

## RESEARCH INTERESTS

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- Artificial Intelligence, Computer Vision, Machine Learning, Deep Learning, Visual Perception and Robotic Vision, Intelligent Robot Systems

## EDUCATION

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- **National Institute of Technology Karnataka** Surathkal, Mangaluru, India  
*B.Tech. in Information Technology, CGPA: 8.3/10* July 2012 - May 2016

## EXPERIENCE

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- **Ati Motors** Bengaluru, India  
*Research Associate [Deep Learning] in Autonomy* Sep 2017 - current
  - 1) Implemented various Convolutional Neural Network model research papers such as FCN, SegNet, UNet, LinkNet using TensorFlow on Cityscapes, CamVid and custom dataset for Road Segmentation. Experimented to quantify performance and inference time of various models on different Nvidia GPUs.
  - 2) Implemented custom Convolutional Neural Network model using TensorFlow on Cityscapes, CamVid and custom dataset for Road Segmentation. Experimented to study custom model's performance and inference time on different Nvidia GPUs and comparison of the same with various research models.
  - 3) Trained Yolo\_v2 implemented using DarkNet framework on Berkeley Deep Drive dataset for Object Detection in road scene. Experimented to quantify performance and inference time of Yolo\_v2 models on different Nvidia GPUs.
  - 4) Worked with Jetson TX2 development board and converted TensorFlow trained models to Nvidia's TensorRT deployment engine.
  - 5) Developed a simple camera driver based on publisher-subscriber model using zeromq.
  - 6) Worked on lane detection problem using multiple approaches such as edge detection-hough transform and segmentation using CNN followed by RANSAC.
  - 7) Worked on implementation of research paper Denoising Autoencoders for Laser-Based Scan Registration for improving initial pose estimation using ICP algorithm on LiDAR data. This is still work in progress with training of autoencoder completed with reasonable performance. Currently we are studying the effect of denoised LiDAR data on ICP algorithm for initial pose estimation.
  - 8) Developed various visualization tools.
- **Indian Institute of Science** Bengaluru, India  
*Project Assistant Intern at HPC Lab in SERC* Jun 2016 - Dec 2016  
Professor - Prof. Govindarajan R
  - 1) Worked primarily on OpenMP, OpenCL and CUDA programming APIs targeting HPC hardware such as multi-core CPUs and GPUs for high performance computing.
  - 2) Implemented various Data Parallel Algorithms pertaining to various domains and studied the effect of target hardware, compute resources, nature of algorithm and performance gain using various parallel programming APIs.

- **J P Morgan Chase** Mumbai, India  
*Technology Analyst Intern in Investment Banking* *May 2015 - July 2015*
  - 1) Worked on Data Analysis using open source Python libraries on certain real time transaction data.
  - 2) Developed a custom visualization tool using open source Python libraries for visualizing certain real time transaction data.

## PROFILES

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- LinkedIn - <https://in.linkedin.com/in/abhishek-r-s-862608a0/>
- Github - <https://github.com/AbhishekRS4/>
- Kaggle - <https://www.kaggle.com/abhishekr4/>
- Course Certificates - <https://drive.google.com/drive/folders/0Byk-dMy2pBxeX21IbmRIWFExNFk?usp=sharing>

## PROJECTS

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- **Implementation of various Convolutional Neural Network models for Semantic Segmentation on Cityscapes and CamVid datasets:** Implemented various CNN models such as FCN, SegNet, UNet, LinkNet, PSPNet, DeepLab\_v3, Tiramisu on custom classes. The experiment is to study the various ideas proposed in research papers and its effects on performance of the model on validation set.
- **Participated in TGS Salt Identification Challenge hosted on Kaggle:** Implemented custom CNN model using ideas from various research papers such as UNet, LinkNet, PSPNet, DeepLab\_v3, DenseNet, Squeeze and Excitation network for salt segmentation in Kaggle competition. The model scored 0.811743 IoU on private test set. Our team finished in top 53% of the leaderboard.
- **Implementation of Convolutional Neural Network model based on Nvidia's research paper End to End Learning for Self-Driving Cars:** Implemented CNN model to predict steering angle from image on California Highway road dataset. The experiment is to reproduce the findings of the research paper that a CNN model can learn to predict steering angle from an image with reasonable performance.
- **Implementation of various CNN models trained on ImageNet dataset:** Implemented various CNN models such as VGG-16, VGG-19, ResNets, DenseNets, Xception, Inception\_v3 models trained on ImageNet dataset using open source model parameters in TensorFlow which can be used for transfer learning.
- **Classification of traffic sign images using German Traffic Sign Recognition Benchmark dataset:** Implemented CNN model for classification of traffic sign images on GTSRB dataset with 43 classes. The model scored 97.7% accuracy on test set.
- **Classification of handwritten digit images using MNIST dataset:** Implemented CNN model for classification of handwritten digit images on MNIST dataset with 10 classes. The model scored 99.47% accuracy on test set.
- **Boston House Price Prediction:** Supervised Learning task of predicting the house median value for the Boston House dataset using various Regression techniques, Artificial Neural Network as part of mini project for Soft Computing Course. Tuning the hyper-parameters of ANN scored the best rmse among the various models.
- **Comparison of Artificial Neural Network, Support Vector Regression (SVR), Genetic Algorithm-SVR:** Studied and experimented an IEEE paper which compares the three models ANN, SVR and GA-SVR using open source R and its packages as part of mini project for Data Warehousing and Data Mining Course. Tuning the hyper-parameters of ANN proved to be the best among the three models.

- **Improvement of Leach Communication Protocol:** Studied and experimented an IEEE paper on the improved LEACH communication protocol in Wireless Sensor Network using Matlab as part of mini project for Wireless Sensor Networks Course.
- **Denial of Service attack identification based on Reputation based Trust in Wireless Sensor Networks:** Identification of DoS attack based on Reputation based Trust in WSN using three different models RFSN model (a mathematical approach), human behavior model and ant colony optimization algorithm. This research was my Major Project (final year). We demonstrated that RFSN model could outperform other models in identification of the DoS attack.
- **Data Parallel Algorithms:** Implementation of various Data Parallel Algorithms in OpenMP and CUDA C as part of Parallel Computing Course.
- **Implementation of Machine Learning Algorithms:** Implemented linear regression using gradient descent and normal equation, logistic regression using gradient descent, perceptron, neural network algorithms using Python and numpy. This is still work in progress as I plan to implement a few more classification, clustering algorithms.

## PROGRAMMING LANGUAGES AND SKILLS

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- **Languages:** Python, C, C++, Java
- **Database:** SQLite, MySQL
- **Open Source libraries:** Numpy, scipy, pandas, matplotlib, scikit-learn, nltk, opencv, tensorflow
- **Parallel Programming APIs:** OpenMP, CUDA C

## SELF LEARNING COURSES

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- Machine Learning, Coursera (Certification)
- Mathematics for Machine Learning Specialization, Coursera (Certification)
- Deep Learning Specialization, Coursera (Certification)
- Data Science Math Skills, Coursera (Certification)
- Python for Everybody Specialization, Coursera (Certification)
- An Intuitive Introduction to Probability, Coursera (Certification)
- Fibonacci Numbers and Golden Ration, Coursera (Certification)
- Parallel Programming and Optimization for Intel Architectures Webinar Series with Hands-on exercise, Colfax Research (Certification)
- CS231n-Convolutional Neural Networks for Visual Recognition, Stanford University (Audit)
- Introduction to Computer Vision, Udacity (Audit)
- Artificial Intelligence for Robotics, Udacity (Audit)

## VOLUNTEER ACTIVITY

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- I was part of the team that conducted the event Techeshis Castle as part of IEEE Tech Fest held during Dec 2012 - Jan 2013.
- I was part of the team that conducted the Gaming Event as part of Incident (Cultural Fest of NITK) held during March 2016.