SAHIL KOMMALAPATI

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EDUCATION

Ph.D. in Mechanical Engineering, University of Texas at Austin, USA   Aug, 2022-

M.S. in Mechanical Engineering, University of Washington (UW), Seattle, USA   Sep, 2019-June, 2021
CGPA : 3.81/4.0, Thesis- **Machine Learning** for fluid turbulence.

B.Tech. in Mechanical Engineering, Mahindra École Centrale (MÉC), India.   Jul, 2015-May, 2019
CGPA: 9.4/10, Thesis-Optimal control for **stability of linearized systems**.

SKILLS

Languages: Python, Matlab, Slurm, Bash, C++.
Software: Git, CUDA, HDF5, Docker, SQLite, Tensorboard, Tableau.
Packages: Pytorch, Keras, Tensorflow, Scikitlearn, Pandas, Scipy, PySpark, MLlib, Numba, Seaborn, RiverML.
Coursework: Nonlinear Optimization, Deep Learning, Artificial Intelligence, Numerical Linear Algebra.

PROFESSIONAL EXPERIENCE

Predoctoral Appointee in Machine Learning at Argonne National Lab, IL, USA.   Nov,2021-Aug,2022
- Appointment at the ES Multi-Physics Computation division. Research sponsored by **Saudi Aramco**.
- Proposed novel Gaussian log likelihood loss function for total uncertainty quantification in deep neural networks.
- Developed deep deterministic policy gradient framework for data driven fuel candidate optimization.

Data Science Research Fellow at Telepath.io, Los Angeles, CA, USA.   May -Oct, 2021
- Developed production-ready Online machine learning algorithms for training with continuous streams of data.
- Researched the interdependence of batch size and learning rate and how it effects ML training deployment.
- Built scalable batch adaptive dataloaders, early stopping and model checkpoint callbacks into Cerebro.

ACADEMIC EXPERIENCE (RESEARCH)

Graduate Student Researcher at Williams Lab (UW), Seattle, WA, USA.   Dec, 2019-Jun,2021
- Developed deep learning image super-resolution models for resolving chaotic turbulent flow data. GitHub Link.
- Used TensorFlow-GPU on HPC clusters for hyperparameter tuning (TensorBoard) and model training.
- Used MCMC Bayesian Inference for coherent pattern extraction in chaotic turbulent flow data.
- Achieved 76% efficiency in identification and validated the framework with turbulence theory. GitHub Link.

Summer Research Intern, Computer Science department, MÉC, India   Jun, 2019-Sep, 2019
- Built ML models for real-time monitoring and control of Industry 4.0 processes with Digital twins.
- Utilized CNNs for fluid flowfield reconstructions with 98.9% efficiency for 100x image super-resolution.
- Presented results at 2019 IEEE SSCI, China, and updates at 2020 NCMDAO, India.

Summer Research Intern at Mechanical Engineering department, IIT-Bombay, India   May, 2018-Jul, 2018
- Developed numerical simulations and analysis of chaotic advection for miscible fluid mixing in microchannels.
- Increased mixing efficiency SOTA from 55% to 92%. Published results in the ACS I&EC Journal (first author).

Summer Research Intern, Mechanical Engineering department, MÉC, India   May, 2017-Aug, 2017
- Developed dynamically adaptive algorithms for optimal vehicle placement in platoons with MATLAB.
- Numerical validation showed 21% theoretical decrease in fuel consumption. Presented at 2019 5th ICC, India.

ACADEMIC EXPERIENCE (TEACHING)

Graduate Teaching Assistant for Data Science specialization, UW-CSE, USA.   Mar-June'20, Mar-June'21
- Lectured weekly lab sections on probability theory, Tableau, binary trees, ensembles, and Deep Learning.
- Mentored 12 student teams on data science class projects over research methodology and effective collaboration.

Lecturer and organizer for Machine Learning workshop series UW-MEGA, USA.   Nov, 2020-June, 2021
- Organized a 5-part ML workshop series based in Keras and PyTorch. Attended by 53 graduate students.
- Lectured on ANNs, CNNs, GANs, Hyper parameter tuning and Bayesian Inference. Workshop series recordings.

ACHIEVEMENTS AND EXTRACURRICULAR ACTIVITIES

Competitive Awards

2022-23 George J. Heuer, Jr. Ph.D. Endowed Graduate Fellowship, University of Texas-Austin, USA.

2020-21 Herbold Data Science Fellowship, University of Washington-Seattle, USA.

2015-19 College of Engineering Merit Scholarship, Mahindra Ecole Centrale, India.

2021   ASC challenge: Honourable Mention, ML for composites manufacturing process discovery. Github Link.

2019   Competitive travel grant recipient, Fifth Indian Control Conference, IIT Delhi, India.

2019   Best student paper nominee, Fifth Indian Control Conference, IIT Delhi, India.

2018   Best Project Award, Undergraduate Research Symposium, Mahindra Ecole Centrale, India.

2018   Best Oral presentation Award, Undergraduate Research Symposium, Mahindra Ecole Centrale, India.

Other activities

2020-21 Member, American Physical Society (APS).

2020-21 Member, American Society for Composites (ASC).

2019-21 Writer for Towards Data Science, a Machine Learning website with over 500,000 readers.

PUBLICATIONS

Conference Presentations (Papers)

1. **Sahil Kommalapati**, P. Pal, N. Kuzhagaliyeva, A. AlRamadan, B. Mohan, M. Sarathy, Y. Pei, E. Cenker, J. Badra, "Uncertainty quantification of deep learning based fuel property prediction models", 75th Annual Meeting of APS DFD, 2022. Abstract link.

2. **Sahil Kommalapati**, Owen Williams. Automated Identification of vortex properties from Individual vector fields using Bayesian approach. *APS-DFD 2020 Bulletin of the American Physical Society. Nov'20.* Abstract Link. Video Link.

3. Arya K. Bhattacharya, **Sahil Kommalapati**, Srija Gurijala, Hritik Narayan. Accurate replication of governing equations of physical systems with Machine Learning for Industry 4.0 and Digital Twin applications.*2020 NCDMAO, Vikram Sarabhai Space Center. Oct'2020.* Video Link.

4. **Sahil Kommalapati,** Arya K. Bhattacharya. Accurate replication with Artificial Neural Networks of simulations of governing equations of processes in Industry 4.0 environments for enhanced monitoring and control. *IEEE Symposium Series on Computational Intelligence, (pp. 1873-1880) Xiamen, China. Dec'19.* Link.

5. **Sahil Kommalapati**, An optimal positioning algorithm for cumulative drag reduction in heterogeneous platoons. *2019 Fifth Indian Control Conference (ICC) (pp. 172-176)*, India Institute of Technology, Delhi, Jan'19.Link.

Conference Presentations (Posters)

1. **Sahil Kommalapati**, Amit Agrawal. Enhancing miscible Fluid Mixing using Golden ratio spiral microchannel. *Undergraduate Research Symposium, Mahindra Ecole Centrale, Nov'18.* Link.

2. Manoj V. R. Poola, **Sahil Kommalapati**. Simulation of Heavy Duty vehicle control architecture. *Undergraduate Research Symposium, Mahindra Ecole Centrale, Nov'18.* Link.

Journal Submissions

1. **Sahil Kommalapati**, Amit Agrawal, Vijay S. Duryodhan. Enhancing Miscible Fluid Mixing by Introducing Pseudo Turbulent Flow in Golden Ratio Spiral Microchannel. *American Chemical Society, Journal of Industrial & Engineering Chemistry Research. 59.9 (2019): 3784-3793* Link.

2. **Sahil Kommalapati**, Owen J.H. Williams. A Bayesian approach for automated identification of vortex properties in turbulent boundary layers. *Under preparation.* Part of MS thesis.