Garima Shakya

https://sites.google.com/view/garima-shakya

Research Interests

Mechanism Design, Collective Welfare, Fair Division, Multiagent Resource Allocation, Social Choice, Modeling and Optimization, Algorithm Design, Game Theory, Experimental Analysis .

Work Experience

Assistant Professor	at Indian Institute of Technology Palakkad, India at the Department of Data Science September 2024 - Present
Post-doctoral Fellow	at Chennai Mathematical Institute, Chennai, India working with Prajakta Nimbhorkar December 2023- September 2024
Research Assistant professor	at Department of Information Science and Technology, Kyushu University, Japan working at Multiagent systems lab October 2022-November 2023
Post-doctoral Fellow	at Multiagent systems lab, Kyushu University, Japan working with Prof. Makoto yokoo March 2022-September 2022

Education

Ph.D.	in Computer science and Engineering, **Indian Institute of Technology Kanpur, India** Joined in: Jul 2017 Thesis submitted on: Nov 10, 2021 Thesis defended on: May 21, 2022 Convocated on: June 29, 2022 Thesis title : "Mechanism Design for Implementing Social Goals in Resource Allocation and Voting" Advisor: Dr. Swaprava Nath
M.Tech.	in Computer science and Engineering, **Indian Institute of Engineering Science and Technology Howrah, India** Period : 2015-2017 Gpa: 8.74/10 Thesis title : "Multistrategic Clustering" Advisor: Assoc. Prof. Somnath Pal
B.Tech.	in Computer science and Engineering, MCAET , **Narendra Dev University of Agriculture and Technology**, Faizabad, U.P. | Period : 2011-2015 | Gpa: 7.98/10
HSE	with Physics, Chemistry, Mathematics, English, Hindi JNV kannauj , **CBSE** | Session : 2010-2011 | Gpa: 7.98/10
SSE	with Mathematics, Science, Hindi, English, Social Science JNV kannauj , **CBSE** | Session : 2008-2009 | Gpa: 8.38/10

Industrial Internship

May 2020 - Jul 2020	at IBM Research India Mentor: Dr. Pankaj S Dayama Research Area : 'Lateral Transshipment using Mechanism Design'

Teaching Experience

Jul 2017 - Present	Teaching assistantship at IIT, Kanpur {Game Theory and Mechanism Design, Algorithmic Game Theory, Computer Networks, Computer Programming}
Jul 2016 - Apr 2017	Teaching assistantship at IIEST, Shibpur {Data Structure and Algorithms, Operating Systems, Introduction to Computer Programming}
May 2016 -Jun 2016	Mentored the Internship program at IIEST, Shibpur organized by department of CST, IIEST Howrah under the title 'Recent trends in software industry' including Machine Learning, Android App Development, Game Theory, Fuzzy logic, MATLAB, and Latex documentation.

Publications

- **Balancing Fairness and Efficiency in 3D Repeated Matching in Ridesharing**, Garima Shakya, Makoto Yokoo, European conference of Artificial Intelligence **(ECAI 2023)** (also presented at the Workshop on Artificial Intelligence for Social Good **(AI4SG, AAAI 2023)**.
- **Truthful and Fair Lateral Transshipment in Multi-Retailer Systems**, Garima Shakya, Sai Koti Reddy Danda, Swaprava Nath, and Pankaj Dayama, European conference of Artificial Intelligence **(ECAI 2023)**.
- **Social Distancing via Social Scheduling**, Deepesh Kumar Lall, Garima Shakya, and Swaprava Nath, International Conference on Autonomous Agents and Multiagent Systems **(AAMAS), 2023**.
- **Algorithmic mechanism design for egalitarian and congestion-aware airport slot allocation**, Aasheesh Dixit, Garima Shakya, Suresh Kumar Jakhar, and Swaprava Nath, **Transportation Research Part E: Logistics and Transportation Review, 2023**.
- **Protecting Elections**, Garima Shakya, Young Researcher's Symposium, The ACM India Joint International Conference on Data Sciences and Management of Data **(CODS-COMAD), 2020**.
- **A Parameterized Perspective on Protecting Elections**, Palash Dey, Neeldhara Misra, Swaprava Nath and Garima Shakya, Theoretical Computer Science **(TCS), 2021** [supersedes the **IJCAI 2019** version].
- **A Parameterized Perspective on Protecting Elections**, Palash Dey, Neeldhara Misra, Swaprava Nath and Garima Shakya, Proceedings of the Twenty-Eighth International Joint Conference on Artificial Intelligence **(IJCAI), 2019**.
- **Testing Preferential Domains using Sampling**, Palash Dey, Swaprava Nath, and Garima Shakya, International Conference on Autonomous Agents and Multiagent Systems **(AAMAS), 2019**.
- **Problems in Computational Mechanism Design**, Garima Shakya, Doctoral consortium, International Conference on Autonomous Agents and Multiagent Systems **(AAMAS), 2019**.

Professional Service

PC Member |	26th European Conference on Artificial Intelligence (ECAI 2023)
PC Member |	22nd International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2023)
PC Member |	36th AAAI Conference on Artificial Intelligence (AAAI 2022)
Sub-reviewer |	14th International Symposium on Algorithmic Game Theory (SAGT 2021)

Scholarships and Certificates

INSTITUTE FELLOWSHIP	Teaching Assistantship/Scholarship for PhD scholars at IIT Kanpur.
FIRST MEDAL	Award for the 1st highest GPA in M.Tech. (CSE, 2015 - 2017) at IIEST Shibpur, India
GATE 2015	Graduate Aptitude Test in Engineering and got Scholarship for post-graduation in India.
GOLD MEDAL	Award for the 1st highest GPA in B.Tech. (CSE, 2011 - 2015) at NDUAT, Faizabad, India

Oral and/or Poster Presentations

- Presented two papers titled as 'Balancing Fairness and Efficiency in 3D Repeated Matching in Ridesharing' and 'Truthful and Fair Lateral Transshipment in Multi-Retailer Systems" at **ECAI 23** in October 2023, held at Krakow, Poland.
- Invited talk on 'Mechanism design for resource allocation' at BVRIT, Hyderabad at a faculty development program help in July 2023.
- Presented our work about 'Fair matching in Ridesharing' at the **Workshop on Artificial Intelligence for Social Good** at AAAI 23 in February 2023, held at Washington DC, USA.
- Participated as a panelist to discuss 'virtual workspaces' at **ACM-W Virtual Workshop** held virtually in February 2021.
- Presented our research about 'Air Traffic Flow Management' in **ARCS 2021** held virtually in February 2021.
- Presented my research about 'Destructive Manipulations of Elections' in **Delhi Economic Theory Workshop** held at ISI New Delhi in February 2020.
- Presented our research about 'Protecting Elections' in the Young Researchers Symposium in **CODS-COMAD** held in Hyderabad, India, in January 2020.
- Presented our paper 'A Parameterized Perspective on Protecting Elections' in **IJCAI 2019** held in Macau, China.
- Presented our research in discussion meet at **ICTS Bangalore**, India in July 2019.

- Presented our paper 'Testing Preferential Domains using Sampling' in AAMAS 2019 held in Montreal, Canada.
- Presented our research about 'Preferential Domains' and 'Ridesharing' in Doctoral Consortium in AAMAS 2019.

Research Projects

Considering Fairness in Ridesharing	The objective is to have a fair assignment of riders and drivers in sharing mode. Fairness for riders is in terms of waiting time, increase in traveling time due to the co-passengers, or the price of the ride. Fairness for drivers is to minimize the difference between the distances covered by the allocated rides to the drivers.
Retailer Level Resource-wastage Reduction	The retailers are non-cooperative rational players, who often face excess supply/demand. They have multiple strategies and private information. Using various notions from game theory, the objective is to devise a mechanism that is truthful, equitable, individually rational, almost budget balance, computationally tractable and leads to optimal among the feasible transshipments of leftover between the retailers.
Social Distancing via Social Scheduling	The objective is to devise a mechanism that ensures social distancing in a given time-slot at the facility, prioritizes individuals who mark their work as important, maintains truthfulness of the reported importance, guarantees voluntary participation of the citizens, and is computationally tractable.
congestion-aware and Fair Slot Allocation at an airport	The objective is to frame a general model and LP formulations for this problem at an airport and to devise a quasi-linear mechanism that is truthful, individually rational, and results in reduced congestion, but an efficient and computationally tractable allocation of the flights at an airport that also provides equal opportunities for flights to remote cities.
Protecting Elections from Destructive manipulation	We study the *parameterized complexity* of the optimal defense and optimal attack problems in voting. The input is a set of votes in different counties, the number of voter groups the attacker can attack, and the number of voter groups the defender can defend.
Constructive Manipulation of elections	We study and find the computational complexity of destructive manipulations of elections where voters are in two partitions: swing or fixed voters. We consider a variety of setups, depending on the information known to the manipulator and defender.
Testing Preferential domains	Considering two notions of closeness to the single peaked domain: K-maverick voters, K- candidate deletion, we solve the testing problem with some *error probability* but with reduced complexity using *sampling* approach.