, Human-Centric AI	AI should prioritise human needs.	Implement AI policies for ethical collaboration.

Real-time detection of worker's emotions for advanced human-robot interaction	https://www.sciencedirect.com/science/article/pii/S1877050922003970/pdf?md5=7e3a70ec270f0dad811aee8ba4614199&pid=1-s2.0-S1877050922003970-main.pdf	Chiurco, A., Frangella, J., Longo, F., Nicoletti, L., Padovano, A., Solina, V., ... & Citraro, C. (2022)	Emotion Recognition, Smart Factories	Real-time emotion detection enhances safety.	Integrate AI emotion analysis in workplaces.