SHREYAS BAPAT

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EDUCATION

Indian Institute of Technology Mandi *August 2016 - Present*
B.Tech. in Electrical Engineering
Overall GPA: 7.3
∗ Awarded a travel grant to attend Python in Astronomy 2019 conference.

PUBLICATIONS

ProjectHiko 1.O - 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 - Present
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 charachteristics 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 July 2019 - Present
Prof. Arnav Bhavsar, Dr. Redouane Boumghar *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 Feb 2019 - June 2019
Prof. Aditya Nigam, Prof. Arnav Bhavsar *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.
- Deviced 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 Feb 2019 - June 2019
Prof. Timothy A. Gonsalves, Prof. Aditya Nigam *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 Dec 2018 - Present
William Falcon, Shreyas Bapat *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 Feb 2018 - June 2018
Prof. Aditya Nigam *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 Nov 2017 - Jan 2018
Prof. Aditya Nigam *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 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.
- 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 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.

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 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.

European Space Agency June 2019 - September 2019
Organisation Admin and Project Mentor SOCIS 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 June 2017 - June 2018
Co-ordinator *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