

Vineet Agarwal

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🐙 github.com/wrothmir

🌐 wrothmir.is-a.dev

EDUCATION

University of Southern California

Master of Computer Science

GPA: 3.52/4.0

Aug. 2021 – Dec. 2023

Birla Vishwakarma Mahavidyalaya

Bachelor of Technology in Mechanical Engineering

GPA: 9.02/10.0

Aug. 2016 – Aug. 2020

SUMMARY

Versatile software engineer with a Master's in Computer Science from the University of Southern California possessing strong foundations in backend development, and full-stack engineering. Proven experience across healthcare, data science, and geo-spatial domains, with a robust tech stack including Python, C++, SQL, FastAPI, PyTorch, Svelte, and cloud platforms like AWS and GCP. Adept in building and deploy scalable applications, optimizing workflows, and leading impactful projects.

Relevant Courses: Adv. Web Technologies, Adv. Database Systems, Adv. Algorithms and Data Structures, Operating Systems, Machine Learning for Data Science, Adv. Programming Languages (Parsers, Compilers, Build Systems)

SKILLS

- **Languages:** Odin, Python, C++, SQL, TypeScript, JavaScript, CSS, HTML, Bash
- **Frameworks:** Next.js, Svelte, Pydantic, FastAPI, Sokol
- **Tools:** Git, GitHub, CI/CD (GitHub Actions), Shell, Docker, Postman
- **Platforms:** Linux, NixOS, Android, AWS, GCP

FREELANCE

Centre for Middle East Studies, Jindal School of International Affairs

Full-Stack Engineer

Apr 2025 – Present

- **Tech Stack:** Svelte, Python, Github Actions, SQLite, Drizzle ORM, FastAPI
- Currently designing and developing a **website**.

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Full-Stack Engineer

May 2024 – Present

- **Tech Stack:** Python, Github Actions, SQLite, Next.js, Drizzle ORM, Docker
- Currently designing and developing a **website**.
- Hosted a **REST API** on premises using **FastAPI** and a frontend web application using **Next.js** enabling patient treatment report and prescription generation.
- Implemented scheduling algorithms to optimize patient appointments, resulting in a **10%** increase in accommodation.
- Created programs which generate test result reports after parsing and processing data received from medical equipment.
- Designed relational database for managing patient details, history, and appointments, and implemented it in **SQLite**.

EXPERIENCE

Ploomber

Software Engineer Intern

Sep 2023 – Dec 2023

- **Tech Stack:** Python, AWS, Github Actions, SQLAlchemy
- Analyzed use-cases of JupySQL and identified issues related to query **snippets** addressing problems with their utilization.
- Designed software architecture that enables complex **query expansion**, allowing snippets to be seamlessly used within SQL queries and within other snippets, enhancing the existing functionality.
- Developed an **optimized flow** in the expansion engine leveraging decision trees to thoroughly address edge cases.
- Diagnosed and resolved a critical issue in JupySQL by implementing deduplication mechanisms to prevent redundant arguments in sql, sqlcmd, and sqlplot **jupyter magics**, enhancing overall functionality and improving **UX**.
- Performed extensive testing through comprehensive **unit tests** using **Pytest**, ensuring consistent behavior.

Johnson & Johnson

Data Science Intern

May 2022 – Aug 2022

- **Tech Stack:** PyTorch, Scikit-learn, Jira, Domino
- Trained and tested **vision transformer** based architectures for hierarchical image classification using PyTorch to predict disease severity and expected response to treatment.
- Preprocessed datasets with **5000+** histopathological images for training and testing **multi-instance models**.

- Created a testbed to investigate capabilities of both binary and **multi-task architectures**, visualized, analyzed and proposed changes to the existing architecture and training methodology.
- Identified architectural limitations and performed model **fine-tuning** which led to an **increase** in accuracy of over **6%**.
- Collaborated with team members to identify bugs in new features developed for internal **deep learning infrastructure**.

University of Southern California

Sep 2021 – Dec 2021

Graduate Researcher

- **Tech Stack:** Tensorflow, Bash, OpenCV, R, HTML, JavaScript [\[Github\]](#)[\[Website\]](#)
- Trained and tested **CNN-based segmentation** models to generate masks for the corpus callosum of the brain for studying relations between the corpus callosum's structure and brain health achieving an **accuracy of 99%**.
- Manipulated datasets with 13000+ MRI images, used **GANs** for image harmonization improving consistency of images from different sources and utilized **augmentation** techniques to ensure robust segmentation results.
- Developed a Quality Control system by comparing **ensemble**, neural networks and **XGBoost models** to check correctness of generated masks with voting classifiers and boosting techniques resulting in a **96% accuracy** in classification of masks.
- Analyzed large datasets and implemented **lasso regression** and **classification models** to link age and neuro-psychological health to features of the corpus callosum masks.
- Awarded the **Best Website** award at DataFest '21 for creating a website showcasing results and model architecture; prepared **interactive visualizations** for comparison of categorical accuracy, loss, IOU between segmentation models.

Foundation for Ecological Security

Mar 2021 – Jul 2021

Software Engineer Intern

- **Tech Stack:** Python, OpenCV, GeoPandas, QGIS, Selenium [\[Github\]](#)
- Automated the generation of processed images from raw **satellite images** procured from Sentinel-2 and Landsat satellites.
- Implemented a **pre-processing pipeline** for correcting atmospheric distortion in the satellite images using **OpenCV**.
- Enhanced **time series analysis** capabilities on satellite images boosting task performance by **4x**.
- Introduced a feature that enabled the use of predefined regions of interest to download data for state to sub-district granularity for the entire region of India.
- Developed a software stack to **periodically** mine and download satellite images for regions of interest which enabled large scale and long term geo-spatial time series analysis projects.

PROJECTS

Theia

Present

- **Tech Stack:** Python, PyQt5, Pydantic, Pytest [\[Github\]](#)
- Programmed a **CRUD** GUI application to download and process satellite images by communicating with the USGS API.
- Implemented a **Pydantic** validated API wrapper which provides methods to search USGS datasets, search scenes within the datasets, and download chosen scenes for a region and/or period of interest.
- Leveraged **multi-threading** to enable bulk downloads and multi processing for faster image processing.
- Maintained high reliability through rigorous unit tests using the **Pytest** library.

EventSeeker

Mar 2023 – Apr 2023

- **Tech Stack:** Angular, Node.js, Flask, HTML, CSS, Android Studio, Axios, GCP [\[Github\]](#)[\[Website\]](#)
- Engineered a **mobile-first** Angular web-application and an **Android app** to allow users to search for events by providing search parameters like keyword, genre, search radius and location.
- Built a custom backend API that serves as the contact for Ticketmaster and Spotify **RESTful APIs** using client credential flow, **dockerized** the app and deployed on GCP through Google Kubernetes Engine.

Alichain

Mar 2022 – May 2022

- **Tech Stack:** C++ [\[Github\]](#)
- Designed a **blockchain system** with three backend servers storing transactions in block files.
- Established communication via **TCP** between client and main servers, and utilized **UDP** for communication between the main and backend servers enabling querying account balances, transferring between clients, and more.

Weenix OS

Aug 2022 – Sep 2022

- **Tech Stack:** C++
- Implemented processes, threads, and drivers in the Weenix operating system ensuring proper functionality.
- Enhanced kernel functionality by implementing a **virtual file system**, including file naming, protection, and kernel data structures for file management.
- Developed features for **virtual memory management**, **addressing demand paging** and implementing essential functions for physical page frames.