Rajani Singh, Ph.D.







Research Interest

Data-Driven Decision-Making, Data Science, Dynamic and Evolutionary Game Theory, Applied Game Theory, Optimal Control Theory, Operations Research

Employment History

$01.02.2022 - \cdots$	Assistant Professor Department of Digitalization, Copenhagen Business School, Denmark
01.12.2019 - 31.01.2022	Postdoctoral Researcher Department of Digitalization, Copenhagen Business School, Denmark
10.06.2019 - 09.09.2019	Full time Visiting Researcher Department of Electrical and Computer Science, University of Waterloo, Ontario, Canada
01.07.2018 - 30.03.2019	Research Associate Department of Mathematics and Computer Science, Brandon University, Manitoba, Canada
15.02.2018 - 15.07.2018	Visiting Research Scholar Institute of Computer Science, Polish Academy of Sciences, Warsaw, Poland
01.07.2015 - 01.09.2015	Guest Faculty Centre for Computer Sciences, Ewing Christian College, University of Allahabad, India
01.01.2014 - 20.09.2014	Subject Matter Expert in Mathematics Evelyn Learning System Pvt. Ltd. New Delhi, India
01.09.2013 - 01.12.2013	Project Fellow Indian Institute of Technology Delhi, India

Education

2014 - 2019	Ph.D. Mathematics Faculty of Mathematics, Informatics and Mechanics, University of Warsaw, Poland
2011 - 2013	M.Sc. Mathematics Department of Mathematics, Indian Institute of Technology Delhi, New Delhi, India
2008 - 2011	B.Sc. Mathematics and Computer Application Ewing Christian College, University of Allahabad, India

Teaching Experience

Spring $2020 - 2025$	Natural Language Processing and Text Analytics 7.5 ECTS (Partially) CBS, Denmark
Autumn $2020 - 2025$	Game Theory for Business and Data-driven Decision Making 7.5 ECTS (Completly) CBS, Denmark
Autumn $2023 - 2024$	Big Data Analytics 7.5 ECTS (Partially) CBS, Denmark
01.10.2015 - 29.01.2017	Linear Algebra Tutorials, Faculty of Economic Sciences, University of Warsaw, Poland

Awards and Achievements

2025	Project Funding for AI-pilot project in teaching for developing "CBotS - Mini Tutor Bot for Students", CBS, Denmark
15 - 18.07.2025	Invited Talk "Market share battles in a competitive advertising clutter", $16^{ m th}$ Viennese Conference on Optimal Control and Dynamic Games, Vienna, Austria
21 - 04.2025	Invited Talk "Game Theory for a Green Transition", Indian Institute Of Management–Lucknow (IIM–Lucknow), India
29 - 01.2025	Invited Talk "Sustainable and Secure Renewable Energy Trading System Based on Digital Twin, Blockchain and Game Theory Integration", Department of Computer Science, University of Copenhagen
22 - 09.2023	Invited Talk "Dynamic Games and its Application", DTU Wind and Energy Systems Department, Technical University of Denmark
25 - 03.2023	Invited Speaker "Game Theory for Decision Making", Lucknow Public College of Professional Studies, India
2021	Best Paper Award For the paper "A Decentralized Privacy-preserving Healthcare Blockchain for IoT" in Sensors
24.09.2020	Young Scientist Award Andrzej Malawski Prize for outstanding contribution to the development of mathematical economics link to webpage: https://nagroda_im_malawskiego.uek.krakow.pl/
05 - 08.08.2019	Invited Speaker $6^{ ext{th}}$ International Conference on Continuous Optimization IC-COPT 2019, Technical University of Berlin, Germany
20 - 22.02.2019	Invited Talk Chair of Operations Research, Department of Mathematics and School of Management, Technical University of Munich, Germany
17 – 19.02.2019	Invited Talk Department of Computer Science, Aarhus University, Kingdom of Denmark
23 - 24.01.2019	Travel Support To attend DCGT 2019: 6 th Day on Computational Game Theory, Potsdam, Germany
	Young Researcher Grant To attend Workshop on Advances in Stochastic Games, Budapest, Hungary
15 – 17.12.2018	ITC Conference Grant To attend WINE 2018: The 14 th Conference on Web and Internet Economics, Oxford, U.K.
03 - 06.07.2018	Invited Speaker 14 th Viennese Conference on Optimal Control and Dynamic Games, Vienna, Austria
2017 – 2019	Principal Investigator of the Project "Games dynamic modeling 'tragedy of the common resource" funded from Funds of National Science Centre, Poland, granted by decision number $FEB2016/21/N/HS4/00258$
2015 — 2017	Ph.D Fellowship : Two-time Awardee of the Fellowship for Outstanding Ph.D. students by Warsaw Center of Mathematics and Computer Science (WCMCS)
17 – 18.09.2018	COST scholarship for Training School on Recent Applications of Game Theory, Krakow, Poland
04 - 09.09.2016	Scholarship for summer school on Game Theory and Dynamic games, Lake Como School of Advanced Studies, Campione d'Italia
07 - 11.09.2015	Scholarship for summer school on Game Theory and Algorithms, Lake Como School of Advanced Studies, Campione d'Italia
2008 – 2009	$\bf Merit\ holder\ B.Sc.\ 1^{St}\ year,$ Ewing Christian College, University of Allahabad, India

Research Publications

Iournal Articles

- S. Adhikary, S. Banerjee, **R. Singh**, and A. D. Dwivedi, "Fish species identification on low resolution a study with enhanced super-resolution generative adversarial network (esrgan), YOLO and VGG-16," *PeerJ Comput. Sci.*, vol. 11, e2860, 2025. ODI: 10.7717/PEERJ-CS.2860.
- S. Dhar, A. Khare, A. D. Dwivedi, and **R. Singh**, "Securing iot devices: A novel approach using blockchain and quantum cryptography," *Internet of Things*, vol. 25, 2024. ODI: 10.1016/j.iot.2023.101019.
- A. D. Dwivedi, **R. Singh**, K. Kaushik, R. R. Mukkamala, and W. S. Alnumay, "Blockchain and artificial intelligence for 5g-enabled internet of things: Challenges, opportunities, and solutions," *Transactions on Emerging Telecommunications Technologies*, vol. 35, no. 4, 2024. ODI: 10.1002/ett.4329.
- 4 A. Wiszniewska-Matyszkiel and **R. Singh**, "Counteracting "the tragedy of the commons" in an imperfect world," *Journal of Public Economic Theory*, vol. 26, no. 5, e12713, 2024.
- S. Dhar, A. Khare, and **R. Singh**, "Advanced security model for multimedia data sharing in internet of things," *Transactions on Emerging Telecommunications Technologies*, vol. 34, no. 11, 2023. ODOI: 10.1002/ett.4621.
- **R. Singh**, A. D. Dwivedi, G. Srivastava, P. Chatterjee, and J. C.-W. Lin, "A privacy preserving internet of things smart healthcare financial system," *IEEE Internet of Things Journal*, vol. 10, no. 21, pp. 18 452–18 460, 2023. ODI: 10.1109/JIOT.2022.3233783.
- A. D. Dwivedi, **R. Singh**, U. Ghosh, R. R. Mukkamala, A. Tolba, and O. Said, "Privacy preserving authentication system based on non-interactive zero knowledge proof suitable for internet of things," *Journal of Ambient Intelligence and Humanized Computing*, vol. 13, no. 10, pp. 4639–4649, 2022. ODI: 10.1007/s12652-021-03459-4.
- M. Gupta, B. Sharma, A. Tripathi, *et al.*, "N-player stochastic duel game model with applied deep learning and its modern implications," *Sensors*, vol. 22, no. 6, 2022. O DOI: 10.3390/s22062422.
- 9 K. Kaushik, A. Bhardwaj, A. D. Dwivedi, and **R. Singh**, "Machine learning-based regression framework to predict health insurance premiums," *International Journal of Environmental Research and Public Health*, vol. 19, no. 13, 2022. ODOI: 10.3390/ijerph19137898.
- **R. Singh**, A. D. Dwivedi, R. R. Mukkamala, and W. S. Alnumay, "Privacy-preserving ledger for blockchain and internet of things-enabled cyber-physical systems," *Computers and Electrical Engineering*, vol. 103, 2022. ODI: 10.1016/j.compeleceng.2022.108290.
- A. Wiszniewska-Matyszkiel and **R. Singh**, "Necessity of the terminal condition in the infinite horizon dynamic optimization problems with unbounded payoff," *Automatica*, vol. 123, 2021. ODI: 10.1016/j.automatica.2020.109332.
- **R. Singh**, A. D. Dwivedi, and G. Srivastava, "Internet of things based blockchain for temperature monitoring and counterfeit pharmaceutical prevention," *Sensors*, vol. 20, no. 14, 2020. ODI: 10.3390/s20143951.
- R. Singh, A. D. Dwivedi, G. Srivastava, A. Wiszniewska-Matyszkiel, and X. Cheng, "A game theoretic analysis of resource mining in blockchain," *Cluster Computing: The Journal of Networks, Software Tools and Applications*, vol. 23, no. 3, pp. 2035–2046, 2020. ODI: 10.1007/s10586-020-03046-w.
- **R. Singh** and A. Wiszniewska-Matyszkiel, "A class of linear quadratic dynamic optimization problems with state dependent constraints," *Mathematical Methods of Operations Research*, vol. 91, no. 2, pp. 325–355, 2020. ODI: 10.1007/s00186-019-00688-4.
- A. Wiszniewska-Matyszkiel and **R. Singh**, "When inaccuracies in value functions do not propagate on optima and equilibria," *Mathematics*, vol. 8, no. 7, 2020. ODI: 10.3390/math8071109.

- A. D. Dwivedi, S. Dhar, G. Srivastava, and **R. Singh**, "Cryptanalysis of round-reduced fantomas, robin and iscream," *Cryptography*, vol. 3, no. 1, 2019. ODI: 10.3390/cryptography3010004.
- A. D. Dwivedi, G. Srivastava, S. Dhar, and **R. Singh**, "A decentralized privacy-preserving healthcare blockchain for iot," *Sensors* (*Switzerland*), vol. 19, no. 2, 2019. ODI: 10.3390/s19020326.
- R. Singh and A. Wiszniewska-Matyszkiel, "Discontinuous nash equilibria in a two-stage linear-quadratic dynamic game with linear constraints," *IEEE Transactions on Automatic Control*, vol. 64, no. 7, pp. 3074–3079, 2019. ODI: 10.1109/TAC.2018.2882160.
- A. D. Dwivedi, P. Morawiecki, **R. Singh**, and S. Dhar, "Differential-linear and related key cryptanalysis of round-reduced scream," *Information Processing Letters*, vol. 136, pp. 5–8, 2018. ODI: 10.1016/j.ipl.2018.03.010.
- **R. Singh** and A. Wiszniewska-Matyszkiel, "Linear quadratic game of exploitation of common renewable resources with inherent constraints," *Topological Methods in Nonlinear Analysis*, vol. 51, no. 1, pp. 23–54, 2018. **9** DOI: 10.12775/TMNA.2017.057.

Conference Proceedings

- O. Benfeldt, A. Schroder, S. Zambach, M. Greve, **R. Singh**, and M. Gierlich-Joas, "From context to aesthetic: A nordic perspective on data studies in information systems," in *SCIS* 2025, 2025.
- A. D. Dwivedi, **R. Singh**, R. L. Olsen, and P. Pahlevani, "Sustainable and secure renewable energy trading system based on digital twin, blockchain and game theory integration," in *Proceedings of International Conference on Contemporary Computing and Informatics, IC₃I 2023*, United States: IEEE, 2023, pp. 1014–1020. ODI: 10.1109/IC3I59117.2023.10397932.
- A. D. Dwivedi, **R. Singh**, S. Dhall, G. Srivastava, and S. K. Pal, "Tracing the source of fake news using a scalable blockchain distributed network," in *Proceedings of the 2020 IEEE 17th International Conference on Mobile Ad Hoc and Sensor Systems*, United States: IEEE, 2020, pp. 38–43. ODI: 10.1109/MASS50613.2020.00015.
- K. Kaushik, S. Dahiya, **R. Singh**, and A. D. Dwivedi, "Role of blockchain in forestalling pandemics," in *Proceedings of the 2020 IEEE 17th International Conference on Mobile Ad Hoc and Sensor Systems (MASS)*, ser. IEEE International Conference on Mobile Ad-hoc and Sensor Systems, United States: IEEE, 2020, pp. 32–37. ODI: 10.1109/MASS50613.2020.00014.
- G. Srivastava, A. D. Dwivedi, and **R. Singh**, "Crypto-democracy: A decentralized voting scheme using blockchain technology," in *Proceedings of the 15th International Joint Conference on e-Business and Telecommunications (ICETE 2018)*, Portugal: SCITEPRESS Digital Library, 2018, pp. 508–513. ODI: 10.5220/0006881905080513.
- G. Srivastava, A. D. Dwivedi, and **R. Singh**, "Phantom protocol as the new crypto-democracy," in *Computer Information Systems and Industrial Managements*, Germany: Springer, 2018, pp. 499–509.

 DOI: 10.1007/978-3-319-99954-8_41.

Presentations at the Conferences

Paper Presentations

22 - 24.06.2025	📕 21 st Annual Symposium on Statistical Challenges in Electronic Commerce	Re-
	search (SCECR), Paphos, Cyprus	

09-12.07.2024 **\square** 20th International Symposium on Dynamic Games and Applications (ISDG), Valladolid, Spain

30.06 − 03.07.2024 ■ 33rd European Conference on Operational Research (EURO), Copenhagen, Denmark

Presentations at the Conferences (continued)

30.06 - 02.07.2021	$16^{ m th}$ European Meeting on Game Theory (SING), Granada, Spain
22 - 24.05.20192019	World Conference on Natural Resource Modelling (WCNRM), Montréal, Canada
14 - 15.02.2019	$6^{ m th}$ Day on Computational Game Theory, Potsdam, Germany
26 - 28.09.2018	$17^{ m th}$ International Conference on Operational Research (KOI), Zadar, Croatia
09 - 12.07.2018	$18^{\mbox{th}}$ International Symposium on Dynamic Games and Applications (ISDG), Grenoble, France
03 - 06.07.2018	$14^{\mbox{th}}$ Viennese Conference on Optimal Control and Dynamic Games, Vienna, Austria
06 - 08.06.2018	Central European Conference on Cryptology (CECC), Smolenice, Slovakia
13 - 15.03.2018	COST Action Workshop on Games, Dynamics and Optimization (GDO), Vienna, Austria
12 - 13.10.2017	$9^{\mbox{th}}$ Workshop on Dynamic Games in Management Science, HEC Montréal, Canada
13 - 15.07.2017	11 th International Society of Dynamic Games Workshop, Warsaw, Poland
05 - 07.07.2017	$13^{ m th}$ European Meeting on Game Theory (SING), Paris, France
09.06.2017	Mini-conference on Game Theory in Economics and Social Sciences, MIMUW, Warsaw, Poland
12 - 15.07.2016	$17^{\mbox{th}}$ International Symposium on Dynamic Games and Applications (ISDG), Urbino, Italy
08 - 09.04.2016	$2^{ m nd}$ Warsaw Workshop on Game Theory, MIMUW, Warsaw, Poland
2015 - 2018	Seminar of Game Theory and Decision, IPI PAN, Warsaw, Poland
	Seminar of Bio-mathematics and Game Theory, MIMUW, Warsaw, Poland

Poster Presentations

15 - 17.12.2018	The 14 th Conference on Web and Internet Economics, Oxford, U.K.
07 - 08.12.2018	■ VII Hurwicz Workshop on Mechanism Design Theory, Warsaw, Poland
17 - 21.09.2018	GAMENET Training School and Conference, Krakow, Poland

Conferences, Seminars and Workshops attended

12 - 16.08.2019	Selected Areas in Cryptography (SAC) conference, University of Waterloo, Ontario, Canada
23 - 24.01.2019	Advances in Stochastic Games, Budapest, Hungary
14 - 16.11.2018	International Conference on NETwork Games, COntrol and OPtimisation, New York, USA
10 - 12.01.2018	Real World Crypto (RWC), Zurich, Switzerland
04 - 09.09.2016	Summer School on Game Theory and Dynamic Games, Lake Como, Campione d'italia
07 - 11.09.2015	Summer School on Game Theory and Algorithms, Lake Como, Campione d'italia
02 - 03.12.2016	VI Hurwicz Workshop on Mechanism Design Theory, Warsaw, Poland
20 - 21.10.2016	Symposium on Optimal Control and Related Topics, Warsaw, Poland
2015 - 2018	Seminar of Bio-mathematics and Game Theory, MIM UW, Warsaw, Poland
	Seminar of Game Theory and Decision, IPI PAN, Warsaw, Poland

Presentations at the Conferences (continued)

22.10.2011	Embedded System And Robotics by Appin Technology, IITD, India
25.11 - 04.12.2010	Advanced Training Programme in Linear Algebra and Analysis, IIT BHU, Varanasi, India
07 - 11.07.2008	Rajbhasha Vaigyanic Workshop, Harish Chandra Research Institute, Allahabad, India
03 - 23.06.2008	Summer School organized by National Academy Of Sciences (NASI), Allahabad, India
09 - 13.07.2007	Rajbhasha Vaigyanic Workshop, Harish Chandra Research Institute, Allahabad, India

Academic Services

Editorship

- Associate Editor IS Research Methods, Theories, and Philosophy Track for ICIS 2025 conference
- **Guest editor** International Game Theory Review Journal for the research topic "Strategic Models in Computing Applications"
- **Topic editor** Frontiers in Blockchain Journal for the research topic "Blockchain for United Nations Sustainable Development Goals (SDGs)"
- Guest Editor Sensors Journal for Special Issue on "Data Privacy, Security, and Trust in Blockchain and IoT Networks"

Programme committee for IEEE Conference

- Workshop on Security and Privacy in Intelligent Infrastructures (SP2I) in Conference on Availability, Reliability, and Security (ARES) 2024.
- Special Session: Smart City Data Analytics: Applications and Implications in IEEE International Conference on Data Science and Advanced Analytics (IEEE DSAA) 2023.
- Workshop on Security and Privacy in Intelligent Infrastructures (SP2I) in Conference on Availability, Reliability, and Security (ARES) 2023.

Reviewed for Journals

- Applied Mathematics and Computation
- IEEE Internet of Things
- IEEE Computer Magazine
- Computer Communications
- IEEE Network Magazine
- Sensors
- Applied Sciences
- Algorithms
- Mathematics
- Sustainability
- Electronics
- Computers
- Symmetry
- Energies

Academic Services (continued)

- Future Internet
- Journal of Risk and Financial Management
- In the Reviewer Board of the Axioms journal
- **Book Proposal** for CRC Press (Taylor and Francis group)
- **Book Proposal** for Springer Nature (Computer Science)

Supervision

Teaching Case

2024 Uncharted Waters for OpenSea: Can Trust and Sustainability Coexist in the Crypto Space? by Jan Franciszek Smolinski

Internship

01.01.2025 Privacy Concerns in Educational AI: A Study of User Attitudes towards an AI Tutor by Miji Jeong

01.03.2024 **Data-driven Insights for optimizing sales** by Benedicte Søvang Christiansen

Master's Thesis

15.05.2025 A Predictive Model for Freight Selection: Balancing Transportation Costs and Stock Availability in Supply Chain Management by Xin Xu

- Applying Natural Language Processing to the Categorization of Procurement Savings: A Case Study by Sofia Gheno and Lili Halász
- Optimizing Internal Customer Support at Danske Bank: A Strategic Implementation of Large Language Models Using a Retrieval-Augmented Generation Knowledge Base by Jakob Nissen and Niklas Ruge
- How to prevent hallucinations in Large language Models? by Marla Cruz Yedra and Veronica Larsson
- Tuning Into Tomorrow: How Generational Trends Shape the Future of Music by Kseniya Meliuk and Linda Sedlicka

15.09.2025 **Detecting Generative AI in Research Papers** by Metin Yücel Mogensen, Carl Laurits Vanman Have and Steffan Maksimovic

04.02.2025 Evaluating Predictive Performance of Machine Learning Models in Bankruptcy Prediction by Kasper Kalmar Elkrog Svendsen

15.05.2024 The Adoption of Data-Driven Decision-Making: A Case Study on Influencing Factors and Social Considerations in Smaller Scandinavian Companies by Ragnhild Andersen Holmbukt

14.05.2024 From User-Generated Content to AI-Powered Support: A Holistic Approach to LLM Integration at Bang and Olufsen by Emil Breilø, Simon Olaf Undset Gyth Larsen and Gustav Nguyen Laigaard Jensen

15.11.2023 Churn or Return? A Comparative Study of Human and Machine Predictions by Evgeniya Litvina and Vanina Mitkova Ivanova

15.05.2023 Customer Churn Prediction for a car insurance at Tryg A/S by Katrine Haudrum Modigh and Cecilie Cullura Raasdal Hansen

Supervision (continued)

- Data Interoperability in The Maritime Industry: A Study on Overcoming Barriers for Cost-Effectiveness and Sustainability Enabling Data Interoperability by Anders Magnus Klingsholm (DTU) and Simon Oliver Hansen (CBS)
- 15.03.2023 Metaverse Ecosystems: A Comparative Case Study of Digital Worlds in the Context of Openness by Charlotte Lynne Melkun
- 15.05.2022 Saxo Bank: Enhancing client engagement with its digital marketing channel Welcome Screen? by Andreas Dahl Palm and Lasse Bjerregaard Nielsen

Digital Management project

Machine learning algorithms for optimal dynamic pricing in Airline Industry by Cédric Bader and Minh Kha Pham

Bachelor E-Business Project

- Technical Cultivating Artificial Intelligence Fairness in Business Investigating bias and best practices for mitigation by Apostolia Marita, Ina Kersti Margaretha Lundholm, Maria-Vanessa Deak and Diana-Elena Nistor
 - Blockchain Technology in Supply Chain Management: Assessing Its Contribution to Sustainable Development Goals by Ambika Venkatesh and Sofia Strümpfler
 - **Tokenizing Customer Loyalty** by Andela Kraljevic and Hanane El Ghiouane
- Business What are the perceived risks and ethical considerations of using GenAI and how can they be mitigated? by Anna Onnea Aina Anttila
 - Blockchain in Cotton Supply Chains:Adoption of the Sustainability Pledge and its Perceived Effects on the Social Risks Faced by Farmers by Anne Martine Weding, Michael Sullmann, and Sofia Strümpfler
 - Sustainability: What are the implications of Rodinia Generation being a creative destruction and in what way will Rodinia (microfactories) change the fashion industry of today? by Amanda Pfeiffer and Daniel Jacku

Digital Business

- Navigating the Challenges of Sustainable Web Development: Overcoming Technical and Organizational Barriers by Sille Marie Vesterby Sørensen and Fie Skov Flatau
- Navigating the Path to AI Compliance by Louisa Qianyi Resdal Kristensen, Clara Foged Andersen, Anne-Sophie Jul Soursou and Sander Lund Ejdesgaard

Other Activities

Autumn 2020	External Examiner Linear Algebra Course (PGR106), Kristiania University Col-
	lege, Oslo, Norway
2021	Session Chair 16 th European Meeting on Game Theory (SING16), Granada, Spain
2016	Session Chair 17 th International Symposium on Dynamic Games and Applications

(ISDG), Urbino, Italy

- 2011 − 2013 **Volunteer three 'INSPIRE' science camps** Organized by Indian Institute of Technology Delhi, funded by Department of science and technology, India