

Jordan Reichhardt, MS Electrical Engineering

California Polytechnic State University

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Education

Date of Degree(or projected)	Degree	Major	Institution
2025	B.S.	Electrical Engineering	California Polytechnic State University
	Undergraduate GPA: 3.60		
2026	M.S.	Electrical Engineering	California Polytechnic State University
	Current Graduate GPA: 3.81		

Research Focus

Integrating Sentinel-2 and Sentinel-3 satellite backscattering and radiance data with environmental features such as solar radiance, Swell magnitude/direction, and salinity levels to train a machine learning model to predict biochemical and optical parameters, including chlorophyll concentration and turbidity levels in complex coastal environments.

Designing marine monitoring devices using STM32, Arduino Pro Mini, and ESP32 microcontrollers for data processing and retrieval, both manually and remotely. Ultimately, I aim to support the collection and processing of oceanographic data streams to enable predictions of coastal processes such as turbidity and algal bloom events.

Oceanic sensing and forecasting interests

Monitoring and predicting coastal systems using a variety of sensor integration of buoys , UAVs, ROVs, and satellites. Detecting harmful algal blooms and observing their impacts on varying ecosystems. Integrating real-time oceanic measurements into datastreams for predictions of critical ecological events.

Developing data pipelines using real world historical oceanographic datasets. Using MATLAB and Python processing for data processing, including cleaning and UTC timestamp alignment of datasets to prepare datasets for training and testing of ML models. Improving the accessibility of coastal observations and predictions, recognizing the importance of coastal monitoring at the interface between land and ocean systems.

Research Experience

Thesis: Remote Sensing of Coastal Chlorophyll and Turbidity Levels— *California Polytechnic State University*

August 2025 - present

- Created models to predict coastal water quality metrics, including chlorophyll and turbidity levels, key indicators of harmful algal blooms, and coastal water visibility metrics.
- Developed machine learning models to estimate coastal water quality metrics, including chlorophyll and turbidity around the Cal Poly Pier using XGBoost, Random Forest, and Neural Network Models.
- Utilized environmental forcing datasets such as wind speed and direction, swell magnitude, period and direction, salinity, solar radiance, air temperature, and water temperature.
- Combined Sentinel-2 and Sentinel-3 datasets as base estimates and then trained models using an environmental dataset (over 30,000 datapoints in the multivariate time-aligned dataset) from the Cal Poly pier and nearby NOAA buoys to predict chlorophyll and turbidity levels in 30-minute intervals.
- Currently developing a backend system using Python and Earth Engine for the preprocessing and display of satellite retrieval, allowing for a visual understanding of the satellite metrics before training and comparison to the post-training turbidity and chlorophyll predictions.

Senior project Research: Voltage Source Converter Design and Control— *California Polytechnic State University*

January 2025 - December 2025

- Designed a grid-tied Voltage Source Converter (VSC) control system within Simulink (MATLAB), focusing on grid synchronization via a phase-locked loop, fault detection, dq-axis transformations, and cascaded current and voltage control loops for power regulation
- Virtually generated PWM signals to simulate switching behavior
- Tested the VSC in simulation using a simulated PWM and varying loads
- Converted control logic to C using a Texas Instruments IDE
- Uploaded the C script to the TMS320F2837xD (Texas Instruments) microcontroller
- Analyzed the harmonics and their distortion from the system's output PWM signal field experience, and transient responses
- Designed a Printed Circuit Board (PCB) to interface the control system in collaboration with the hardware team's representation of a VSC
- Created the PCB relying on gate drivers and GaN FETs for switching and hall effect sensors for current feedback measurements allowing for microsecond fault detection with submicrosecond hardware shutdown

Whale Detangler Project — *California Polytechnic State University*

May 2024 - September 2025

- Lead a team of four Electrical and Computer Engineering students through the design and testing of a PCB to detangle marine mammals from crab pot lines
- Designed the PCB to be placed at the junction between a crab pot and its line, and cut the line when the force

of a marine mammal is detected

- Implemented embedded Python programming for integration of Arduino Pro Mini with peripherals such as an accelerometer, strain gauge, and line cutting circuit
- Tested the functionality of each peripheral using hardware in the loop simulation
- Received a summer research grant (summer 2025) from the California Cetacean Society and presented to a panel of over fifty members from this organization at the completion of the project

Remote Tidal Gauge Ultrasonic Sensor — *California Polytechnic State University*

September 2024 - December 2024

June 2023 - September 2023

- Designed, tested, and demoed a dual-node wireless tidal gauge to measure and remotely monitor tidal changes in real-time, including the integration of a remote ultrasonic sensor node and a receiving processing and display node

Remote Ultrasonic sensor node:

- Integrated an SR04 ultrasonic sensor with an STM 32, two arduino pro mini LoRaWAN microcontrollers,
- Transmitted the time of each ultrasonic ping to the receiver node via LoRaWAN radio for calculations of distance from the sensor to the water and calibrated tidal measurements

Receiver and display node:

- Integrated a Liquid Crystal Display (LCD) with the STM32 via SPI for display and processing
- Validated the system for remote sensing capabilities and long range wireless transfer up to 7 miles from transmitter in Morro Bay to the receiver and display in Los Osos

Engineers For Exploration Internship — *University of California, San Diego*

June 2023 - September 2023

- Designed a sensor system embedded in a surfboard fin to utilize surfers as citizen scientists in the surfzone, a traditionally difficult region for buoy-based data collection
- Integrated peripherals to measure wave height, water temperature, wet/dry conditions, and salinity
- Created a PCB using Altium to connect an ESP 32 SoM to peripherals such as a wet/dry sensor, temperature sensor, power management circuit, accelerometer, and salinity sensor
- Loaded embedded C firmware to the ESP32 for connection of peripherals, data acquisition, and wireless transmission
- Tested the PCB in a hardware in the loop environment before potting the electronics in a surfboard fin for waterproofing and in water testing
- Broadened oceanographic data collection techniques by engaging citizen scientists with coastal monitoring in otherwise sparsely observed environments

Kellet's Whelks Lab / Opentrons Coding — *California Polytechnic State University*

October 2021 - May 2022

- Worked with a team of 10 graduate and undergraduate students in a wet lab to process and extract DNA for over 3,000 Kellet's whelks utilizing Opentrons pipetting robots
- Personally developed and tested a Python script for the Opentrons robots to automate the extraction pipetting procedure

- Designed code to add buffers and enzymes, along with performing automated mixing later in the extraction process
- Applied data acquisition techniques to manage the large genetic dataset via R, thus enabling genetic analysis and comparison of Kellet's Whelks across California and throughout changing oceanic conditions

Additional Professional Experience

Distribution Planning and protection Engineering Internship

December 2025 - Present

- Querying large datasets using SQL Developer to analyze recloser status, track alarm states of the device, and monitor system conditions, leading to the real-time analysis of network performance.
- Build distribution line protection settings, including states for normal and emergency conditions, ensuring coordination between devices down the line.
- Determining the root causes of malfunctioning distribution devices, such as reclosers and fuses, based on field data from linemen, identifying failure modes, and correcting system settings to restore the distribution protective devices.
- Integrating data from real-time remote monitoring systems, such as SCADA, to identify patterns in system malfunctions.

Data systems and CeNCOOS Experience

- Trained multiple ML models on Chlorophyll, Turbidity, and salinity data from ERDDAP (CeNCOOS affiliated) in conjunction with various environmental measurements from the Cal Poly pier (Station CPXC1).
- Sorted all environmental training data and ground truth data (chlorophyll and turbidity) into a 30-minute bin UTC time-aligned dataset over the span of 5 years for use in training ML models
- Wrote MATLAB scripts to align the data and clean missing and invalid values and graphically represented gaps in the data
- Trained multiple ML models on the calculated error between satellite prediction of chlorophyll and turbidity and ground truth values in conjunction with the environmental data to fill the gaps in coastal satellite predictions
- Ultimately, combined oceanic datasets with three ML models (XGBoost, Random Forest, Neural Networks) to estimate key coastal water metrics
- Building a backend environment with a Python script and Google Earth Engine for a visualization of satellite data predictions of chlorophyll and turbidity measurements

Field Experience

- Coastal testing of LoRaWAN ultrasonic tidal sensor from Morro Bay to Los Osos, reaching wireless connection of 7 miles
- Surf zone testing of Smartfin embedded systems surfboard sensing design for Engineers for Exploration, including waterproofing tests, sensor calibration, and data acquisition and transfer
- Analyzed in-situ data from Cal poly pier (Station CPXC1) including chlorophyll turbidity, salinity, and meteorological data
- Completed 12 AAUS Scientific Diver Certification dives engaging in species identification of fish, invertebrates, and benthic organisms performed using transect and quadrat techniques
- Analyzed real environmental limitations such as signal attenuation (ultrasonic sensor range), environmental noise

(wave height estimates), and sensor alignment and adjusted systems to account for these limitations

Technical Skills

Programming Languages:

Python; JavaScript; C; MATLAB; SystemVerilog; VHDL

Engineering Software & Tools:

MATLAB/Simulink; LTspice; Altium; Eagle; KiCad; Fusion 360;

Instrumentation & Hardware:

Oscilloscope; Vector Network Analyzer (VNA); Signal Generators; Embedded Systems (STM32, ESP32, Arduino, TI MCUs)

Remote Sensing & Data Analysis

Satellite data processing (Sentinel-2 & Sentinel-3); Google Earth Engine; SQL; Matplotlib; NumPy

Research Certifications

Scientific Diver Certification (AAUS)

California Polytechnic State University- *Cal Poly Pier 2025 cohort*

Field and Safety Certifications

Title 22 First Aid, CPR, and Oxygen Training for First Responders

Red Cross certification- *2025 & 2026*

Machine Shop Equipment Certification

California Polytechnic State University Mechanical Engineering Shop Program (Red Tag)- *2025*

Awards and honors

Dean's List — California Polytechnic State University

Freshman Year: Fall, Winter, Spring

Sophomore Year: Fall, Winter, Spring

Junior Year: Fall

Senior Year: Fall, Winter, Spring

Publications

Reichhardt, J., Young, B., Elgassier, M. (2026).

DC to AC Voltage Source Converter Control System.

California Polytechnic State University Digital Commons

Research Features

Reichhardt, J. (2023). Featured in UC San Diego Qualcomm Institute article on Engineers for Exploration (Smartfin / FishSense projects).

Presentations

Reichhardt, J. (2023). *End-of-Program Research Presentation: Smartfin and FishSense Systems*. Engineers for Exploration Program, University of California, San Diego.

Reichhardt, J. (2024). *Development of Whale Detangling Devices*. Invited presentation, California Cetacean Society (Monterey Bay Chapter) Speaker Series.

Reichhardt, J. (2025). *Remote Sensing of Coastal Chlorophyll and Turbidity Using Machine Learning*. Thesis proposal defense, California Polytechnic State University.

Grants

Reichhardt, J. (2025). Summer Research Grant, Whale Detangler Project- California Cetacean Society- \$3,000

Advisors and Collaborators

Undergraduate Advisors

Bridget G. Benson (Whale Detangler PI)
John L. Penvenne (Remote Tidal Gauge PI)

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Graduate Advisors

Wayne C. Pilkington (Main Thesis Advisor)
Jane Zhang (Thesis committee member)
Ryan K. Walter (Thesis Committee Member)

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Service Activities

Professional Organization Memberships

2022–Present Society of Women Engineers (SWE)
2023–Present Institute of Electrical and Electronics Engineers (IEEE), Student Member

Service to the community

2025 Volunteer, Avila Beach Junior Guards Program, Avila Beach, California, USA

2024–Present Volunteer (June–September), Adaptive surfing volunteer instructor (Surfing With Smiles), Hampton Beach, New Hampshire, USA

2024–Present Volunteer, Surfrider Foundation Beach Cleanups, Central Coast, California, USA

2024 Volunteer, Hampton State Beach Water Safety Day, Hampton, New Hampshire, USA