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EDITORIAL

Bridging Minds and Machines: *TAIC*'s Vision for Next-Gen AI and Cybernetic Revolutions

Hazrat Bilal[1,*]

[1] School of Information Science and Technology, University of Science and Technology of China, Hefei 230026, China

Dear Esteemed Researchers and Practitioners,

It is with immense pleasure and a profound sense of purpose that I introduce the inaugural edition of the *Transactions on Applied Intelligence and Cybernetics* (*TAIC*). In an era defined by rapid technological evolution, the convergence of artificial intelligence (AI) and cybernetics is not merely an academic pursuit but a transformative force reshaping industries, societies, and our daily lives. *TAIC* is conceived as a pivotal platform to bridge the critical gap between theoretical advancements and practical implementations in these dynamic fields. Our core objective is to foster a vibrant ecosystem of collaboration among scholars, engineers, and industry leaders, thereby accelerating innovation in AI-driven automation, adaptive systems, and human-machine collaboration.

1 The Evolving Landscape of Applied Intelligence and Cybernetics

The past decade has witnessed an unprecedented surge in the capabilities of AI and cybernetic systems, propelled by exponential growth in computational power, sophisticated algorithmic developments, and the ubiquitous proliferation of interconnected devices. The advent of large language models (LLMs), diffusion models, and other multimodal generative AI paradigms have unlocked new frontiers in content creation, problem-solving, and intelligent interaction [1–3]. Concurrently, advancements in deep learning [4, 5], reinforcement learning [6], and meta-learning [7] continue to push the boundaries of autonomous decision-making and adaptive behavior. The imperative for Explainable AI (XAI), trustworthy AI, and robust AI ethics frameworks underscores our collective responsibility to develop intelligent systems that are not only powerful but also transparent, fair, and aligned with human values. Cybernetics, as the science of control and communication in animals and machines, provides the foundational principles for understanding and designing complex adaptive systems. From brain-computer interfaces (BCIs) and neuro-cybernetics to swarm intelligence and bio-inspired AI, the field continues to offer profound insights into self-learning mechanisms and collective behaviors that are crucial for developing truly autonomous systems.

In the realm of **Artificial Intelligence & Machine Learning**, *TAIC* delves into the foundational and applied aspects that drive modern intelligent systems. This includes the rapid evolution of generative AI, encompassing large language models (LLMs) and diffusion models, which are revolutionizing content

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***Corresponding author:**
✉ Hazrat Bilal
hbilal@mail.ustc.edu.cn

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generation and complex problem-solving, as seen in applications like traffic scenario generation [8] and data augmentation for robust perception systems [9]. We also explore advanced deep learning architectures [11], reinforcement learning for dynamic control, and meta-learning techniques that enable systems to adapt and learn efficiently. Crucially, the journal emphasizes Explainable AI (XAI), trustworthy AI, and the ethical considerations surrounding AI deployment, alongside innovations in federated learning [12], edge AI [13], and decentralized intelligence that are vital for privacy-preserving and distributed intelligent systems.

Our focus on **Cybernetics & Autonomous Systems** highlights the intricate interplay of control, communication, and intelligence that underpins self-governing entities. This area encompasses adaptive and cognitive control systems [14], essential for dynamic environments, and extends to cutting-edge research in Brain-Computer Interfaces (BCIs) and neuro-cybernetics, exploring the direct interaction between biological and artificial systems. We welcome contributions on swarm intelligence, multi-agent systems [15], and collective robotics, where decentralized coordination leads to emergent complex behaviors. Furthermore, the journal covers self-learning systems and bio-inspired AI, drawing lessons from natural intelligence to design more resilient and efficient autonomous agents, alongside advanced cybernetic modeling of complex systems to predict and manage their behavior.

Within **Intelligent Automation & Industry 4.0**, *TAIC* addresses the transformative impact of AI on industrial processes and manufacturing. This includes AI-driven smart manufacturing and the Industrial Internet of Things (IIoT) [16], where connected devices and intelligent algorithms optimize production and resource management. We feature research on autonomous robots [17, 18], drones [10, 19], and unmanned systems, such as those employed in precision agriculture [20] or industrial inspection, and their fault diagnosis for continuous operation [21]. The journal also covers digital twins and AI-based predictive maintenance, which leverage data to forecast equipment failures and minimize downtime, alongside advancements in human-robot collaboration (cobots) and adaptive automation, fostering safer and more efficient work environments.

The domain of **Cyber-Physical Systems & Security** is paramount in an increasingly interconnected world. *TAIC* explores AI-enhanced cybersecurity measures and the challenges posed by adversarial machine learning, crucial for protecting critical infrastructure. We emphasize the development of resilient autonomous systems capable of withstanding attacks and failures, a vital aspect for safety-critical applications like intelligent transportation systems [22], where robust multi-modal fusion and real-time anomaly detection are essential. Furthermore, the journal covers the integration of AI in 5G/6G networks and edge computing [23] for low-latency, high-reliability applications, as well as smart grids, energy systems [24], and the broader role of sustainable AI in resource management.

Finally, **Emerging & High-Impact Applications** represent the frontier of AI and cybernetics, showcasing their potential to revolutionize diverse sectors. This includes the application of generative AI in healthcare for drug discovery and personalized medicine, in finance for fraud detection and algorithmic trading, and in creative industries for novel content generation [25]. We delve into the nascent fields of quantum machine learning and neuromorphic computing, which promise to redefine computational paradigms. The journal also features AI's role in climate modeling and environmental sustainability, the development of immersive experiences through the Metaverse and virtual agents, and the critical discourse on ethical AI, policy frameworks, and the broader societal impact of autonomous systems, ensuring responsible innovation.

2 *TAIC*'s Commitment to Real-World Impact

Our journal is meticulously designed to encompass a wide spectrum of topics, emphasizing both foundational research and applied innovations across computer science, electrical engineering, robotics, and intelligent systems. We are particularly keen on contributions that demonstrate tangible impact in key areas such as:

1. **Artificial Intelligence & Machine Learning**: Including the latest in generative AI, deep learning, explainable AI, federated learning, and AI for big data analytics, NLP, and computer vision.
2. **Cybernetics & Autonomous Systems**: Covering adaptive control, BCIs, swarm intelligence, self-learning systems, and cybernetic modeling of complex systems.
3. **Intelligent Automation & Industry 4.0**:

Focusing on AI-driven smart manufacturing, industrial IoT (IIoT), autonomous robots, digital twins, and human-robot collaboration.

4. **Cyber-Physical Systems & Security**: Addressing AI-enhanced cybersecurity, resilient autonomous systems, AI in 5G/6G networks, smart grids, and intelligent transportation systems.
5. **Emerging & High-Impact Applications**: Exploring generative AI in healthcare, finance, and creative industries, quantum machine learning, AI for climate modeling, and the societal impact of autonomous systems.

3 Challenges and Ethical Considerations

While the potential of applied intelligence and cybernetics is immense, we recognize the inherent challenges and ethical considerations that accompany these advancements. Issues such as data privacy, algorithmic bias, and the security of increasingly complex cyber-physical systems demand rigorous attention. *TAIC* is committed to fostering discourse around these critical aspects, promoting research that not only pushes technological boundaries but also ensures the responsible, equitable, and secure deployment of intelligent systems for societal well-being.

4 Call for Contributions and Our Vision

We extend a warm invitation to researchers, engineers, and practitioners to submit their original research articles, comprehensive review papers, concise breakthrough application notes, and proposals for special issues on emerging trends. Through a rigorous and transparent peer-review process, we are dedicated to upholding the highest standards of academic integrity and ensuring that published work in TAIC makes a significant and lasting contribution to the field.

5 A Vision for the Future

Our vision for *TAIC* is to cultivate a vibrant, interdisciplinary community that actively shapes the future of intelligent technologies. We aspire to be the leading platform where cutting-edge theoretical insights meet practical, real-world applications, driving innovation that benefits humanity.

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Conflicts of Interest

The author declares no conflicts of interest.

AI Use Statement

The author declares that no generative AI was used in the preparation of this manuscript.

Ethical Approval and Consent to Participate

Not applicable.

References

[1] Tseng, P. Y., Lin, P. C., & Kristianto, E. (2023). Vehicle theft detection by generative adversarial networks on driving behavior. *Engineering Applications of Artificial Intelligence, 117*, 105571. [CrossRef]

[2] Chang, C., Wang, S., Zhang, J., Ge, J., & Li, L. (2024). Llmscenario: Large language model driven scenario generation. *IEEE Transactions on Systems, Man, and Cybernetics: Systems, 54*(11), 6581-6594. [CrossRef]

[3] Liu, T., Qin, Y., Zhang, S., & Tao, X. (2024). Empowering corner case detection in autonomous vehicles with multimodal large language models. *IEEE Signal Processing Letters*. [CrossRef]

[4] Wang, C., Chen, Y., Liu, F., Elliott, M., Kwok, C. F., Pena-Solorzano, C., ... & Carneiro, G. (2023). An interpretable and accurate deep-learning diagnosis framework modeled with fully and semi-supervised reciprocal learning. *IEEE transactions on medical imaging, 43*(1), 392-404. [CrossRef]

[5] Mahmud, M., Kaiser, M. S., Hussain, A., & Vassanelli, S. (2018). Applications of deep learning and reinforcement learning to biological data. *IEEE transactions on neural networks and learning systems, 29*(6), 2063-2079. [CrossRef]

[6] Cao, Z., Wong, K., & Lin, C. T. (2021). Weak human preference supervision for deep reinforcement learning. *IEEE Transactions on Neural Networks and Learning Systems, 32*(12), 5369-5378. [CrossRef]

[7] Chen, J., Hu, W., Cao, D., Zhang, Z., Chen, Z., & Blaabjerg, F. (2022). A meta-learning method for electric machine bearing fault diagnosis under varying working conditions with limited data. *IEEE Transactions on Industrial Informatics, 19*(3), 2552-2564. [CrossRef]

[8] Bilal, H., Rehman, A., Aslam, M. S., Ullah, I., Chang, W. J., Kumar, N., & Almuhaideb, A. M. (2025). Hybrid TrafficAI: A Generative AI Framework for Real-Time Traffic Simulation and Adaptive Behavior Modeling. *IEEE Transactions on Intelligent Transportation Systems*. [CrossRef]

[9] Zheng, Z., Cheng, Y., Xin, Z., Yu, Z., & Zheng, B. (2023). Robust perception under adverse conditions for autonomous driving based on data augmentation. *IEEE Transactions on Intelligent Transportation Systems, 24*(12), 13916-13929. [CrossRef]

[10] Tanveer, M., Kumar, N., & Hassan, M. M. (2021). RAMP-IoD: A robust authenticated key management protocol for the Internet of Drones. *IEEE Internet of Things Journal, 9*(2), 1339-1353. [CrossRef]

[11] Jindal, A., Aujla, G. S., Kumar, N., Chaudhary, R., Obaidat, M. S., & You, I. (2018). SeDaTiVe: SDN-enabled deep learning architecture for network traffic control in vehicular cyber-physical systems. *IEEE network, 32*(6), 66-73. [CrossRef]

[12] Rahman, A., Hasan, K., Kundu, D., Islam, M. J., Debnath, T., Band, S. S., & Kumar, N. (2023). On the ICN-IoT with federated learning integration of communication: Concepts, security-privacy issues, applications, and future perspectives. *Future Generation Computer Systems, 138*, 61-88. [CrossRef]

[13] Guo, Z., Yu, K., Kumar, N., Wei, W., Mumtaz, S., & Guizani, M. (2022). Deep-distributed-learning-based POI recommendation under mobile-edge networks. *IEEE Internet of Things Journal, 10*(1), 303-317. [CrossRef]

[14] Li, S., Liu, Y. J., Ding, L., Liu, L., & Wan, F. (2024). Neural adaptive optimal control of inequality-constrained nonlinear system with partial uncertain time delay. *IEEE Transactions on Systems, Man, and Cybernetics: Systems, 54*(7), 4066-4076. [CrossRef]

[15] Li, H., & Li, X. (2023). Distributed fixed-time consensus of discrete-time heterogeneous multi-agent systems via predictive mechanism and Lyapunov approach. *IEEE Transactions on Circuits and Systems II: Express Briefs, 71*(1), 321-325. [CrossRef]

[16] Gupta, D., Juneja, S., Nauman, A., Hamid, Y., Ullah, I., Kim, T., ... & Ghamry, N. A. (2022). Energy saving implementation in hydraulic press using industrial Internet of Things (IIoT). *Electronics, 11*(23), 4061. [CrossRef]

[17] Ullah, I., Adhikari, D., Khan, H., Ahmad, S., Esposito, C., & Choi, C. (2024, May). Optimizing mobile robot localization: Drones-enhanced sensor fusion with innovative wireless communication. In *IEEE INFOCOM 2024-IEEE Conference on Computer Communications Workshops (INFOCOM WKSHPS)* (pp. 1-6). IEEE. [CrossRef]

[18] Ullah, I., Noor, A., Nazir, S., Ali, F., Ghadi, Y. Y., & Aslam, N. (2024). Protecting IoT devices from security attacks using effective decision-making strategy of appropriate features. *The Journal of Supercomputing, 80*(5), 5870-5899. [CrossRef]

[19] Bilal, H., Aslam, M. S., Tian, Y., Ullah, I., Ayouni, S., & Vasilakos, A. V. (2025). A Consumer Electronics-Enhanced UAV System for Agricultural Farm Tracking With Fuzzy SMO and Actuator Fault Detection Control Algorithms. *IEEE Transactions on Consumer Electronics*. [CrossRef]

[20] Deka, B., & Chakraborty, D. (2024). UAV sensing-based litchi segmentation using modified mask-RCNN for precision agriculture. *IEEE Transactions on AgriFood Electronics*. [CrossRef]

[21] Bilal, H., Obaidat, M. S., Aslam, M. S., Zhang, J., Yin, B., & Mahmood, K. (2024). Online fault diagnosis of industrial robot using IoRT and hybrid deep learning techniques: An experimental approach. *IEEE Internet of Things Journal, 11*(19), 31422-31437. [CrossRef]

[22] Wang, F. Y., Lin, Y., Ioannou, P. A., Vlacic, L., Liu, X., Eskandarian, A., ... & Olaverri-Monreal, C. (2023). Transportation 5.0: The DAO to safe, secure, and sustainable intelligent transportation systems. *IEEE Transactions on Intelligent Transportation Systems, 24*(10), 10262-10278. [CrossRef]

[23] Wu, C., Li, L., Zhang, L., Gao, C., Wu, X., & Xiao, S. (2024). Efficient GAN-Based Federated Optimization for Vehicular Task Offloading With Mobile Edge Computing in 6G Network. *IEEE Internet of Things Journal*. [CrossRef]

[24] Aslam, M. S., Shamrooz, S., Bilal, H., Vasilakos, A. V., & Hayajneh, M. (2025). Dynamic event–triggered scheme of T–S fuzzy controller for wind energy plant with dependent membership operator. *Renewable energy*, 124013. [CrossRef]

[25] Anwar, M. S., Alhalabi, W., Choi, A., Ullah, I., & Alhudali, A. (2024). Internet of metaverse things (IoMT): Applications, technology challenges and security consideration. In *Future Communication Systems Using Artificial Intelligence, Internet of Things and Data Science* (pp. 133-158). CRC Press.

Hazrat Bilal received his MS degree in Control Science and Engineering in 2018 from Nanjing University of Science and Technology, Nanjing, China, and his PhD degree in Control Science and Engineering in 2024 from the University of Science and Technology of China, Hefei, Anhui, respectively. He is currently a full-time Research Fellow at the College of Mechatronics and Control Engineering, Shenzhen University, China. His research interests include robotics, autonomous vehicles, industrial automation, Internet of robotic things (IoRT), and artificial intelligence. In 2018, considering his research achievement, the Nanjing University of Science and Technology awarded him the Outstanding Graduate Award, while the University of Science and Technology of China awarded him the CAS-TWAS Fellow Award in 2018 and the Outstanding Graduate Award in 2024. He is currently a member of IEEE, IEEE Robotics and Automation Society, and IEEE Control Systems Society. Mr. Bilal has many publications in IEEE, Elsevier, and Springer brands. (Email: hbilal@mail.ustc.edu.cn)