Albert Larson
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Education & Professional Experience

2024 – Present Research Associate, Brown University, Providence, RI
2023 – Present Adjunct Faculty, Community College of Rhode Island, Warwick, RI
2019 – 2023 PhD, Civil and Environmental Engineering, University of Rhode Island (URI)

Dissertation Title

Flux to Flow: A Clearer View of Earth's Water Cycle via Neural Networks and Satellite Dat

Program of Study

Water in the Environment, Waterborne Diseases, Programming for Scientists, Neural Networks and Deep Learning, Geospatial Watershed Modeling, GIS Analysis of Environmental Data, Remote Sensing and Natural Resource Mapping

Awards

2023, 36th Rhode Island Transportation Forum, best dissertation

2019 – 2020 MBA, Department of Business Administration, URI

Program of Study

Statistical Methods for Management, Organizational Behavior, Legal Environment of Business, Organizational Decision Making and Design, Consulting and Management Practice, Principles of Economics, Operations and Supply Chain Management, Management Data Analysis and Communication, Global Supply Chain Management, Global Warehousing and Distribution Systems, Strategic Management

2016 – 2018 Territory Manager, Wescor Associates, Wrentham, MA
2015 Assistant Project Manager, Golden Rule Designs, West Kingston, RI
2014 Sales Engineer, Zoll Medical, Chelmsford, MA
2012 – 2013 Sales Engineer, Dewesoft, Whitehouse, OH
2011 – 2012 Sales Engineer, Dewetron, Wakefield, RI
2010 – 2011 Application Engineer, Yushin, Cranston, RI
2019 – 2010 Technical Support Engineer, Grass Technologies, West Warwick, RI
2005 – 2009 BS, Mechanical Engineering, URI

Teaching Experience

CCRI, ENGR 1020, Introduction to Engineering and Technology	Fall 2024
CCRI, OCEN 1010/1030, Introduction to Oceanography	Fall 2023
URI, CVE 370, teaching assistant, hydraulics	Spring 2023
URI, Metcalf Institute, flood monitoring science coach	Summer 2022
URI, Google exploreCSR, workshop coach	Spring 2021
URI, CVE 475, guest lectured topic of water scarcity	Fall 2021
URI, CVE 374, teaching assistant, environmental engineering	Fall 2020

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

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

(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.

(2023) Performed (on behalf of the University of California Irvine's Water Equity Lab) a literature review around the phrase "unincorporated communities". Executed GIS analyses of existing unincorporated communities (sometimes referred to as colonias) that exist in the United States and the relationship of this status to water quality.

(2023) Performed a literature review around the phrase "environmental flows" to support the International Water Management Institute and their efforts surrounding the Brisbane Declaration. Became familiar with the natural language toolkit (NLTK) and the text detection framework ASReview. Github repo available here.

(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.