Ragavendran (Raga) Gopalakrishnan

https://smith.queensu.ca/faculty_and_research/faculty_list/gopalakrishnan-raga.php

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CURRENT POSITION

Queen's University, Kingston, ON, Canada. **July 2019 - Present**
Assistant Professor of Operations Management, Stephen J.R. Smith School of Business.
Area Group: *Management Analytics.*

PRIOR POSITIONS

Cornell University, Ithaca, NY. **December 2017 - June 2019**
Postdoctoral Associate, School of Civil & Environmental Engineering.
Visiting Postdoctoral Associate, School of Operations Research & Information Engineering.
Hosted by Samitha Samaranayake and Siddhartha Banerjee.

Conduent Labs India (formerly Xerox Research Centre India), Bangalore, India.
Algorithms & Optimization Area, Data Analytics Lab.
Research Manager **January 2017 - September 2017**
Research Scientist **April 2015 - December 2016**

University of Colorado Boulder, Boulder, CO. **July 2013 - February 2015**
Research Associate, Department of Electrical, Computer & Energy Engineering.
Hosted by Jason Marden.

University of Southern California, Los Angeles, CA. **August 2013 - February 2015**
Visiting Researcher, Department of Data Sciences & Operations, Marshall School of Business.
Hosted by Amy Ward.

INTERNSHIPS

Google, Boulder, CO. **Summer 2011**
Software Engineering Intern, Native Client SDK Team.

Yahoo!, Burbank, CA. **Summer 2009**
Research Intern, Marketplace Design.

Northeastern University, Boston, MA. **Summer 2007**
Research Intern, College of Computer & Information Science.

EDUCATION

California Institute of Technology, Pasadena, CA. **September 2008 - June 2013**
Ph.D. in Computer Science, June 2013.
M.S. in Computer Science, June 2010.
Department of Computing + Mathematical Sciences.
Dissertation: Characterizing Distribution Rules for Cost Sharing Games. Defense: Video
Advisor: Adam Wierman.

Indian Institute of Technology Madras, Chennai, India. **July 2004 - July 2008**
B.Tech. in Computer Science and Engineering, July 2008.

RESEARCH INTERESTS

- **[PRIMARY] Service Operations**: Service systems with strategic entities (customers/servers).
- **Pricing & Revenue Management**: Sustainable market models for modern urban mobility.

My research combines tools from multiple subjects such as optimization, probability, queueing theory, decision theory, game theory, and mechanism design for obtaining analytical results, as well as numerical methods and data-driven simulation for validation in real-world environments.

JOURNAL PUBLICATIONS

Zhong Y, Gopalakrishnan R, Ward AR (2023) *Behavior-Aware Queueing: The Finite-Buffer Setting with Many Strategic Servers.* ***Operations Research***, Forthcoming. Preprint: SSRN

Gopalakrishnan R, Doroudi S, Ward AR, Wierman A (2016) *Routing and Staffing when Servers are Strategic.* ***Operations Research***, 64(4):1033–1050.[1]

Gopalakrishnan R, Marden JR, Wierman A (2014) *Potential Games are Necessary to Ensure Pure Nash Equilibria in Cost Sharing Games.* ***Mathematics of Operations Research***, 39(4):1252–1296.[1]

Doroudi S, Gopalakrishnan R, Wierman A (2012) *Dispatching to Incentivize Fast Service in Multi-Server Queues.* ***Performance Evaluation Review***, 39(3):43–45.

Gopalakrishnan R, Marden JR, Wierman A (2011) *An architectural view of game theoretic control.* ***Performance Evaluation Review***, 38(3):31–36.

MANUSCRIPT SUBMITTED

Gopalakrishnan R and Zhong Y *Asymptotic Properties of the Erlang-C Formula in Many-Server Limiting Regimes* Submitted to ***Operations Research Letters***. Link: arXiv

RESEARCH GRANT

Gopalakrishnan R (Principal Investigator) (2020–2022) *Behaviour-Aware Queueing Models for Smart Service Operations.* ***SSHRC Insight Development Grant***. **Amount: $60,100**

INTERVIEW

Chana SR (2019, November 18) *Secrets of Wait Loss.* ***Chicago Booth Review***. Article: View Online

REFEREED CONFERENCE & WORKSHOP PROCEEDINGS

Biswas A, Gopalakrishnan R, Tulabandhula T, Mukherjee K, Metrewar A, Thangaraj RS (2018) *Impact of Detour-Aware Policies on Maximizing Profit in Ridesharing.* ***International Workshop on Agents in Traffic and Transportation (ATT)***.

Biswas A, Gopalakrishnan R, Tulabandhula T, Mukherjee K, Metrewar A, Thangaraj RS (2017) *Profit Optimization in Commercial Ridesharing.* ***International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)***.

Gopalakrishnan R, Biswas A, Lightwala A, Vasudevan S, Dutta P, Tripathi A (2016) *Demand Prediction and Placement Optimization for Electric Vehicle Charging Stations.* ***International Joint Conference on Artificial Intelligence (IJCAI)***.

Biswas A, Gopalakrishnan R, Dutta P (2016) *Managing Overstaying Electric Vehicles in Park-and-Charge Facilities.* ***International Joint Conference on Artificial Intelligence (IJCAI)***.

Marden JR, Touri B, Gopalakrishnan R, O'Brien JP (2015) *Impact of Information in a Simple Multiagent Collaborative Task.* ***IEEE Conference on Decision and Control (CDC)***.

Gopalakrishnan R, Nixon SD, Marden JR (2014) *Stable Utility Design for Distributed Resource Allocation.* ***IEEE Conference on Decision and Control (CDC)***.

Gopalakrishnan R, Kanoulas D, Karuturi NN, Rangan CP, Rajaraman R, Sundaram R (2012) *Cache Me If You Can: Capacitated Selfish Replication Games.* ***Latin American Theoretical INformatics Symposium (LATIN)***.

Gopalakrishnan R, Marden JR, Wierman A (2011) *Characterizing Distribution Rules for Cost Sharing Games.* ***International Conference on NETwork Games, COntrol and OPtimization (NETGCOOP)***.

Selvi SSD, Vivek SS, Gopalakrishnan R, Karuturi NN, Rangan CP (2009) *On the Provable Security of Multi-Receiver Signcryption Schemes.* ***International Conference on Information Security and Cryptology (ICISC)***.

Selvi SSD, Vivek SS, Karuturi NN, Gopalakrishnan R, Rangan CP (2008) *Cryptanalysis of Bohio et al.'s ID-Based Broadcast Signcryption (IBBSC) Scheme for Wireless Ad-hoc Networks.* ***International Conference on Privacy, Security and Trust (PST)***.

Selvi SSD, Vivek SS, Gopalakrishnan R, Karuturi NN, Rangan CP (2008) *Cryptanalysis of Mu et al.'s and Li et al.'s Schemes and a Provably Secure ID-Based Broadcast Signcryption (IBBSC) Scheme.* ***International Workshop on Information Security Applications (WISA)***.

[1] Earlier versions were accepted to the ACM Conference on Economics and Computation (EC) 2014/2013, appearing as extended abstracts.

WORKING PAPERS

Zhong Y, Gopalakrishnan R, Ward AR *Queues with Strategic Arrivals and Strategic Servers.*

Zhong Y, Gopalakrishnan R, Ward AR *Some Properties of the Erlang-B and Erlang-C Formulae.*

Gopalakrishnan R *On the Architecture of Service Systems when Servers are Strategic.*

Luo Q, Liu Y, Gopalakrishnan R, Samaranayake S *Pricing Frameworks for Mobility-on-Demand Services at Request Level.*

Gopalakrishnan R, Tulabandhula T, Mukherjee K *Sequential Individual Rationality in Dynamic Ridesharing.*

UNPUBLISHED MANUSCRIPTS

Eshwar RA, Gopalakrishnan R (2018) *The Price of Indivisibility in Cake Cutting.* Link: arXiv

Gopalakrishnan R, Bax E, Chitrapura KP, Garg S (2015) *Portfolio Allocation for Sellers in Online Advertising.* Link: arXiv

Karuturi NN, Gopalakrishnan R, Srinivasan R, Rangan CP (2008) *Foundations of Group Key Management: Framework, Security Model, and a Generic Construction.* Link: Cryptology ePrint Archive

CONFERENCE, SYMPOSIUM, & INVITED TALKS

On the Design of Service Systems when Arrivals and/or Servers are Strategic

- INFORMS Annual Meeting, Phoenix, AZ, October 2023.
- APS Conference, Nancy, France, June 2023.
- INFORMS Annual Meeting, Indianapolis, IN, October 2022.
- INFORMS Annual Meeting, Virtual & Anaheim, CA, October 2021.
- CORS Annual Conference, Virtual, June 2021.
- INFORMS Annual Meeting, Seattle, WA, October 2019.
- APS Conference, Brisbane, Australia, July 2019.
- Rotman School of Management, University of Toronto, ON, November 2018.
- INFORMS Annual Meeting, Phoenix, AZ, November 2018.
- Simon Business School, University of Rochester, NY, October 2018.
- MSOM Conference, Dallas, TX, July 2018.

The Multi-Modal Mobility Marketplace: Opportunities and Challenges

- ISTDM, Virtual & Ann Arbor, MI, June 2021.
- INFORMS Annual Meeting, Seattle, WA, October 2019.
- MSOM Conference, Singapore, July 2019.
- INFORMS Annual Meeting, Phoenix, AZ, November 2018.

Sequential Individual Rationality in Dynamic Ridesharing

- CORS Annual Conference, Virtual, June 2021.
- INFORMS Annual Meeting, Houston, TX, October 2017.
- TSL Conference, Chicago, IL, July 2017.
- MSOM Service Operations SIG Conference, Chapel Hill, NC, June 2017.
- INFORMS Annual Meeting, Nashville, TN, November 2016.
- Marshall School of Business, University of Southern California, Los Angeles, CA, April 2016.
- Indian Institute of Science, Bangalore, India, February 2016.

Routing and Staffing Games in Service Systems

- MSOM Service Operations SIG Conference, Seattle, WA, June 2014.
- Young European Queueing Theorists (YEQT) Workshop, Eindhoven, Netherlands, November 2013.
- INFORMS Annual Meeting, Minneapolis, MN, October 2013.
- INFORMS Applied Probability Society Conference, San Jose, Costa Rica, July 2013.
- INFORMS Applied Probability Society Conference, Stockholm, Sweden, July 2011.

Characterizing Distribution Rules for Cost Sharing Games

- International Conclave on Foundations of Decision and Game Theory, Mumbai, India, March 2016.
- Marshall School of Business, University of Southern California, October 2013.
- Stony Brook Conference on Game Theory and Applications, Stony Brook, New York, July 2013.

PATENTS FILED

Gopalakrishnan R, Biswas A, Metrewar A, Mukherjee K, Thangaraj RS (2016) *Method and System for Real Time Ridesharing Management.* ***U.S. Patent Application No. 15373744***.

Gopalakrishnan R, Biswas A, Lightwala A, Tripathi A, Dutta P, Greene DH (2016) *Method of Planning for Deployment of Facilities and Apparatus Associated Therewith.* ***U.S. Patent Application No. 15205206***.

Gopalakrishnan R, Biswas A, Dutta P, Tripathi A (2016) *Method and System for Managing Parking Violations by Vehicles in Parking Areas in Real-Time.* ***U.S. Patent Application No. 15194730***.

Gopalakrishnan R, Mukherjee K, Thangaraj RS, Rai A (2016) *Method and System for Cost Sharing in a Pooled Vehicle.* ***U.S. Patent Application No. 15183827***.

TEACHING GRANT

Gopalakrishnan R (Project Lead) (Summer 2021) *Prevention & Detection of Departures from Academic Integrity.* ***Faculty Development Fund, Smith School of Business***. **Amount: $5,625**

TEACHING EXPERIENCE

MMA 841, Operations & Supply Chain Analytics. Instructor, Queen's University. **Winter 2023 Summer 2023**

MGMT 8/961, Probabilistic Operations Research Models. Instructor, Queen's University. **Falls 2021, 2023**

COMM 341, Operations Management. Instructor, Queen's University. **Falls 2019, 2020, 2021**

CEE 6620, Transportation System Design & Analysis. Guest Lecturer, Cornell. **Spring 2018**

ECEN 5018, Game Theory & Multiagent Systems. Guest Lecturer, CU-Boulder. **Spring 2014**

ECEN 2703, Discrete Mathematics. Guest Lecturer, CU-Boulder. **Fall 2013**

CS/EE 144, Ideas Behind the Web. Teaching Assistant, Caltech. **Winters 2011, 2012**

CS/EE 147, Network Performance Evaluation. Teaching Assistant, Caltech. **Spring 2010**

GRADUATE STUDENT SUPERVISION

Yueyang Zhong, The University of Chicago Booth School of Business. *Ph.D. in Operations Management*, co-supervised with Amy Ward and John Birge, **Fall 2019 - present**.

Jenna Dijkema, Smith School of Business at Queen's University. *M.Sc. in Management Analytics* (part-time), **Fall 2021 - Present**.

Navid Mohammadi, Smith School of Business at Queen's University. *M.Sc. in Management Analytics*, co-supervised with Murray Lei and Elaheh Fata, **Fall 2022 - present**.

Andreas Wachter, University of Colorado Boulder. *Smart Cities & Ridesharing Project*, **Summer 2016**.

Rajeev R Tripathi, Indian Institute of Technology Madras. *Ridesharing Project*, **Summer 2016**.

Sabitha Devarajulu, Indian Institute of Technology Madras. *Efficient Budget-Constrained Incentive Schemes Project*, co-supervised with Rahul Ghosh, **Summer 2016**.

UNDERGRADUATE STUDENT SUPERVISION

Daniel Forestell, Smith School of Business at Queen's University. *Behaviour-Aware Queueing Models for Smart Service Operations (SSHRC IDG Project)*, **Winter 2022**.

Jared Becker, Smith School of Business at Queen's University. *Prevention & Detection of Departures from Academic Integrity Project*, **Summer 2021**.

Veni Subramanian, Smith School of Business at Queen's University. *Prevention & Detection of Departures from Academic Integrity Project*, **Summer 2021**.

Helen Wang, Smith School of Business at Queen's University. *Prevention & Detection of Departures from Academic Integrity Project*, **Summer 2021**.

Vedant SK Srinivasan, School of Computing at Queen's University. *Eastern Ontario Workforce Skills AI Project*, co-supervised with Matthias Spitzmuller, **Summer 2020 - Summer 2021**.

Baadshah Verma, Smith School of Business at Queen's University. *Eastern Ontario Workforce Skills AI Project*, co-supervised with Matthias Spitzmuller, **Summer 2020 - Summer 2021**.

Eshwar R Arunachaleswaran, Birla Institute of Technology and Science, Pilani. *Urban Mobility & Ridesharing Project*, **Summer 2017**.

Praneet Khandelwal, Indian Institute of Technology Delhi. *Shared Savings Analytics in Accountable Care Organizations Project*, **Summer 2016**.

HONORS & AWARDS

Winner, INFORMS Minority Issues Forum (MIF) Paper Competition. **2018**

Scientific Excellence Award, Xerox/Conduent Labs India. **2017**

On-The-Spot Award for *Go Bengaluru*, a multi-modal trip planning app for the city of Bangalore, Xerox/Conduent Labs India. **2016**

Special Division Fellowship, California Institute of Technology. **2008**

PROFESSIONAL SERVICE

Conference Session Chair: Applied Probability Society Sponsored Session, INFORMS Annual Meeting, Virtual & Anaheim, CA. **October 2021**.

Member: INFORMS Diversity, Equity, and Inclusion (DEI) Committee. **2018-2019**.

Co-Organizer: Xerox Research Centre India (XRCI) - Indian Institute of Technology Guwahati (IITG) Workshop on Game Theory, Optimization, & Machine Learning. **November 7-8, 2015**.

Ad-hoc Journal Referee: Operations Research, Management Science, Transportation Science, Production and Operations Management, Performance Evaluation, Operations Research Letters, ACM Transactions on Internet Technology, IEEE Transactions on Mobile Computing.

Ad-hoc Conference Referee: ACM SIGMETRICS, ACM EC, IEEE CDC.

Community Membership: ACM, CORS, IEEE, INFORMS (APS, MIF, MSOM, TSL).

INSTITUTE & COMMUNITY SERVICE

Queen's University

- Chair, Doctoral Thesis Committee (Candidate: Xingwei Yang, *Smith School of Business*). **April 2023**
- Member, Management Analytics Comprehensive Exam Committee, *Smith School of Business.* **2023**
- Member, Renewal, Tenure, and Promotion Committee, *Smith School of Business.* **2022-2023**
- Internal/External Examiner, Doctoral Thesis Committee (Candidate: Bora M Yongacoglu, *Department of Mathematics and Statistics*). **December 2022**
- Internal/External Examiner, Doctoral Thesis Committee (Candidate: Daniel O Adu, *Department of Mathematics and Statistics*). **May 2022**
- Member, Management Analytics Comprehensive Exam Committee, *Smith School of Business.* **2022**
- Co-Chair, Management Analytics Seminar Series, *Smith School of Business.* **2021-2022**
- Member, Research Committee, *Smith School of Business.* **2021-2022**
- Co-Lead, Eastern Ontario Workforce Skills AI Project, *Smith School of Business.* **2020-2021**
- Faculty Advisor, Miele-Smith Case Competition, *Smith School of Business.* **Winter 2021**
- Member, Smith EDII Task Force, *Smith School of Business.* **2020-2021**
  - Co-Lead, Data & Dashboard Project.
  - Member, Research & Thought Leadership Working Group.
- Member, Renewal, Tenure, and Promotion Committee, *Smith School of Business.* **2020-2021**
- Member, Interim Organizing Committee and ERG Working Group, *Queen's University Association for Queer Employees (QUAQE).* **2019-2020**

California Institute of Technology

- Member, Graduate Honor Council. **2009-2013**

Indian Institute of Technology Madras

- Councillor, Guidance and Counselling Unit. **2007-2008**
- Member, Class Committee, *Department of Computer Science and Engineering.* **2006-2008**
- Volunteer, National Service Scheme. **2004-2006**