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Research Experience

Graduate Research Assistant, Jan 2023 – Present

Department of Geography and Geospatial Sciences, South Dakota State University, Brookings, South Dakota, USA

- Lead research on precision- agriculture analytics integrating UAS multispectral, and hyperspectral data with machine- learning and crop- simulation models (DSSAT) for within- season maize- yield forecasting.
- Develop deep- learning pipelines (CNNs, multitask learning) for wheat Fusarium Head Blight detection and canopy- nutrient retrieval from drone imagery.
- Assimilate UAS- derived biophysical parameters into DSSAT using reinforcement- learning- based data- assimilation strategies (PPO, SAC, TD3) to improve sub- field yield estimation accuracy.

Remote Sensing & GIS Specialist, Ten Billion Tree Tsunami Project (TBTTP), Feb 2021 – Dec 2023

Forest Department, Azad Jammu & Kashmir, Pakistan

- Planned and executed large- scale satellite based data to monitor afforestation progress, producing high- resolution canopy- cover and biomass maps for restoration planning.
- Designed geospatial databases and automated analysis scripts (Google Earth Engine, Python) for change detection and periodic reporting to project stakeholders.

Remote Sensing & GIS Specialist & Research Contributor, USAID Chitral– Kabul River Basin Project, Jan 2018 – Dec 2020

Institute of Geo- Information Engineering (project partner), Pakistan/Afghanistan

- Quantification of groundwater storage variation and stressed area using multi- temporal GRACE data of Kabul River Basin

Teaching Assistant, Dept. of Geo- Information & Earth Observation, PMAS- Arid Agriculture University, Sep 2018 – Dec 2020

Rawalpindi, Pakistan

- Led lab sessions for “Advanced Remote Sensing & Digital Image Processing” and “GIS & Spatial Analysis,” mentoring undergraduate students per semester.
- Assisted in exam design, grading, and curriculum updates.

Publications

- Fareed, N., Das, A. K., Flores, J. P., Mathew, J. J., Mukaila, T., Numata, I., & Janjua, U. U. R., 2024. "UAS quality control and crop three-dimensional characterization framework using multi-temporal LiDAR data." *Remote Sensing*, 16(4): 699. <https://doi.org/10.3390/rs16040699>
- Maimaitijiang, M., Millett, B., Janjua, U. U. R., Dorissant, L., Acharya, I., & Kovács, P., 2024. "Simultaneously estimating crop biomass and nutrient parameters using UAS remote sensing and multitask learning." In *Proceedings of the 16th International Conference on Precision Agriculture (ICPA)*, online.
- Janjua, U. U. R., Maimaitijiang, M., Millett, B., Yabwalo, D., Dilmurat, K., Billah, M. M., Khan, S. N., & Ali, S., 2024. "Wheat Fusarium Head Blight disease severity estimation using UAS multispectral imagery and machine learning." In *2024 International Conference on Frontiers of Information Technology (FIT)*, IEEE, 1-6.
- Janjua, U. U. R., Maimaitijiang, M., Millett, B., Dilmurat, K., Billah, M. M., & Kovács, P., 2024. "Assimilation of UAS remote sensing and deep learning-based crop parameters into DSSAT model for grain yield prediction." *AGU Fall Meeting Abstracts* GC51K-01.
- Irshad, M. A., Maimaitijiang, M., Millett, B., Billah, M. M., Janjua, U. U. R., Kovács, P., & Sehgal, S. K., 2024. "Satellite and UAS synergy for large-scale crop canopy cover mapping with deep learning." *AGU Fall Meeting Abstracts* IN31A-04.
- Billah, M. M., Maimaitijiang, M., Millett, B., Janjua, U. U. R., Kaushal, S., Kovács, P., & Sehgal, S. K., 2024. "A domain-adaptation approach for cross-crop leaf area index estimation using UAS multispectral imagery." *AGU Fall Meeting Abstracts* IN01-21.
- Tariq, A., Ali, S., Basit, I., Jamil, A., Farmonov, N., Khorrami, B., ... & Janjua, U. U. R., 2023. 'Terrestrial and groundwater storage characteristics and their quantification in the Chitral (Pakistan) and Kabul (Afghanistan) river basins using GRACE/GRACE-FO satellite data'. *Groundwater for Sustainable Development*, 23: 101026. <https://doi.org/10.1016/j.gsd.2023.101026>
- Janjua, U. U. R., Maimaitijiang, M., Millett, B., Billah, M. M., Shires, M., Yabwalo, D., Sehgal, S. K., & Ali, S., 2023. "Wheat Fusarium Head Blight (FHB) disease severity estimation using UAV multispectral imagery and machine learning." *Authorea Preprints*.
- Amin, M., Baig, M. H. A., Sagin, J., Abid, M., Khan, M. R., & Janjua, U. U. R., 2019. "Quantification of groundwater storage variation and stressed area using multi-temporal GRACE data of Kabul River Basin." *AGU Fall Meeting Abstracts* H43N-2252.

Awards

- Travel Award — AI in Agriculture & Natural Resources Conference (AG2PI), College Station, TX, 2024.
 - Travel Award — USDA S1069 Multistate Program Conference, Bozeman, MT, 2024.
 - Travel Award — AGU Annual Meeting, Washington, DC, 2024.
 - Travel Award — 16th International Conference on Precision Agriculture, Manhattan, KS, 2024.
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Conference & Symposium Presentations

- “From Image to Insight: AI-Driven Wheat Monitoring and Yield Prediction with Multi-Scale Sensing [Abstract]. CANVAS 2025, Salt Lake City, UT.
- “Assimilation of UAS Remote Sensing and Deep Learning-Derived Crop Parameters into DSSAT Model for Grain Yield Prediction” — *56th Annual SDSU Geography Convention*, Brookings, SD, Apr 2025.
- “Wheat Spike and Spikelet Detection on Close-Range Digital Imagery Using Deep Learning” — Precision Ag/Biological Sciences Application Track, *56th Annual SDSU Geography Convention*, Brookings, SD, Apr 2025.
- “Assimilation of UAS Remote Sensing and Deep Learning-Based Crop Parameters into DSSAT Model for Grain Yield Prediction” — *AGU Fall Meeting (Poster)*, Washington, DC, Dec 2024.
- “Satellite and UAS Synergy for Large-Scale Crop Canopy Cover Mapping with Deep Learning” — *AGU Fall Meeting*, Washington, DC, Dec 2024.
- “Domain Adaptation Approach for Cross-Crop Leaf Area Index Estimation Using UAS Multispectral Imagery” — *AGU Fall Meeting*, Washington, DC, Dec 2024.
- “Assimilation of UAS Remote Sensing and Deep Learning-Derived Crop Parameters into DSSAT Model for Grain Yield Prediction” — *USDA S1069 Multistate Program Conference*, Bozeman, MT, Jun 2024.
- “UAS and Satellite Synergy for Large-Scale Crop Canopy Cover Mapping Using Deep Learning” — *USDA S1069 Multistate Program Conference*, Bozeman, MT, Jun 2024.
- “Crop Yield Estimation Using Crop Growth Models, Machine Learning, and Remote-Sensing Data Assimilation” — *AAG Annual Conference*, Honolulu, HI, Apr 2024.
- “Large-Scale Crop Canopy Cover Estimation Using Satellite-UAS Synergy and Machine Learning” — *AAG Annual Conference*, Honolulu, HI, Apr 2024.
- “Assimilation of UAS Remote Sensing and Machine Learning-Based Biomass with a Crop Simulation Model for Maize Yield Prediction” — *AI in Agriculture & Natural Resources Conference*, College Station, TX, Apr 2024.
- “Assimilation of UAS Remote Sensing and ML-Based Biomass within a Crop Simulation Model for Maize Yield Prediction” — *55th Annual SDSU Geography Convention*, Brookings, SD, Apr 2024.

- “Wheat Fusarium Head Blight Disease Severity Estimation Using UAV Multispectral Imagery and Machine Learning” — NAPPN Annual Conference (Poster), West Lafayette, IN, Feb 2024.
- “Wheat Fusarium Head Blight Disease Detection Using UAV Multispectral Imagery and Machine Learning” — *USGS EROS Poster Session, Sioux Falls, SD*, Nov 2023.
- “Wheat Fusarium Head Blight Disease Detection Using UAV Multispectral Imagery and Machine Learning” — *AAG Great Plains/Rocky Mountains Conference, Rapid City, SD*, Oct 2023.

Education

Ph.D. Geospatial Science and Engineering (Remote Sensing specialization) 2023 – Present

South Dakota State University, Brookings, SD, USA

Research focus: Artificial intelligence, UAS remote sensing, crop modeling, precision agriculture.

Relevant coursework: Machine Learning for Remote Sensing/GIS; Agricultural Remote Sensing; Quantitative Remote Sensing; Terrestrial Monitoring; UAS Remote Sensing; Advanced Research Methods; Statistical Methods; Evolution of Geographic Thought; Geoinformatics for Agriculture.

M.S. Remote Sensing & GIS 2017-2019

PMAS- Arid Agriculture University, Rawalpindi, Pakistan

Selected coursework: Advanced Remote Sensing & Digital Image Processing; Advanced GIS & Spatial Analysis; Hydrological Geospatial Analysis; Natural Hazards & Disaster Management; Applied RS & GIS; Geospatial Data Modeling; Geoinformatics for Agriculture.

B.S. Applied Geology 2012-2016

University of Azad Jammu & Kashmir, Muzaffarabad, Pakistan

Peer Reviewer

Remote Sensing Applications: Society and Environment (Elsevier)

- **Impact Factor (2024):** 4.5
- **CiteScore (2024):** 7.9
- **Publisher:** Elsevier
- **SCImago Quartile:** Q1 in *Earth and Planetary Sciences (miscellaneous)*; Q1 in *Environmental Science*

Earth Systems and Environment (Springer)

- **Impact Factor (2024):** 4.7

- **Five-Year Impact Factor (2024):** 6.4
 - **Publisher:** Springer Nature
 - **SCImago Quartile:** Q1 in *Geosciences, Multidisciplinary*
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Technical Skills

Remote Sensing & GIS: Drone- and satellite-based Earth observation; UAS multispectral/hyperspectral/LiDAR data acquisition and processing; photogrammetry; crop modeling; geospatial database design.

Software: Pix4D, Agisoft Metashape Professional, ArcGIS Pro, Google Earth Engine, ENVI.

Programming & AI: Python; machine learning; deep learning; reinforcement learning.

Certificates & Training

- FAA Part 107 Remote Pilot Certificate, 2024.
 - Remote Sensing & Digital Image Processing for Precision Agriculture (Short Course), 2019.
 - International GNSS Workshop, 2019.
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Professional Affiliations

- Member, American Geophysical Union (AGU), 2024 – Present
 - Member, International Conference on Precision Agriculture (ICPA), 2024 – Present
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Languages

English (fluent)

Professional Summary

Remote-sensing and GIS specialist (Ph.D. student) with 3+ years of applied-research experience fusing satellite- and drone-borne multispectral/hyperspectral/LiDAR data with geospatial AI (ML & RL) to advance precision-agriculture analytics.

References

Maitiniyazi Maimaitijiang, Ph.D.

Assistant Professor, Geography & Geospatial Sciences

South Dakota State University

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