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# Dr.Saurabh J. Shigwan

Assistant Professor, Computer Science and Engineering, Shiv Nadar IOE Delhi-NCR

## Professional Summary

**Shiv Nadar Institute of Eminence Delhi-NCR**
*Designation: Assistant Professor, CSE department* — *Jan '21 - Present*

**Psychiatry Neuroimaging Laboratory, HMS, Boston**
*Designation: Pre-doctoral Fellow* — *Aug '19 - Mar '20*

## Computer Skills

**Languages**: Python, MATLAB, Cython
**Platforms/Libraries**: SciPy-NumPy, Tensorflow, Keras, DiPy
**Research Tools**: Slicer, ITK-SNAP, VTK

## Ongoing Research Projects

**Quantitative measure estimation from Sparse DWI using Transformers**
*Students: Abhishek Tiwari, Ananya Sighal* — *Sept '22 - Present*

- Understanding traditional diffusion tensor imaging
- Finding correlation between Diffusion Weighted imaging signal
- Estimating principle components of diffusion tensor using DNN
- Implementation is in **Python-Keras-TensorFlow** and **Cython**

**3D CT reconstruction using sparse cone beam sinograms**
*Students: Siddharth Reddy* — *Sept '22 - Present*

- Studying traditional parallel beam and fan beam 2D reconstruction
- Studying existing cone beam reconstruction using ASTRA toolbox
- Reconstruction from sparse cone beam sinograms using Geometry aware DNNs
- Implementation is in **Python-Keras-TensorFlow** and **Cython**

**Tractography using Deep Neural Nets**
*PI : Prof. Yogesh Rathi, PNL, BWH, Harvard Medical School* — *Sept '19 - Present*

- Understanding traditional diffusion tractography using **unscented Kalman filter**
- Finding correlation between DMRI input and Fibre Bundle positions
- Estimating Fibre directions from DMRI with state of the art Deep Neural Nets
- Implementation is in **Python-Keras-TensorFlow** and **Cython**

**Analysis of Spine bone for fractures**
*Students: Chekuri Arahanth Varma* — *Sept '23 - Present*

- Studying traditional parallel beam and fan beam 2D reconstruction
- Studying existing cone beam reconstruction using ASTRA toolbox
- Reconstruction from sparse cone beam sinograms using Geometry aware DNNs
- Implementation is in **Python-Keras-TensorFlow** and **Cython**

## Research Interests

Statistical Modeling and Inference, Medical Image Processing, Bayesian Analysis, Machine Learning, Computer Vision, Deep Learning, Convolution network, Graph convolutional network, Shape analysis.

## Awards & Achievements

Secured **Research Funding of $16000 from Mass General Brigham** to do research at Harvard Medical lab on **Brain Tractography using Diffusion-MRI**.

## Publications

Abhishek Tiwari, **Saurabh J. Shigwan** and Rajeev Kumar Singh, "Validation of Deep Learning techniques for quality augmentation in diffusion MRI for clinical studies" Wiley ISMRM and ISMRT 2023

Abhishek Tiwari, Ananya Singhal, **Saurabh J. Shigwan**, Rajeev Kumar Singh, "Early Diagnosis of Alzheimer through Swin-Transformer-Based Deep Learning Framework using Sparse Diffusion Measures" The 15th Asian Conference on Machine Learning (ACML 2023)

Abhishek Tiwari, Ananya Singhal, **Saurabh J. Shigwan**, Rajeev Kumar Singh, "Deep Learning Framework using Sparse Diffusion MRI for Diagnosis of Frontotemporal Dementia", IEEE/CVF International Conference on Computer Vision ICCV 2023

Abhishek Tiwari, **Saurabh J. Shigwan** and Rajeev Kumar Singh, "Validation of Deep Learning techniques for quality augmentation in diffusion MRI for clinical studies" Elsevier NeuroImage: Clinical Q1 SCI Journal Impact Factor = 4.2

**Saurabh J. Shigwan**, Akshya Gailkwad, Suyash P. Awate, "Object Segmentation With Deep Neural Nets Coupled with a Shape Prior, When Learning from a Training Set of Limited Quality and Small Size" to appear in *International Symposium on Biomedical Imaging* (ISBI-2020), Iowa City, USA

**Saurabh J. Shigwan**, Suyash P. Awate, "Hierarchical generative modeling and Monte-Carlo EM in Riemannian shape space for hypothesis testing" appeared in *Medical Image Computing and Computer Assisted Intervention* (MICCAI-2016), Athens, Greece

Akshya Gailkwad, **Saurabh J. Shigwan**, Suyash P. Awate, "A statistical model for smooth shapes in Kendall shape space" appeared in *Medical Image Computing and Computer Assisted Intervention* (MICCAI-2015), Munich, Germany

## Education

**PhD, Computer Science (CGPA: 8.85/10)** *Jul' 14 - August' 20*
CSE, Indian Institute of Technology Bombay, Maharashtra, India
Thesis title: **Hierarchical Pointset-Based Statistical Shape Modeling and Applications**

**MTech, Computer Science (I Class)** *Jul' 12 - Jul' 14*
MIU, Indian Statistical Institute Kolkata, West Bengal, India
Thesis title: **Shot Boundary Detection in Video**

**BE, Computer Engineering (I Class)** *Jul' 07 - Jul' 11*
University of Mumbai, Maharashtra, India
Project title: **Hand fingers detection and localization for generation of computer mouse instruction**