

SATWIK PASANI

satu002@gmail.com | StackExchange: stochastic13 | GitHub: stochastic13

My personal webpage + blog is available at stochastic13.github.io/my_page

DEGREE AND CERTIFICATIONS

All India Institute of Medical Sciences
MBBS (Bachelor of Medicine, Bachelor of Surgery)

New Delhi, India
Aug 2014 – Dec 2019

PUBLICATIONS & POSTER PRESENTATIONS

- i **S. Pasani**, S. Sahoo, and M. K. Jolly, “Hybrid E/M Phenotype(s) and Stemness: A Mechanistic Connection Embedded in Network Topology,” *JCM*, vol. 10, no. 1, p. 60, Dec. 2020, doi: 10.3390/jcm10010060. [link](#)
- ii **S. Pasani**, and S. Viswanath, “A Framework for Stochastic Optimization of Parameters for Integrative Modeling of Macromolecular Assemblies,” *Life*, vol. 11, no. 11, Nov. 2021, doi: 10.3390/life11111183. [link](#)
- iii Poster presented at Research Day, AIIMS (All India Institute of Medical Sciences, New Delhi), 2019 on “Modeling Anthropometric catchup in pediatric TB patients on treatment”
- iv Poster presented (I was involved in the work behind the poster; poster presented by the first author) at the 34th International Epilepsy Conference by ILAE (International League Against Epilepsy), 2021 titled “Inter-observer agreement between Primary Care Physicians and Pediatric Neurologists in classifying epilepsy in children according to ILAE 2017 scheme”, work authored by P. K. Choudhary, R. Tiwari, P. Kaur, S. Bansal, G. Puri, S. Pattisapu, **S. Pasani**, P. Jauhari, B. Chakrabarty, R. Lodha, R. M. Pandey, V. K. Paul, S. Gulati [link](#)

UPCOMING RESEARCH ENGAGEMENTS

- i **OIST (Okinawa Institute of Science and Technology), Okinawa** Upcoming in Feb 2022
Research Intern with **Prof. Simone Pigolotti** *Biological Complexity Unit*
 - Selected for a short term Internship as part of the OIST research internship program ([link](#))

RESEARCH EXPERIENCE

- i **Yale, Connecticut** Mar. 2021 – Ongoing
Research Intern with **Dr. David van Dijk** *Comp Bio & ML @ Yale Medical School*
 - **Project 1:** I am working on developing transformer-based novel frameworks for self-supervised learning for ECG classification and utilizing gradient-based saliency analysis (integrated-gradients, GradCAM) of ECG Deep Learning models, *Ongoing*
 - **Project 2:** I am working on using deep CNN models for bone-age prediction from pediatric radiographs, *Ongoing*
 - **Project 3:** I am working on developing contrastive learning frameworks to augment survival analysis (cox and Accelerated Failure Time models) for RCT data for personalized medicine, *Ongoing*
 - **Tools:** pytorch, torchvision, pillow, xgboost, sklearn, sksurv, pysurvival, scipy, numpy, pandas, matplotlib
- ii **NCBS (National Center for Biological Sciences), India** Oct 2020 – Ongoing
Graduate Trainee and Intern with **Dr. Shruthi Viswanath** *Integrative Structural Biology Lab*
 - **Project 1:** I am working on Integrative Modeling of Desmosome via the Integrative Modeling Platform involving Bayesian structural modeling using spatial restraints from multiple kinds of biochemical and biophysical experiments and Markov-Chain-Monte-Carlo sampling methods, *Ongoing*
 - **Project 2:** I worked on developing a Stochastic Optimization algorithm with flexible parallel computing for Integrative Modeling parameters, *Publication II*

- Contributed to the C++ and Python codebase for Integrative Modeling Platform, Python Modeling Interface and the imp-sampcon repositories. ([link](#))
- **Tools:** IMP, MODELLER, biopython, UCSF Chimera, PSIPRED/HHPRED, multiprocessing, scipy, numpy, pandas, matplotlib

III IISc (Indian Institute of Science), Bangalore

Mar 2020 – Dec 2020

Research Intern with **Dr. Mohit Kumar Jolly**

Center for BioSystems Science and Engineering

- **Project:** I worked on non-linear dynamical simulations with randomly sampled circuit parameters of the (epithelial to mesenchymal transition) EMT-Stemness genetic network, *Publication I*
- **Tools:** RACIPE, scipy, numpy, pandas, matplotlib

IV AIIMS (All India Institute of Medical Sciences), New Delhi

2019

Undergraduate Intern with **Prof. Sheffali Gulati**

Pediatrics Department

- **Project:** I worked on studying the inter-observer variation in the clinical classification of pediatric epilepsy, *Poster IV*
- Part of the data collection team based on a clinical questionnaire for the pediatric OPD

V AIIMS (All India Institute of Medical Sciences), New Delhi

2016 – 2018

Undergraduate Intern with **Prof. Rakesh Lodha**

Pediatrics Department

- **Project 1:** I worked on clustering analysis of a pediatric asthma cohort to discover clinical subphenotypes in an unsupervised manner and the subsequent comparison of clustering algorithms on the clinical dataset, *Submitted to ICMR under the STS program*
- **Project 2:** I worked on modeling the anthropometric parameter catchup profile during pediatric tuberculosis treatment, *Poster presented III*
- **Tools:** R - cluster, dplyr, ggplot2, Python - scipy, numpy, pandas, matplotlib

MENTORING AND TEACHING EXPERIENCE

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|-----|--|---|
| I | Taught a 20-lecture Course with assignments on Computer Science and Programming
<i>AIIMS (All India Institute of Medical Sciences), New Delhi</i> | 2021
YouTube |
| II | Full time TA in an 3-week international Computational Neuroscience workshop
<i>Neuromatch Academy</i> | 2021
NMA link |
| | <ul style="list-style-type: none"> • The course covered Machine Learning (GLM, Deep Learning, Dimensionality Reduction, Autoencoders), Dynamical Systems (Biological Neuron Models, Dynamic Networks) and Stochastic Processes (Bayesian Decisions, Hidden Dynamics, Optimal Control, Reinforcement Learning and Network Causality) | |
| III | TA in a graduate course on Statistical Inference in Biology
<i>NCBS (National Center for Biological Sciences), Bangalore</i> | 2021 (ongoing) |
| | <ul style="list-style-type: none"> • The course covers Basic Statistical Theory, Bayesian Inference, Markov-chain Monte Carlo methods, Machine Learning Theory and the python implementation of these | |
| IV | Active in answering on peer-to-peer QA sites on Multiple Subjects
<i>StackExchange Network (Math, CS, Stats, etc) and StackOverflow and KhanAcademy QA Forums</i> | 2012 – Ongoing
KA link and SE Link |

WORKSHOPS

- | | | |
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| I | Computational Approaches to Memory and Plasticity (CAMP)
<i>Annual Course on Computational Neuroscience</i> | July 2018
NCBS, Bangalore |
| | <ul style="list-style-type: none"> • Worked on a small group project (python; MOOSE) to simulate cellular dynamics to create a bistable switch capable of acting as synaptic memory • Introduction and hands-on training for MOOSE, BRIAN, NEURON and allied computational tools to model dynamical systems, single-neuron compartment model and multi-scale neuronal networks | |
| II | Simons Monsoon School
<i>Introductory Physics and Mathematics for Biological Problems</i> | June 2018
Simons Center, NCBS, Bangalore |
| | <ul style="list-style-type: none"> • Worked on a small group project (python) to simulate dispersal dynamics in a computational model of a forest | |

- iii **B4 program workshop** Dec 2017
SAI-Harvard course on Bioinformatic and Lab-based techniques for Genomics IBAB, Bangalore
- Introduction and hands-on training for mutation calling, genome alignment, analysis of NGS whole-genome and ChIP-seq data, de-novo genome synthesis and lab procedures for DNA/RNA extraction, purification and amplification
- iv **Visualizing Science**
Wellcome-DBT and Nature, India organized course on Visualizations in science NII, Delhi
- Explanation of various aesthetic concepts involved in scientific illustrations and usage of multi-media to communicate and develop science

AWARDS AND MERITS

i Scholarships

- Awarded the **NTSE** National Talent Search Scholarship by NCERT (National Center for Education, Research and Training) since 2010
- Awarded national scholarship **KVPY** (under mentorship scheme) and attended the **Vijyoshi Camp** (2012)
- Awarded the **Aruna Lal Scholarship** by Physical Research Laboratory, Ahmedabad (top 5 students of the state) (2013)

ii CSIR-UGC NET (Life Sciences)

National Rank: 3; Overall percentile: 99.9969

NTA
 Nov 2020

- Junior Research Fund (JRF) awarded; Awarded to $\approx 1\%$ of total students (Total applicants ≈ 60000)

iii Medical Entrances

- 1 Secured **All India Rank 17** in AIIMS Entrance Examination with one of the smallest acceptance ratios (2014)
- 2 Secured **All India Rank 5** in JIPMER Entrance examination (2014), **Rank 116** in AIPMT (General Medical Entrance examination) (2014) and **≥ 99 th Percentile** in State Board Examination (Gujarat) (2014)

STANDARDIZED TESTS

i GRE General Examination

Overall: 336/340

ETS
 Feb 2020

- Quantitative Reasoning: 170/170 (pr: ≥ 96), Verbal Reasoning: 166/170 (pr: 97), Essays: 6/6 (pr: 99)

ii TOEFL

Overall: 119/120

ETS
 Nov 2020

- Writing: 30/30, Listening: 30/30, Reading: 30/30, Speaking: 29/30

SOFTWARE EXPERIENCE & OPEN-SOURCE PROJECTS

Programming Language Proficiency: **Python** (Expert), **R** (proficient), **MATLAB/Octave** (Moderate), **C/C++** (Moderate), **LaTeX** (Moderate), **shell** (basics)

Python Frameworks I am Fluent in: **Pytorch/Keras/XGBoost** (for DL),

sklearn/scipy/numpy/pandas/matplotlib (for ML and Data Science), **biopython/MODELLER/IMP** (for structural biology and bioinformatics), **tkinter** (for python based GUI), **ctypes** (for interfacing with C), **multiprocessing/subprocess** (for parallel computing), **pytest** (for unittests and github CI)

Other Frameworks I have experience in: **GNU MPFR** (for arbitrary precision arithmetic), **openMPI** (for parallel computing in C), **Makefile** (for build systems in C), **Arduino Language** (for electronic prototyping with Arduino)

i Authored and Actively Maintaining *lemniscate*

Arbitrary Precision Multiprocessing Color Fractal Engine

C, Python, Makefile
[GitHub Link](#)

II	Authored and Actively Maintaining <i>homeFinance</i> <i>A GUI-based Encrypted Personal Finance Manager and Analyzer</i>	Python GitHub Link
III	Authored and Actively Maintaining <i>StOP</i> <i>Parallel Stochastic Optimization algorithm, adjunct to publication II</i>	Python, Shell GitHub Link
IV	Authored <i>voronoiTessellations</i> <i>Parallel Framework for a Voronoi-Map based Mosaic Patterning of Images</i>	Python GitHub Link
V	Miscellaneous projects and other software contributions <ul style="list-style-type: none"> • CLI Scrabble: Co-author • Keract, IMP, PMI, IMP-Sampcon: Contributions 	C++, Python

MANAGEMENT EXPERIENCE, SERVICE AND EXTRA-CURRICULARS

I	Literary Secretary and a member of the Students' Union	2017 – 2018
II	Member of the Editorial Board for College Magazine	2016
III	Executive member of the organizing committee for PULSE <ul style="list-style-type: none"> • PULSE: One of the Largest medical college fest in south-east asia 	2014 – 2016
IV	Sports <ul style="list-style-type: none"> 1 Yellow Belt and State Rank 3 (2009) in Judo 2 Participated (and finished) in Winter Delhi Half Marathon 2018, Grand Prix 10k Run, AIIMS 5K run twice and Pulsathon 5K run 	
V	Miscellaneous <ul style="list-style-type: none"> 1 Delivered lectures for AIM4AIIMS portal aimed towards helping students clear the AIIMS entrance examination and co-authored the AIM4AIIMS preparation book, first edition 	