

Manish S. Devana, PhD

devanamarsci@gmail.com | (413) 281-1989 | [msdevana.github.io](https://github.com/msdevana)

Professional Experience

[1] **Aquatic Labs** 2023-Present

Technical Lead: Sensor Development & Business Development Team Member

- Leading technical development team for novel solid state electrochemical sensor systems designed to be massively deployable and exponentially lower costs.
- Leading multidisciplinary team of engineers and scientists to bring novel sensing technology to market. Tasks include developing product development plan, building and carrying out R&D plans, and executing on key commercial pilots.
- **Key contributor to embedded systems development** including designing and executing ESP32 and STM32 based systems with various communication protocols (I2C, CAN, RS232, MODBUS). Responsibilities including designing onboard computational algorithms for novel sensing in C and C++, integrating 3rd party sensors, and building MQTT based communication protocols.
- Maintain backend web infrastructure for real time data monitoring and storage of coastal oceanographic measurements using flask and react web frameworks and multiple database types (PostgreSQL, TimescaleDB, MongoDB)
- Strong skills in AWS ecosystem with typical tasks including maintaining AWS virtual machines, using AWS Amplify for deployment of web apps, and data storage and integrity work via S3.
- Sourced and executed on monitoring deals marine CDR removal suppliers using new model of ocean sensing as a service. Serve as main interface between clients and internal engineering.
- Actively involved in supporting the CEO during Seed and Series A fundraising process. Tasks involve providing supporting information for investors, market analysis and unit economics studies, and scientific support for investor due diligence.

[2] **Marine Chemistry, Instrumentation, and Engineering Lab** 2023

Postdoctoral Investigator, Woods Hole Oceanographic Institution

- Aided in development of a longterm aquatic eddy covariance system capable of measuring high frequency benthic carbon, oxygen fluxes, and temperature fluxes.
- **Developing systems for control of multiple oceanographic sensors in synchronisation** for real time high frequency measurements in marine settings using arduino based controllers (C++ and Python)
- Maintain backend web infrastructure for real time data monitoring and storage of coastal oceanographic measurements using django web frameworks and multiple database types (Sqlite, PostgreSQL)
- Led field deployments and testing of instrumentation and troubleshooting of sensors and internal circuits.
- Developed algorithms for automated calibration, quality control, anomaly detection, and exploration of Machine Learning driven tools for extended insights.

[3] **Innovation Advisors, Sustainability Consulting** 2023-Present

Contractor (part-time), Research Triangle Institute

- Conducted market research and techno-economic analysis on alternative maritime fuels for shipping decarbonization.
- Assessed technology readiness of various maritime fuel alternatives using Dept. of Energy and NASA technology readiness frameworks
- Maintain backend web infrastructure for real time data monitoring and storage of coastal oceanographic measurements using django web frameworks and multiple database types (Sqlite, PostgreSQL)
- Investigated adsorbent technology for use in novel direct air capture methods and assess commercial viability of different adsorbents
- Led business development research efforts for innovation in the airport industry

[4] **Overturning in the Subpolar North Atlantic Program** 2018-2023

Graduate Research Assistant, University of Miami

- Investigated mid-depth and deep ocean flows across a range of physical and temporal scales in an effort to

understand various components of the flow variability and impacts on larger Atlantic Meridional Overturning Circulation

- Geospatial data analysis with numerous types of datasets including: high resolution time series, unstructured spatial shipboard and ARGO observations, remote sensing observations (ocean altimetry and sea surface temperature), high resolution numerical model “big data”, ocean and atmosphere reanalysis products.
- Implemented numerical simulations to supplement observational campaigns (fluid dynamics simulations and statistical models)
- Assisted in constructing, deploying, and recovering mooring arrays with various instruments during multiple sea campaigns. Tasks involved manual construction of instrument components, calibrating instruments, data quality control and calibration post recovery
- Collaborative work involving partners at institutions in numerous countries

Technical Skills

[1] Embedded Systems & Firmware Development (Expert)

- **C/C++:** Developed production-quality embedded software for microcontrollers (ESP32, STM32, Arduino) used in real-time sensor control and data acquisition systems
- **Real-time Systems:** Experience with timing-sensitive operations, deterministic system behavior, and high-frequency data processing
- **Low-level I/O:** Direct hardware interface programming, sensor integration, and peripheral management
- **Memory Management:** Optimized code for constrained environments, reduced memory and power consumption on embedded platforms
- **Modular Design:** Created portable libraries and frameworks allowing easy sensor interchangeability and system scalability

[2] Industrial Communication Protocols (Strong)

- **MODBUS:** Implementation and support for industrial communication protocols to interface with PLCs and control systems
- **I2C, UART, CAN, RS232, SPI:** Built and tested circuits using multiple communication protocols in combination, currently deployed in industrial marine settings
- **MQTT:** Developed MQTT-based communication protocols for real-time data transmission and remote monitoring
- **Ethernet/IP:** Experience with industrial Ethernet protocols for factory automation integration

[3] Python (Strong)

- **Development & Scripting:** Python for embedded development tasks, test automation, and system validation
- **Data Processing:** Real-time data analysis, sensor calibration algorithms, and quality control systems
- **Backend Infrastructure:** Django and Flask web frameworks for real-time data monitoring and storage
- **Database Integration:** PostgreSQL, TimescaleDB, MongoDB for industrial data management
- **Machine Learning:** TensorFlow, PyTorch, and Keras for anomaly detection and predictive analytics

[4] System Integration & Testing (Strong)

- **Cross-platform Development:** Linux (CentOS, Debian, Ubuntu) for embedded system development and deployment
- **System-level Testing:** Validation in both simulated and real-world industrial environments
- **Field Support:** Diagnostics, debugging, and troubleshooting of deployed systems
- **Documentation:** Technical documentation for embedded designs, protocols, and system interfaces

[5] Cloud & Web Technologies (Proficient)

- **AWS Ecosystem:** Virtual machines, Amplify deployment, S3 data storage and integrity
- **Frontend Development:** React web frameworks for real-time data visualization
- **Javascript, HTML & CSS:** Responsive web design and interactive data dashboards

Fieldwork & Deployment Experience

[1] OSNAP Mooring Recovery and Hydrographic Survey Cruise *2022 August*

[2] RAPID-MOCHA Mooring Recovery and Hydrographic Survey Cruise *2021 September*

- Assisted with mooring build, deployments, and recovery, CTD operations, salinity/temperature/velocity instrument calibrations, and realtime data analysis during 24 day cruise on the R/V Endeavor

- [3] OSNAP Mooring Recovery and Hydrographic Survey Cruise *2019 September*
 - Assisted with mooring build, deployments, and recovery, CTD operations, salinity/temperature/velocity instrument calibrations, and realtime data analysis during 34 day cruise on the R/V Armstrong
- [4] RAPID-MOCHA Mooring Recovery and Hydrographic Survey Cruise *2018 November*
 - Assisted with mooring deployments and recovery during 22 day cruise on the R/V Atlantic Explorer

Publications

- [1] M. Devana, W.E. Johns (2023-*in prep*): Structure and Variability of Iceland Scotland Overflow Water Transport in the Western Iceland Basin, *Journal of Geophysical Research: Oceans*
- [2] M. Devana, W.E. Johns (2021): Rapid Freshening of Iceland Scotland Overflow Water Driven By Entrainment of a Major Upper Ocean Salinity Anomaly, *Geophysical Research Letters*
- [3] W.E. Johns, M. Devana, A. Houk, S. Zou (2021): Moored Observations of the Iceland-Scotland Overflow Plume Along the Eastern Flank of the Reykjanes Ridge, *Journal of Geophysical Research: Oceans*

Seminars and Conference Presentations

- [1] Ocean Sciences Fall Meeting 2024: **Enhancing Marine Carbon Dioxide Removal Assessments with Real Time Long-Term Eddy Covariance Measurements of Coastal Biogeochemical Fluxes** 2024
- [2] American Meteorological Society Atmospheric and Oceanic Fluid Dynamics 2022: **Boundary Layer Dynamics in Bottom Intensified Flow along the Reykjanes Ridge** 2022
- [3] U.S. Atlantic Meridional Overturning Circulation Science Team Meeting: **Rapid Freshening of the Iceland Scotland Overflow Driven By Entrainment** 2022
- [4] Ocean Sciences Fall Meeting 2022: **Variability of the Iceland Scotland Overflow** 2022
- [5] Ocean Sciences Fall Meeting 2020: **Rapid Freshening of the Iceland Scotland Overflow Driven By Entrainment 2019**
- [6] American Geophysical Union Fall Meeting 2019: **Rapid Freshening of the Iceland Scotland Overflow Driven by Entrainment** 2019
- [7] Geophysical Fluid Dynamics Summer School Student Seminar 2019

Education

- [1] Rosenstiel School of Marine and Atmospheric Science, University of Miami: *Meteorology and Physical Oceanography - PhD* 2018-2023
- [2] 2015-2018 University of Southampton, UK, *Physical Oceanography First Class Honours - MSc (integrated BSc & MSc)* 2015-2018
- [3] New York University: *Biochemistry* 2013-2015

Professional Development

- [1] Graduate Undergraduate Mentoring (GUM) *Co-Founder and Mentor* 2019-Present
 - Co-founded mentoring program for earth science graduate students to mentor undergraduate students with the aim of enhancing the experience and retention of under-represented groups of students in earth science research
- [1] COMPASS Student Seminar Series Speaker 2019, 2020, 2021
- [2] University of Miami Teaching Assistant: *Intro to Marine Science Lab* Fall 2019
- [3] University of Miami Teaching Assistant: *Python Programming for Marine Science* Fall 2021

Awards and Honors

- [1] Top of Class University of Southampton Oceanography 2018
- [2] 2019 Outstanding Student Presentation Award - AGU Fall Meeting 2019
- [3] COMPASS Student Seminar Series Best Graphics 2019-20
- [4] COMPASS Student Seminar Series 3rd Place Overall 2021-22

Teaching Experience

- [1] University of Miami Teaching Assistant **Introduction to Marine Science Laboratory** Fall 2019
- [2] University of Miami Teaching Assistant **Python Programming for Marine Science** Fall 2021

Other Work Experience

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| [1] Wetlab Bar (<i>Bartender</i>) | 2019-2023 |
| [2] University of Southampton Student Union (<i>Event Staff and Bartender</i>) | 2016-2018 |
| [3] Cal Adventures Summer Camp <i>Windsurfing/Sailing Instructor and Boating Programs Manager</i> | 2014-2017 |