AMNINDER SINGH

Data Scientist

CONTACT

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SKILLS

- Programming: Python (pandas, NumPy, matplotlib, seaborn, PySpark, etc.), Matlab, and R.
- Geospatial: Google Earth Engine, Descartes Labs, ArcGIS, QGIS.
  - Python: xarray, geopandas, shapely, rasterio, pystac_client.
- Machine Learning and Deep Learning: scikit-learn, TensorFlow, Keras, PyTorch.
- Version control: Git, GitLab, GitHub.
- Soil and environmental sensor network data acquisition systems.
- Geophysical soil sensing.
- Deployment: Django, Streamlit.
- Other: SQL, AWS, Google Cloud Platform.

EDUCATION

Ph.D. | Environmental Sciences (Soil & Water)
University of California, Riverside
2018 – 2021

MS | Plant Science
California State University, Fresno
2015– 2017

BSc | Agriculture (Soil science, Agronomy and Agroforestry)
Punjab Agricultural University, Ludhiana | Punjab, India
2011 – 2015

EXPERIENCE

DATA SCIENTIST, REMOTE SENSING Climate LLC | Nov 2023 – Present

- Development and testing of new and existing pipelines to generate field-level features from remote sensing data to support the detection of cover crop/tillage practices and deliver historical crop information.
- Optimized existing pipeline for retrieving historical crop data, resulting in a 15% reduction in processing time.

GEOSPATIAL DATA SCIENTIST (CONTRACT) Climate LLC | Nov 2022 – Nov 2023

- Performed EDA, data cleaning, and leveraged existing pipelines to deliver high-quality remote sensing data to stakeholder teams within set timelines.
- Collaborated with team members in designing, developing, and testing geospatial pipelines for remote sensing data extraction and machine learning model deployment.
- Evaluated and analyzed spatial indexing systems such as Geohash, H3, and S2 to understand their viability for different use cases. Made recommendations and contributed to implementing spatial indexing systems, ensuring alignment with the team's requirements.

POST-DOCTORAL SCHOLAR UC, Riverside & USDA Salinity Lab | Jan 2022 – Oct 2022

- Leveraged Google Earth Engine's Python API and Planet Labs APIs to get satellite data, including synthetic aperture radar (SAR), multispectral optical imagery, land use/crop type (USDA CDL, USDA NLCD), soil properties (SSURGO, POLARIS), weather (GRIDMET), and SRTM Digital Elevation Data (DEM).
- Implemented machine learning models (Random Forest, LightGBM) for soil moisture estimation using Python libraries.
- Use vegetative indices derived from optical imagery to get phenological parameters of a crop and study relationships with soil salinity/texture.
- Collaborated with private companies and data scientists to implement new strategies and fulfill project requirements.
- Participated in soil surveys using electromagnetic (EM) induction, L-band radiometer, and soil sampling campaigns.

GRADUATE STUDENT RESEARCHER UC, Riverside | Jan 2018 – Dec 2021

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

- Sampling and analyzing soil hydrology field measurements, including soil water potential, soil volumetric water content, infiltration, evapotranspiration, and weather data.
- Developed deep learning models including Artificial Neural Networks (ANN), Long Short-Term Memory (LSTM), and Convolutional Neural Networks (CNN) utilizing soil hydrology and time-series weather data.
- Collaborated and participated in several field campaigns supporting remote sensing projects.

GRADUATE RESEARCH ASSISTANT CSU, Fresno | Aug 2015 – Dec 2017

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.
- Analysis of the data using ArcGIS and R.

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RELEVANT COURSES

ENSC 175 – Spatial Analysis and Remote Sensing, CS235 – Data mining methods, STAT208 – Statistical Data mining, ENSC 217 - Vadose Zone Processes, ENSC110 – Environmental Statistics, PLANT 251 – Soil Plant Water relations.

LANGUAGES

- English
- Punjabi
- Hindi

ACHIEVEMENTS AND AWARDS

- Attended IEEE GRSS-USC MHI 2023 Remote Sensing Summer School, from July 13 – 15, 2023, by IEEE Geoscience and Remote Sensing Society, at the University of Southern California (USC).
- Attended Second IADF School on Computer Vision for Earth Observation. IEEE Geoscience and Remote Sensing Society. Oct 3 to Oct 7, 2022. (~12% of the applicants were selected to attend this school).
- Best Oral Presentation Award - 2021 UCR Environmental Sciences Graduate Student Symposium.
- Dissertation Year Program Fellowship, Department of Environmental Sciences, UCR (Fall 2021).
- Hilda and George Liebig Environmental Sciences Summer Fellowship, Department of Environmental Sciences, UCR (2020).
- SCSC-NWRI Fellowship, Southern California Salinity Coalition (SCSC), and the National Water Research Institute (NWRI), 2018-2020.
- Stolzy-Letey Travel Scholarship, Department of Environmental Sciences, UCR (2018-2019).
- Mini GSA Award, Hilda and George Liebig Foundation, Department of Environmental Sciences, UCR (2019, 2021).
- UCANR Drone Camp, June 18-20, 2018, UC San Diego
- Outstanding Thesis Award. Jordan College of Agricultural Sciences & Technology, CSU, Fresno (2017-2018 Academic year).
- Graduate Student Achiever, Department of Plant Science, CSU, Fresno. (2018).
- Ag One-John P. “Phil” Larson Scholarship, CSU, Fresno (Spring 2017).
- Inducted to The Honor Society of Phi Kappa Phi (Spring 2017).
- Jim Pattersen’s Ag Science Student Recognition Award - Agriculture Science Student of the Year, 23rd Assembly District, (2017).
- The Gerald O. Mott Meritorious Graduate Student Award in Crop Science, Crop Science Society of America (CSSA), (2017).
- Third place in Poster Competition, Plant and Soil Conference – American Society of Agronomy, California chapter, (2017).
- Jordan Assistantship, Jordan College of Agricultural Sciences and Technology, CSU, Fresno (August 2015-May 2017).
- Graduate Research Fellowship, Graduate Net Initiative, CSU, Fresno (2016-2017).
- Travel grant, Division of Graduate Studies, CSU, Fresno for the 2016 ASA, CSSA, and SSSA Annual Meeting, November 5-9, 2016, in Phoenix, AZ.
- Dean’s Scholarship Tuition Waiver, CSU, Fresno (2015- 2016).
- Punjab State Marketing Board Scholarship, PAU, Ludhiana (2011 - 2015).

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PRESENTATIONS

- Scudiero, E., **Singh, A.,** Mahajan, G., Chatziparaschis, D., Karydis, K., Houtz, D., & Skaggs, T. H., On-the-Go Microwave Radiometry for High-Resolution Soil Moisture Mapping in Micro-Irrigated Orchards. **2022 ASA, CSSA, SSSA International Annual Meeting** | November 6- 9, 2022| Baltimore, MD
- Scudiero, E., **Singh, A.,** Huang, J., Ellegaard, P., Skaggs, T. H., Soil Moisture Estimation of Agricultural Fields Using Remote Sensing and Machine Learning. **2022 ASA, CSSA, SSSA International Annual Meeting** | November 6- 9, 2022| Baltimore, MD
- Guevara, M., Corwin, D. L., Todd-Brown, K. E., Rounsaville, T., **Singh, A.**, Benes, S. E., Quinn, N., Skaggs, T. H., & Scudiero, E. Geospatial Measurements of Soil Electrical Conductivity and Saturation Percentage to Support Soil Salinity Assessments across California Irrigated Farmland. **2021 ASA, CSSA, SSSA INTERNATIONAL ANNUAL MEETING** | November 7-10, 2021 | Salt Lake City, UT
- **Singh A**., *Haghverdi A., Sapkota A., Haver D*., Recycled Water Application for Turfgrass Irrigation to conserve water and maintain turf health, **ASABE 2021 Annual International Meeting** | July 12–16, 2021 | Virtual (Poster presentation).
- ***Singh A****., Haghverdi A., Sapkota A., Haver D.,* Autonomous Irrigation in Bermudagrass Using Recycled Water and Soil Moisture Sensor Based Smart Controller, **2020 ASA-CSSA-SSSA International Annual Meeting** | November | Virtual (Oral presentation)
- ***Singh A****., Haghverdi A. Öztürk H. S., Durner W.,* Pseudo Continuous Water Retention Pedotransfer Functions for International Soils Measured with the Evaporation Method and the HYPROP System, **2020 ASA-CSSA-SSSA International Annual Meeting** | November | Virtual (Poster)
- ***Singh A****., Haghverdi A., Sapkota A., Haver D.,* Autonomous Bermudagrass irrigation using recycled water and SMS based smart controller, **UC Riverside Urban landscape Irrigation and Water Conservation Virtual Field Day for Master Gardeners** | September 3, 2020.
- ***Singh A****., Sharifi M., Ghodsi S., Haghverdi A.,* Monitoring the impact of multiple water conservation strategies on turfgrass using ground based remote sensing tools. **2019 SSSA Annual Meeting, San Diego, CA** *(Oral presentation).*
- *Benes S.E.,* ***Singh A****., Quinn N.W. and Cassel Sharma F.* (2018). Monitoring Soil Salinity using EM-38 Surveys to Calibrate a Hydro-salinity Model for Decision Support. 2018, The Future of Water for Irrigation in California and Israel Workshop. Davis, California, July 16-18, 2018. *(Poster)*
- ***Singh, A****., Benes, S.E., Quinn, N., Cassel, F.* 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. **Plant and Soil Conference by American Society of Agronomy – California Chapter** (2018) *(Poster).*
- ***Singh, A****., Benes, S.E., Quinn, N., Cassel, F.* Monitoring Soil Salinity in Alfalfa and 'Jose' tall wheatgrass fields using EM-38 soil Surveys and Developing Input Data for a Transient Hydro-salinity Computer Model. **38th Annual Central California Research Symposium**, University Business Center, CSU, Fresno, April 18, 2017 *(Oral presentation).*
- ***Singh, A****., Benes, S.E., Quinn, N., Cassel, F.* Use of EM-38 soil salinity surveys to develop validation data sets for a transient hydro-salinity model CSUID-II. **CWEMF annual meeting**, Folsom, CA, March 20-22, 2017 *(Poster).*
- ***Singh, A****., Benes, S.E., Quinn, N., Cassel, F.* Development of validation data sets for a transient hydro-salinity model using EM-38 soil surveys, irrigation water monitoring and forage analysis. **Plant and Soil Conference by American Society of Agronomy – California Chapter**, Jan. 31- Feb. 1, 2017 *(Poster).*
- ***Singh, A****., Benes, S.E., Quinn, N., Cassel, F., Bottino, U. Jr.,* Soil Salinity Mapping Using Electromagnetic Induction (EM-38) to Provide Input Data for the CSUID-II Model, a Decision Support Tool for Irrigation in Saline Water Reuse Areas. **2016 ASA, CSSA, and SSSA Annual Meeting**, Phoenix, AZ, November 6-9, 2016 *(Poster).*

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PUBLICATIONS

- **Singh, A.,** Verdi, A., 2024. Estimating the soil water retention curve by the HYPROP-WP4C system, HYPROP-based PCNN-PTF and inverse modeling using HYDRUS-1D. Journal of Hydrology 639, 131657. https://doi.org/10.1016/j.jhydrol.2024.131657
- **Singh, A.,** Verdi, A., Haver, D., Sapkota, A., Iradukunda, J. C., 2024. Using a soil moisture sensor-based smart controller for autonomous irrigation management of hybrid bermudagrass with recycled water in coastal Southern California. Agricultural Water Management 299, 108906. https://doi.org/10.1016/j.agwat.2024.108906
- Verdi, A., **Singh, A.,** Sapkota, A., Ghodsi, S., 2024. Assessing the Impact of Water Conservation on Cooling Potential of Two Turfgrass Species. Journal of the ASABE. 67(3): 749-759. https://doi.org/10.13031/ja.15845
- **Singh, A.,** Haghverdi, A., 2023. Development and evaluation of temperature-based deep learning models to estimate reference evapotranspiration. Artificial Intelligence in Agriculture. https://doi.org/10.1016/j.aiia.2023.08.003
- Sapkota, A., Haghverdi, A., Merhaut, D., **Singh, A.**, & Iradukunda, J. C., 2023. Response of Landscape Groundcovers to Deficit Irrigation: An Assessment Based on Normalized Difference Vegetation Index and Visual Quality Rating. HortScience, 58(3), 274-285. Available at https://doi.org/10.21273/HORTSCI16915-22.
- Haghverdi, A., Reiter,M., **Singh**, **A.**, and Sapkota, A. 2021. Hybrid Bermudagrass and Tall Fescue Turfgrass Irrigation in Central California: II. Assessment of NDVI, CWSI, and Canopy Temperature Dynamics. Agronomy 11(9): 1733 Available at https://www.mdpi.com/2073-4395/11/9/1733.
- Haghverdi, A., Reiter, M., Sapkota, A., and **Singh, A.** 2021. Hybrid Bermudagrass and Tall Fescue Turfgrass Irrigation in Central California: I. Assessment of Visual Quality, Soil Moisture and Performance of an ET-Based Smart Controller. Agronomy 11(8): 1666. Available at https://doi.org/10.3390/agronomy11081666.
- **Singh, A**., Haghverdi, A., Öztürk, H.S., and Durner, W. 2021. Developing Pseudo Continuous Pedotransfer Functions for International Soils Measured with the Evaporation Method and the HYPROP System: II. The Soil Hydraulic Conductivity Curve. Water 13(6): 878 Available at https://www.mdpi.com/2073-4441/13/6/878.
- Haghverdi, A., **Singh, A.**, Sapkota, A., Reiter, M., and Ghodsi, S. 2021. Developing irrigation water conservation strategies for hybrid bermudagrass using an evapotranspiration-based smart irrigation controller in inland southern California. Agric. Water Manag. 245(April 2020): 106586 Available at https://doi.org/10.1016/j.agwat.2020.106586.
- **Singh, A**., Haghverdi, A., Öztürk, H.S., and Durner, W. 2020. Developing pseudo-continuous pedotransfer functions for international soils measured with the evaporation method and the hyprop system: I. the soil water retention curve. Water (Switzerland) 12(12): 1–17 Available at https://www.mdpi.com/2073-4441/12/12/3425.
- **Singh, A**., Quinn, N.W.T., Benes, S.E., and Cassel, F. 2020. Policy-Driven Sustainable Saline Drainage Disposal and Forage Production in the Western San Joaquin Valley of California. Sustain. 2020, Vol. 12, Page 6362 12(16): 6362 Available at https://www.mdpi.com/2071-1050/12/16/6362/htm
- **Singh, A**., Haghverdi, A., Nemati, M., and Hartin, J. 2020. Efficient Urban Water Management Smart Weather-Based Irrigation Controllers. Univ. Calif. Agric. Nat. Resour. 8674(July): 1–11