

# YASHASWINI MURTHY

## PERSONAL DATA

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## EDUCATION

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since 01/21	PH.D. IN ELECTRICAL AND COMPUTER ENGINEERING, <a href="#">University of Illinois Urbana-Champaign</a> Thesis Advisor: <a href="#">Prof. R. Srikant</a>
08/19 - 01/21	PH.D IN MECHANICAL ENGINEERING (TRANSFERRED) <a href="#">University of Illinois Urbana-Champaign</a>
01/18 - 07/19	M. TECH. IN MECHANICAL ENGINEERING <i>Specialization: Automation</i> <a href="#">Indian Institute of Technology Bombay</a>
07/14 - 01/18	B. TECH. IN MECHANICAL ENGINEERING <i>Minor: Systems and Control Engineering</i> <a href="#">Indian Institute of Technology Bombay</a>

## RESEARCH EXPERIENCE

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09/23 - 12/23	Reinforcement Learning for Reversible MDPs <span style="float: right;">[INTERNSHIP]</span> <i>Mentor: <a href="#">Prof. Ana Busic, INRIA, Paris</a></i> <ul style="list-style-type: none"><li>Developing sample-efficient RL algorithms by leveraging reversibility in MDPS with practical applications in queueing and Monte-Carlo simulations.</li></ul>
05/22 - Present	Average Reward Reinforcement Learning <i>Advisor: <a href="#">Prof. Srikant, ECE &amp; CSL, UIUC</a></i> <ul style="list-style-type: none"><li>Solved a classical open problem: provided the first performance bounds for actor-critic algorithms in <i>average-reward</i> MDPs.</li></ul>
09/21 - Present	Risk Sensitive Reinforcement Learning <i>Advisor: <a href="#">Prof. Srikant, ECE &amp; CSL, UIUC</a></i> <ul style="list-style-type: none"><li>Proved the convergence of several RL algorithms (policy gradient, modified policy iteration and others) for <i>exponential-cost</i> risk sensitive robust MDPs.</li></ul>
02/20 - 05/21	Differential Privacy and Game Theory <i>Advisor: <a href="#">Prof. Roy Dong, ISE &amp; CSL, UIUC</a></i> <ul style="list-style-type: none"><li>Developed a game-theoretic approach for smart lighting in shared buildings and designed algorithms that generate gene-wide association studies statistics while ensuring differential privacy.</li></ul>
01/18 - 07/19	Theoretical modeling and control of microscallop <i>Master's Thesis, <a href="#">Indian Institute of Technology, Bombay</a></i> <ul style="list-style-type: none"><li>Mathematically modeled microscallop in Newtonian and non-Newtonian fluids, and devised motion planning and control laws with biomedical applications.</li></ul>

## PUBLICATIONS AND PREPRINTS

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### REINFORCEMENT LEARNING: AVERAGE COST MDPs

- 2024 On the Global Convergence of Policy Gradient in Average Reward Markov Decision Processes , [Yashaswini Murthy\\*](#), Navdeep Kumar\*, Itai Shufaro, Kfir Levy, R. Srikant and Shie Mannor. *Under Review at Reinforcement Learning Conference*.
- 2023 Performance Bounds for Policy-Based Average Reward Reinforcement Learning Algorithms, [Yashaswini Murthy](#), Mehrdad Moharrami, R. Srikant. *Advances in Neural Information Processing Systems (NeurIPS)*.
  - Selected for oral presentation at Coordinated Science Laboratory Student Conference.
- 2023 On the Convergence of Natural Policy Gradient and Mirror Descent-Like Policy Methods for Average-Reward MDPs, [Yashaswini Murthy](#) and R. Srikant. *IEEE Conference on Decision and Control (CDC)*.

### REINFORCEMENT LEARNING: RISK-SENSITIVE MDPs

- 2024 On the Convergence of Modified Policy Iteration for robust MDPs, [Yashaswini Murthy](#), Mehrdad Moharrami, R. Srikant. *Under Review at Operations Research Journal*.
- 2024 On the Performance of Actor-Critic Reinforcement Learning Algorithms for Risk Sensitive Exponential Cost Markov Decision Processes. [Yashaswini Murthy](#) and R. Srikant, *In preparation*.
- 2023 Modified Policy Iteration for Exponential Cost Risk Sensitive MDPs, [Yashaswini Murthy](#), Mehrdad Moharrami, R. Srikant. *Learning for Dynamics and Control (L4DC)*.
  - Stochastic Networks Conference Poster Session
  - TTIC Summer Workshop on New Models in Online Decision Making for Real-World Applications
- 2022 A Policy Gradient Algorithm for the Risk-Sensitive Exponential Cost MDP, Mehrdad Moharrami, [Yashaswini Murthy](#), Arghyadip Roy, R. Srikant. *Mathematics of Operations Research Journal*.

### GAME THEORY AND INFORMATION THEORY

- 2022 smartSDH: A Mechanism Design Approach to Building Control, Ioannis C. Konstantakopoulos, Kristy A. Hamilton, [Yashaswini Murthy](#), Tanya Veeravalli, Costas Spanos and Roy Dong. *IEEE Systems Journal*.
- 2021 The Twelfefold Way of Non-Sequential Lossless Compression, T. Ameen ur Rahman\*, A. Barbehenn\*, X. Chen\*, H. Dbouk\*, J. Douglas\*, Y. Geng\*, I. George\*, J. Harvill\*, S. Jeon\*, K. Kansal\*, K. Lee\*, K. Levick\*, B. Li\*, Z. Li\*, [Y. Murthy\\*](#), A. Muthuveeru-Subramaniam\*, S. Olmez\*, M. Tomei\*, T. Veeravalli\*, X. Wang\*, E. Wayman\*, F. Wu\*, P. Xu\*, S. Yan\*, H. Zhang\*, Y. Zhang\*, Y. Zhang\*, Y. Zhao\*, Sourya Basu, and Lav R. Varshney. *IEEE Data Compression Conference*.

### ROBOTICS AND NONLINEAR CONTROL

- 2021 A Theoretical Model of Microscallop in Non-Newtonian Fluids, [Yashaswini Murthy](#), *Under review at Journal of Microbiorobotics, Springer*.

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\* Equal contribution

2019	A Lagrangian Model to Predict Microscallop Motion in non Newtonian Fluids, <a href="#">Yashaswini Murthy</a> and Ravi Banavar. <ul style="list-style-type: none"> <li>Invited for a special Journal issue.</li> <li>Presented at <a href="#">International Conference on Manipulation Automation and Robotics at Small Scales [MARSS], IEEE.</a></li> </ul>
PREPRINT	Coordinated Scallop Motion in Newtonian Fluids - Modelling, Motion Planning and Control, <a href="#">Yashaswini Murthy</a> . <a href="#">[link]</a>

## ACHIEVEMENTS AND AWARDS

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APR 2023	<a href="#">Mavis Future Faculty Fellowship</a> , awarded by the Grainger College of Engineering, UIUC
APR 2023	<a href="#">Joan and Lalit Bahl Fellowship</a> , awarded to an outstanding graduate student in ECE, UIUC (\$20,000 and Tuition Waiver)
APR 2022	<a href="#">Rambus Computer Engineering Fellowship</a> , UIUC
APR 2021	<a href="#">James M. Henderson Fellowship</a> , UIUC
APR 2019	Certificate of excellence for outstanding Academic Mentorship, IITB.
AUG 2018	<a href="#">Institute Academic Excellence Prize</a> for obtaining the highest GPA, IITB.
JUN 2018	Received a pre-placement offer at Sysmex, Japan for conducting exemplary research during an internship, IITB. (declined)
AUG 2017	<a href="#">Institute Academic Excellence Prize</a> for obtaining the highest GPA, IITB.
MAR 2014	<a href="#">All India Rank of 239</a> in KVPY examination and fellowship, conducted by Indian Institute of Science(IISc.), Bangalore. (declined)
JAN 2014	Successfully cleared the Regional Mathematical Olympiad (RMO) and attended the <a href="#">Indian National Mathematical Olympiad (INMO)</a> camp.

## SELECTED INVITED TALKS

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FEB 2024	CSL Student Conference, UIUC, USA
NOV 2023	Argo Seminar, INRIA, Paris, France
OCT 2023	Argo Reading Group, INRIA, Paris, France
MAY 2023	Cross-Team Joint Seminar Series (across OSU, VirginiaTech, UIUC, MIT, UT Austin)
JAN 2023	Google Research, Bengaluru, India
APR 2022	CSL Social Hour, UIUC, USA

## TEACHING AND MENTORING EXPERIENCE

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01/24 - 05/24	Teaching Assistant for MATH227, Linear Algebra for Data Science, UIUC
08/22 - 12/22	Teaching Assistant for ECE586, MDPs and Reinforcement Learning, UIUC
08/19 - 12/20	Teaching Assistant for ME270, Design for Manufacturability, UIUC.
07/18 - 05/19	Institute student mentor ( <a href="#">ISMP</a> ) to 11 female freshmen.
07/18 - 05/19	Department Academic Mentor (DAMP) to two senior undergraduates in the academic rehabilitation program, <a href="#">ISMP, IITB</a> .
01/19 - 05/19	Teaching Assistant for Microprocessors and Automatic Control lab, IITB.
07/18 - 12/18	Teaching Assistant for Microprocessors and Automatic Control, IITB.

## KEY COURSEWORK

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MATH	Deep Learning Theory, High Dimensional Probability <sup>1</sup> , Graduate Real Analysis, Mathematical Statistics I <sup>1</sup> , Optimization through Vector Space Methods <sup>1</sup>
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ECE & CS	Deep Learning <sup>1</sup> , Information Theory, Statistical Learning Theory <sup>1</sup> , Random Processes, Communication Network Analysis
CONTROL THEORY	Mathematical Structures in Control, Control System Theory and Design <sup>1</sup> , Control of Nonlinear Dynamical Systems, Signals and Feedback Systems, Optimization, Analytic and Geometric Dynamics, Microprocessors and Automatic Control [MAC], MAC lab, Nonlinear Dynamics, Linear and Nonlinear Systems

## TECHNICAL SKILLS

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COMPUTER LANGUAGES	Python, C, C++, Java, R, Qt, FORTRAN, HTML
SOFTWARE & TOOLS	Numpy, Pandas, MATLAB, Mathematica, Scilab, $\LaTeX$

## SERVICE

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REVIEWER	Math of Operations Research, ISIT, L4DC
ROBOTICS CHAIR	Coordinated Science Lab Student Conference, 2022
MEDIA CHAIR	Coordinated Science Lab Student Conference, 2021

## UNDERGRADUATE INTERNSHIPS

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05/17 - 07/17	Emulated a flow cytometry set up to generate and detect droplets employed in minimally invasive cancer diagnosis, <a href="#">Sysmex Corporation, Kobe, Japan</a>
05/16 - 07/16	Designed a microwear reciprocating tribometer to be positioned atop the stage of a scanning electron microscope, subject to dimensional and weight constraints, <a href="#">Indian Institute of Science, Bangalore</a>

## REFERENCES

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Available upon request.

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<sup>1</sup>Obtained A+ for excellent performance