Rajneesh Anand

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Research Interests

Reinforcement Learning, Autonomous Driving, Optimal Control, Microchemical Systems, and Transport Processes

Education

Aug 2024 - Present | **Lehigh University**, Bethlehem, PA, USA
PhD, Chemical Engineering — Current GPA: 3.97/4.0

2019 - 2023 | **National Institute of Technology (NIT) Durgapur**, WB, India
B.Tech, Chemical Engineering — GPA: 8.30/10.0 (US: 3.60/4.0)
First Class with Distinction

Academic Experience

Oct 2024 - Present | **Research Assistant**
Department of Chemical and Biomolecular Engineering, Lehigh University
- Advisor: Dr. Mayuresh V. Kothare
- *Working at the intersection of reinforcement learning, optimal control, and microfluidics*

May 2022 - Jul 2023 | **Research Assistant**
Department of Chemical Engineering, NIT Durgapur, WB, IN
- Advisors: Dr. Abhiram Hens and Dr. Mrinal Kanti Mandal
- Thesis: *Optimization of geometry and surface wettability for enhanced efficiency of the solar still-based desalination unit*
- Project sponsored by the Dept. of Science & Tech. (India)

Industrial Experience

Aug - Dec 2023 | **Reliance Industries Ltd.**, Jamnagar, India
Graduate Engineer Trainee (Process Engineer)

May - June 2022 | **Mitsubishi Chemical Corporation**, Haldia, WB, India
Industrial Engineering Intern

Honors and Awards

2026 | **Third Place Team Hackathon Award**, presented by *World Wide Technology* (Sponsored by **NVIDIA**), 2026, Dr. Robert Gillies Machine Learning Workshop, *Moffitt Cancer Center*.

2023 | **Third Prize (National Level)** in the **New Generation Ideation Contest 2022** (NGIC), issued by HP Green R&D Centre (HPCL, India).

Mentoring Experience

Summer 2026 | **Lehigh University**, Bethlehem, PA
Fatima Tanveer (Lafayette College, Undergraduate) – co-mentored with M.V. Kothare
Supervised a project on autonomous droplet navigation; won 'Best Research' award in Lehigh Summer Research Expo 2026.

SUMMER 2023 | **National Institute of Technology (NIT) Durgapur**, WB, India
Meghna Bhattacharya (NIT Durgapur, Undergraduate)
Supervised a CFD-based project on heat exchangers design and performance; work presented in IIChE-CHEMCON conference 2023 **[A6]**.

TEACHING EXPERIENCE

SPRING 2026 | **Lehigh University**, Bethlehem, PA
Fluid Mechanics, Teaching Assistant

FALL 2025 | **Lehigh University**, Bethlehem, PA
Heat and Mass Transfer, Teaching Assistant

PUBLICATIONS

JOURNAL PUBLICATIONS

[J6] **Anand, R.**, Lakshmanan, N., Yari, M.* PassGPT+: Leveraging Linguistic Priors for Password Modeling. *(Manuscript under revision)* https://arxiv.org/abs/2609.39880

[J5] **Anand, R.**, Kothare, M.V.* Autonomous Droplet Navigation via Model-Based Reinforcement Learning. *(Manuscript under revision)* https://arxiv.org/abs/2609.16369

[J4] **Anand, R.**, Kothare, M.V.* Optimal control and closed-loop stability of droplet transport in a microchannel. *(Manuscript in preparation)* https://arxiv.org/abs/2609.19320

[J3] **Anand, R.**, Kothare, M.V.* Surfactant-free splitting of water droplets in a microchannel. ***Analyst*** (2026) 151 (17): 5095–5106. https://doi.org/10.1039/d6an00516k

[J2] **Anand, R.**, Mandal, M.K., Chaudhuri, R.G., Hens, A.* Effect of patterned condensation surface on the performance of a newly designed basin-type solar desalination unit. ***Applied Thermal Engineering*** (2024) 249: 123399. https://doi.org/10.1016/j.applthermaleng.2024.123399

[J1] **Anand, R.**, Mandal, M.K., Chaudhuri, R.G., Hens, A.* Optimization of geometry and surface wettability for enhanced efficiency of the solar still-based desalination unit. ***International Journal of Ambient Energy*** (2023) 44(1): 1549-1556. https://doi.org/10.1080/01430750.2023.2177886

CONFERENCE PROCEEDINGS

[C1] **Anand, R.**, Kothare, M.V.* Autonomous Droplet Navigation via Model-Based Reinforcement Learning: Zero-Shot Transfer and Emergent Dynamics. In ***IEEE/RSJ IROS Workshop*** *on Robotics & Automation in Self-Driving Laboratories* (2026). https://arxiv.org/abs/2610.08852

BOOK CHAPTERS

[B1] Akhtar, F., **Anand, R.*** Computational study of flow past a cylinder in tandem setup. ***Advances in Mechanical Engineering, Springer Nature*** (2025) 2: 163-171. https://doi.org/10.1007/978-981-96-6613-3_13

REFEREED ABSTRACTS

[A10] **Anand, R.**, Kothare, M.V.* (2026). Autonomous Droplet Navigation In a Labyrinth Via Reinforcement Learning. ***AIChE*** *Annual meeting 2026*.

[A9] **Anand, R.**, Kothare, M.V.* (2026). Optimal Control and Closed-Loop Stability of Droplet Transport In a Microchannel. ***AIChE*** *Annual meeting 2026*.

[A8] **Anand, R.**, Kothare, M.V.* (2026). Surfactant-free droplet breakup dynamics under confinement. ***APS*** *Global Physics Summit (March Meeting) 2026*.

* denotes corresponding author.

[A7] **Anand, R.**, Kumar, I., Hens, A.* (2023). Effect of bed porosity and inlet temperature on hydrogen adsorption inside a cylindrical storage tank: A CFD study. ***IIChE-CHEMCON*** *2023*.

[A6] Bhattacharya, M., Akhtar, F., **Anand, R.*** (2023). Numerical investigation of heat transfer enhancement in heat exchangers using CFD. ***IIChE-CHEMCON*** *2023*.

[A5] **Anand, R.***, Ray, R., Akhtar, F. (2023). Modeling and simulation of cumene process in Aspen Plus. *Int. Conf. on Recent Advances in Technology, Engineering, Science and Management (**ICRATESM**-2023)*.

[A4] Akhtar, F., **Anand, R.**, Hens, A.* (2023). Computational study of pipeline transportation of crude oil. *Int. Conference on Chemical Engineering Innovations and Sustainability (**ICEIS**-2023), Jadavpur University*.

[A3] Akhtar, F., **Anand, R.*** (2023). Computational study of flow past a cylinder in tandem setup. *4th International Conference on Recent Advancements in Mechanical Engineering (**ICRAME**-2023)*.

[A2] Akhtar, F., **Anand, R.*** (2023). The adsorptive hydrogen storage in an activated carbon tank based on a modified Dubinin–Astakhov model. *International Conference on Materials Science and Mechanical Engineering (**ICMSME**-2023)*.

[A1] **Anand, R.***, Akhtar, F. (2022). Effect of operating parameters on nickel removal in a fixed bed adsorption column. *International Conference on Advances and Creations in Mechanical Engineering (**ICACME**)*.

Invited Talks

Oct 16, 2026 | Team HTT Lab (Nura Brimo, **Rajneesh Anand**, Anshuman Sabath, Hassan Harb, Iman Gadzhikulieva). *Hierarchical Temporal Transformers for Cancer Grade Prediction and Cross-Cancer Transfer Learning from Pathology Reports.* 2026 Dr. Robert Gillies Machine Learning Workshop, *Moffitt Cancer Center*, Tampa, FL.

Services

Peer Review

Journals: IEEE Control Systems Letters; Automatica; Annals of Nuclear Energy
Conferences: Conference on Decision and Control, American Control Conference
Workshops: NeurIPS '26 (Interp4Discovery)

Professional Affiliations

Sigma Xi, The Scientific Research Honor Society – Full Member (Elected)

Institute of Electrical and Electronics Engineers (IEEE) – Member

American Institute of Chemical Engineers (AIChE) – Member

American Physical Society (APS) – Member

Software Products

[S3] **DropletRunner** (Main Developer)

- Autonomous droplet navigation system via MBRL on open surfaces
- https://github.com/rajneeshanand/DropletRunner

[S2] **OncoLocus** (Main Developer)

- Hierarchical Temporal Transformer and zero-shot transfer to unseen Cancer types
- Awarded Third Place at the 2026 Robert Gillies ML Workshop Hackathon sponsored by NVIDIA & WWT
- https://github.com/rajneeshanand/OncoLocus

[S1] **DropletOC** (Main Developer)

- Optimal control of droplet transport in a microchannel
- https://github.com/rajneeshanand/DropletOC

Technical Skills

Robotics & Systems:	ROS2, Circuit Design, Distributed Computing, Computer Vision, & CAD
Programming:	MATLAB, Python, Parallel Computing & HPC
Numerical Methods:	Continuous (Nonlinear) Optimization, FEM, FVM, PDE Solvers
CFD Software:	ANSYS Fluent, COMSOL Multiphysics, FEniCS
Process Simulation:	Aspen Plus

References

Provided upon request.

Updated on October 19, 2026