Devansh Tripathi

Roll No.: IMS22090
Integrated BS-MS Programme
IISER Thiruvananthapuram

(+91)9580752916
devansh22@iisertvm.ac.in
GitHub Profile
LinkedIn Profile

Education

- **Indian Institute of Science Education and Research (IISER), Thiruvananthapuram** *2022 ∼ Present*
  Integrated BS-MS Programme, Applied Mathematics major CGPA: 9.3
- **V.K.S Saraswati Vidya Niketan Inter College, Gola (Kheri)** *2008 ∼ 2022*
  Secondary and Higher Secondary Schooling, PCM and Computer Science

Internship Experience

- **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 for which I contributed can be found here and project report can be found on this link.

Side-Projects

- **MPI-based Finite Difference Method for Parallel Numerical Simulation of Linear ODEs in C++**
  Dr. K.R. Arun, IISER Thiruvananthapuram
  - Applied master-worker parallel algorithm in solving linear boundary value problems with Dirichlet, Neumann, and mixed boundary conditions
  - Code for parallel implementation of ordinary differential equation solver can be accessed here.
- **Serial Numerical Simulation of Linear ODEs using Finite Difference Method in C++**
  Dr. K.R. Arun, IISER Thiruvananthapuram
  - Studied Finite difference method, derivative approximations for boundary value problems with Dirichlet, Neumann and mixed boundary conditions.
  - Code for serial implementation of ordinary differential equation solver can be accessed here.
- **Reading Project on Advance C++ and Message Passing Interface (MPI)**
  Dr. K.R. Arun, IISER Thiruvananthapuram
  - Studied point-to-point and collective communication as well as blocking and non-blocking communication routines in MPI.
  - Reading includes the book **"Guide to Scientific Computing in C++" by Dr. Joe Pitt-Francis and Prof. Jonathan Whiteley** and some online mpi-tutorial websites.
  - A parallel and serial implementation of Gauss Elimination using MPI can be found here and few other related codes can be found here.

Presentation

- **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

- **Classroom**
  Single Variable Calculus, Multivariable Calculus, Mathematical Tools, Introduction to Probability, Data Analysis and Visualisation.
  Current semester: Real Analysis, Theory of Groups and Rings, Numerical Analysis, Linear Algebra, Machine Learning, Mathematical Statistics

Technical Skills and Interests

Languages: C++, C, Julia, Python, Latex
Developer Tools: Command line, Linux, Windows, Git, VSCode, Valgrind.
Libraries: Python Libraries - Numpy, Pandas, Matplotlib
C++/C - OpenMPI
Solvers: MUMPS, Trixi.jl, TrixiLW.jl
Certifications: Advance MPI - UK National Supercomputing Service (Pdf)
Human Languages: English, Hindi
Areas of Interest: Numerical solution of PDEs/ODEs, Parallel Computing, Machine Learning

Roles & Extra Curriculars

- **Head of Maintenance and Software, Student Cooperative Mess (SCoM), IISER TVM**
  - Volunteered in Daily Activity Committee (DAC) from May to July, 2023.
  - Promoted to Mess Supervision Committee (MSC) (Aug, 2023 $\sim$ Present).
  - SCoM is a dining service managed entirely by student volunteers in IISER Thiruvananthapuram, handling 2000 students daily for all three meals.
- **Sports**
  - Badminton and Cricket.

Achievements

- **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*
- **Received academic scholarship for competitive exam preparation by Government of Uttar Pradesh.** *2021*
  Given to selected top performers of the examination conducted by *Government of UP.*
- **Awarded a monetary grant and a tablet by District Magistrate.** *2020*
  Secured 2^{nd} position among hundred thousand (100K) candidates in secondary school board examination.

References

- **Prof. Praveen Chandrashekar**, Professor of Mathematics
  Centre of Applied Mathematics, Tata Institute of Fundamental Research,
  Bangalore, India
  Email: praveen@tifrbng.res.in
- **Dr. K.R Arun**, Associate Professor of Mathematics
  Indian Institute of Science Education and Research (IISER),
  Thiruvananthapuram, India
  Email: arun@iisertvm.ac.in