USRA – Foothill SLI Internship at NASA Ames Research Center

Technical Area: High Performance Computing (HPC)

PROJECT 1: Title: Earth Data Visualization using WorldWind

Duration: 1/3/22 – 3/18/22 (11 weeks)

Term: Winter 2022

Open to US citizens only

Project Description:

The internship aims to gain insights into WorldWind platform and understand the deployment of a visualization service based on it. The focus will be on designing efficient server and client sides for visualization. The task will showcase a wildfire dataset over CONUS (Continental US) from 2018 to present.

Effective visualization of Earth science data is a vital part of research field, helping them promote new dataset and assist decion makers and public in a significant way. There are very few tools available to help with this objective. The available tools often either lack in backend simplicity or are non-intuitive to end users. NASA's WorldWind is among the best platforms that meets the two criteria and is a straight-forward software to use. In this internship we want to expand the knowledge on this platform and introduce a containerized pipeline to stitch Kubernetes-backed server to WorldWind and generalize the process for any incoming type of dataset. As a proof of settings, we will incorporate a wildfire dataset, over CONUS, to WorldWind platform and make it available to public through a USRA owned public domain. The backend system will be designed on Pacific Research Platform (PRP) and then on NASA's supercomputer NAS.

The intern will:

- Develop a WorldWind based web app running on a Kubernetes instance.
- Prepare show case dataset to fit the WorldWind criteria to load and visualize.
- Set up an efficient backend data server to match the needs of WorldWind platform.
- Possible improvements for user-experience in the built visualization.

Preferred Qualifications:

- Web Design skills (html, javascript, css)
- Backend skills (Databases and Cache: SQL) Cloud Computing (Kubernetes)
- Programming Language including but not limited to Python and/or Java.

Deliverables:

- Provide working software code
- Full report on technical work
- Develop a working example available on a USRA host domain
- Final presentation to the technical group

Technical Area: High Performance Computing (HPC)

PROJECT 2: Title: Post-Wildfire Flooding

Duration: 1/3/22 – 3/18/22 (11 weeks)

Term: Winter 2022

Open to US citizens only

Project Description:

The objective of this internship is to develop a fine-tuned precipitation dataset from a new generation of radar data and match its spatial and intensity patterns to nationally operational radars.

California has been experiencing severe wildfires over the past years. One of the disastrous side-effects of wildfires are post-wildfire floodings. The flooding happens even with low amount of rainfall due to loss of vegetation. Californian authorities are exploring new technologies to monitor precipitation in urban scale and high temporal resolution via new radar technology. The new radars are not finely calibrated and have discrepancies compared to nationally operational radar data such as NEXRAD. This project will focus on reducing the differences between the two generations of radars and calibrate new radar to produce more reliable estimations. The outcome will benefit researchers, decision makers and public to understand the new technology and how to transition between the two generations.

The intern will:

- Retrieve new and operational radar data
- Pre-process both datasets.
- Apply a statistical and/or machine learning method to adjust the distributions.
- Measure the task success by calculating statistical metrics and visual comparisons.
- Visualize the data in a user-friendly format.

Preferred Qualifications:

- Strong mathematical and statistical skills
- Programming languages including but not limited to Python, R, MATLAB.
- Data visualization experience is desired.
- Earth science background is a plus.

Deliverables:

- Provide working software code
- Full report on technical work
- Final presentation to the technical group