

# Amninder Singh

Data Scientist and Geospatial ML Engineer with *7+ years of experience* building production-grade machine learning systems for remote sensing, environmental monitoring, and agricultural intelligence. Deep expertise in Python, geospatial AI, computer vision, and cloud-based ML pipelines on GCP and AWS, including large-scale feature engineering, model deployment, and monitoring. Proven record delivering business impact through scalable Earth-observation workflows, segmentation models, and foundation-model-based prototyping across multimodal geospatial datasets.

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## — Skills

- **LANGUAGES & FRAMEWORKS** Python, SQL, PyTorch, TensorFlow, scikit-learn, LightGBM.
- **APPLIED AI** Computer vision, geospatial AI, multimodal feature engineering, segmentation, time-series modeling, transformers, foundation-model prototyping.
- **ML SYSTEMS** End-to-end pipelines, experiment tracking, model evaluation, CI/CD, MLflow, model monitoring, versioning.
- **CLOUD & INFRASTRUCTURE** GCP (Vertex AI, BigQuery), AWS (S3, EC2, SageMaker), Docker, Databricks.
- **GEOSPATIAL STACK** Google Earth Engine, rasterio, xarray, rioxarray, geopandas, shapely, GDAL, SAR/optical imagery, COG, GeoParquet, GeoZarr.

## — Experience

**BAYER CROP  
SCIENCE  
(CLIMATE LLC)**

**NOV 2022 -  
PRESENT**

### Data Scientist — Remote Sensing

Nov 2023 - Present

- Led delivery of high-impact ML analytics pipelines for spatial prediction and segmentation, driving **\$450K annual revenue** for the Carbon business via land-cover analysis and large-scale feature extraction workflows.
- Built and operated scalable, cloud-native geospatial pipelines on GCP and Google Earth Engine to preprocess and engineer spatiotemporal features from time-series imagery across **35,000+ agricultural parcels**, delivering a production-ready ML model for cover crop detection.
- Optimized a cloud-based geospatial imagery pipeline (USDA Cropland Data Layer) using GEE server-side distributed processing, achieving **30-50x throughput improvement**.
- Improved the Field Boundary Delineation model's accuracy by **25%** through advanced computer vision and time-series feature engineering, enhancing segmentation quality for large-scale agricultural monitoring.
- Prototyped geospatial foundation-model workflows using **SAM2 and AlphaEarth** to improve generalization and accelerate feature extraction on unseen regions and tasks.
- Presented technical findings and recommendations to business stakeholders, translating remote sensing and ML outputs into operational decisions.

### Geospatial Data Scientist

Nov 2022 - Nov 2023 · Contract

- Delivered repeatable, scalable geospatial pipelines for remote sensing feature extraction and spatial insights using Python, Google Earth Engine, and Descartes Labs, supporting both R&D and operational applications.
- Conducted robust exploratory data analysis (EDA) on geospatial and remote sensing datasets to uncover spatial/temporal patterns and data quality issues.
- Applied hypothesis testing and statistical validation to support feature selection and drive modeling improvements for complex spatial analytics.
- Evaluated spatial indexing systems (**Geohash, H3, S2**) for large-scale geospatial workflows; recommended and supported implementation aligned with team requirements for efficient data access and aggregation.
- Collaborated cross-functionally to deliver repeatable, scalable insights for operational and business stakeholders.

## UC RIVERSIDE

JAN 2018 - OCT 2022

### Post-Doctoral Scholar

Jan 2022 - Oct 2022 · *USDA Salinity Lab*

- Engineered multi-source geospatial and weather time-series features for machine learning models that estimated soil moisture from remote sensing and in-situ observations.
- Developed predictive modeling workflows with Random Forest and LightGBM and integrated satellite imagery, field measurements, and environmental covariates for calibration and validation.
- Used Google Earth Engine and Planet Labs APIs to access and process satellite imagery for predictive analytics.
- Participated in soil surveys using electromagnetic (EM) induction, L-band radiometer, and soil sampling campaigns, integrating in-situ data with remote sensing inputs for model calibration and validation.

### Graduate Student Researcher

Jan 2018 - Dec 2021

**DISSERTATION** *Advancing Urban Landscape Irrigation Management using Smart Controllers and Machine Learning-based Models.*

- Developed and deployed deep learning models (**ANN, LSTM, CNN**) using soil hydrology and time-series weather data to advance irrigation management for urban landscapes.
- Collected and analyzed soil hydrology measurements (soil water potential, volumetric water content, infiltration, evapotranspiration, weather data) to build robust labeled datasets for ML experiments.
- Collaborated and participated in several field campaigns supporting remote sensing projects.

## CSU, FRESNO

AUG 2015 - DEC 2017

### Graduate Research Assistant

**THESIS** *Use of EM-38 soil surveys in forage fields at a saline drainage water reuse site to calibrate a hydro-salinity model for decision support.*

- Led soil surveys, sampling, and analysis to map soil salinity using geophysical measurements from an electromagnetic (EM) induction instrument.
- Processed and analyzed geospatial data using ArcGIS and R, producing maps and statistical summaries for research and stakeholder reports.

## — Education

### UC RIVERSIDE

Riverside, CA

2018 - 2021

#### Ph.D., Environmental Sciences (*Soil & Water*)

**AWARDS** Best Oral Presentation Award (2021) · SCSC-NWRI Fellowship, Southern California Salinity Coalition (SCSC) and the National Water Research Institute (NWRI), 2018-2020.

### CSU, FRESNO

Fresno, CA

2015 - 2017

#### M.S., Plant Sciences

**AWARDS** Outstanding Thesis Award, Jordan College of Agricultural Sciences & Technology · Gerald O. Mott Meritorious Graduate Student Award in Crop Science, Crop Science Society of America (CSSA), 2017.

### PUNJAB AGRICULTURAL UNIV.

Ludhiana, Punjab, India

2011 - 2015

#### B.S., Agriculture (*Soil Science, Agronomy & Agroforestry*)

## — Achievements & Awards

<b>2023</b>	Attended IEEE GRSS-USC MHI 2023 Remote Sensing Summer School (July 13-15, 2023), IEEE Geoscience and Remote Sensing Society, University of Southern California (USC).	<b>2020</b>	Hilda and George Liebig Environmental Sciences Summer Fellowship, Department of Environmental Sciences, UCR.
<b>2022</b>	Attended the Second IADF School on Computer Vision for Earth Observation, IEEE Geoscience and Remote Sensing Society, Oct 3-7, 2022. (~12% of applicants selected.)	<b>2018-20</b>	SCSC-NWRI Fellowship, Southern California Salinity Coalition (SCSC) & National Water Research Institute (NWRI).
<b>2021</b>	Best Oral Presentation Award – UCR Environmental Sciences Graduate Student Symposium.	<b>2018-19</b>	Stolzy-Letey Travel Scholarship, Department of Environmental Sciences, UCR.
<b>2021</b>	Dissertation Year Program Fellowship, Department of Environmental Sciences, UCR (Fall 2021).	<b>2019, 2021</b>	Mini GSA Award, Hilda and George Liebig Foundation, Department of Environmental Sciences, UCR.
		<b>2018</b>	UCANR Drone Camp, June 18-20, 2018, UC San Diego.

<b>2017-18</b>	Outstanding Thesis Award, Jordan College of Agricultural Sciences & Technology, CSU, Fresno.	<b>2017</b>	Third place in Poster Competition, Plant and Soil Conference – American Society of Agronomy, California chapter.
<b>2018</b>	Graduate Student Achiever, Department of Plant Science, CSU, Fresno.	<b>2015-17</b>	Jordan Assistantship, Jordan College of Agricultural Sciences and Technology, CSU, Fresno (Aug 2015 – May 2017).
<b>2017</b>	Ag One – John P. "Phil" Larson Scholarship, CSU, Fresno (Spring 2017).	<b>2016-17</b>	Graduate Research Fellowship, Graduate Net Initiative, CSU, Fresno.
<b>2017</b>	Inducted to The Honor Society of Phi Kappa Phi (Spring 2017).	<b>2016</b>	Travel grant, Division of Graduate Studies, CSU, Fresno – 2016 ASA, CSSA, and SSSA Annual Meeting, Nov 5–9, 2016, Phoenix, AZ.
<b>2017</b>	Jim Pattersen's Ag Science Student Recognition Award – Agriculture Science Student of the Year, 23rd Assembly District.	<b>2015-16</b>	Dean's Scholarship Tuition Waiver, CSU, Fresno.
<b>2017</b>	The Gerald O. Mott Meritorious Graduate Student Award in Crop Science, Crop Science Society of America (CSSA).	<b>2011-15</b>	Punjab State Marketing Board Scholarship, PAU, Ludhiana.

## — Publications

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