

SARANSH CHOPRA

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About

Saransh is an engineering junior who, by day, works on his academic and professional commitments, and by night, develops and maintains Open-Source Software, which he believes are the key to reproducible and collaborative research.

He is passionate about Software Development, DevOps, Research Software Engineering, Machine Learning, Scientific Machine Learning, and Open-Source Software.

Education

Cluster Innovation Centre, University of Delhi

New Delhi, India

Major: Information Technology and Mathematical Innovations

2020 – 2024

Minor: Computational Biology

CGPA 9.40

Research and Work Experience

FluxML, The Julia Programming Language

Remote

Technical Writer and Open-Source Developer [Funded by The Julia Programming Language]

May 2022 – November 2022

Mr. Dhairya Gandhi (Julia Computing)

- Worked on FluxML, an ML ecosystem providing lightweight abstractions on top of Julia's native GPU and AD support.
- Fixed bugs and developed the infrastructure of numerous ML packages such as Flux.jl, NNlib.jl and Metalhead.jl.
- Wrote original Machine Learning/Deep Learning tutorials, documentation and API references for FluxML's ecosystem.

Institute for Research and Innovation in Software for High Energy Physics (IRIS-HEP), Princeton University

Remote

Research and Development Fellow [Funded by IRIS-HEP]

June 2022 – October 2022

Dr. Henry Schreiner (Princeton University / CERN) and Dr. Jim Pivarski (Princeton University)

- Prepared Vector, a Python library for constructing Just-In-Time compilable jagged Lorentz vectors, for v0.9.0, v0.10.0, and v1.0.0 (first major release, in progress).
- Worked closely with CERN researchers to develop new API, fix bugs, and build infrastructures for the HEP ecosystem.
- The releases are currently being used by researchers at CERN, Princeton University, and other research institutes.

AiView

New Delhi, India

Research and Development Engineer

September 2021 – December 2021

Mr. Geetansh Saxena and Mr. Chappa Sri Vinay

- Developed end-to-end OCR and Object Detection libraries by wrapping existing software for visually impaired people.
- Built a CI/CD pipeline and a REST API for ease of integration with any existing software using FastAPI and Heroku.
- Collected a dataset of human images and their distance from a point by building a stereovision camera.

PyBaMM (Python Battery Mathematical Modelling), NumFOCUS

Remote

Google Summer of Code Student Developer [Funded by Google]

May 2021 – August 2021

Prof. Ferran Brosa Planella (University of Warwick), Dr. Valentin Sulzer (Carnegie Mellon University), Dr. Robert Timms (University of Oxford)

- Built an automated Twitter Bot capable of constructing Mathematical Simulations of Batteries, including but not limited to different battery models, parameter sets, chemistries, degradation modes, and experiments.
- Developed a replying functionality to run Mathematical Simulations on command using Twitter API.
- Created a novel CI - CD infrastructure and followed a micro-services-based architecture.

Open Source Research Software

PyBaMM

Steering Committee Member and Core Developer - 450+ stars

PyBaMM (Python Battery Mathematical Modelling) solves physics-based electrochemical DAE models by using state-of-the-art automatic differentiation and numerical solvers.

Vector

Collaborator and Core Developer - 45+ stars

Vector is a Python 3.7+ library for 2D, 3D, and Lorentz vectors, especially arrays of vectors, to solve common physics problems in a NumPy-like way.

[SSP] **S. Chopra**, H. Schreiner, and J. Pivarski. *Vector: vector classes and utilities*. DOI: 10.5281/zenodo.5942082. URL: <https://github.com/scikit-hep/vector>.

Flux.jl

Member (FluxML) and Core Contributor - 3,700+ stars

Flux is an elegant approach to machine learning. It's a 100% pure-Julia stack, and provides lightweight abstractions on top of Julia's native GPU and AD support. Flux makes the easy things easy while remaining fully hackable.

BattBot

Maintainer and Core Developer - 10+ stars

An automated Twitter Bot that Tweets random Battery Mathematical Modeling Simulations and replies to the requested Battery Simulations.

liionpack

Member (pybamm-team) and Core Contributor - 30+ stars

liionpack takes a 1D PyBaMM model and makes it into a pack. You can either specify the configuration e.g. 16 cells in parallel and 2 in series (16p2s) or load a netlist.

Other notable contributions

- **Zarr**: An implementation of chunked, compressed, N-dimensional arrays for Python. - 1,000+ stars
Migrated Zarr's build and packaging infrastructure to a pyproject.toml based configuration.
- **Scikit-HEP ecosystem**: High Energy Physics in Python
Fixed minor bugs in awkward and hist, added support for coverage in cookiecutter, and wrote new developer pages.
- **Scikits.odes**: Offers extra ODE/DAE solvers; an extension to ones available in SciPy - 100+ stars
Debugged and fixed their build (which was failing because of setuptools) and removed support for Python 2.7-3.6.

Posters and Presentations

- [SSP22a] **S. Chopra**, H. Schreiner, and J. Pivarski. *Compiling Awkward Lorentz vectors with Numba*. 21st International Workshop on Advanced Computing and Analysis Techniques in Physics Research (ACAT). Poster (upcoming). Oct. 2022. URL: <https://indi.to/45Kzq>.
- [SSP22b] **S. Chopra**, H. Schreiner, and J. Pivarski. *Constructing HEP vectors and analyzing HEP data using Vector*. 5th International Workshop on Python in High Energy Physics (PyHEP). Presentation. Oct. 2022. DOI: <https://doi.org/10.5281/zenodo.7081003>. URL: <https://indi.to/bPmMc>.
- [S C22a] **S. Chopra**. *Code coverage through unit tests running in sub-processes/threads: Locally and automated on GitHub*. 10th Annual Conference on Python - Asia-Pacific (PyCon APAC). Presentation. Sept. 2022. URL: <https://tw.pycon.org/2022/en-us/conference/talk/243>.
- [S C22b] **S. Chopra**. *Code coverage through unit tests running in sub-processes/threads: Locally and automated on GitHub*. 21st Annual Conference On Python - Europe (EuroPython). Presentation. July 2022. URL: <https://ep2022.europython.eu/session/code-coverage-through-unit-tests-running-in-sub-processes-threads-locally-and-automated-on-github>.

Grants, Prizes and Achievements

- **PyCon Asia-Pacific (APAC)**'s grant to lead a talk virtually (NT\$3,600) July 2022
- **Shubhra Kar Linux Foundation Training Scholarship** (500 recipients worldwide) for contributions to open-source research software (\$695) June 2022
- **EuroPython**'s travel grant to lead a talk in-person (£460) June 2022
- **PyCon Italia**'s travel grant to lead a workshop in-person (£400 + lodging support) April 2022
- **Faraday Institution's Collaboration Award** for contributions to the PyBaMM ecosystem November 2021
- Won the **Elastic hackathon** (out of 2500+ registrations) with a Flutter-Node-Google Cloud-ELK (Elasticsearch, Logstash, Kibana) based application May 2021
- **Discovered an asteroid** having a fixed orbit around Sun by analysing the data August 2016

Pan-STARRS observatory

Projects

- releaseup** [NLP, Text summarisation, spaCy, Scikit-learn, TF-IDF, Python library] September 2022
 - Releaseup uses an extractive approach for generating release notes from comments and docstrings added b/w two git tags.
 - The Python library has **400+ installs** on PyPI, **5+ stars** on GitHub, and follows best development practices.
- OCRed** [OCR, Computer Vision, Tesseract-OCR, NLTK, Python library] August 2022
 - OCRed provides clever, simple, and intuitive wrapper functionalities for OCRing specific textual materials.
 - The Python library has **2,900+ installs** on PyPI, **10+ stars** on GitHub, and follows best development practices.

- ForMente** [NLP, Flutter, Dart, FastAPI, Python, Firebase, Firestore, Heroku, GitHub Actions]
 June 2022

 - Using Natural Language Processing, ForMente lets you diagnose your feelings in the form of a secure personal diary.
 - The NLP model is deployed on Heroku using FastAPI, and the app uses Firebase and Firestore as its backend.
- ChaoticEncryption.jl** [Image processing, Encryption algorithms, ODEs, PRNGs, Julia package]
 February 2022

 - Vectorised image encryption and PRNG algorithms that runs **~40X faster** than ordinary nested-for implementations.
 - The Julia package has **10+ installs** on JuliaHub and **28+ stars** on GitHub.
- PopItUp** [Android, Kotlin, Firebase, Firestore, Google Sceneform SDK, Google ARCore SDK]
 August 2021

 - An Augmented Reality shooting game developed in native android by manually adding and editing the Sceneform SDK.
 - Developed a live leaderboard using the FirestoreRecyclerView and Firestore.
- MemeTastic** [Flutter, Dart, NodeJS, Elasticsearch, Kibana, CI/CD, Google Cloud, Reddit API, Ngram Analyser]
 May 2021

 - Developed and deployed a backend service to ingest the latest meme data into Google Cloud hosted Elasticsearch.
 - Created a frontend with a clean UI to fetch this data, providing an auto-complete feature to search any meme.

Position of Responsibilities, Volunteering, and Mentoring

- Member of **PyBaMM's steering committee**.

Present
- Member of **FluxML's** GitHub organisation.

Present
- Vector's** collaborator on GitHub.

Present
- Invited to mentor a hackashop organised at **PyHEP 2022**.

September 2022
- Mentored students under PyBaMM, NumFOCUS for **Google Summer of Code 2022**.

May 2022
- Mentored 10+ students under Codepeak 2021 on open-source application development.

December 2021

Relevant Skills

Languages:	Python (proficient) Julia (proficient) Dart (proficient) C/C++ Java JavaScript
Frameworks/Libraries:	Tensorflow PyTorch FluxML-Ecosystem PyData-Ecosystem SciML-Ecosystem Flutter FastAPI NodeJS ExpressJS Android
Platforms and Tools	Linux Heroku Google Cloud Elasticsearch Kibana Shell Scripting Docker CI/CD VCS SQL and NoSQL Databases GitHub Actions

Languages

Hindi (mother tongue), English (fluent)