Parth Sastry
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Engineering Physics
Indian Institute of Technology Bombay

180260026
UG Third Year

Examination	University	Institute	Year	CPI/%
Graduation	IIT Bombay	IIT Bombay	2022	9.46
Intermediate/+2	CBSE	Delhi Public School, Bopal	2018	94%
Matriculation	CBSE	Delhi Public School, Bopal	2016	10.0

Pursuing Honors in Physics and a Minor in Computer Science

academic achievements

Joint Entrance Examination   2018

- Secured an All India Rank of 145 in Joint Entrance Examination (Advanced) among 230,000 aspirants
- Secured an All India Rank of 1473 in JEE (Mains) among 1.04 million aspirants

Indian National Astronomy Olympiad and OCSC   2017

- Was selected for the **Orientation-cum-Selection camp (OCSC) for Astronomy** as **one among 30**, on the basis of my performance in the INAO-2017.
- In the OCSC, was **among the top 5**, selected to represent India at the **IOAA-2017**
- At the OCSC, was given a **Special Merit Award** for my solution to a Light Curve Data Analysis problem.

International Olympiad of Astronomy and Astrophysics   2017

- **Represented India at the IOAA-2017**, held in Thailand.
- Given the **Honorable Mention Award** at the IOAA-2017, with a final score of 315.30, or 60.99% of the maximum

experience

Modelling Movement of Animals as Continuous Fluid Flow   Mar'20-current
Under Prof. Manikandan Mathur, IIT Madras
Research Project

- Currently working on modelling movement of discrete animals in a collective herd as a fluid flow
- Working on adapting random walk models with reinforcement and memory to a continuous flow model

Studies Towards Predicting Failure of Rubidium Frequency Standards using Long-Term Frequency Data   Oct'20-Feb'21
Under Dr. Thejesh Bandi, SAC, ISRO
Research Internship

- Analysed time-series frequency data from Rubidium Frequency Standards on-board satellites
- Worked on identifying markers that could correspond to causes of failure, and worked on adapting these markers to a Remaining Useful Life (RUL) estimate
- Identified the existence of probable indicators of failure, and worked on correlating these with external factors.

- ✣ Formed a basis on which future Machine Learning and statistical models would work on identifying features of interest and making RUL estimates

Internship at EXL Service Jun-Jul'20

Data Analyst, Decision Analytics Team
Internship

- ✣ Built loan default prediction models based on borrower information from a peer-to-peer lending platform (LendingClub)

- ✣ Implemented binary classification models on **Logistic Regression, Decision Tree, Random Forest and Gradient Boosting algorithms;** evaluated classifier performances on the metrics of AUROC and Lift Curve

- ✣ Managed implementations on **statsmodels, scikit-learn and pandas;** achieved a best case accuracy of 83%

- ✣ Cursorily worked on adapting **Recurrent Neural Networks** and **Multi-Layer Perceptron Neural Networks** to this classification problem.

projects

Fluid Flows and Lagrangian Coherent Structures Jul'19-nov'19

Advisor: Prof. Punit Parmananda, Department of Physics, IIT Bombay
Course Project for Non-Linear Dynamics

- ✣ Looked at and made some models and simulations for fluid flows, and worked on identifying **Lagrangian Coherent Structures** from the evolution of fluid flows

- ✣ Presented as part of our Honors class on the topic, and studied about the **various types and ways to model LCSs**

- ✣ Looked at **examples of LCSs and their structure,** as seen on various planets in our Solar System

- ✣ Studied about ways to obtain data for modeling, and **used sample datasets to make model simulations of fluid flow and the evolution of LCSs**

Black Hole Information Paradox May'19-Jul'19

Advisor: Prof. S. Mohanty, Physical Research Laboratory, Ahmedabad
Supervised Reading

- ✣ Studied about the **Black Hole Information Paradox** and about the modern approach to the Paradox proposed by Stephen Hawking

- ✣ Learnt about the foundations of **Quantum Field Theory,** and read up on **General Relativity** to understand the problem

- ✣ Learnt about modern resolutions to the paradox, like the **Black Hole Firewall, and the Fuzzball**

Accessing the optical non-linearities of metals Sep'2020-Nov'2020

Advisor: Prof. Anshuman Kumar, Department of Physics, IIT Bombay
Course Project for Photonics

- ✣ Alongside three others, worked on reproducing the results of the following paper - (Bennink, Ryan S., et al. "Accessing the optical nonlinearity of metals with metal–dielectric photonic bandgap structures." Optics Letters 24.20 (1999): 1416-1418)

- ✣ Created a python notebook with simulations of the **electric and magnetic fields inside metallo-dielectric structures** to recreate the plots from the paper

- ✣ Went through subsequent literature to identify future work done based on this paper, and studied about **Hyperlenses and Optical Switching** in context

- ✣ Python notebook and related papers uploaded to git repository on this link.

Image Quilting for Texture Synthesis and Transfer Sep'2020-Nov'2020

Advisors: Profs. Ajit Rajwade and Suyash P. Awate, Department of Computer Science, IIT Bombay

Course Project for Digital Image Processing

- � Alongside two others, worked on creating a **MATLAB algorithm for the purpose of Image Quilting**.

- � Built a patch transfer and reproduction algorithm to **multiply and transfer textures** based on minimal cost paths and boundary cuts through images.

Fast True Random Number Generation in Arduino using Atmospheric Noise Sep'2020-Nov'2020

Advisor: Prof. Pradeep Sarin, Department of Physics, IIT Bombay

Course Project for Microprocessors Lab

- � Together with my teammate, worked on adapting an **XORshift RNG algorithm proposed by George Marsaglia** to an Arduino UNO board

- � Developed a functionally faster (than the rand() function) RNG using an Arudino Uno board combining a **naive atmospheric noise sampling algorithm with a Von Neumann extractor**, using a bitshift method to eliminate multiple sampling

- ✬ Ran the algorithm through a battery of Diehard tests (on the UNO board) and a Serial Correlation Coefficient Test to demonstrate how the algorithm is a good RNG

key courses

Physics	Fluid Dynamics, Non-Linear Dynamics, General Relativity, Quantum Mechanics 1 & 2, Astrophysics[‡], Photonics, Electromagnetic Theory[‡], Special Theory of Relativity, Classical Mechanics, Thermal Physics
Mathematics	Calculus, Linear Algebra, Ordinary and Partial Differential Equations, Complex Analysis, Introduction to Numerical Analysis
Computer Science	Logic for Computer Science, Automated Reasoning, Digital Image Processing, Data Structures and Algorithms, Design and Analysis of Algorithms, Introduction to Machine Learning[‡]
Others	Data Analysis and Interpretation, Analog Electronics Lab, Digital Electronics Lab, Microprocessors Lab

‡. To be completed by April 2021

technical skills

Languages	English (fluent), Hindi (native), Latin[‡] (read/write)
Programming	C++, C, Python, MATLAB, Octave, Julia[‡]
Data Science	Pandas, NumPy, scikit-learn, Statsmodels, Theano
Machine Learning & AI	TensorFlow, Keras, PyTorch
Computer Aided Drawing	AutoCAD, Solidworks
Other Software	LaTeX

‡. In progress