



Rajani Singh

Game Theory, Optimization and Blockchain Researcher



<https://orcid.org/0000-0002-9997-5830>



Howitzvej 60, Frederiksberg, 2000, Copenhagen, Denmark



(+45) 7144 1890



www.cbs.dk/en/staff/rsdigi



rajani babu7@gmail.com,
rs.digi@cbs.dk

Skills

English Language

Hindi Language

MATLAB

Latex

Maple

C

C++

(*)[The skill scale is from 0 (Fundamental Awareness) to 6 (Expert).]

Research Interests

Game Theory, Dynamic games, Differential games, Dynamic optimization problems, Cooperative and Non-cooperative games, Self enforcing environmental agreements with delayed information, Numerical optimization, Game theoretic approach to Blockchain Technology, Cryptography, Zero-knowledge Proofs, Blockchain Technology.

Present Working

From 01.12.2019 Postdoctoral Researcher
Department of Digitalization
Copenhagen Business School, Denmark

Education

- 2014 – 2019 Doctor of natural sciences (Ph.D.) in Mathematics
Faculty of Mathematics, Informatics and Mechanics,
University of Warsaw, Poland
- 2011 – 2013 Master of Science (M.Sc.) in Mathematics,
Department of Mathematics,
Indian Institute of Technology Delhi, New Delhi, India
- 2008 – 2011 Bachelor of Science (B.Sc.) in Mathematics and Computer Application
Ewing Christian College,
University of Allahabad, India

Experience

- 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
- 01.10.2015 – 29.01.2017 Taking Tutorial classes of Linear Algebra
Faculty of Economic Sciences,
University of Warsaw, Poland
- 01.07.2015 – 01.09.2015 Assistant Professor (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
Development of decision tree based classifier for avalanche forecasting
Indian Institute of Technology Delhi, India

Academic Achievements

Young Scientist Award

24.09.2020

Andrzej Malawski Prize for outstanding contribution to the development of mathematical economics link to webpage: https://nagroda_im_malawskiego.uek.krakow.pl/

Invited Speaker

05 – 08.08.2019

6th International Conference on Continuous Optimization ICCOPT 2019, Technical University of Berlin, Germany

Invited Talk

20 – 22.02.2019

Chair of Operations Research, Department of Mathematics and School of Management, Technical University of Munich, Germany

Invited Talk

17 – 19.02.2019

Department of Computer Science, Aarhus University, Kingdom of Denmark

Travel Support

23 – 24.01.2019

To attend DCGT 2019: 6th Day on Computational Game Theory, Potsdam, Germany

Young Researcher Grant

23 – 24.01.2019

To attend Workshop on Advances in Stochastic Games, Budapest, Hungary

ITC Conference Grant

15 – 17.12.2018

To attend WINE 2018: The 14th Conference on Web and Internet Economics, Oxford, U.K.

Invited Speaker

03 – 06.07.2018

14th Viennese Conference on Optimal Control and Dynamic Games, Vienna, Austria

Grant Holder

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 FEB 2016/21/N/HS4/00258

Fellowship

2015 – 2017

Two times Awardee of the Fellowship for Outstanding Ph.D students by Warsaw Center of Mathematics and Computer Science (WCMCS)

Organizer

13 – 15.07.2017

In the Organizing Committee of 11th International ISDG Workshop, Warsaw, Poland

Worked on Grant

2014 – 2016

Worked on Project funded from Funds of National Science Centre granted by decision number DEC-2013/11/B/HS4/00857

Scholarship

17 – 18.09.2018

COST scholarship for Training School on Recent Applications of Game Theory, Krakow, Poland

Scholarship

04 – 09.09.2016

Scholarship for summer school on Game Theory and Dynamic gamesI, Lake Como School of Advanced Studies, Campione d'Italia

Scholarship

07 – 11.09.2015

Scholarship for summer school on Game Theory and Algorithms, Lake Como School of Advanced Studies, Campione d'Italia

Volunteering

Three times volunteered 'INSPIRE science camps' Organized by Indian Institute of Technology Delhi, funded by Department of science and technology, India

Merit holder

B.Sc. 1st year, Ewing Christian College, University of Allahabad, India

Journal Publications

- 2020 *Necessity of The Terminal Condition in The Infinite Horizon Dynamic Optimization Problems With Unbounded Payoff*, Rajani Singh and Agnieszka Wiszniewska-Matyszekiel, Automatica, DOI: <https://doi.org/10.1016/j.automatica.2020.109332>
- 2020 *Internet of Things Based Blockchain for Temperature Monitoring and Counterfeit Pharmaceutical Prevention*, Rajani Singh, Ashutosh Dhar Dwivedi and Gautam Srivastava, Sensors, MDPI, DOI: <https://doi.org/10.3390/s20143951>
- 2020 *When Inaccuracies in Value Functions Do Not Propagate on Optima and Equilibria*, Agnieszka Wiszniewska-Matyszekiel and Rajani Singh Mathematics, MDPI, DOI: <https://doi.org/10.3390/math8071109>
- 2020 *A Game Theoretic Analysis of Resource Mining in Blockchain*, Rajani Singh, Ashutosh Dhar Dwivedi, Gautam Srivastava, Agnieszka Wiszniewska-Matyszekiel and Xiaochun Cheng, Cluster Computing volume 23, pages 2035–2046
- 2019 *Discontinuous Nash Equilibria in a Two Stage Linear-Quadratic Dynamic Game with Linear Constraints*, Rajani Singh and Agnieszka Wiszniewska-Matyszekiel, IEEE Transactions on Automatic Control, pages 1-13, DOI: 10.1109/TAC.2018.2882160
- 2019 *A Class of Linear Quadratic Dynamic Optimization Problems with State-dependent Constraints*, Rajani Singh and Agnieszka Wiszniewska-Matyszekiel, Mathematical Methods of Operations Research, pages 325-355, DOI: <https://doi.org/10.1007/s00186-019-00688-4>
- 2019 *A Decentralized Privacy-preserving Healthcare Blockchain for IoT*, Ashutosh Dhar Dwivedi, Gautam Srivastava , Shalini Dhar, Rajani Singh, Sensors, MDPI, Volume 19(2) , 326, DOI:10.3390/s19020326
- 2019 *Cryptanalysis of Round-Reduced Fantomas, Robin and iSCREAM*, Ashutosh Dhar Dwivedi, Shalini Dhar, Gautam Srivastava, Rajani Singh, Cryptography, Volume 3(1), pages 4
- 2018 *Linear Quadratic Game of Exploitation of Common Renewable Resources with Inherent Constraints*, Rajani Singh and Agnieszka Wiszniewska-Matyszekiel, Topological Methods in Nonlinear Analysis, Volume 51(1), pages 23-54
- 2018 *Differential-linear and Related Key Cryptanalysis of Round-reduced Scream*, Ashutosh Dhar Dwivedi, Paweł Morawiecki, Rajani Singh and Shalini Dhar, Information Processing Letters, Elsevier, Volume 136, pages 5-8

Conference and Workshop Publications

- 2020 *Role of Blockchain in Forestalling Pandemics*, Keshav Kaushik, Susheela Dahiya, Rajani Singh, and Ashutosh Dhar Dwivedi, IEEE MASS 2020 workshop on Security and Privacy in Distributed Ledger Technology (SP-DLT)
- 2020 *Tracing the Source of Fake News using a Scalable Blockchain Distributed Network*, Ashutosh Dhar Dwivedi, Rajani Singh, Sakshi Dhall, Gautam Srivastava, Saibal K. Pal, IEEE MASS 2020 workshop on Security and Privacy in Distributed Ledger Technology (SP-DLT)
- 2018 *PHANTOM Protocol as The New Crypto-democracy*, Gautam Srivastava, Ashutosh Dhar Dwivedi and Rajani Singh, International Conference on Computer Information Systems and Industrial Management Applications (CISIM), Olomouc, Czech Republic
- 2018 *Crypto-democracy: A Decentralized Voting Scheme Using Blockchains*, Gautam Srivastava, Ashutosh Dhar Dwivedi and Rajani Singh, International Conference on Security and Cryptography (SECRYPT), Porto, Portugal

Communicated Papers

- 2020 *A Zero knowledge based Privacy-Preserving Ledger suitable for Blockchain*
- 2020 *Improved Zero Knowledge Ledger With Efficient Range-Proof*
- 2020 *Blockchain for 6G-enabled IoT: Challenges, Opportunities and Solutions*
- 2019 *Stackelberg Competition in Dynamic Advertising with Application in Cryptocurrency Market*
- 2019 *Self Enforcing Environmental Agreements, Taxes and Delayed Information in a Continuous Time Fish Wars Model*

Working Papers

- 2020 *Leader-Follower game in a two stage linear-quadratic dynamic game with constraints*
- 2019 *Zero-Knowledge Proofs in Healthcare: Sharing Personal Information without Disclosing the Data*

Paper Presentations at the Conferences

- 22 – 24.05.2019 2019 World Conference on Natural Resource Modelling, Montréal, Canada
- 14 – 15.02.2019 6th Day on Computational Game Theory, Potsdam, Germany
- 26 – 28.09.2018 17th International Conference on Operational Research (KOI), Zadar, Croatia
- 09 – 12.07.2018 18th International Symposium on Dynamic Games and Applications (ISDG), Grenoble, France
- 03 – 06.07.2018 14th 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 9th Workshop on Dynamic Games in Management Science, HEC Montréal, Canada
- 13 – 15.07.2017 11th International Society of Dynamic Games Workshop, Warsaw, Poland
- 05 – 07.07.2017 13th 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 17th International Symposium on Dynamic Games and Applications (ISDG), Urbino, Italy
- 08 – 09.04.2016 2nd Warsaw Workshop on Game Theory, MIMUW, Warsaw, Poland
- 2015 – 2018 Seminar of Game Theory and Decision, IPI PAN, Warsaw, Poland
- 2015 – 2018 Seminar of Bio-mathematics and Game Theory, MIMUW, Warsaw, Poland

Poster Presentations at the Conferences

- 15 – 17.12.2018 WINE 2018: The 14th 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

Conference, 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
- 2015 – 2018 Seminar of Game Theory and Decision, IPI PAN, Warsaw, Poland
- 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

Teaching Responsibility

- Autumn 2020 Game Theory for Business and Data-driven Decision Making (7.5 ECTS)
Copenhagen Business School, Denmark
- Spring 2020 Text Analytics (Partially) (7.5 ECTS)
Copenhagen Business School, Denmark

Other Activities

- External Examiner Linear Algebra Course (PGR106), Autumn 2020
Kristiania University College, Oslo, Norway