

Swetaprovo Chaudhuri

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Research interests

Aerospace propulsion, turbulent combustion, droplets and aerosols

Education and training

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| 2010 – 2013 | Princeton University – Mechanical and Aerospace Engineering
Postdoc and Associate Research Scholar with Professor C. K. Law |
| 2006 – 2010 | University of Connecticut – Mechanical Engineering
PhD in Energy and Thermal Sciences, <i>GPA: 3.992/4.000</i>
Advisor: Professor B. M. Cetegen |
| 2002 – 2006 | Jadavpur University – Mechanical Engineering
BE with Honors, <i>GPA: 8.610/10.000</i> |

Honors and awards

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| 2026 | Inducted to the Academy of Distinguished Engineers - University of Connecticut |
| 2025 | Connaught Innovation Award – University of Toronto |
| 2024 | Teaching award – Division of Engineering Science, University of Toronto, for excellence in teaching Aerospace Propulsion |
| 2021 | Associate Fellow – American Institute of Aeronautics and Astronautics |
| 2019 | Heuckroth Distinguished Faculty Award in Aerospace Engineering – University of Toronto Institute for Aerospace Studies |
| 2017 | Young Scientist Medal – Indian National Science Academy |
| 2016 | Associate – Indian Academy of Sciences |
| 2010 | Graduate Research Fellowship Award, First Prize – Department of Mechanical Engineering, University of Connecticut |
| 2009 | Doctoral Dissertation Fellowship – University of Connecticut |
| 2009 | ASME Foundation Scholarship – American Society of Mechanical Engineers |

- 2009 Graduate Pre-doctoral Fellowship – Department of Mechanical Engineering, University of Connecticut
- 2008 Graduate Research Fellowship Award, Second Prize – Department of Mechanical Engineering, University of Connecticut

Appointments

- 2025 – present **University of Toronto** – Institute for Aerospace Studies
Professor
- 2019 – 2025 **University of Toronto** – Institute for Aerospace Studies
Associate Professor with tenure

University of Toronto – Institute for Aerospace Studies
Aerospace Option Chair (Interim) for Fall 2023
- 2022 – 2023 **Indian Institute of Technology Madras** – Department of Aerospace Engg.
Visiting Faculty Fellow
- 2018 – 2019 **Indian Institute of Science** – Department of Aerospace Engg.
Associate Professor with tenure
- 2013 – 2018 **Indian Institute of Science** – Department of Aerospace Engg.
Assistant Professor
- 2014 – 2014 **Princeton University** – Department of Mechanical and Aerospace Engg.
Visiting Associate Research Scholar
- 2011 – 2013 **Princeton University** – Department of Mechanical and Aerospace Engg.
Associate Research Scholar
- 2010 – 2011 **Princeton University** – Department of Mechanical and Aerospace Engg.
Postdoctoral Research Associate
- 2006 – 2010 **University of Connecticut** – Department of Mechanical Engineering
Research Assistant

Contributions

- **Flame blowoff mechanism:** Applying laser diagnostics and high-speed imaging in a laboratory burner as well as in a prototypical afterburner, we proposed and experimentally validated a mechanism of lean blowoff of bluff body stabilized turbulent premixed flames. The generality of the blowoff

mechanism have subsequently been demonstrated by many groups around the world not only for bluff body flames but even for initial stages of interacting swirl flame blowoff. The series of papers on blowoff serve as powerful examples where laser-based diagnostics have been used to solve a fundamental combustion problem of industrial relevance and scale.

- **Turbulent flame speed of expanding flames:** Using theory and experiments we obtained and validated a model for turbulent flame speed, a self-similar scaling relation for turbulent expanding flames over a large range of fuels, pressure, and turbulence Reynolds number. Once again, several groups around the world have corroborated this scaling.
- **Flame Particle Tracking:** We developed Forward Flame Particle Tracking (FFPT), as well as its back in time variant, Backward Flame Particle Tracking (BFPT): computational diagnostics for turbulent combustion. Applying BFPT-FFPT on DNS datasets, we have found how the turbulent premixed flames generate at the leading points to evolve and eventually annihilate at the trailing regions of the corresponding surfaces. Development and application of these techniques on in-house computed DNS datasets have provided unprecedented, causal insights into flame surface generation, annihilation, flame element dispersion, ignition, and extinction in turbulent flows.
- **Local flame speed in turbulence:** Recently, we have shown that in both moderate or intensely turbulent conditions, large enhancement of local flame displacement speed from their standard laminar values result from flame-flame interactions at large negative curvatures. We have derived an analytical model for such local flame propagation rate as a function of curvature and validated the model using Direct Numerical Simulations of hydrogen-air flames. Developing a new Conditionally Averaged Structure, we have also shown how differential diffusion combined with curvature layering enhance flame propagation rates at even zero-curvature locations of ultra-lean hydrogen-air flames, leading to overall faster propagation.
- **Mitigating instability by actuating the swirler in a combustor:** We were the first to show that in a laboratory combustor the otherwise static swirler when actuated to a rotary motion, the higher intensity turbulence and higher swirl number generated can assist in mitigating thermoacoustic instabilities. A new synchronization model for flamelet oscillators has been proposed that can reproduce the intermittent dynamics en route to mitigation. This experimental setup also offers a controlled environment where instability to noise transition, or vice versa, could be effectively investigated.
- **Optically accessible supersonic combustion facility:** At IISc, we conceptualized, designed, and developed a Mach 2.2, 1kg/s, 1600K stagnation temperature, direct connect supersonic combustion facility, ab-initio. This optically accessible facility is the first of its kind in India and has been commissioned and tested.
- **Modeling COVID-19 disease dynamics from aerosol dispersion:** We derived an analytical probability density function that could describe the real-world features of overdispersion in Covid-19 infections. A disease spread model based on aerosol and droplet dynamics was also developed from first principles. Based on these works I was invited to the Ontario Modeling Consensus Table, as the only member with non-public health background.

These contributions are reflected in our inclusion, from 2021 onward, in the top 2% of scientists listed in the "science-wide author databases of standardized citation indicators" <https://elsevier.digitalcommonsdata.com/datasets/btchxktzyw/6>

Published/accepted journal papers

- [1] A. Roy, R. Sawanni, Y. Rajan, I. Jahncke, T. Taddesse, C. Groth, **S. Chaudhuri**, and Gülder, "Effects of fuel and soot characteristics on the inception and development of contrails," *In press Proceedings of the Combustion Institute*, 2026.
- [2] Y. N. Ardebili, , S. Watson, O. Zeyl, and **S. Chaudhuri**, "Stabilizing lifted, micromix h₂ flames in a fuel-flex, model gas turbine combustor," *In press Proceedings of the Combustion Institute*, 2026.
- [3] Yuvraj and **S. Chaudhuri**, "Turbulence induced mixing-chemistry interaction within ultra-lean h₂ flame structures," *Flow Turbulence and Combustion*, vol. 116, no. 57, 2026.
- [4] A. Mukerjee, S. Mishra, K. Murty, and **S. Chaudhuri**, "Analysing the distribution of sars-cov-2 infections in schools: comparing model predictions with real-world observations," *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences*, vol. 482, p. 20250291, 2025.
- [5] Yuvraj, H. Im, and **S. Chaudhuri**, "How "mixing" affects propagation and structure of intensely turbulent, lean, hydrogen-air premixed flames," *Combustion and Flame*, vol. 273, p. 113903, 2025.
- [6] K. S. Akojwar, S. A. Pawar, and **S. Chaudhuri**, "Performance analysis of a self-decarbonizing combustor," *Journal of Engineering for Gas Turbine and Power*, vol. 47, p. 011013, 2025.
- [7] D. D. Rathod, S. Kumar, S. Chaudhuri, P. Panda, and S. Basu, "Isothermal flow field characterization of a full-scale sector combustor at elevated pressures," *Journal of Engineering for Gas Turbines and Power*, vol. 147, no. 4, 2025.
- [8] S. Singh, R. Bhavi, P. R. Midhun, A. Bhaskarana, P. Mishra, **S. Chaudhuri**, and R. Sujith, "Intermittency transition to azimuthal instability in a turbulent annular combustor," *International Journal of Spray and Combustion Dynamics*, 2024.
- [9] J. Bae, Y. Naderzadeh, P. Vena, and **S. Chaudhuri**, "Effect of swirler spin on flame shape and combustion dynamics," *Proceedings of the Combustion Institute*, vol. 40, p. 105663, 2024.
- [10] K. S. Akojwar, S. A. Pawar, and **S. Chaudhuri**, "Mitigating co₂ emission of methane based thermal power using a self-decarbonizing combustor," *Proceedings of the Combustion Institute*, vol. 40, p. 105689, 2024.
- [11] J. Bae, S. Yun, **S. Chaudhuri**, and P. Canteenwalla, "Combustion characteristics of sustainable aviation fuels at a scaled-down afterburner test rig," *The Aeronautical Journal*, vol. 40, p. 1429–1449, 2024.
- [12] S. Singh, A. Roy, J. M. Dhadphale, **S. Chaudhuri**, and R. Sujith, "Mean-field synchronization model of turbulent thermoacoustic transitions," *AIP Advances*, vol. 14, p. 065106, 2024.

- [13] Y. Yuvraj, Y. Naderzadeh, W. Song, , H. G. Im, C. K. Law, and **S. Chaudhuri**, “On flame speed enhancement in turbulent premixed hydrogen-air flames during local flame-flame interaction,” *Combustion and Flame*, vol. 257, p. 113017, 2023.
- [14] S. Singh, A. Dutta, J. M. Dhadphale, A. Roy, R. I. Sujith, and **S. Chaudhuri**, “Mean-field model of synchronization for open-loop, swirl controlled thermoacoustic system,” *Chaos: An Interdisciplinary Journal of Nonlinear Science*, vol. 33, no. 4, p. 043104, 2023.
- [15] **S. Chaudhuri** and B. Savard, “Turbulent flame speed based on mass flow rate: theory and DNS,” *Combustion and Flame*, vol. 252, p. 112735, 2023.
- [16] **S. Chaudhuri**, P. Kasibhatla, A. Mukherjee, W. Pan, G. Morrison, S. Mishra, and V. K. Murty, “Analysis of overdispersion in airborne transmission of Covid-19,” *Physics of Fluids*, vol. 34, no. 5, p. 051914, 2022.
- [17] Yuvraj, W. Song, H. Dave, H. G. Im, and **S. Chaudhuri**, “Local flame displacement speeds of hydrogen-air premixed flames in moderate to intense turbulence,” *Combustion and Flame*, vol. 236, p. 111812, 2022.
- [18] S. Bagchi, S. Basu, **S. Chaudhuri**, and A. Saha, “Penetration and secondary atomization of droplets impacted on wet facemasks,” *Physical Review Fluids*, vol. 6, no. 11, p. 110510, 2021.
- [19] A. Roy, S. Singh, A. Nair, **S. Chaudhuri**, and R. Sujith, “Flame dynamics during intermittency and secondary bifurcation to longitudinal thermoacoustic instability in a swirl-stabilized annular combustor,” *Proceedings of the Combustion Institute*, vol. 38, no. 4, pp. 5171–5180, 2021.
- [20] A. Rasheed, S. Sharma, P. Kabi, A. Saha, **S. Chaudhuri**, and S. Basu, “Precipitation dynamics of surrogate respiratory sessile droplets leading to possible fomites,” *Journal of Colloid and Interface Science*, vol. 600, pp. 1–13, 2021.
- [21] S. Majee, A. Saha, **S. Chaudhuri**, D. Chakravorty, and S. Basu, “Two-dimensional mathematical framework for evaporation dynamics of respiratory droplets,” *Physics of Fluids*, vol. 33, no. 10, 2021.
- [22] **S. Chaudhuri**, A. Saha, and S. Basu, “An opinion on the multiscale nature of covid-19 type disease spread,” *Current Opinion in Colloid and Interface Science*, vol. 54, 2021.
- [23] S. Singh, A. Roy, K. Reeja, A. Nair, **S. Chaudhuri**, and R. Sujith, “Intermittency, secondary bifurcation and mixed-mode oscillations in a swirl-stabilized annular combustor: Experiments and modeling,” *Journal of Engineering for Gas Turbines and Power*, vol. 143, no. 5, 2021.
- [24] S. Sharma, R. Pinto, A. Saha, **S. Chaudhuri**, and S. Basu, “On secondary atomization and blockage of surrogate cough droplets in single- and multilayer face masks,” *Science Advances*, vol. 7, no. 10, 2021.
- [25] P. Kabi, V. Razdan, D. Roy, L. Bansal, S. Sahoo, R. Mukherjee, **S. Chaudhuri**, and S. Basu, “Evaporation-induced alterations in oscillation and flow characteristics of a sessile droplet on a rose-mimetic surface,” *Soft Matter*, vol. 17, no. 6, pp. 1487–1496, 2021.

- [26] Z. Liu, V. Unni, **S. Chaudhuri**, R. Sui, C. Law, and A. Saha, “Self-turbulization in cellularly unstable laminar flames,” *Journal of Fluid Mechanics*, vol. 917, 2021.
- [27] Z. Liu, V. Unni, **S. Chaudhuri**, C. Law, and A. Saha, “Local statistics of laminar expanding flames subjected to darrieus–landau instability,” *Proceedings of the Combustion Institute*, vol. 38, no. 2, pp. 1993–2000, 2021.
- [28] S. Basu, P. Kabi, **S. Chaudhuri**, and A. Saha, “Insights on drying and precipitation dynamics of respiratory droplets from the perspective of covid-19,” *Physics of Fluids*, vol. 32, no. 12, 2020.
- [29] **S. Chaudhuri**, S. Basu, and A. Saha, “Analyzing the dominant sars-cov-2 transmission routes toward an ab initio disease spread model,” *Physics of Fluids*, vol. 32, no. 12, 2020.
- [30] S. Kumar, S. Malavalli, **S. Chaudhuri**, and S. Basu, “Spray characteristics and flow topologies of high shear injector at high primary swirl,” *International Journal of Multiphase Flow*, vol. 131, 2020.
- [31] **S. Chaudhuri**, S. Basu, P. Kabi, V. Unni, and A. Saha, “Modeling the role of respiratory droplets in covid-19 type pandemics,” *Physics of Fluids*, vol. 32, no. 6, 2020.
- [32] G. Ramachandran, A. Dutta, H. Durairaj, and **S. Chaudhuri**, “On the interaction of swirling flames in a lean premixed combustor,” *Journal of Engineering for Gas Turbines and Power*, vol. 142, no. 3, 2020.
- [33] H. Dave and **S. Chaudhuri**, “Evolution of local flame displacement speeds in turbulence,” *Journal of Fluid Mechanics*, vol. 884, 2020.
- [34] A. Dutta, G. Ramachandran, and **S. Chaudhuri**, “Investigating thermoacoustic instability mitigation dynamics with a kuramoto model for flamelet oscillators,” *Physical Review E*, vol. 99, no. 3, 2019.
- [35] V. Unni, **S. Chaudhuri**, and R. Sujith, “Flame blowout: Transition to an absorbing phase,” *Chaos*, vol. 28, no. 11, 2018.
- [36] P. Kabi, B. Chattopadhyay, S. Bhattacharyya, **S. Chaudhuri**, and S. Basu, “Evaporation-oscillation driven assembly: Microtailoring the spatial ordering of particles in sessile droplets,” *Langmuir*, vol. 34, no. 42, pp. 12642–12652, 2018.
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- [39] R. Vishwanath, P. Tilak, and **S. Chaudhuri**, “An experimental study of interacting swirl flows in a model gas turbine combustor,” *Experiments in Fluids*, vol. 59, no. 3, 2018.
- [40] P. Kabi, **S. Chaudhuri**, and S. Basu, “Micro to nanoscale engineering of surface precipitates using reconfigurable contact lines,” *Langmuir*, vol. 34, no. 5, pp. 2109–2120, 2018.

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- [44] H. Uranakara, **S. Chaudhuri**, and K. Lakshmisha, “On the extinction of igniting kernels in near-isotropic turbulence,” *Proceedings of the Combustion Institute*, vol. 36, no. 2, pp. 1793–1800, 2017.
- [45] P. Kabi, **S. Chaudhuri**, and S. Basu, “Insights into drying of noncircular sessile nanofluid droplets toward multiscale surface patterning using a wall-less confinement architecture,” *Langmuir*, vol. 32, no. 42, pp. 10977–10986, 2016.
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- [50] **S. Chaudhuri**, “Pair dispersion of turbulent premixed flame elements,” *Physical Review E - Statistical, Nonlinear, and Soft Matter Physics*, vol. 91, no. 2, 2015.
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- [53] F. Wu, A. Saha, **S. Chaudhuri**, and C. Law, “Propagation speeds of expanding turbulent flames of c4 to c8 n-alkanes at elevated pressures: Experimental determination, fuel similarity, and stretch-affected local extinction,” *Proceedings of the Combustion Institute*, vol. 35, no. 2, pp. 1501–1508, 2015.
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Book chapters

- [76] A. Mukherjee, S. Basu, S. Sharma, and S. Chaudhuri, “Modeling airborne disease dynamics: progress and questions,” *Mathematics for Public Health*, p. 129–159, 2023.
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Patents

- [83] S. Chaudhuri, K. Akojwar, and S. Pawar, “Self-decarbonizing combustor systems and methods of using the same,” July 21 2023. US Provisional Patent Application No. 63/514,833, International Application PCT/CA2024/050858.
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Conference publications

- [86] I. Jahncke, C. Chelem Mayigue, T. Taddesse, C. Groth, A. Roy, R. Sawanni, O. Gulder, S. Chaudhuri, and Y. Rajan, “Fans-based predictions of jet-regime contrail formation using a two-equation soot/ice aerosol transport model,” in *AIAA SCITECH 2026 Forum*, p. 1021, 2026.
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- [88] S. Watson, Y. Naderzadeh, S. Chaudhuri, L. Fan, A. Durocher, and P. Vena, “Phase-average study of heat release profiles of self-excited premixed methane-air flames,” in *Combustion Institute, Canadian Section 2025 Spring Technical Meeting*, 2025.
- [89] Y. Naderzadeh, S. Watson, O. Zeyl, S. Chaudhuri, G. Bourque, S. Jella, and M. Furi, “Experimental investigation of hydrogen flames in a micro-mix fuel-flexible combustor using piv/plif,” in *Combustion Institute, Canadian Section 2025 Spring Technical Meeting*, 2025.
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Edited Book

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Research Funding

2026 – 2031	Unravelling fundamental structures of turbulent reacting flows to mitigate the climate impact of aircraft propulsion [C\$ 235k] Natural Sciences and Engineering Research Council of Canada, Discovery Grant Principal Investigator: S. Chaudhuri
2026 – 2027	UTIAS - NRC Collaboration on swirling flames [C\$ 75k] National Research Council Canada Principal Investigator: S. Chaudhuri
2025 – 2026	Connaught Innovation Award - Developing a self-decarbonizing micro-gas turbine for clean power generation [C\$ 100k] University of Toronto
2024 – 2028	Hydrogen as a Sustainable Aviation Fuel – Combustion Research to Remove Impediments to Adoption in Gas Turbine Engines [C\$ 5M] Ontario Research Fund - Research Excellence Award - INSAT Pratt & Whitney, Canada Principal Investigator: C. P. T. Groth (UofT) co-Principal Investigators: S. Chaudhuri, O. L. Gulder (UofT), C. Devaud (Waterloo) Partners: Pratt & Whitney Canada

- 2024 – 2027 High Pressure Hydrogen Micromix Combustion for Gas Turbines [C\$ 5M]
Natural Sciences and Engineering Research Council of Canada, Alliance Mission Grant, Siemens Energy Canada Ltd., CRIAQ
Principal Investigator: B. Savard (École Polytechnique de Montréal)
co-Principal Investigators: S. Chaudhuri (UofT), E. Roberts (École Polytechnique de Montréal), J. Bergthorson (McGill University)
Partners: P. Vena (National Research Council Canada), M. Furi, S. Jella D. May (Siemens)
- 2024 – 2024 Market Assessment of a Self-Decarbonizing Micro Gas Turbine [C\$ 15k]
NSERC-idea to innovation grant
Principal Investigator: S. Chaudhuri
- 2023 – 2024 Predicting outbreaks in shelters: development and data-driven testing of a computational model of airborne SARS-CoV-2 spread [C\$ 30k]
Institute for Pandemics, UofT
Principal Investigator: S. Chaudhuri
co-Principal Investigators: S. Mishra (UofT), S. Huang (Unity Health), V. K. Murty (UofT, Fields)
- 2022 – 2024 Developing a carbon capturing combustor-reactor powered by hydrogen generated in-situ from thermally coupled pyrolysis of natural gas [C\$ 50k]
Climate Positive Energy Institute, UofT
Principal Investigator: S. Chaudhuri
- 2022 – 2025 Transitioning to hydrogen based power generation through a novel, fuel-flex, gas turbine injector concept [C\$ 790k]
Natural Sciences and Engineering Research Council of Canada, Alliance Mission Grant
Principal Investigator: S. Chaudhuri
co-Principal Investigators: B. Savard, E. Roberts (École Polytechnique de Montréal), J. Bergthorson (McGill University)
Partners: P. Vena (National Research Council Canada), G. Bourque, M. Furi, S. Jella P. Versailles (Siemens Energy Canada)
- 2022 – 2025 Reducing aviation’s impact on climate change - understanding effects of fuel and engine characteristics on formation of contrails [C\$ 900k]
Natural Sciences and Engineering Research Council of Canada, Alliance Mission Grant
Principal Investigator: Ö . Gülder
co-Principal Investigators: S. Chaudhuri, C. Groth
Partners: C. Bretta, R. Stratton (Pratt & Whitney, Canada) F. Liu, A. Brown (National Research Council, Canada)

2022 – 2025	Actively controlled acoustic dampening in a hydrogen fueled model aircraft combustor [C\$ 100k] National Research Council Canada Principal Investigator: S. Chaudhuri
2021 – 2022	Investigating the effects of alternative fuels on the combustion instabilities of two staged combustion system [C\$ 63k] National Research Council Canada Principal Investigator: S. Chaudhuri
2021 – 2026	Structure, propagation, and stabilization of turbulent flames at aircraft engine conditions [C\$ 160k] Natural Sciences and Engineering Research Council of Canada, Discovery Grant Principal Investigator: S. Chaudhuri
2021 – 2023	Direct numerical simulations of turbulent reacting and multiphase flows (HPC time allocation worth [C\$ 62k (2021), C\$68k (2022), C\$135k (2024)]) Compute Canada, Resource Allocation Competitions Principal Investigator: S. Chaudhuri
2021 – 2026	Kinetics-transport interaction towards deposition of carbon particulates in mesochannel: supercritical fuel flows [C\$ 220k] Canada Foundation for Innovation, John R. Evans Leaders Fund Principal Investigator: S. Chaudhuri Co-Principal Investigator: O. L. Gulder
2021 – 2022	Mathematics for Public Health and Variants of Concern [C\$ 100k] Canadian Institutes of Health Research Principal Investigator: V.K. Murty
2016 – 2022	Next generation low-emission combustor technologies for high-efficiency compact aviation gas turbine engines [C\$ 3104k] Ontario Research Fund Principal Investigator: O. L. Gulder
2019 – 2022	Heuckroth Distinguished Faculty Award in Aerospace Engineering [C\$ 200k] University of Toronto Institute for Aerospace Studies
2013 – 2019	Funding secured as Principal Investigator at Indian Institute of Science $\approx$ INR 100 million
Research supervision: Current PhD students	
2023 – present	Saifullah , DNS of lean hydrogen flames at engine relevant conditions University of Toronto Institute for Aerospace Studies

- 2020 – present **Yazdan Naderzadah**, Stabilization mechanisms in micromix-premix fuel-flex combustor
University of Toronto Institute for Aerospace Studies
- 2020 – present **Arnab Mukherjee**, Large scale disease dynamics from flow physics of airborne transmission
University of Toronto Institute for Aerospace Studies

Research supervision: Graduated PhD students

- 2019 – 2025 **Kartikeya S. Akojwar**, In-situ thermal decomposition of methane in a Self-Decarbonizing Combustor for CO₂-mitigated thermal power
University of Toronto Institute for Aerospace Studies
- 2019 – 2024 **Yuvraj**, Enhancement of flame speeds of hydrogen-air premixed flames in turbulence
University of Toronto Institute for Aerospace Studies
Present affiliation: Post-doc at RWTH Aachen University
- 2015 – 2023 **Ankit Dutta**, Synchronization and combustion dynamics in lean premixed combustors
Indian Institute of Science
Present affiliation: Honeywell International Inc.
- 2014 – 2020 **Gopakumar R**, Dynamics of actuated and interacting swirl premixed flames in model gas turbine combustors
Indian Institute of Science
Present affiliation: Sandia National Laboratories
- 2013 – 2020 **Prasenjit Kabi**, A study of internal transport mechanisms in evaporating sessile droplets leading to dynamic self-assembly
Indian Institute of Science, co-supervised with S. Basu
Present affiliation: University College London
- 2014 – 2019 **Himanshu L. Dave**, Structure and propagation of premixed flames in turbulence
Indian Institute of Science
Present affiliation: Assistant Professor at IIT Jodhpur
- 2013 – 2018 **Harshavardhana Uranakara**, Flame Particle Tracking analysis of turbulence-premixed flame interaction
Indian Institute of Science
Present affiliation: ANSYS

Research supervision: Current MASc students

2024 – present	Matthew He , Direct contact Self-Decarbonizing Combustor University of Toronto Institute for Aerospace Studies
2024 – present	Owen Zeyl , Stabilization of micromix hydrogen flames at elevated pressure University of Toronto Institute for Aerospace Studies
2024 – present	Raghu Alluri , High speed turbulent flames University of Toronto Institute for Aerospace Studies

Research supervision: Graduated MAsC students

2023 – 2025	Scott Watson , Mechanisms for mitigating period-2 oscillations of fully pre-mixed methane-air flames in a spinning axial swirler combustor joining Pratt & Whitney Canada
2017 – 2021	Vishal Singh , Spray interaction with supersonic crossflow Indian Institute of Science
2017 – 2019	Mallikarjuna Tilak , Analysis of interacting swirling flows Tata Advanced Systems
2017 – 2019	Abinash Mohan , Lagrangian flame element analysis of turbulence-premixed flame interactions Indian Institute of Science

MEng project supervision

2022 – 2023	Alisa Nitu University of Toronto
2021 – 2022	Vlad Vasylyev University of Toronto
2018 – 2019	Nitin Chandy Joseph Indian Institute of Science
2018 – 2019	Nithin Somasekharan Indian Institute of Science
2017 – 2018	Mehul Kumar Indian Institute of Science
2017 – 2018	Harish S. Indian Institute of Science
2016 – 2017	Mohammad Anwar Indian Institute of Science
2016 – 2017	Abhijit Kalbhor Indian Institute of Science

2016 – 2017 **Lakshmi Ganesh Shankar**
Indian Institute of Science

2013 – 2014 **Kaladasi Dileep Kumar**
Indian Institute of Science

Postdoc supervision

2024 – 2025 **Dr. Yuvraj**
UTIAS, Post-doc at Pitsch group, RWTH Aachen

2022 – present **Dr. Amitesh Roy**
UTIAS, joining Trinity College Dublin as an Assistant Professor

2022 – present **Dr. Samadhan Pawar**
UTIAS

2021 – 2023 **Dr. Jinhyun Bae**
UTIAS, currently at University of Cambridge

2017 – 2018 **Dr. Mahesh S.**
Assistant Professor at Indian Institute of Space Science and Technology

Teaching

Fall 2021 **AER 1324: Introduction to Turbulence**
Fall 2022 University of Toronto
Fall 2023
Fall 2024
Fall 2025

Winter 2020 **AER 510: Aerospace Propulsion**
Winter 2021 University of Toronto
Winter 2022
Winter 2023
Winter 2024
Winter 2025
Winter 2026

Winter 2025 **AER 1315: Sustainable Aviation**, guest lecture
University of Toronto

Fall 2017 **AE 245: Mechanics and Thermodynamics of Propulsion**
Fall 2015 Indian Institute of Science

Spring 2016 **AE 250: Advanced Combustion**
Spring 2015 Indian Institute of Science
Spring 2014

Fall 2018	AE 276: Experimental Techniques (few lectures)
Fall 2016	Indian Institute of Science
Fall 2014	
Summer 2017	Combustion in Air Breathing Aero Engines (NPTEL) 30 hours MOOC https://nptel.ac.in/courses/101/108/101108068/

Invited Talks

December 2025	Analyzing the distribution of SARS-CoV-2 infections in schools and shelters: Integrating model predictions with real-world observations <i>Catalyst Seminar Series: Artificial Intelligence and Data, Institute of Health Emergencies & Pandemics</i>
June 2025	Analyzing conditionally averaged structures to decipher and model mixing-chemistry interaction in high Ka, lean H ₂ flames <i>2nd Combustion DNS Workshop, Corfu</i>
June 2025	Three faces of hydrogen: its generation, injection, and flame structure in turbulence <i>Delft University of Technology, Delft</i>
July 2024	Introducing two novel combustors: fuel-flex combustor and self-decarbonizing combustor <i>Joint PTF-TNF workshop, Milan</i>
July 2024	How “mixing” affects propagation and structure of intensely turbulent, lean, hydrogen-air premixed flames <i>PTF workshop, Milan</i>
March 2023	Multiscale complexities of turbulent reacting flows: from faster hydrogen air flames to superspreading events <i>Combustion Webinar</i> https://www.youtube.com/watch?v=8jC24dNwv5k&t=2616s
January 2023	Turbulent reacting flow dynamics: some advances and applications <i>IIT-Madras, Chennai</i>
August 2022	Turbulent flame speed based on mass flow rate: theory and DNS <i>Turbulent combustion workshop, Vancouver</i>
October 2021	Hydrogen in aerospace propulsion, part 1: Ignition and extinction <i>Pratt & Whitney mini conference on hydrogen</i>
September 2021	Hydrogen in aerospace propulsion, part 2: Flame propagation, interaction, and dynamics <i>Pratt & Whitney mini conference on hydrogen</i>

July 2021	Turbulent Combustion II: Structure and propagation of turbulent flames <i>Princeton Combustion Institute Summer School 2021</i>
July 2021	Local Structure and Propagation of Turbulent Premixed Flames <i>Pratt & Whitney Canada Seminar Series</i>
June 2021	Estimating overdispersion from turbulent diffusion of infectious aerosols <i>Ontario Science Table</i>
June 2021	Analyzing overdispersion from turbulent diffusion of infectious aerosols <i>Modeling Consensus Table</i>
March 2021	Propagation and structure of premixed flames in turbulence <i>Guest lecture in graduate course on Combustion: Princeton University</i>
March 2021	Genesis and evolution of premixed flames in turbulence <i>Pratt & Whitney Canada Seminar Series</i>
February 2021	Constructing an ab-initio disease spread model to decipher Covid-19 type pandemics <i>Department of Mechanical Engineering, University of Connecticut</i>
February 2021	Constructing a disease spread model from the flow physics of infectious droplets and aerosols <i>The Fields Institute, Toronto</i>
December 2020	Analyzing the dominant SARS-CoV-2 transmission routes towards an ab initio disease spread model <i>Complex Fluids Conference, IIT Bombay</i>
March 2019	How Swirl Flames Interact in a Multi Nozzle Model Gas Turbine Combustion <i>International Workshop on Energy Power and Environment, Kurukshetra</i>
November 2018	Evolution of Flame Speeds in Turbulence at Different Pressures <i>International Conference on Combustion and Energy Utilization, Sendai, Japan</i>
May 2018	Autoignition of Hydrogen in Shear Flows <i>ASeT 2018: Future Directions in Propulsion Conference, LPSC ISRO</i>
April 2018	Genesis, Evolution and Annihilation of Premixed Flames in Turbulence <i>Taiwan Annual National Conference on Energy and Combustion</i>
March 2018	Turbulent Combustion Dynamics in Aero Engine Combustors <i>University of Toronto Institute for Aerospace Studies</i>
March 2018	Genesis, Evolution and Annihilation of Premixed Flames in Turbulence <i>KAUST Research Conference on Combustion in Extreme Environments</i>
February 2018	Genesis and Evolution of Premixed Flames in Turbulence <i>Prof. P. J. Paul Memorial Meet, Hyderabad</i>
December 2016	Dispersion, Propagation and Extinction of Flame Elements in Turbulence <i>International Discussion Meeting on Chemical Kinetics for Aerospace Applications, IISc</i>

February 2016	Mitigating Instability by Actuating the Swirler in a Combustor <i>Prof. P. J. Paul Memorial Meet at VSSC, Trivandrum</i>
February 2016	Lagrangian Investigations of Turbulent Premixed Flames <i>Complex System Approach to Self-Organization, IIT Madras</i>
August 2015	Local and Global Viewpoints in Turbulent Combustion <i>IISc Astrophysics Seminar</i>
August 2015	Lagrangian Viewpoint of Turbulent Premixed Combustion <i>Prof. P. J. Paul Memorial Meet, Mahabalipuram</i>
January 2015	Local and Global Viewpoints in Turbulent Combustion: Turbulent Flame Speed and Flame Particle Tracking <i>International Workshop on Sustainable Energy Power and Propulsion, organized by Jadavpur University, IITK, University of Maryland, University of Illinois and Chicago</i>
March 2014	Turbulent Combustion at NCCRD, IISc <i>Pan India Combustion Workshop IITM</i>
February 2014	Two Problems in Turbulent Combustion: Experiments and DNS <i>Prof. P. J. Paul Memorial Meet, Jain University</i>
February 2014	Blowoff Dynamics and its Measurements <i>Thermo-acoustic and Aero-acoustic nonlinearities in green combustors with orifice structures Workshop, Indian Institute of Technology, Madras</i>
July 2013	Turbulent Combustion: Flame Speed and Flame Blowoff <i>Vikram Sarabhai Space Center, ISRO</i>
July 2013	Two Problems in Turbulent Combustion: Flame Propagation and Stabilization <i>Indian Institute of Technology, Madras</i>
July 2013	A Brief Journey with Turbulent Reacting Flows <i>Jadavpur University</i>
January 2012	Two Problems in Turbulent Combustion: Flame Propagation and Stabilization <i>Indian Institute of Science, Bangalore</i>
December 2011	Propagation and Stabilization of Turbulent Premixed Flames <i>Imperial College London</i>
November 2009	Dynamics and Diagnostics of Turbulent Premixed Flames <i>Max Planck Institute for Dynamics and Self Organization, Göttingen</i>
August 2009	Blowoff Mechanism and Forced Response of Bluff Body Stabilized Turbulent Premixed Flames <i>Princeton University</i>

University Service

2023 – 2023 UTIAS EngSci Aerospace Option Chair (Acting)

2020 – 2022	UTIAS Curriculum Committee
2020 – present	UTIAS Seminar Committee (Chair)
2020 – present	UTIAS Planning Committee
2017	IISc AE Department Review Committee
2017	IISc AE Department Review Committee
2014	IISc AE Department Development Committee
2013	GATE Examination Committee
2013 – 2019	IISc ICER Research Student Admission
2013 – 2019	IISc AE Research Student Admission
2013 – present	Doctoral and Masters evaluation committees at UTIAS and at IISc

Academic and Professional service

Colloquium Co-Coordinator of the Energy and material conversion and heating processes colloquium of the 41st International Symposium on Combustion 2026; WiPP Co-Chair of the 39th International Symposium on Combustion 2022.

AIAA Propellants and Combustion Technical Committee, Member of the best paper award sub-committee

Served as reviewer for the following journals and conferences

1. Combustion and Flame 2. Progress in Energy and Combustion Science 3. Proceedings of the Combustion Institute 4. Journal of Fluid Mechanics 5. AIAA Journal 6. AIAA Journal of Propulsion and Power 7. International Journal of Spray and Combustion Dynamics 8. Physics of Fluids 9. Combustion Science and Technology 10. International Journal of Hydrogen Energy 11. Experimental Thermal and Fluid Sciences 12. Chinese Journal of Aeronautics, Elsevier 13. Sadhana, Indian Academy of Sciences, Springer 14. Physics Letters A 15. Chaos: An Interdisciplinary Journal of Nonlinear Science 16. PLOS One 17. International Journal of Heat and Mass Transfer 18. International Symposium in Combustion 19. ASME Turbo Expo 20. ASME GT India Conference 21. ILASS Asia 22. International Heat Transfer Conference 23. Asia Pacific Conference on Combustion 24. International Conference on Computational Methods in Thermal Problems 25. Journal of Aerospace Technology and Management 26. Atmospheric Chemistry and Physics 27. Science of the Total Environment 28. Current Science 29. Springer Books 30. Applications in Energy and Combustion Science

Served as reviewer for the following funding agencies

1. Science and Engineering Research Board, Government of India. 2. ISRO-IISc Space Technology Cell 3. Natural Science and Energy Research Council of Canada 4. Mitacs 5. EPSRC UK

Professional memberships

2021 – Present	Climate Positive Energy, UofT
2023 – Present	Institute for Pandemics, UofT
2021 – 2022	Modeling Consensus Table for Covid-19 advisory, Ontario
2019 – Present	AIAA Propellants and Combustion Technical Committee
2006 – Present	American Society of Mechanical Engineers
2006 – Present	Combustion Institute