Dr. Albert Larson
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Professional Summary

PhD-level Civil and Environmental Engineer with an MBA. Enjoys leveraging cutting-edge data science, GIS, and machine learning techniques to advance research in municipal processes. Proven success in neural network modeling, satellite data analysis, geospatial tools (OpenLayers, ArcGIS), web dashboard development, marketing and sales territory management. Experienced with both computer and social networking. Adept at managing technical projects, teaching, and translating complex findings into actionable insights for diverse stakeholders.

Core Skills and Keywords

Data Analysis & Modeling: Neural networks, deep learning, time-series analysis, statistical modeling
Geospatial & Remote Sensing: OpenLayers, GIS, QGIS, ArcGIS, Google Earth Engine
Programming & Software: Python, MATLAB, Rust, JavaScript, Vite, HTML/CSS, FastAPI, NGINX, Git, Pytorch, Tensorflow, Keras, matplotlib, numpy, geopandas, polars, glob, rsync, SLURM
Project Management: Six-sigma, scientific management, systems engineering, Slack, Teams, Discord
Design tools: Onshape, Illustrator, Solidworks, Abaqus, Crystal Ball
General tech interests: water resources, environmental engineering, watershed modeling, hydrologic extremes, ocean engineering, noise, vibration, harshness, sound design, digital twin systems
Communication & Leadership: Teaching, coaching, peer-reviewed publishing, public speaking, team collaboration

Education

PhD, Civil & Environmental Engineering (2019–2023)
University of Rhode Island (URI), Kingston, RI
- Dissertation: Flux to Flow: A Clearer View of Earth's Water Cycle via Neural Networks and Satellite Data
- Key Coursework: Geospatial Watershed Modeling, Water in the Environment, Neural Networks & Deep Learning, Remote Sensing

MBA, Business Administration (2019–2020)
University of Rhode Island, Kingston, RI
- Key Coursework: Managerial Marketing, Organizational Behavior, Supply Chain Management

BS, Mechanical Engineering (2005–2009)
University of Rhode Island, Kingston, RI

Academic and Research Experience

Research Associate (2024–Present)
Brown University, Providence, RI
- Design, build, and deploy web dashboards.

Adjunct Faculty (2023–Present)
Community College of Rhode Island (CCRI), Warwick, RI
- Teach ENGR 1020: Introduction to Engineering and Technology and OCEN 1010/1030: Introduction to Oceanography.

Graduate Research Assistant & Teaching Assistant (2019–2023)
University of Rhode Island (URI), Kingston, RI
- Conducted data-driven research in hydrology.
- Deployed neural network techniques for satellite data fusion (SST, soil moisture).
- Assisted in teaching CVE 370: Hydraulics, CVE 374: Environmental Engineering.

Industry Experience

Wescor Associates, Wrentham, MA
Territory Manager (2016–2018)
- Managed a multi-state territory, built new client relationships, and increased annual sales revenue through strategic product demonstrations and proposals.
- Streamlined communication between engineering teams and customers, ensuring technical product support and timely delivery.
- Promoted ~42 product lines including the Ishigaki Screw Press, BEAST septage receiving station, WEMCO grit equipment, Vogelsang grinders, ConstantChlor chlorine briquettes, Flomotion chemical feed equipment, and Atlas Copco low-pressure aeration blowers.

Golden Rule Designs, West Kingston, RI
Assistant Project Manager (2015)
- Built high-end wooden doors and appurtenances for projects like bannisters for the Central Park Bow Bridge Boat Landing and doors for the downtown Westerly Savoy revitalization.

Zoll Medical, Chelmsford, MA
Sales Engineer (2014)
- Demonstrated technical product functionalities to hospital administrators and clinical staff, facilitating data-driven purchasing decisions.
- Increased territory sales by leveraging strong relationships with existing accounts.

Publications

1. **Larson, A.**, 2022. A clearer view of Earth's water cycle via neural networks and satellite data. *Nature Reviews Earth & Environment*. https://doi.org/10.1038/s43017-022-00303-x

2. Murray, C., **Larson, A**., Goodwill, J., Wang, Y., Cardace, D., & Akanda, A. S., 2022. Water Quality Observations from Space: A Review of Critical Issues and Challenges. *MDPI Environments*, *9*(10), 125. https://doi.org/10.3390/environments9100125

3. **Larson, A.**, Hendawi, A., Boving, T., Pradhanang, S., & Akanda, A., 2023. Discerning Watershed Response to Hydroclimatic Extremes with a Deep Convolutional Residual Regressive Neural Network. *MDPI Hydrology*, *10*, 116. https://doi.org/10.3390/hydrology10060116

4. **Larson, A.** and Akanda, A., 2023. Transforming Observations of Ocean Temperature with a Deep Convolutional Residual Regressive Neural Network. *arXiv preprint arXiv:2306.09987*, https://doi.org/10.48550/arXiv.2306.09987

5. Altayyar, M, Ali, S., **Larson, A.**, Boving, T., Thiem, L., Akanda, A., 2024. Quantifying groundwater depletion in Arabian Peninsula transboundary aquifer systems: Understanding natural and anthropogenic drivers. *Groundwater for Sustainable Development*, 26, 101293. https://doi.org/10.1016/j.gsd.2024.101293

6. **Larson, A.**, Dove, L., Parent, J., Pradhanang, S., Boving, T., Akanda, A., 2024. Holistic Water Cycle Analysis of Two Transboundary River Watersheds: Leveraging the Confluence of Land Data Assimilation Outputs, Satellite Observations of Ocean Temperature, Ground Truth Flow Measurements, and Machine Learning Signal Processing Technologies. *Submitted.*

Technical Projects

(2024) Built several prototype web dashboards using a full-stack of open source front-end and back-end software such as NGINX, FastAPI, Martin, Vite, and OpenLayers. Considered a variety of weather and climate data. Investigated availability of high quality high resolution meteorological data in New England and along the Western Atlantic coastline. Pair programmed with artificial intelligence to write/use applications in several languages (JavaScript, Python, Rust, R, MATLAB, .html, .sh, and .css). Updated 3CRS.org website via wix.com. Evaluated the technical environment and wrote a strategic plan for the improvement / development of the NSF 3CRS and Georgia CEAR Hub dashboards.

(2021 – 2024) Designed, built and maintained the AkandaLab website.

(2022 – 2023) Worked with deep convolutional neural networks using the GLDAS & NLDAS surface and subsurface flow parameters as predictors of large basin streamflow for various size river basins in the USA. I acquired image and vector data, performed upsampling, downsampling, geographical constraining and filtering the data, and exporting the data post treatment to a variety of formats for analysis (.gif, .nc, .npy, .pt)

(2022) Investigated soil moisture data assimilation products based on the Soil Moisture Active Passive (SMAP) satellite mission, improving its spatial resolution, and its potential for use as an input to watershed calibration via a regression neural network.

(2021 – 2022) Employed neural network techniques of varying complexities (multilayer perceptrons, residual networks, adversarial networks, autoencoders) for fusing simulated and satellite-derived global sea surface temperature (SST) fields.

(2020 – 2022) Created and maintained an open jupyter notebook to serve as a small educational tool for graduate students to remote sensing with python. I created animations and visuals for various funding proposals.

(2021) Performed literature review of climate extremes, hydrology and associated waterborne disease (cholera) risk for use in a feasibility experiment about leveraging meteorological, climatological, and demographic data to predict cholera risk.

(2020) Combined high speed digital image correlation & *in situ* blast sensors to obtain profiles of explosions to model the solid mechanics phenomena that occur with underwater blasts, simulating naval warfare events.

(2020) Used the Soil Water and Assessment Tool (SWAT), Remote Sensing and GIS software to model and calibrate watersheds in RI in order to validate modeling/calibration with and without ground truth streamflow.

(2020) Created visualizations using Massachusetts DOT traffic count data and satellite air quality data (Sentinel 5P observations of NO_2) to visualize change in traffic and emission due to the coronavirus pandemic.

(2020) Utilized Google Earth Engine and Landsat satellite imagery to extract information about the extent and year over year impact of wildfire in the Lost River region of New Hampshire in 2017–2018.

(2016 – 2018) Updated and maintained Wescor's website using GoDaddy.