

# SHREYAS PADHY

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## EDUCATION

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**Indian Institute of Technology Delhi**

**May 2017 (expected)**

B.Tech in Engineering Physics

Overall GPA: 8.802/10 (Department Rank 4)

## RELEVANT COURSEWORK

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Advanced Functional Brain Imaging<sup>1</sup>, Bio-Optics and Biophotonics<sup>1</sup>, Biomedical Signal and Image Processing<sup>1</sup>, Computational Optical Imaging, Numerical Methods in Electromagnetics<sup>2</sup>, Computational Physics, Mathematical Physics, Linear Algebra, Calculus, Data Structures & Algorithms, Artificial Intelligence

## RESEARCH INTERESTS

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Medical Image Computing, Forward & Inverse Problems in Medical Physics, Computational Electromagnetics and Optics

## RESEARCH PROJECTS

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**Adaptive Meshing in Diffuse Optical Tomography**

**June 2016 - August 2016**

*Under supervision of Dr. Simon Arridge, Director, Centre for Inverse Problems, Centre for Medical Image Computing, University College London*

- Worked on formulating a-posteriori error and adaptive meshing algorithms for two and three-dimensional diffuse optical tomography.
- Developed adaptive meshing and a-posteriori error calculation routines for the TOAST++ software package for diffuse optical tomography.

**Fourier Ptychography using Sparsity Constraints**

**May 2016 - December 2016**

*Under supervision of Dr. Kedar Khare, Dept. of Physics, IIT Delhi*

- Worked on improving the efficiency of the Fourier Ptychographic Microscopy method in bio-medical imaging, and reduce individual imaging requirements by incorporating sparsity constraints and image perturbations in phase retrieval algorithms.

**Adaptive Meshing Techniques in Microwave Imaging**

**May 2015 - Dec 2015**

*Under supervision of Dr. Uday Khankhoje, Dept. of Electrical Engineering, IIT Madras*

- Worked on adaptive meshing techniques to improve resolution and computational time for bio-medical microwave imaging of cancerous tumors.
- Implemented an inverse solver for microwave imaging using the Contrast Source Inversion technique.
- Designed an adaptive mesh reconfiguration algorithm that uses a multilevel sampling algorithm based on filtered backpropagation predictions of the solution to the inverse problem.

**Stochastic Methods in Rough Surface Scattering**

**December 2015 - May 2016**

*Under supervision of Dr. Uday Khankhoje, Dept. of Electrical Engineering, IIT Madras*

- Worked on stochastic modelling of rough surfaces to improve speed of forward solver in radar backscattering from inhomogeneous rough soil.
- Implemented a stochastic modelling of the rough surface using a Kosambi-Karhunen-Loeve expansion in the Galerkin polynomial chaos basis involved in the Finite Element Method solution.

## PUBLICATIONS

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### Manuscripts

Uday K. Khankhoje and Shreyas Padhy, "Stochastic Solutions to Rough Surface Scattering using the Finite Element Method", **2016**, submitted for review to IEEE Transactions on Antennas and Propagation

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<sup>1</sup>Current

<sup>2</sup>Non-graded

## RESEARCH EXPOSURE

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### UCL Medical Image Computing Summer School

July 2016

*Conducted by Centre for Medical Image Computing, University College London*

- Worked on image segmentation of brain MRI samples using global and local voting techniques under the supervision of Dr. Jorge Cardoso, CMIC.
- Attended a five day course covering Image Acquisition, Reconstruction, Modelling, Optimizations, and Systems & Pipelines.

### Pulsar Observatory for Students

July 2013

*Conducted by National Centre for Radio Astrophysics*

- Performed time-series observations for pulsars B1642-03 and Vela pulsar with Ooty Radio Telescope.
- Calculated the dispersion measure, flux density, period, modulation index and pulse broadening of B1642-03 and the Vela pulsar.

## TECHNICAL PROJECTS

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### Medical Diagnosis using Bayesian Networks

April 2015 - May 2015

*Course Project, Under supervision of Dr. Mausam, Dept. of Computer Science, IIT Delhi*

- Used the Expectation-Maximization algorithm to learn the Conditional Probability Table for a Bayesian Network for medical diagnosis of strokes from certain pathological markers from medical data with an incomplete data-set.

### Multiple Sequence Alignment of DNA

February 2015 - May 2015

*Course Project, Under supervision of Dr. Mausam, Dept. of Computer Science, IIT Delhi*

- Implemented depth-first-search with branch & bound for optimal solutions to alignment of DNA sequences.
- Implemented greedy hill-climbing local search with simulated annealing and pseudo-random restarts, for non-optimal solutions.

### Analysis of Crab Nebula using Ground Based Gamma Ray Telescopy

December 2013

*Under supervision of Dr. Kuldeep Yadav, Bhabha Atomic Research Centre*

- Analysed the periodicity and spectrum of the gamma ray emission of the Crab Nebula using very high energy ground-based gamma ray telescopy methods.
- Analysed data obtained from observations made by the TACTIC telescope located at Mt. Abu, Rajasthan.

## TECHNICAL STRENGTHS

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### Computer Languages

C++, Java, Python, L<sup>A</sup>T<sub>E</sub>X, Verilog

### Computational EM

Meep (FDTD), Cubit (Meshing), Seldon

### Mathematical Computing

MATLAB, Mathematica, R

### App Design

iOS (Objective C)

## SCHOLASTIC ACHIEVEMENTS

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- Received Merit Scholarship for Top 7% GPA in institute in Fall Semesters, 2013, 2014 and 2015.
- Received Summer Undergraduate Research Award 2015 for “Adaptive Meshing for Bio-Medical Imaging”.
- Recipient of the KVPY Scholarship from the Department of Science, Government of India.
- Recipient of the NTSE Scholarship from NCERT, Government of India.

## EXTRA-CURRICULAR ACTIVITIES

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**National Service Scheme:** Worked with the National Association for the Blind as a scribe and exam writer to provide visually impaired students equal opportunities while appearing for tests and qualifying examinations. Worked with the BloodConnect Organization at IIT Delhi and Safdarjung Hospital.

**Physics & Astronomy Society:** Senior Coordinator for National Astronomy Festival “Astroweek 2015” held at IIT Delhi.

**Quizzing Society:** Coordinator and Quizmaster for Rendezvous National Quizzing Fest 2015.