Debanjan Konar, Ph.D.

d.konar@hzdr.de, debanjan.konar@bosonqpsi.com
https://sites.google.com/view/debanjankonar/
https://in.linkedin.com/in/debanjan-konar-5894a746/

Career Experience

November 2022–January 2023 — **Helmholtz Visiting Fellow**, Steinbuch Center for Computing (SCC), Karlsruhe Institute of Technology, Karlsruhe, Germany.

October 2022–Present — **Head of Quantum Research** (Lead Quantum Research Scientist), BosonQ Psi Pvt. Ltd, Bangalore, India. [Remote]

December 2021–Present — **Postdoctoral Research Scientist** (Quantum Machine Learning), Center for Advanced Systems Understanding (CASUS), Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Görlitz, Germany.

July 2021–Nov 2021 — **Assistant Professor.** Department of Computer Science and Engineering, SRM University-AP, Andhra Pradesh, India.

September 2020–June 2021 — **Assistant Professor (Research).** Department of Computer Science and Engineering, Sikkim Manipal Institute of Technology, Sikkim Manipal University, Sikkim, India.

August 2012–December 2015 — **Assistant Professor.** Department of Computer Science and Engineering, Sikkim Manipal Institute of Technology, Sikkim Manipal University, Sikkim, India.

Education Background

January 2016 – February 2021 — **Doctor of Philosophy (Ph.D. [Engg.])** in Quantum Machine Learning (CGPA: 7.5/10)
Thesis title: *Quantum-inspired Self-supervised Neural Network Architectures for Automatic Brain MR Image Segmentation.*
Computer Technology Laboratory, Department of Electrical Engineering, Indian Institute of Technology Delhi (IITD), New Delhi, India

September 2010 – August 2012 — **Master of Technology (M. Tech.) [Post-Graduate]** in Artificial Intelligence (Computer Science and Engineering) (CGPA: 9.38/10)[Silver Medalist]
Thesis title: *A Rough Set Based Technique for Evaluation of User's Textual Response in Online Examination System Under E-Learning Environment*.
Artificial Intelligence Laboratory, Department of Computer Science and Engineering, National Institute of Technical Teachers' Training and Research (NITTTR), Kolkata, India [West Bengal University of Technology, Kolkata, India].

August 2006 – July 2010 — **Bachelor of Engineering (B.E.) [Undergraduate]** in Computer Science and Engineering) (CGPA: 7.84/10)
Project title: *Design and Implementation of 1K Static RAM using VHDL*.
VLSI Laboratory, Department of Computer Science and Engineering, University Institute of Technology, University of Burdwan, Burdwan, West Bengal, India.

Research Publications

Journal Articles

1. Konar, D., Gelenbe, E., Bhandary, S., Sarma, A. D., & Cangi, A. (2022). Random quantum neural networks (RQNN) for noisy image recognition. doi:https://arxiv.org/abs/2203.01764

2. Chandra, S., Gourisaria, M. K., Harshvardhan, G., Konar, D., Gao, X., Wang, T., & Xu, M. (2022). Prolificacy assessment of spermatozoan via state-of-the-art deep learning frameworks. *IEEE Access*, *10*, 13715–13727. doi:10.1109/ACCESS.2022.3146334.

3. Konar, D., Bhattacharyya, S., Dey, S., & Panigrahi, B. K. (2022). Optimized activation for quantum-inspired self-supervised neural network based fully automated brain lesion segmentation. *Applied Intelligence*. doi:https://doi.org/10.1007/s10489-021-03108-5

4. Konar, D., Bhattacharyya, S., Panigrahi, B. K., & Behrman, E. C. (2022). Qutrit-inspired fully self-supervised shallow quantum learning network for brain tumor segmentation. *IEEE Transactions on Neural Networks and Learning Systems*, *33*(11), 6331–6345. doi:10.1109/TNNLS.2021.3077188

5. Vemula, D. R., Konar, D., Satheesan, S., Kalidasu, S. M., & Cangi, A. (2022). A scalable 5,6-qubit grover's quantum search algorithm. *arXiv*. doi:10.48550/ARXIV.2205.00117

6. Konar, D., Bhattacharyya, S., Gandhi, T. K., Panigrahi, B. K., & Jiang, R. (2021). 3D quantum-inspired self-supervised tensor network for volumetric segmentation of medical images. doi:10.36227/techrxiv.12909860.v3.

7. Konar, D., Panigrahi, B. K., Bhattacharyya, S., Dey, N., & Jiang, R. (2021). Auto-diagnosis of COVID-19 using lung CT images with semi-supervised shallow learning network. *IEEE Access*, *9*, 28716–28728. doi:10.1109/ACCESS.2021.3058854

8. Konar, D., Bhattacharyya, S., Gandhi, T. K., & Panigrahi, B. K. (2020). A quantum-inspired self-supervised network model for automatic segmentation of brain MR images. *Applied Soft Computing*, *93*, 106348. doi:https://doi.org/10.1016/j.asoc.2020.106348

9. Chakraborty, U. K., Konar, D., Roy, S., & Choudhury, S. (2019). Automatic short answer grading using rough concept clusters. *International Journal of Advanced Intelligence Paradigms*, *14*(3-4), 260–280. doi:10.1504/IJAIP.2019.103413

10. Konar, D., Bhattacharyya, S., Sharma, K., Sharma, S., & Pradhan, S. R. (2017). An improved hybrid quantum-inspired genetic algorithm (HQIGA) for scheduling of real-time task in multiprocessor system. *Applied Soft Computing*, *53*, 296–307. doi:https://doi.org/10.1016/j.asoc.2016.12.051

11. Chakraborty, U. K., Konar, D., Roy, S., & Choudhury, S. (2016). Intelligent fuzzy spelling evaluator for e-learning systems. *Education and Information Technologies*, *21*(1), 171–184. doi:https://doi.org/10.1007/s10639-014-9314-z

12. Konar, D., Bhattacharyya, S., Panigrahi, B. K., & Nakamatsu, K. (2016). A quantum bi-directional self-organizing neural network (QBDSONN) architecture for binary object extraction from a noisy perspective. *Applied Soft Computing*, *46*, 731–752. doi:https://doi.org/10.1016/j.asoc.2015.12.040

Conference Proceedings

1. Bhattacharyya, S., Dey, S., & Konar, D. (2019). A novel qutrit based quantum ant colony optimization for multi-level thresholding. In *TENCON 2019-2019 IEEE region 10 conference (TENCON)* (pp. 1375–1380). IEEE. doi:10.1109/TENCON.2019.8929561

2. Dey, S., De, S., Ghosh, D., Konar, D., Bhattacharyya, S., & Platos, J. (2019). A novel quantum inspired sperm whale meta-heuristic for image thresholding. In *2019 second International conference on advanced computational and communication paradigms (ICACCP)* (pp. 1–7). IEEE. doi:10.1109/ICACCP.2019.8882905

3. Konar, D., Bhattacharyya, S., Dey, S., & Panigrahi, B. K. (2019). Opti-QIBDS Net: A quantum-inspired optimized bi-directional self-supervised neural network architecture for automatic brain mr image

segmentation. In *TENCON 2019-2019 ieee region 10 conference (TENCON)* (pp. 761–766). IEEE. doi:10.1109/TENCON.2019.8929585

4 Konar, D., Bhattacharyya, S., & Panigrahi, B. K. (2019). QIBDS Net: A quantum-inspired bi-directional self-supervised neural network architecture for automatic brain mr image segmentation. In *International conference on pattern recognition and machine intelligence* (pp. 87–95). Springer. doi:https://doi.org/10.1007/978-3-030-34872-4_10

5 Bhattacharyya, S., Snasel, V., Dey, A., Dey, S., & Konar, D. (2018). Quantum spider monkey optimization (QSMO) algorithm for automatic gray-scale image clustering. In *2018 International conference on advances in computing, communications and informatics (ICACCI)* (pp. 1869–1874). IEEE. doi:10.1109/ICACCI.2018.8554872

6 Konar, D., Sharma, K., Sarogi, V., & Bhattacharyya, S. (2018). A multi-objective quantum-inspired genetic algorithm (Mo-QIGA) for real-time tasks scheduling in multiprocessor environment. In *Recent advancement in information and communication technology: Proceedings of the 8th International conference of information and communication technology- 2018 (ICICT)* (Vol. 131, pp. 591–599). doi:https://doi.org/10.1016/j.procs.2018.04.301

7 Bhattacharyya, S., Chaki, N., Konar, D., Chakraborty, U. K., & Singh, C. T. (2017). Advanced computational and communication paradigms. In *Proceedings of International conference on ICACCP*. Springer. doi:10.1007/978-981-10-8240-5

8 Konar, D., Roy, S., Choudhury, S. et al. (2017). Intelligent evaluation of short responses for e-learning systems. In *Proceedings of the first International conference on computational intelligence and informatics* (pp. 365–372). Springer. doi:https://doi.org/10.1007/978-981-10-2471-9_35

9 Konar, D., Chakraborty, U. K., Bhattacharyya, S., Gandhi, T. K., & Panigrahi, B. K. (2016). A quantum parallel bi-directional self-organizing neural network (QPBDSONN) architecture for extraction of pure color objects from noisy background. In *2016 International conference on advances in computing, communications and informatics (ICACCI)* (pp. 1912–1918). IEEE. doi:10.1109/ICACCI.2016.7732330

10 Konar, D., Sharma, K., Pradhan, S. R., & Sharma, S. (2016). An efficient dynamic scheduling algorithm for soft real-time tasks in multiprocessor system using hybrid quantum-inspired genetic algorithm. In *Proceedings of the 4th International conference on frontiers in intelligent computing: Theory and applications (ficta) 2015* (pp. 3–11). Springer. doi:https://doi.org/10.1007/978-81-322-2695-6_1

11 Chakraborty, U. K., Konar, D., Roy, S., & Choudhury, S. (2015). Rough set based keyword selection and weighing for textual answer evaluation. In *2015 annual IEEE india conference (INDICON)* (pp. 1–6). IEEE. doi:10.1109/INDICON.2015.7443405

12 Konar, D., Bhattacharyya, S., Das, N., & Panigrahi, B. K. (2015). A quantum bi-directional self-organizing neural network (QBDSONN) for binary image denoising. In *2015 International conference on advances in computing, communications and informatics (icacci)* (pp. 1225–1230). IEEE. doi:10.1109/ICACCI.2015.7275780

Books and Chapters

1 Althar, R. R., Samanta, D., Konar, D., & Bhattacharyya, S. (2021). *Software source code: Statistical modeling*. Walter de Gruyter GmbH & Co KG.

2 Dey, S., Konar, D., De, S., & Bhattacharyya, S. (2021a). Chapter 1 - an introductory illustration of medical image analysis. In T. Gandhi, S. Bhattacharyya, S. De, D. Konar, & S. Dey (Eds.), *Advanced machine vision paradigms for medical image analysis* (pp. 1–9). doi:https://doi.org/10.1016/B978-0-12-819295-5.00001-9

3 Dey, S., Konar, D., De, S., & Bhattacharyya, S. (2021b). Chapter 11 - conclusion and future research directions. In T. Gandhi, S. Bhattacharyya, S. De, D. Konar, & S. Dey (Eds.), *Advanced machine vision*

paradigms for medical image analysis (pp. 273–277). doi:https://doi.org/10.1016/B978-0-12-819295-5.00011-1

4. Gandhi, T., Bhattacharyya, S., De, S., Konar, D., & Dey, S. (Eds.). (2021). *Advanced machine vision paradigms for medical image analysis*. doi:https://doi.org/10.1016/C2018-0-05420-1

5. Konar, D., Bhattacharyya, S., De, S., Das, A., Platos, J., Gorbachev, S. V., & Muhammad, K. (2021). Early prediction of coronavirus epidemic outbreak using stacked long short-term memory networks. (p. 81). CRC Press.

6. Bhattacharyya, S., Konar, D., Platos, J., Kar, C., & Sharma, K. (2020). *Hybrid machine intelligence for medical image analysis*. doi:10.1007/978-981-13-8930-6

7. Gupta, M., Konar, D., Bhattacharyya, S., & Biswas, S. (2020). *Computer vision and machine intelligence in medical image analysis*. doi:10.1007/978-981-13-8798-2

8. Konar, D., Pradhan, R., Dey, T., Sapkota, T., & Rai, P. (2020). Predicting students' grades using CART, ID3, and multiclass SVM optimized by the genetic algorithm (GA): A case study. (pp. 85–99). doi:https://doi.org/10.1002/9781119551621.ch5

9. Kar, C., Kumar, A., Konar, D., & Banerjee, S. (2019). Automatic region of interest detection of tropical cyclone image by center of gravity and distance metrics. In *2019 fifth International conference on image information processing (ICIIP)* (pp. 141–145). doi:10.1109/ICIIP47207.2019.8985860

10. Konar, D., & Kar, S. K. (2018). An efficient handwritten character recognition using quantum multilayer neural network (QMLNN) architecture: Quantum multilayer neural network. In *Quantum-inspired intelligent systems for multimedia data analysis* (pp. 262–276). doi:10.4018/978-1-5225-5219-2.ch008

Patents

March 2021 — **A Microcontroller Based Low-Cost Electronic Locking System Using 2-Way Authentication**, Patent#: 2021101384, Inventors: S. Bhattacharyya, A. Basu, A. Roy, S. Sinha, P. Chakrabarti, S. De, **D. Konar**, D. Samanta, T. Dutta, S. Dey, and D. Mukhopadhyay.

February 2020 — **Automatic Violence Detection - A Tool for Woman's Safety**, Application# 202041006858, Applicants: **D. Konar**, R. Rakshit, S. Dey, D. Samanata, C. Kar, H. Pal, K. Sharma and S. Bhattacharyya.

Skills

Research Interest — Quantum Machine Learning, Computer Vision, Deep Neural Networks, Medical Image Analysis

Languages — Strong reading, writing and speaking competencies for English, Bengali, and Hindi.

Coding — Python, Matlab, C, R, C++, Latex, Overleaf, Tensorflow, Pytorch, QSKit-IBM Q Libraries, PennyLane Quantum simulator.

Funded Projects/External Funds

July 2022-Ongoing — **Hybrid Classical-Quantum Deep Random Neural Networks**, Helmholtz Visiting Researcher Grant funded by Helmholtz Information and Data science Academy (HIDA) [Sanction No. 12749 dated 1st July 2022], PI: D. Konar

Funded Projects/External Funds (continued)

July 2020-Ongoing — **Super Resolution of Brain MR Images using Deep Learning**, TMA Pai University Research Fund Award of Minor Grant [Sanction No. 6100/SMIT/R&D/Project/13/2020 dated 20th July 2020], Co-PI: D. Konar

October 2018-December 2020 — **Automatic Detection of Violent Activity using Deep Pose and Multiple Instance Learning**, Manipal Endowment Fund 2018-2020. [Sanction No. 1094/SMIT/OO/303/2018 dated 08th October 2018]. PI: D. Konar

October 2018-September 2019 — **Second International Conference on Advanced Computational and Communication Paradigms (ICACCP-2019)**, Science and Engineering Research Board (SERB), Department of Science and Technology (DST), Govt. of India, [Sanction No. SERB/F/9463/2018-2019 dated 16 November 2018]. PI: D. Konar

December 2018-December 2019 — **Second International Conference on Advanced Computational and Communication Paradigms (ICACCP-2019)**, Indian National Science Academy (INSA), Govt. of India, [Sanction No. SP/C-Dec-28/2018-19 dated 19 December 2018]. PI: D. Konar

May 2017-April 2018 — **IEEE International Conference on Advanced Computational and Communication Paradigms (ICACCP-2017)**, Science and Engineering Research Board (SERB), Department of Science and Technology (DST), Govt. of India. [Sanction No. SERB/F/746/2017-18 dated 17 May 2017]. PI: D. Konar

Organization of Scientific Meetings

22/03/2021-24/03/2021 — **Organizing Chair, ICACCP 2021**: 2021 Third International Conference on Advanced Computational and Communication Paradigms, India. [http://www.icaccpa.in/]

25/02/2019-28/02/2019 — **Convener, ICACCP 2019**: 2019 Second International Conference on Advanced Computational and Communication Paradigms, India. [http://2019.icaccpa.in/]

08/08/2017-10/8/2017 — **Convener, ICACCP 2017**: IEEE International Conference on Advanced Computational and Communication Paradigms, India. [http://2017.icaccpa.in/]

Awards and Achievements

2022 — **Fulbright-Nehru Postdoctoral Research Fellowships 2022-2023** as a principal candidate in Computer Sc. (24 Months) awarded by Fulbright Commission, USA.

Helmholtz Visiting Researcher Grant funded by Helmholtz Information and Data science Academy (HIDA) to work on a Quantum Machine learning project collaborating with Karlsruhe Institute of Technology (KIT), Germany.

One of the six recipients of the Travel grant from the **Wilhelm und Else Heraeus-Stiftung** to attend ESOF 2022 (http://www.esof.eu/) in Leiden, Netherlands.

2017 — **Silver Medallist**, for secured 2nd rank in the National Institute of Technical Teachers' Training and Research (NITTTR), Kolkata, awarded by West Bengal University of Technology Kolkata, India, 2017.

2010 — **Graduate Aptitude Test Qualified (Computer Science)**, and Awarded MHRD Scholarship (Fellowship) during M. Tech (2010-2012).

Awards and Achievements (continued)

2003 **National scholarship**, awarded by Ministry of Human Resources and Development, Govt. of India.

Research Expeditions and International Collaborations

September 2022-Present **Quantum Computing Research Laboratory**, School of Industrial Engineering, Purdue University, West Lafayette, USA.

November 2022-Present **Data Analytics, Access and Applications Department**, Steinbuch Centre for Computing (SCC), Karlsruhe Institute of Technology, Karlsruhe, Germany.

March 2021-Present **Xu Research Laboratory**, School of Computer Science, Carnegie Mellon University, USA.

September 2020-Present **Quantum AI Research Laboratory**, School of Computing & Communications, Lancaster University, UK.

September 2021-Present **Computer Systems Modelling and Performance Evaluation Group**, Institute of Theoretical & Applied Informatics, Polish Academy of Sciences, Poland.

March 2021-present **Neural Networks and Patter recognition Research Group**, Department of Electrical Engineering, Indian Institute of Technology Delhi (IITD), New Delhi, India.

Memberships of Scientific Societies

05/07/2022-present Full member of EuroScience.

16/8/2021-present Institute of Electrical and Electronics Engineers (IEEE) Senior Member# 94028574.

21/9/2016-15/08/2021 Institute of Electrical and Electronics Engineers (IEEE) Membership# 94028574.

01/10/2016-present Computer Society of India (CSI) CSI Membership# F8002120.

01/10/2018-present Association for Computing Machinery (ACM) Membership# 1283609.

12/7/2016-present Institute of Engineers, India (MIE) Membership# AM178316-8.

Contribution as Guest Editor/Reviewer

Guest Editor

2022-present Quantum Inspired Soft Computing for Intelligent Data Processing, Journal of Applied Soft Computing, Elsevier (IF: 6.725).

2019-2020 Hybrid Machine Intelligence for Imbalanced Data Analysis, CAAI Transactions on Intelligence Technology.

Reviewer

2016-present Journal of Applied Soft Computing, Elsevier (IF: 6.725).

2020-present IEEE Access (IF: 3.367)

2021-present IEEE Transactions on Computational Social Systems.

IET Quantum Communication.

Computers in Biology and Medicine (IF: 4.589).

Soft Computing Letters.

Invited Presentations

23/04/2022 **Inaugural Keynote on Quantum Machine Learning Algorithms in 11th IEEE CSNT 2022** (http://www.csnt.in/) organized by IEEE Madhya Pradesh Section, India.

09/07/2022 **Invited Talk on Hybrid Classical -Quantum Neural Networks for Large-Scale Algorithms in ICISHMC 2022** (https://kcevent-8e82a.web.app/) organized by K.C. College of Engineering and Management Studies and Research, Thane, Maharashtra, India.

25/05/2021 **Workshop on "Quantum Artificial Intelligence"**, at IIIT, Pune, India.

27/02/2021 **Workshop on Quantum Intelligence**, at CHRIST University, Bangalore, India.

Presentation in International Conference

04/02/2023-10/02/2023 **26th Conference on Quantum Information Processing (QIP)** (http://qip2023.ugent.be/) organized by the Quantum Group of Ghent University, in Ghent, Belgium.

16/05/2022-20/05/2022 **LEAPS meets Quantum Technology 2022** (https://leaps-initiative.eu/event/leaps-meets-quantum-technology-conference/) organized by League of European Accelerator-based Photon Sources (LEAPS), in Elba Island, Italy.

17/10/2019-20/05/2019 **2019 IEEE Region 10 Conference (TENCON)** (https://www.ieeer10.org/events/tencon-2019/) organized by IEEE Region 10, in Kochi, India.

17/12/2019-20/12/2019 **2019 8th International Conference on Pattern Recognition and Machine Intelligence (PReMi 2019)** (http://www.tezu.ernet.in/~premi2019/) organized by Machine Intelligence Unit (MIU), Indian Statistical Institute (ISI), in Tezpur, India.

27/01/2018-28/01/2018 **2018 8th International Conference of Information and Communication Technology (ICICT 2018)** (http://www.icict2018.org/), Xiamen, China.

21/09/2016-24/09/2016 **2016 Fifth International Conference on Advances in Computing, Communications and Informatics (ICACCI)** (https://ieeexplore.ieee.org/xpl/conhome/7259950/proceeding), Kochi, India.

10/08/2015-13/08/2015 **2015 Fourth International Conference on Advances in Computing, Communications and Informatics (ICACCI)** (https://ieeexplore.ieee.org/xpl/conhome/7259950/proceeding), Kochi, India.