

SHREYAS BAPAT

(+91) · 9131 · 851172 ◊ bapat.shreyas@gmail.com

<https://shreyasb.com> ◊ GitHub: shreyasbapat

LinkedIn: shreyasbapat ◊ Twitter: astroshreyas

EDUCATION

Indian Institute of Technology Mandi

August 2016 - Present

B.Tech. in Electrical Engineering

Overall GPA: 7.5

* Awarded a travel grant to attend Python in Astronomy 2019 conference.

PUBLICATIONS

ProjectHiko 1.0 - The Voice and Internet Enabled Smart Home

June 2017

Shreyas Bapat et.al.

IJETSR ISSN: 2394-3386

- Cost Reduction in home automation. Complete set of home automation with fairly interactive voice assistant, and a web based interface under \$40.

EXPERIENCE

Siemens Technology and Services Pvt. Ltd.

June 2019 - July 2019

Software Research Intern

Bengaluru, India

- Benchmarking CycleGAN and MUNIT against similar problem and finding the benefit of Cycle Consistency Loss.
- Working on solution to find coverage of a Neural Network.
- Exposing Heat Maps of a Neural Network Model.
- Implementing GradCAM to find Class Activation Maps of Object Detection Models for cause of Explainable AI

Siemens Technology and Services Pvt. Ltd.

December 2018 - February 2019

Software Research Intern

Bengaluru, India

- Using generative models for test data generation. Exploring active learning for automatic data labelling.
- Understanding and exploring best approaches for style transfer of images.
- Using cycle consistency loss (CycleGAN) for style transfer due to lack of paired data. Understanding the convergence criteria of CycleGAN..

Ankam

August 2018 - November 2018

Deep Learning Intern

Remote

- Implementing transfer learning to classify images of human eyes using ResNet50 for Diabetic Retinopathy Detection.
- Using regression models to predict various characteristics of a person from Retina images.
- Creating a scalable web-app to take image input and show results using Docker Swarm.

poliastro - OpenAstronomy

May 2018 - July 2018

Summer Developer

Remote

- Implemented interactive 2D plotting, re factoring the plotting module to create backends and orbit simulation. Fixed hyperbolic orbits.
- Developed a module for DASTCOM5 being used by scientists in ESA (European Space Agency) to simulate orbits of various objects in space.

RESEARCH / ACADEMIC PROJECTS

VLBI Image Reconstruction

Prof. Arnav Bhavsar, Dr. Redouane Boumghar

July 2019 - Present

SCEE, IIT Mandi

- The task of creating an image from a Event Horizon Telescope is very big! It attempts to create a telescope of size of earth and tries to image objects billions of light years far away.
- Due to very less telescopes on earth, we only get a very partial fourier space. The task is to reconstruct the image using the available data.
- On completion, a possibility of a better Black Hole image is there. A python module for reading OIFITS data is created.

k-space MRI Reconstruction

Prof. Aditya Nigam, Prof. Arnav Bhavsar

Feb 2019 - June 2019

CS671, IIT Mandi

- MR Images are never reconstructed in Fourier Space, even when the data is collected in Fourier Space. Handling imaginary part of frequencies is hard.
- Devised a method to pack the imaginary and real part in a single value so as enabling the neural network to work well.
- Then used residual learning in a convolutional encoder-decoder type network along with a network for Fourier Transform to produce MR Images.

Keyboard Macros

Prof. Timothy A. Gonsalves, Prof. Aditya Nigam

Feb 2019 - June 2019

SCEE, IIT Mandi

- Developed a kernel module to implement keyboard macros.
- Used the proc file system for modifications in kernel space from a GUI for adding/editing/removing macros.
- Created Tkinter based GUI for managing macros! Possibility for Exporting and Importing macros from other systems.

pytorch-lightning

William Falcon, Shreyas Bapat

Dec 2018 - Present

New York University

- Developing a deep learning framework like keras for pytorch.
- Pytorch allows a lot of flexibility for research and it is a clear choice of researchers.
- Everything is controlled by lightning, no need of defining a training loop, validation loop, gradient clipping, checkpointing, loading, gpu training, etc.

Egocentric - Non egocentric Video Classification

Prof. Aditya Nigam

Feb 2018 - June 2018

SCEE, IIT Mandi

- Classification of videos based on for where the camera was held to film them is not a trivial task. There are minute patterns that change in each application!
- Created Optical Flows using Flownet2 and later applied a CNN classifier involving ResNet50 (pre-trained) and fine tuned the weights and bias metrics .

Fabric Classification and Matching

Prof. Aditya Nigam

Nov 2017 - Jan 2018

SCEE, IIT Mandi

- Developed a complete framework for fabric matching, classification and clustering.
- Used a ResNet50 architecture for classification and tSNE for clustering.
- Classification was done on the already generated encodings from the encoder model trained separately.
- A siamese network was trained separately so as to match two fabrics and give a match score!

OPEN SOURCE PROJECTS / COMMUNITY PROJECTS

The EinsteinPy Project

Python for General Relativity

Jan 2019 - Present

OpenAstronomy

- Founder of the Python Library for computations related to general relativity!.
- Project partly sponsored by European Space Agency's ESTEC Office of Advance Studies.
- EinsteinPy gives a very easy API to solve some problems like Geodesic calculations, understanding various geometries, binary black hole simulations.
- The major work involves development, packaging for pip, conda and apt, and outreach.

poliastro

Astrodynamics in Python

Dec 2018 - Present

OpenAstronomy

- Core Developer of the Python Library for orbital mechanics and astrodynamics.
- It tries to solve the problems like orbit propagation, solution of the Lambert's problem, conversion between position and velocity vectors and classical orbital elements and orbit plotting, focusing on interplanetary applications
- Contributed some core algorithms and a 2D interactive plotting module to the library.

TECHNICAL STRENGTHS

Computer Languages

Python, C, C++, Rust, Erlang, Go, Dart, Lua

Frameworks

Flask, Django, Dash, NodeJS, Pytorch, Keras

Protocols & APIs

XML, JSON, SOAP, REST

Databases

MySQL, PostgreSQL

Tools

Docker, Nginx, nano, vim

POSITIONS OF RESPONSIBILITIES

Debian

Maintainer of Debian Astro Team

April 2019 - Present

Debian Astro Pure Blend

- Packaging new softwares related to Debian Astro Pure Blend.
- Actively maintaining softwares and packaging them for Debian/Ubuntu/Mint.
- Packaging EHTImaging (Software used to generate Black Hole Image in 2019) with MIT CSAIL.

European Space Agency

Organisation Admin and Project Mentor SOCIS 2019

June 2019 - September 2019

The EinsteinPy Project

- Mentored a student throughout the summer for a Summer of Code project.
- Organized and managed the whole EinsteinPy Organization for ESA's Summer of Code in Space.

Space Technology and Astronomy Cell

Co-ordinator

June 2017 - June 2018

SnTC, IIT Mandi

- Awarded as the best technical society coordinator of the year 2017-18.

TALKS AND SESSIONS

* **PyCon India 2018** - "Through Python to the Stars", a talk on poliastro - a python library for orbital mechanics at HICC, Hyderabad, India

* **Python in Astronomy 2019** - "Python at the speed of light : Simulating relativity using EinsteinPy", a talk on The EinsteinPy Project! at Space Telescope Science Institute, Baltimore, USA