

Aditya Ranjan

Indian Institute of Technology Madras

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Research Interest

- **Areas:** Microfluidics, Interfacial Phenomena, Heat transfer, Healthcare.

Education

Program	Institution	Marks	Completion year
M.Tech.(Mechanical Engineering)	Indian Institute of Technology (IIT) Bhilai	8.83/10	2022
B.Tech.(Mechanical Engineering)	Netaji Subhash Engineering College (NSEC), Kolkata	8.81/10	2019
12th (Intermediate)	D.A.V. Public School, BSEB Colony, Patna	81.6/100	2014
10th (Matriculation)	D.A.V. Public School, Jamui	9.6/10	2012

Work Experience

- **IIT Kharagpur:** Research Fellow at the Hydrodynamics and Thermal Multiphysics Lab (HTML) under **Prof. Purbarun Dhar**.
Sept 2022 - Dec 2022
- **Broad Research Area:** Droplet actuation in a microchannel.

Experience

Teaching Assistant and Research Scholar **July 2020 - April 2022**
(M.Tech.) IIT Bhilai

- **TA work:** Performed all teaching assistant duties, including mentoring UG students.
- **Research work:** Worked on the numerical analysis of drug delivery via human skin and fabricated an artificial human skin model and PVA hydrogels.

Dissertation

1. Numerical study of transdermal drug delivery and fabrication of artificial human skin model **April 2022**
(M.Tech.) IIT Bhilai

- **Abstract:** A comparative study has been performed by numerically analyzing the passive drug diffusion through the skin routes by solving a set of PDEs using in-house MATLAB code. Hydrogels and artificial skin samples are also fabricated using PDMS, PVA, and GA to replicate the texture, wettability, and hydration characteristics of human skin.
- **Supervisors:** **Dr. Nagesh D. Patil** and **Dr. Vijay S. Duryodhan**

2. Optimization of parameters of spur gear using genetic algorithm technique **May 2019**
(B.Tech.) NSEC Kolkata

- **Abstract:** In this study, the maximum normal load developed along the pressure line during the meshing of the teeth of two spur gears for two different pressure angles (14.5° and 20°) has been compared. A non-traditional optimization technique (Genetic algorithm) is used to determine the optimum value of design variables such as face width, height, and thickness of gear teeth.
- **Supervisor:** **Dr. Kushal Bhattacharya**

Projects

1. Thermocapillary actuation of a droplet in a microchannel **October 2022**
(Research Fellow) IIT Kharagpur

- **Abstract:** A numerical analysis is performed to manipulate droplet motion under the influence of the temperature field.

2. Survival of viruses in respiratory droplets on human skin **December 2020**
(M.Tech.) IIT Bhilai

- **Abstract:** A numerical analysis is conducted to determine the drying time of droplets (hence the survival time of viruses) on different skin sites and for various age groups subjected to varying ambient conditions such as temperature and relative humidity.

3. Comparison of output power when dispersed light falls over a solar panel **February 2016**
(B.Tech.) NSEC Kolkata

- **Abstract:** Dispersed light of different colors (blue, red, and green) is allowed to fall over the solar panel. The output current and voltage readings in the ammeter and voltmeter are noted and used to calculate the power output.

List of Publications

- **Journal:** Aditya Ranjan, Vijay S. Duryodhan, and Nagesh D. Patil, "A comparative study of passive drug diffusion through human skin via intercellular and sweat duct route: effect of aging". (Under review)
- **Conference:** Aditya Ranjan, Vijay S. Duryodhan, and Nagesh D. Patil, "On the replication of human skin texture and hydration on PDMS based artificial human skin model". (Presented in FMFP-2022).
- **Conference:** Aditya Ranjan, Vijay S. Duryodhan, and Nagesh D. Patil, "Effect of aging on passive drug diffusion through human skin". (Presented in FMFP-2022).

Achievements

- **2nd Prize** in the Parliament quiz competition, Awarded by the Honorable Member of Parliament, Raipur, IIT Bhilai (2022).
- Secured **3rd Position** in the Dept. of Mechanical Engineering, M.Tech., IIT Bhilai (2022).
- Recipient of **MHRD Institute Fellowship**, IIT Bhilai, 2020-2022.
- GATE (ME) qualified 2019 and 2020 (2 times).
- Secured **3rd Position** in the Dept. of Mechanical Engineering, B.Tech., NSEC, Kolkata (2019).
- Secured **1st Position** in B.Tech. Second Year, NSEC, Kolkata (2017).

Relevant Courses

- **Mechanical:** Microfluidics, Computational Fluid Dynamics (CFD), Interfacial Transport Phenomena, Advanced Fluid Mechanics, Advanced Engineering Mathematics, Thermodynamics, Heat transfer.
- **Electives:** Renewable Energy System, Metrology and Measurement, Operations Research.

Online Courses

Fundamentals of Machine Learning for Healthcare
(Stanford University)

October 2022

- A certified online non-credit course authorized by Stanford University and offered through Coursera.

Trainings

1. *Industrial Training*
(B.Tech)

27, July 2018 - 22, August 2018
Regional Training Centre, Kolkata

- Basic training programme on Diesel Gasoline Engine, Diesel and Gasoline fuel injection system, Newer technologies Vehicle Diagnosis.

2. *Vocational Training*
(B.Tech)

7, August 2017 - 19, August 2017
Netaji Subhash Engineering College, Kolkata

- Vocational training on MATLAB conducted by Micro-Pro.

Technical Skills

- **Lab Instruments:** Optical Profilometer, High-Speed Camera, IR Camera, Drop Shape Analyzer, Optical Microscope, Reflux unit.
- **Programming Languages:** MATLAB, Python, C.
- **Simulation Software:** Comsol Multiphysics, Ansys.
- **Post-processing software:** Origin Pro, Tecplot, ImageJ.

Positions of Responsibility

- Mess committee member, IIT Bhilai, 2022.
- Teaching assistant, ME Department, IIT Bhilai, 2020-2022.
- Class Representative of B.Tech (Mechanical) at NSEC, Kolkata.

Others

- **Hobbies:** Writing Poems, Dancing, Singing, Cooking, Playing Badminton, Cricket, and Interacting with research scholars.
- **Languages:** English, Hindi.