

SHREYAS BAPAT

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EDUCATION

Indian Institute of Technology Mandi

August 2016 - Present

B.Tech. in Electrical Engineering

Overall GPA: 7.34

* 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.

POSITIONS OF RESPONSIBILITIES

European Space Agency

June 2019 - September 2019

Organization Administrator and Project Mentor SOCIS 2019

The EinsteinPy Project

- Mentored a student throughout the summer for a Summer of Code project titled "Visualising Relativity using EinsteinPy".
- EinsteinPy was among 17 organizations that got sponsored by European Space Agency for Summer Program.
- Organized and managed the whole EinsteinPy Organization for ESA's Summer of Code in Space.

Debian

August 2019 - Present

Managing Member

Python Software Foundation

- Packaging new softwares related to Debian Astro Pure Blend.
- Actively maintaining softwares and packaging them for Debian/Ubuntu/Mint.
- Packaging HeliPy, EinsteinPy etc. for Debian Package Management System.

Debian

April 2019 - Present

Maintainer of Debian Astro Team

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.

Space Technology and Astronomy Cell

June 2017 - June 2018

Co-ordinator

SnTC, IIT Mandi

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

OPEN SOURCE PROJECTS / COMMUNITY PROJECTS

The EinsteinPy Project

Jan 2019 - Present

Python for General Relativity

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 and Python Software Foundation for the computational needs.
- EinsteinPy gives a very easy API to solve some problems like Geodesic calculations, understanding various geometries, binary black hole simulations.
- Every module is tested before adding to the master branch with the test coverage 94%. API Documentation, user guide and other important details are made using sphinx and reStructured Text
- EinsteinPy is completely developed on a Linux system and is tested on Linux, Windows and OS X. It can be installed via conda, pip or apt!
- Multiple Continuous Integration frameworks are integrated to check linting, running unit tests, building docs, checking coverage and generating coverage report.

poliastro

Dec 2018 - Present

Astrodynamics in Python

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.

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.
- Packaged the python library for PyPI.

python-oifits

Making OIFITS easy for Radio Astronomers

July 2018 - Present
IIT Mandi

- Created a python module for reading and writing OIFITS data files.
- Making data analysis easy for radio astronomers and data scientists. There is no actively maintained package that can take care of OIFITS data.
- Writing the documentation, setting up the CI, writing unit tests is the main responsibility.

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.

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!

TECHNICAL STRENGTHS

Computer Languages	Python, C, C++,
Frameworks	Flask, Django, Dash, Pytorch, Keras
Protocols & APIs	XML, JSON, SOAP, REST
Tools	Docker, Nginx, nano, vim

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
- * **Python in Astronomy 2019** - "Looking at a black hole using Python", a talk on how Deep Learning can be used to generate black hole image contrary to what was used in recent release of black hole image by EHT at Space Telescope Science Institute, Baltimore, USA