Krishna Wadhwani

Webpage, Github

Email : krishnaw14@gmail.com
Mobile : +91-7389352411

Education

- **Indian Institute of Technology Bombay** *July 2016-Present*
  B.Tech in Aerospace Engineering; CPI: 9.25/10

Scholastic Achievements

- **Department Rank 3** in Aerospace Engineering Department IIT Bombay
- Pursuing Minor in **Computer Science and Engineering**
- Secured **99.51 percentile** in JEE-Advanced 2016 among 200 thousand students
- Secured **99.92 percentile** in JEE-Mains 2016 among 1.2 million students
- **State Merit Rank 10** in Chhattisgarh Pre-Engineering Test 2016 among 30 thousand students

Techincal Experience

- **Research and Development Engineer, Sony Japan** *May 2019 - July 2019*
  Offered a position of student intern at Sony Corporation for the Sony Global Internship Program 2019 in Tokyo, Japan. The Job description is as follows:
  - Implementation, experiment and comparison of latest Deep Learning algorithms
  - Performance improvement of existing algorithms and suggestion of new algorithms
  - Adding new functions, examples and documentation of Sony's own Neural Network Libraries (NNabla)
- **Software subsystem, IITB Mars Rover Team** *December 2017 - July 2018*
  The IITB Mars Rover project is a student initiative to build a prototype Mars rover capable of extra-terrestrial robotics. The team participated in University Rover Challenge 2018 and was ranked 31 out of 95 teams worldwide.
  - Implemented **Gaussian Mixture Model** for tennis ball detection via color segmentation and contour detection
  - Developed a python script for **wireless control of GoPro camera** with Raspberry Pi
  - Worked on the implementation of **stereo camera vision** for distance legend mapping of the captured images
- **Controls system and UAVS, Show Genesis Pvt. Ltd** *December 2017 - January 2018*
  Show Genesis Pvt. Ltd is a company involved in hardware software solutions
  - Worked with **crazyflie quadcopters** to develop a server to control multiple drones on **ROS** framework
  - Developed ROS workspace for **stabilization** and **location positioning system** of the drone
- **Software subsystem, Team Rakshak-IIT Bombay** *May 2017 - December 2017*
  Team Rakshak is a student initiative to develop a fleet of robust Unmanned Aerial Vehicles to support Rescue Operations
  - Developed image segmentation algorithm using **k-means clustering** to separate out desired objects from disturbances, enabling faster processing for object detection
  - Worked on **letter recognition** using **convolutional neural networks** on **TensorFlow**

Key Projects

- **Deep Neural Networks** *July 2018-Present*
  Supervised Learning Project, Guide: Prof. Manoj Gopalkrishnan
  - Implemented **Capsule Networks** using TensorFlow-GPU on MNIST dataset to achieve a **99.53 % accuracy**
  - Worked on the applications of **General Adversarial Networks** and implemented the original paper, **Deep Convolutional GANs**, **InfoGANs** and **SR-GANs** using **PyTorch**
  - Exploring the applications of multi agent Reinforcement Learning on Biological and Financial ecosystem
- **Capturing Semantic Structures in Neural Machine translations** *May 2018-July 2018*
  Seasons of Code, Web and Coding Club-IIT Bombay
  - Implemented **attention based encoder-decoder** architecture with deep **LSTM** cell network and beam search for **language translation** module
  - Implemented a **multi-decoder** module in the NMT code to capture a different semantic structure of the sequence
  - Modified the training loss by incorporating **cross entropy** on the predicted sequence and **divergence between different decoder models**
  - Matched the benchmarked Bleu score with the initial results, further testing on the model isto be done for an improvement over the benchmark

- **Parallelising N-Body Simulations** *January 2018-May 2018*
  High Performance Scientific Computing under Prof. Shivasubraminum Gopalakrishnan
  - Developed a program for calculation of the trajectory of n bodies under the influence of gravitational force
  - Used **gprof** to profile the serial code and determine the parallel algorithm for the simulation
  - Parallelised the code with **openMP** to obtain a **speedup of 4.5 times** over the serial code
  - Parallelised the code with **MPI** to obtain a **speedup of 6 times** over the serial code
- **Mayavi** *July 2017-February 2018*
  Mayavi is an open source application and library for interactive scientific data visualization in python.
  Guide: Prof. Prabhu Ramachandran
  - Developed a **vtk** and **tvtk** script for rendering **multiblock data** files using **XML readers** and **composite data geometry filter** for structured and unstructured grids
  - **Improved Mayavi's documentation** by updating installation from conda, conda-forge and Enthought Deployment Manager (edm) and latest development version from git
  - Operated on various bugs filed on github related to documentation, python 3 and vtk
- **Human Detection Autonomous Hexacopter** *May 2017-July 2017*
  Institute Technical Summer Project
  - Used **pixhawk px4** with **qGroundControl** for positioning of the drone with **GPS** and **autonomous flight**
  - Developed an interface between **R-Pi** and camera module to **wirelessly transfer images** to the base station
  - Used **openCV** to build a human detection classifier using **Support Vector Machines** and **HOG descriptor**
- **Warehouse Inventory Check** *December 2017-January 2018*
  InterIIT Tech Contingent Meet 2018
  - Part of a 4 member team selected to **represent IIT Bombay** at Warehouse Inventory Check competition organised by Honeywell in InterIIT Tech Meet 2018
  - Built an **autonomous quadcopter** for indoor navigation with **px4Flow sensor** and **odroid xu4** using mavros
  - Implemented **Image processing via openCV** for **contour detection** to **extract QR code, barcode** and **hazardous symbols** and employed zbar module of python to decode them
- **IRAS Space Mission Case Study** *January 2018-May 2018*
  Spaceflight Mechanics under Prof. Ashok Joshi
  - Performed a literature survey on the orbit of **IRAS spacecraft** and its connection with the mission objective
  - Modelled the various forces and studied the propulsion systems used in different stages to **design the trajectory** of Launch vehicle Delta 3910 and **orbital manoeuvres** of the spacecraft

Position of Responsibility

- **Cofounder and Director, Autonise AI** (*Regd.*) *October 2018 - Present*
  - The Company sells end to end **Artificial Intelligance Solutions** to clients based on thorough research and high efficiency employment of the state of the art Deep Learning algorithms
  - Developed topic extraction and text classification analysis report examining the efficiency and performance of topic modelling, FastText and CNN based approaches
  - Working on building a Recommendation Engine and skincare solution application for clients
- **Mentor, Department Academic Mentorship Program** *April 2018 - Present*
  - Part of a 22 member team of mentors selected based on ethics and peer review, responsible for **mentoring 6 sophomores** to cope up with their academic and extracurricular activities efficiently
  - Attended an extensive training and icebreaking case studies session conducted by counsellors
  - Responsible for coordinating with faculty advisor for comprehensive course planning and guidance

Technical Skills

- **Programming Languages**: Python, C, C++, LaTeX, Matlab
- **Web Development**: HTML, CSS, Javascript
- **Tool kits**: PyTorch, Tensorflow, Keras, OpenCV, OpenCL, CUDA, MPI, OpenMP, Sklearn, Mayavi, VTK, Git
- **Electronics**: ROS, Raspberry Pi, Pixhawk px4, Odroid XU4

Miscellaneous Projects

- **Parallelization using various tools**: Parallelized numerical integration methods using multiple processes on CPU using **openMP**, **MPI** and GPU computing using **CUDA** and **openCL** and analyzed the variation of execution time with number of sampling points and number of threads
- **Open source Development**: Debugged **neural networks notebook** and added **function and test cases for cross-entropy loss** in loss functions API in **aima-python**; Added pseudocode for back-propagation with regularization on **aima-psedocode**; Developed a script for differentiation in visual math solving repository **VisMa**
- **Deep Learning Specialization**: Completed a 5 course specializtion- **Neural Networks and Deep Learning; Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization; Structuring Machine Learning Projects; Convolutional Neural Networks; Sequence Models** by deeplearning.ai on Coursera
- **Survival**: Created a wildlife survival simulator game using **pygame**, which won **2nd prize in FOSSEE python Hackathon** among all IIT Bombay students
- **Ubisoft Game Jam 2018**: Developed a 3D Puzzle based treasure hunt **multiplayer game** in **Unity** with **C#** scripts, from scratch in a 48 hour Game Jam; Designed and Programmed game play mechanics and the game scene
- **Summer of Science 2017**: Authored a certified project report of Machine Learning exploring concepts such as **neural networks, SVM, regularization, clustering and anomaly detection**
- **Computer Networking**: Developed a Client Server model to store key and values using socket programming with event driven I/O using epoll and implemented distance vector routing defining the network packets data structure
- **Streamline Visualization**: Solved **stream** and **velocity potential** function for an infinitely long rotating cylinder using **scipy** and plotted the **streamlines** and **equipotential lines**

Key courses undertaken

- **Aerospace**: Data Analysis and Interpretation, Aircraft Propulsion, Fluid Mechanics, Aerospace Structural Mechanics, Spaceflight Mechanics, Control Theory*, Aerodynamics*,
- **Computer Science**: Computer Programming and Utilization, Computer Networks (*Minor*), Data Structures and Algorithms (*Minor*), Introduction to Machine Learning* (*Minor*), Digital Image Processing*, Supervised Learning Project*
- **Inter-disciplinary**: High Performance Scientific Computing, Introduction to Numerical Analysis, Linear Algebra, Calculus, Differential Equations, Quantum Physics and its Applications, Economics, Psychology*

* *To be completed by November 2018*

References

- **Prof. Prabhu Ramachandran**, Aerospace Engineering, IIT Bombay
- **Prof. Manoj Gopalkrishnan**, Electrical Engineering, IIT Bombay