

Education

- **Indian Institute of Sciences** Bengaluru, India
Ph.D. in Computational and Data Sciences; CGPA: 9.11/10
Mentor : Dr. Phaneendra K. Yalavarthy
Aug. 2018 - Present
- **Delhi Technological University** New Delhi, India
Bachelor of Technology in Mechanical; Percentage: 81.1 (8.86/10.0)
Thesis supervisor: Dr. Atul Kumar Agrawal
Aug. 2012 – July. 2016

Research interests

My research interests are computational methods in medical imaging, parameter estimation from dynamic magnetic resonance imaging namely DCE MRI and ASL, multi-modal imaging, medical image reconstruction techniques, physiological modelling of pathologies.

Ongoing Projects

- **Tracer Kinetic parameter estimation from undersampled DCE MRI data** IISc
Under Dr. Phaneendra K Yalavarthy Aug 2019 - Present
 - **Task** : To estimate permeability parameters from undersampled dynamic contrast enhanced MRI data by implementing linear and non linear pharmacokinetic models using iterative and deep learning based techniques.
 - **Progress** : Implemented indirect DL based and direct iterative algorithms for parameters estimation using linear Patlak model on Breast DCE MRI dataset. The study showed that for higher undersampling rates, indirect DL based techniques perform sub-par compared to direct iterative techniques. This work is accepted for publication [1] in **Medical Physics** journal.
- **SpiNet : A model based DL architecture for solving inverse problems** IISc
Under Dr. Phaneendra K Yalavarthy Feb 2020 - Present
 - **Task** : To develop a model based DL architecture for solving linear inverse problems in medical imaging.
 - **Progress** : Developed a Schatten p-norm regularized medical image reconstruction architecture or **SpiNet**. This architecture is first of a kind DL architecture which can work for any p-norm on prior between 0 and 2 which can be trainable or fixed. Current architectures only support either 1 norm or 2 norm on prior. This work is currently under review [2] in **IEEE Transactions on Medical Imaging**.
- **Fusion of Cardiac Angiography Images** IISc
Under Dr. Phaneendra K Yalavarthy & SSSIHMS Jan 2019 - Present
 - **Task** : Fusion of Cardiac Angiography images of different RR phases using guided image fusion. The ECG data is used to detect the phases with less motion of right coronary artery. The objective is to reduce the number of study images required by the diagnostician for detecting stenosis in RCA or LDA. *In tandem with Shri Satya Sai Institute of Higher Medical Sciences.*

Completed Projects

- **Defianz Racing, DTU Formula Student Team** DTU
Aerodynamics and Bodyworks department 2014 - 2016
 - **Overview** : Defianz Racing is an undergraduate student team of DTU which focuses on designing and developing a formula race car to participate in FSAE competition organised by SAE.
<https://www.facebook.com/teamdefianzracing/>
 - **Task** : **1.** Designing of undertray diffuser and side pods of the car for increasing the downforce for providing better traction. **2.** Fabricate the package with carbon fibre using in-house vacuum bagging process.
 - **Participation** : FS India 2016 (now formula bharat) at BIC, Noida and got 3rd for business proposal

- **Autonomous Underwater vehicle, DTU**

DTU

Team Lead

2012 - 2016

- **Task** : Designed and fabricated ZYRA and ZYRA 2.0, 5th generation model of DTU AUV capable of grabbing objects and navigating its path by digital image processing and passive sonar navigation. It had the capacity to go up to 50 feet of depth and had 6 degrees of freedom. <http://auv.dtu.ac.in>
- **Application** : Funded by ONGC for its potential application in offshore pipeline fault detection and repairing
- **Participation** : **1.** RoboSub 2013, 2014 organised by AUVSI in San Diego, California and went into semi-finals. **2.** NIOT SAVE 2014 a competition for autonomous underwater vehicles held in Chennai, India.

- **Computational modelling of Composite dynamics and fabrication techniques**

DTU

Bachelor's Thesis, Under Dr. Atul Kumar Agrawal

2015-2016

- **Task** : The thesis was a part of my project of Defianz racing in which I built a MATLAB library for computing the dynamics of Carbon fibre composites and calculated their deformations under tensile, compressive, shear, thermal, moisture and curing induced stress for different layers of composites and their orientation. The library could be used to analyze the final shape of the composite after curing based on the orientation of the layers.
- **Application** : Main application was to decided the orientation of CF layers w.r.t each other while fabricating the aerodynamic packages of the car so that the composite takes the shape of the mould without much distortion.

Professional Experience

- **R&D Hero Moto Corp**

Jaipur, India

Assistant Manager , Engine Calibration and Emission group

Dec 2017 - July 2018

- **Power Train Control Strategy development** : ECU control strategy development for BS 6 vehicles along with Magneti Marelli (Italy)

- **R&D Bajaj Auto ltd.**

Pune, India

Senior Engineer, Engine Calibration and Emission group

Aug 2016 - Oct 2017

- **ECU calibration** : Powertrain Calibration and Validation aspects of gasoline engines with Bosch Motronic software structure for Bajaj 2W.
- **Developing MIL algorithm** : Developing MIL(model in loop) testing algorithms for control strategy department to meet ISO26262 safety regulation, emission reduction and performance optimization

Relevant Courses

- **ML/DL/Mathematics** : Neural Network and Learning System, Numerical Optimization, Numerical Methods, Numerical Linear Algebra, Computational Fluid Dynamics, Quantitative Methods
- **Others** : Medical Imaging, Digital Signal Processing, Advance Image Processing, Instrumentation and Control Systems, Compressive Sensing and Sparse Signal Processing.

Teaching Assistant

- **DS 288: Numerical Methods**

CDS,IISc

Instructor: Dr. Phaneendra K Yalavarthy

Aug 2019 - Dec 2019

- **DHIM: Advance Certificate in Digital Health and Medical Imaging**

IISc

Instructor: Dr. Phaneendra K Yalavarthy

Aug 2020 - Dec 2020

Programming Skills

- **Languages & libraries**: MATLAB, Python, C, HTML, Tensorflow(1.xx), Keras, Git/Github

Journal Publications

- [1] **Aditya Rastogi** and Phaneendra K. Yalavarth, “*Comparison of iterative parametric and indirect deep learning-based reconstruction methods in highly undersampled DCE-MR Imaging of the breast*,” Medical Physics 2020 (in press; 26 pages in journal format) [This work is the first comprehensive comparison of compressive sensing reconstruction methods with model based deep learning method for breast perfusion imaging and shows that deep learning methods are sub-optimal at higher undersampling rates.]
- [2] **Aditya Rastogi** and Phaneendra K. Yalavarth, “*SpiNet: A Deep Neural Network for Schatten p -norm Regularized Medical Image Reconstruction*,” in review at IEEE Transactions Medical Imaging, 2020, Submission ID - TMI-2020-1488; Submitted on: August 7, 2020. [This work is first-of-its kind in proposing a generic Schatten p -norm ($0 < p \leq 2$) regularization based deep learning network for medical image reconstruction, where p is a trainable parameter (chosen automatically).]
- [3] **Gupta, Aayush, et al.**, “*Delhi Technological University: Design and Development of the Littoral AUV Zyra 2.0*,” AUVSI RoboSub Competition, 2013 [This paper was presented as design report for the Autonomous Underwater Vehicle competition (RoboSub), organised by AUVSI on July 2013. The autonomous underwater submarine constructed by students of DTU had six degrees of freedom and was capable of performing complex tasks like underwater object detection and sound based navigation.]