



**Devansh Tripathi**

Roll No.: IMS22090

Integrated BS-MS Programme

IISER Thiruvananthapuram

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## EDUCATION

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- **Indian Institute of Science Education and Research (IISER), Thiruvananthapuram** 2022 ~ Present  
*Integrated BS-MS Programme, Applied Mathematics major* CGPA: 9.1/10
- **V.K.S Saraswati Vidya Niketan Inter College, Gola (Kheri)** 2008 ~ 2022  
*Secondary and Higher Secondary Schooling, Mathematics and Computer Science*

## RESEARCH EXPERIENCE

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- **Universal Approximation Property of Foundation Models For Computational PDEs** May ~ August, 2025  
*ETH Zürich, Prof. Dr. Siddhartha Mishra, ETH Zürich, Switzerland*
  - Studied theoretical foundations of operator-learning foundation models for PDEs, including Convolutional Neural Operator (CNO), POSEIDON, and Geometry Aware Operator Transformer (GAOT).
  - Investigated the universal approximation property for GAOT as a PDE solution operator between  $L^p$  function spaces, drawing on existing approximation results for CNO and POSEIDON.
  - Leveraged techniques from PDE analysis, measure theory, functional analysis, and Fourier analysis to analyze the expressive power of transformer-based operator learning architectures.
- **Distributed memory parallelization of Lax-Wendroff Flux Reconstruction** June ~ July, 2024  
*TIFR-CAM SSRP Program, Prof. Praveen Chandrashekar, TIFR-CAM, Bangalore*
  - Performed parallelisation of the code for Lax-Wendroff Flux Reconstruction method for solving hyperbolic conservation laws for 1D and 2D cases using Message Passing Interface (MPI).
  - Improved execution time of code by 13 times on a multicore architecture with efficiency of 82 % on cartesian and curvilinear meshes.
  - Implemented Remote Memory Access (RMA) for parallelizing the code for numerically solving linear advection equation for 1D and 2D cases.
  - Link of the github issue that was resolved is available [here](#) and project report can be found on this [link](#).

## SIDE-PROJECTS

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- **Study in Parallel Computing & Numerical Methods in C++**  
*Dr. K.R. Arun, IISER Thiruvananthapuram*
  - Developed a serial and MPI-parallelized **Finite Difference solver** for linear ODEs with Dirichlet, Neumann, and mixed boundary conditions in C++. (Code available [here](#).)
  - Implemented **parallel Gauss Elimination** using blocking and non-blocking MPI communication routines to optimize point-to-point and collective data transfer. (Code available [here](#).)

## PRESENTATION

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- **Distributed memory parallelization of Lax-Wendroff Flux Reconstruction**
  - Presented my summer project to Computational PDEs research group of Prof. Praveen Chandrashekar at TIFR-CAM, India on August 11, 2024
  - Slides for the presentation can be found on this [link](#).

## RELEVANT COURSES

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**Current Semester (8th):** Sobolev Spaces and Elliptic BVPs, Finite Element Method, High Performance Computing, Variational Methods and Control Theory, Data Structure, Functional Analysis

**Completed:** Real Analysis, Theory of Groups and Rings, Numerical Analysis, Linear Algebra, Mathematical Statistics, General Topology, Theory of ODE, Complex Analysis, Probability and Stochastic Processes, Scientific Computing, Measure Theory, Partial Differential Equations, Analysis on Manifold, Numerical Solutions of Differential Equations, Applied Stochastic Analysis.

## TECHNICAL SKILLS AND INTERESTS

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**Languages:** Julia, C, Python, C++, Latex

**Developer Tools:** HPC, Git, Command line, Linux, VSCode

**Libraries:** Python Libraries - Numpy, Pandas, Matplotlib  
C++/C - OpenMPI, OpenMP

**Solvers:** MUMPS, Trixi.jl, TrixiLW.jl

**Human Languages:** English, Hindi

**Areas of Interest:** Numerical Analysis of PDEs, Scientific Computing, High Performance Computing.

## ACHIEVEMENTS

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- **Awarded ETH For Development (ETH4D) Fellowship**, *ETH Zürich, Switzerland.* 2025
- **Awarded Summer Student Research Fellowship 2024**, *TIFR-CAM, Bangalore.* 2024
- **Innovation in Science Pursuit for Inspired Research (INSPIRE) Fellowship**, *Government of India.* 2022  
Given to top 1 % candidates in the state.
- **Awarded by Chief Minister, Government of Uttar Pradesh for academic excellence in higher secondary school.** 2022

## REFERENCES

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- **Prof. Dr. Siddhartha Mishra**, Full Professor of Mathematics  
Seminar for Applied Mathematics, D-Math, ETH Zürich,  
Zürich, Switzerland  
Website: <https://camlab.ethz.ch/the-group/group-head.html>  
Email: [siddhartha.mishra@sam.math.ethz.ch](mailto:siddhartha.mishra@sam.math.ethz.ch)
- **Dr. K.R Arun**, Associate Professor of Mathematics  
Indian Institute of Science Education and Research (IISER),  
Thiruvananthapuram, India  
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- **Prof. Praveen Chandrashekar**, Full Professor of Mathematics  
Centre for Applicable Mathematics, Tata Institute of Fundamental Research (TIFR),  
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