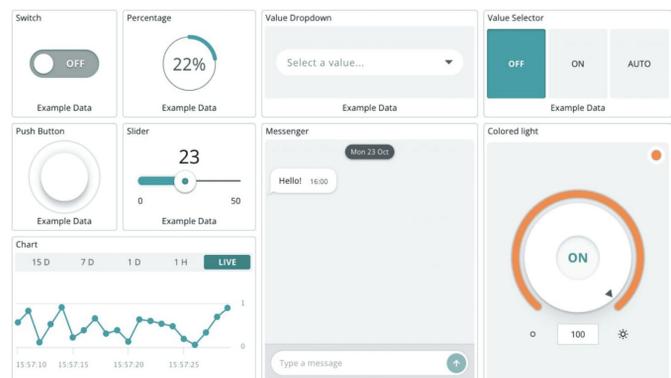
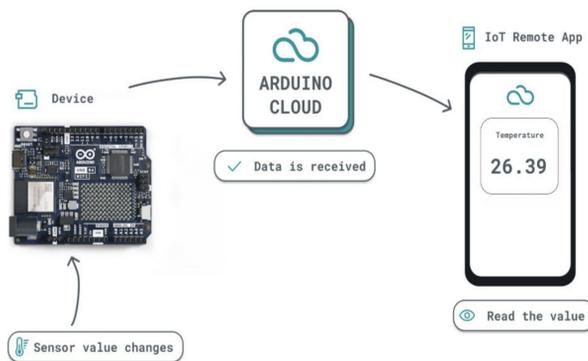


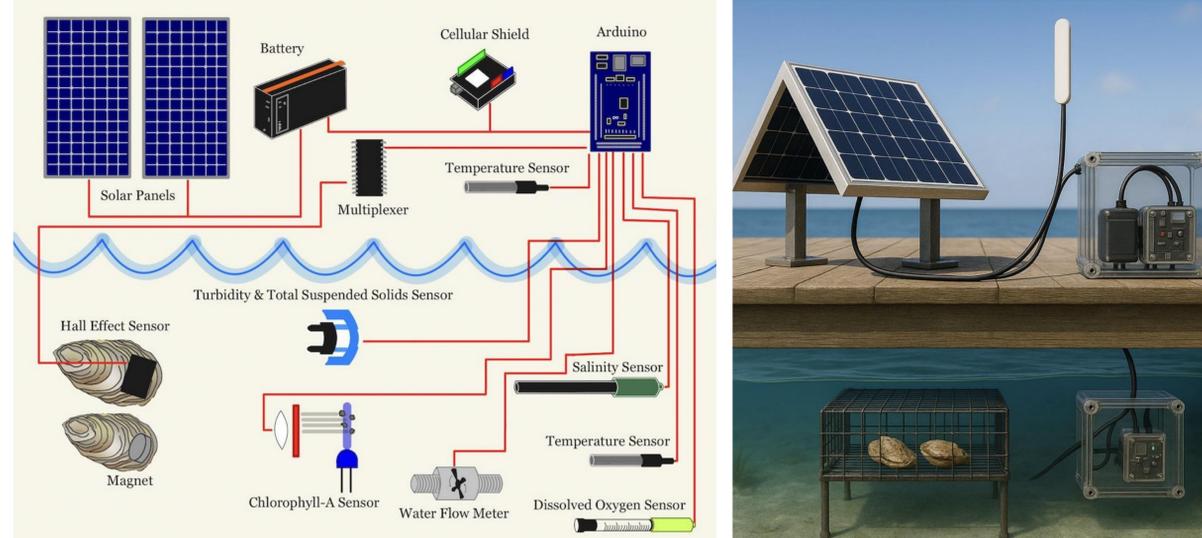
Abstract

This project focuses on the development of a biological and environmental sensor network to monitor the health and feeding behavior of oysters. This system utilizes a specialized cage design to consolidate oysters and sensors into a single, high-precision monitoring hub. The system correlates oyster valve gape activity - specifically feeding duration and frequency - with real-time water quality parameters such as salinity, dissolved oxygen, and chlorophyll-a. These upgrades provide a significant use case for the project sponsor, Freese and Nichols Inc., by establishing a scalable model for remote water quality monitoring that can be expanded across the Gulf and Atlantic coasts.

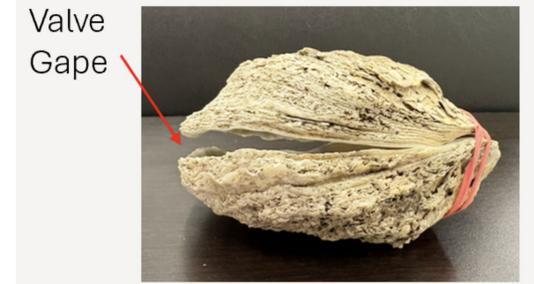
Communications



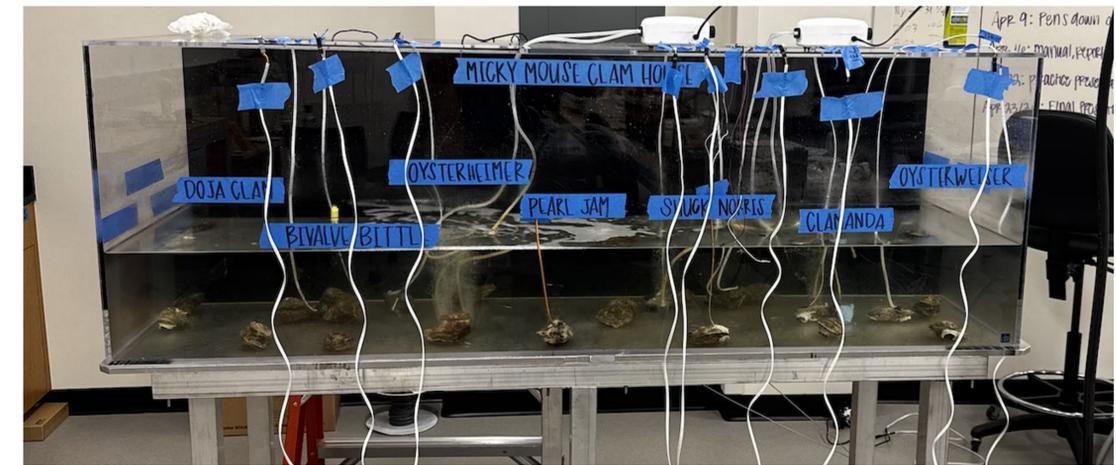
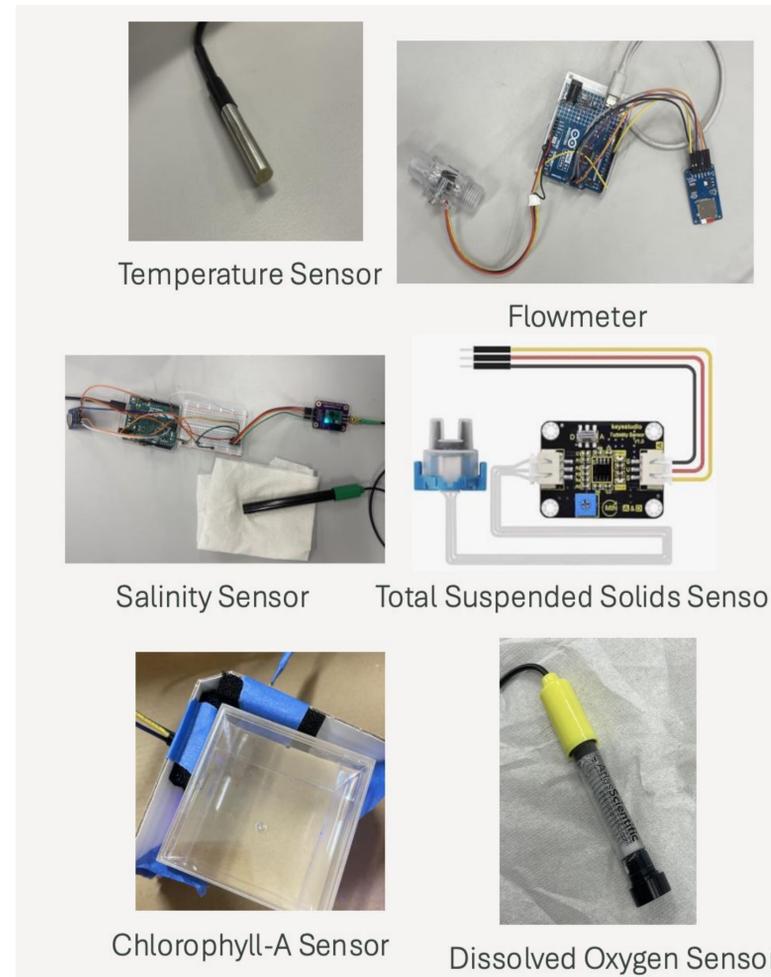
System Diagram



Valve Gape



Water Conditions



Discussion & Impact



The development of this integrated oyster monitoring system represents a meaningful advancement in both environmental sensing and coastal restoration efforts. By directly linking oyster valve gape behavior with real-time water quality parameters, this project provides a novel method for quantifying ecosystem health in a continuous and scalable way. For Freese and Nichols Inc., the system offers a practical tool for expanding remote monitoring capabilities across a variety of coastal and estuarine environments, enabling more informed decision-making and long-term resource management. Beyond technical applications, the project supports broader ecological benefits, including improved habitat conditions, enhanced water filtration, and increased biodiversity within aquatic ecosystems. Additionally, the system creates opportunities for community engagement and education by making environmental data more accessible and relevant to the public. By combining engineering design with ecological impact, this project demonstrates how sensor-driven solutions can contribute to sustainable coastal development, support local economies, and strengthen public awareness of restoration initiatives in diverse environments.