WILLOW RUDGE

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EDUCATION

Duke University | QuestBridge Scholar **August 2024 – Present**
Durham, NC
Bachelor of Science in Computer Science & Earth and Climate Sciences
Relevant coursework:
- Intro to Databases, Intro to Computer Systems, Data Structures and Algorithms
- Ocean and Atmosphere Dynamics, Energy and the Environment, Future of the Oceans, Chemistry of the Earth

Technical Skills:
- Python, Java, R, C, Git, Object-Oriented Programming, Data Visualization (Matplotlib, ggplot2), Rails, JavaScript, ML, SQL

Languages:
- Proficient in Spanish, American Sign Language, developing proficiency in Mandarin

RESEARCH AND WORK EXPERIENCE

GAIA Lab, Duke University **March 2026 – Present**
Undergraduate Researcher Durham, NC
- Study the relationship between Uranium isotope fractionation, seafloor anoxia, and extinction events
- Refine a Bayesian inverse MCMC model (GitHub Repo) in R to more accurately reconstruct ancient seafloor conditions based on ion concentrations and isotope fractionation
- Quantify the model's improvement as it becomes more dynamic by comparing results before and after alteration

Data Structures and Algorithms (COMPSCI 201) **August 2026 – Present**
Teaching Assistant Durham, NC
- Provide one-on-one guidance on complex Java data structures and algorithm problems across course topics
- Lead a classroom of 32 students through solutions to algorithmic problem-solving questions during weekly recitation
- Host two hours of weekly office hours for a course with over 300 students
- Break down complex ideas into simple, plain language, making it easy for students to digest

Duke Code+ **May 2026 – July 2026**
Software Development Intern Durham, NC
- Led five fellow interns to build and publish EcoTrace, a Chrome Web Store extension and website that estimates the per-prompt energy, water, and carbon impact resulting from AI usage
- Designed most of EcoTrace's front end, including a draggable live overlay and React dashboard, covering five AI platforms
- Co-developed Python scripts that use local LLM runs to relate token count to energy draw, then used that relation to estimate environmental impacts basing our calculation off US Energy Grid statistics
- Coordinated team roles and served as main contact for project leads, presenting EcoTrace at the All-OIT staff meeting

Florida Oceanographic Society **May 2025 – August 2025**
Research Intern Stuart, FL
- Designed and conducted a summer research project, where I used R to process large datasets and model long-term climate change impacts on dissolved oxygen (DO) levels in the Indian River Lagoon
- Compared my results with DO studies done on estuaries in Australia and England; all results suggested no direct correlation, pointing to the complexity of estuary systems

PROJECTS

Aquatic Stress Sentinel – HackDuke: Code For Good 2026 | GitHub Repo
- Built a drone-based aquatic ecosystem stress detection system in Python to assess coral bleaching, harmful algal blooms, and fish kill risk
- Developed a data pipeline that ingests CSV drone sensor data, and references live NOAA and Open-Meteo APIs for temperature comparison
- Validated estimates within 0.3°C of a real water quality monitoring station (IRLON) and deployed an interactive Streamlit dashboard

Concert Countdown | GitHub Repo
- Built a Chrome extension for my friends and me to count down to live music events and listen to setlists, overlaying a live timer and Spotify controls on any webpage
- Integrated Spotify Web API to connect accounts, link playlists, and play, pause, and skip tracks
- Engineered a draggable, resizable Shadow DOM overlay that scales proportionally and remembers its position and moves between tabs

EXTRACURRICULARS

Swerve Ultimate Frisbee, *Spirit Captain* **January 2026 – Present**
- Coordinate with leadership on other teams as Spirit Captain to ensure a respectful and safe environment for all players