Joel Samuel Rhine

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Skills:
Backend: Python, JavaScript, Node, AWS, GCS
Frontend: ReactJS, ThreeJS, HTML, CSS, JavaScript; **Docs and Dev Ops:** ReadTheDocs, Git, CI/CD, Docker
Spatial Analysis: PostgreSQL, GDAL, GeoPandas, ArcGIS (Pro, Online), QGIS, Mapbox, Google Earth Engine, KoBoToolbox, ODM, Claude AI
Project Management: Agile, Scrum, Kanban, Waterfall, Risk Management, Stakeholder Management, Prioritization, Jira, Asana, Trello
Certifications: Part 107 Remote Pilot (Drone Pilot), AWS CCP-Ongoing; **Soft Skills**: Troubleshooting, Collaboration, Communication, Prioritization
Languages: English (fluent)

Professional Experience:

The World Bank, Washington, DC

Technical Consultant **May 2024 – Present**

- Developed complete pipeline integrated with Google Cloud Services (Drive API and Desktop API) and Jupyter Notebooks in Python to fetch 20m Sentinel-1 raster data for any country in Africa using DEA's Open Data Cube
    - Developed detailed guides to reproduce outputs. **Docs** - mosaicbuilder.readthedocs.io **GitHub** - github.com/rhinejoel/dea-mosaic-builder
    - Implemented custom algorithms in Python to process entire country area improving ADM0 processing time by 90% [mean 10 days to 1 day]
- Identified random seed location discrepancies and proposed methods to improve clustering algorithm outputs in ArcGIS.
- Automated and aggr. admin boundaries, agriculture, conflict, world pop data-fetch pipelines in Python, reducing time required by 77% [27m to 6m]

Development Monitors LLC., Arlington, VA

Senior Software Development Engineer/Team Lead **May 2019 – Apr 2024**

- Designed and implemented open-source georeferenced water-network asset management system in two pilot cities of Shimla and Aizawl (India) using PyQGIS and PyQt5 as part of a World Bank India project; improving city-wide monitoring-and-analysis time by nearly 100% [days to mins]
    - Developed optimum algorithms and data structures where applicable.
    - Developed a standardized-scalable PostgreSQL database schema based on industry standard best practices.
    - Designed complete data ETL pipeline from collection, validation, geo-transformation, visualization-interaction to flood-risk analysis.
    - Integrated Anthropic's Claude LLM to create "Artemis AI" – conduct tasks based on prompts within the system UI.
    - Led cross-functional team consisting of software developers, data engineer and GIS engineers.
- Led and managed development of 3D risk mapping application in ReactJS, ThreeJS and python backend improving stakeholder engagement by 40%
    - Automated elevation, satellite-imagery and OSM building data-fetch reducing manual time required by 94% [35m to 2m]
    - Containerized and deployed using Docker on AWS EC2
    - Developed and integrated 3D drone point-cloud viewer using ThreeJS
- Managed enhancement of satellite imagery using a trained machine learning model, achieving 55% increase in resolution [10 meter to 4.5 meter]
- Mentored over 35 interns from USA, Mexico, Canada, Afghanistan, Yemen, Germany, Belgium, Bangladesh and India.
- Developed air-tight roadmaps for complete project lifecycle, from Inception to Delivery – scheduling Deliverables, identifying KPIs, implementing Performance Metrics like Stakeholder Satisfaction Score, Project Completion Rate, Resource Utilization and Milestone Achievement.

Software Developer Engineer

- Developed 2D flood-risk mapping application in ReactJS with Python backend. Integrated a machine learning model to identify building footprints to use as vector intersection with flood data. Pilot tested in Blacksburg, VA, reducing manual analysis time by 93% [30m to 2m] with 78% mean accuracy.
- Developed 2D desktop hazard-risk mapping application with PyQt5 and PyQGIS as part of respective World Bank projects. Integrated machine learning model with application to automate detection and digitization of building footprints.
- Developed drone inventory application to keep track of in-house and commercial drones in PyQt5, improving org-wide efficiency.
- Designed and built fixed-wing and quadcopter RTK-enabled drones. Automated drone-imagery to 3D model generation using opendronemap (ODM).

Research/Automation Engineer

- Managed training of machine learning model to digitize Afghan roofs, achieving 80% IOU and resulting in 76% effective decrease in time [20m to 1m]
- Developed an autonomous drone flight-path generation application compatible with Pixhawk drones in HTML, CSS and JS with python backend
- Automated flood risk analysis of 6 villages in Afghanistan as part of a World Bank project in python, reducing manual time by 95% [10m to 30s]

Full-Stack Projects
Tresses Salon DC, E-Commerce Website w/ Admin Panel – ReactJS, NodeJS, Typescript, MongoDB, Square for scheduling and payments (tresses.us)
YouTube Clone – NextJS, Express, Docker, Typescript, Express, GCS: Cloud Run, Storage Buckets, Pub-Sub, Firebase (github.com/rhinejoel/youtube-clone)
Personal Portfolio – HTML, CSS, JS [92% Accessible - Lighthouse] (github.com/rhinejoel/portfolio)

Education:
George Washington University, Washington, DC. May 2019. (**GPA 3.52**) M.S. in Mechanical and Aerospace Engineering
University of Mumbai, Mumbai, India. April 2016. B.S. in Mechanical Engineering