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https://r-gaurav.github.io

## Education

- **Virginia Tech** Blacksburg VA, USA
  *Ph.D. (Spiking Networks and Neuromorphic Computing);* *January 2022 – Present*
  Electrical and Computer Engineering; Supervisor: Prof. Yang (Cindy) Yi
- **University of Waterloo** Waterloo ON, Canada
  *MASc. (Computational Neuroscience and Artificial Intelligence); CGPA: 95/100* *January 2020 – December 2021*
  Systems Design Engineering; Supervisors: Prof. Apurva Narayan & Prof. Bryan Tripp
- **Indian Institute of Technology - BHU** Varanasi UP, India
  *Dual Degree (Master of Technology and Bachelor of Technology); CGPA: 9.10 / 10.0* *July 2012 – May 2017*
  Computer Science and Engineering

## Research Interests & Relevant Courses

- Spiking Networks, Neuromorphic Computing, Computational Neuroscience, AI/ML, Neuroimaging
- SYDE 552 - Computational Neuroscience, SYDE 750 - Simulating Neurobiological Systems, ECE 612 - Information Theory, PSYCH 784 - Human Neuroanatomy and Neuropathology, COL 786 - Advanced Functional Brain Imaging, Principles of fMRI – part 1, Principles of fMRI – part 2

## Spiking Networks & Neuroimaging Research Experience

- **Driving Scene Understanding using Spiking Neural Networks (SNNs)**
  *Master's Thesis (at UW), Supervised by Prof. A. Narayan & Prof. B. Tripp* *January 2020 – December 2021*
  This project involves building a low power SNN for driving scene understanding. State-of-the-art AI models are rate neurons (e.g. ReLU) based which run on power hungry GPUs/FPGAs. Spiking neurons on the other hand consume very less energy when executed on neuromorphic hardware, thus well-suited for electric vehicles.
- **Resting-State Functional Connectivity analysis of Autistic Individuals**
  *Self-motivated project, Collaboration with: Prof. Rahul Garg, IIT Delhi* *January 2019 – December 2019*
  This project involved a study of the alterations in the resting-state functional connectivity of autistic patients. Data-driven approaches (first level and group level GLM) were applied on ABIDE-I and ABIDE-II datasets to discover functionally altered links apart from consolidating, reproducing, and validating existing results. [Code]

## Machine Learning Research Experience

- **Estimation of train delays at railway stations in India**
  *Self-motivated project, Collaboration with: Prof. Biplav Srivastava, UofSC, USA* *July 2017 – April 2018*
  A delay prediction algorithm inspired from N-Order Markov Processes was formulated which leveraged Random Forest Regressors and Ridge Regressors to predict delays at in-line stations. [Open Source at Github]
- **Algorithms for Subspace Learning**
  *Master's Thesis, Supervisor: Prof. K K Shukla, IIT-(BHU), Varanasi* *August 2015 – May 2017*
  The thesis involved developing algorithms for learning latent subspaces from visual features of images for image classification - in the context of two different problem settings. First: Traditional image classification with training and test images drawn from the same database (Supervised Matrix Factorization was used to add intelligence to the subspace); Second: An image classification challenge where training and test images' classes are disjoint (Zero Shot Learning approaches were used to transfer knowledge from known to unknown classes).
- **Content-based image classification via multi-modal fusion of visual features**
  *Bachelor's Thesis, Supervisor: Prof. K K Shukla, IIT-(BHU), Varanasi* *January 2015 – May 2015*
  A Matrix Factorization based framework for multi-modal fusion of $N$ different modals of image datasets was designed, where a latent subspace was learned with the help of simple gradient descent additive update rules.

## Publications

- **Driving Scene Understanding: How much temporal context and spatial resolution is necessary?** CAIAC
  *Ramashish Gaurav*, Bryan Tripp, Apurva Narayan Canadian AI 2021
- **Estimating Train Delays in a Large Rail Network Using a Zero Shot Markov Model** IEEE
  *Ramashish Gaurav*, Biplav Srivastava ITSC 2018
- **Informed Multimodal Latent Subspace Learning via Supervised Matrix Factorization** ACM
  *Ramashish Gaurav*, Mridula Verma, K K Shukla ICVGIP 2016
- **Multimodal Subspace Learning on Flickr Images** IEEE
  *Ramashish Gaurav*, Ankit Vallecha, Mridula Verma, K K Shukla UPCON 2015

## Technical Experience

- **Nutanix Technologies India Pvt. Ltd.** Bangalore, India
  *Member of Technical Staff - 3* *June 2017 – December 2019*
  - **Remote Procedural Calls for managing Virtual Machines**: Designed and implemented the code architecture for managing HyperV Virtual Machines via Remote Procedural Calls (RPCs)
  - **Metadata Service**: Designed and implemented a server-client architecture where the Virtual Machines (VMs) could introspect themselves by executing REST calls which landed on their hosts
  - **Proactive CPU Scheduler**: Mentored interns in prototyping a Machine Learning based dynamic CPU scheduler to proactively host the VMs to minimize the number of migrations, CPU hot-spots, and steal time faced by them
- **Centre for e-Governance, Government of Karnataka** Bangalore, India
  *Software Developer Intern* *May 2015 – July 2015*
  - **Online Ticket Management Tool**: Created for monitoring and managing service request tickets for Karnataka State Data Center (KSDC)
  - **Online Asset Inventory Application**: Created for storing and monitoring resource information at KSDC

## Skills

- **Programming Languages**: Python, C, C++
- **Technologies**: Nengo, NengoDL, NengoLoihi, NxSDK, Git, FSL FMRIB, Nipy, Nilearn, Nibabel, Nipype

## Extracurricular Activities

- Teaching Assistant for:
  - Matrices and Linear Systems - SYDE 113 (University of Waterloo): Fall 2020
  - Systems Models - SYDE 351 (University of Waterloo): Spring 2020, Winter 2021
  - Linear Systems and Signals - SYDE 252 (University of Waterloo): Spring 2021
  - Computer Programming (IIT-BHU): 3 semesters
  - Information Security, Network Security, and Network Security Lab (IIT-BHU): 2 semesters
- Won third position in a dance competition held in freshman year of college (IIT-BHU)
- Team leader and mentor of Academic Automation Group in sophomore year of college (IIT-BHU)
- Taught Algorithms and Data Structures crash course at Programming Pathshala's two weeks workshop

## Awards

- Graduate Research Studentship (2020) - CAD 18,000 / year.
- International Master's Award of Excellence (2020) - CAD 2,500 / term

## Other Interests

- Book Reading, Movies, Music, Badminton, Cricket