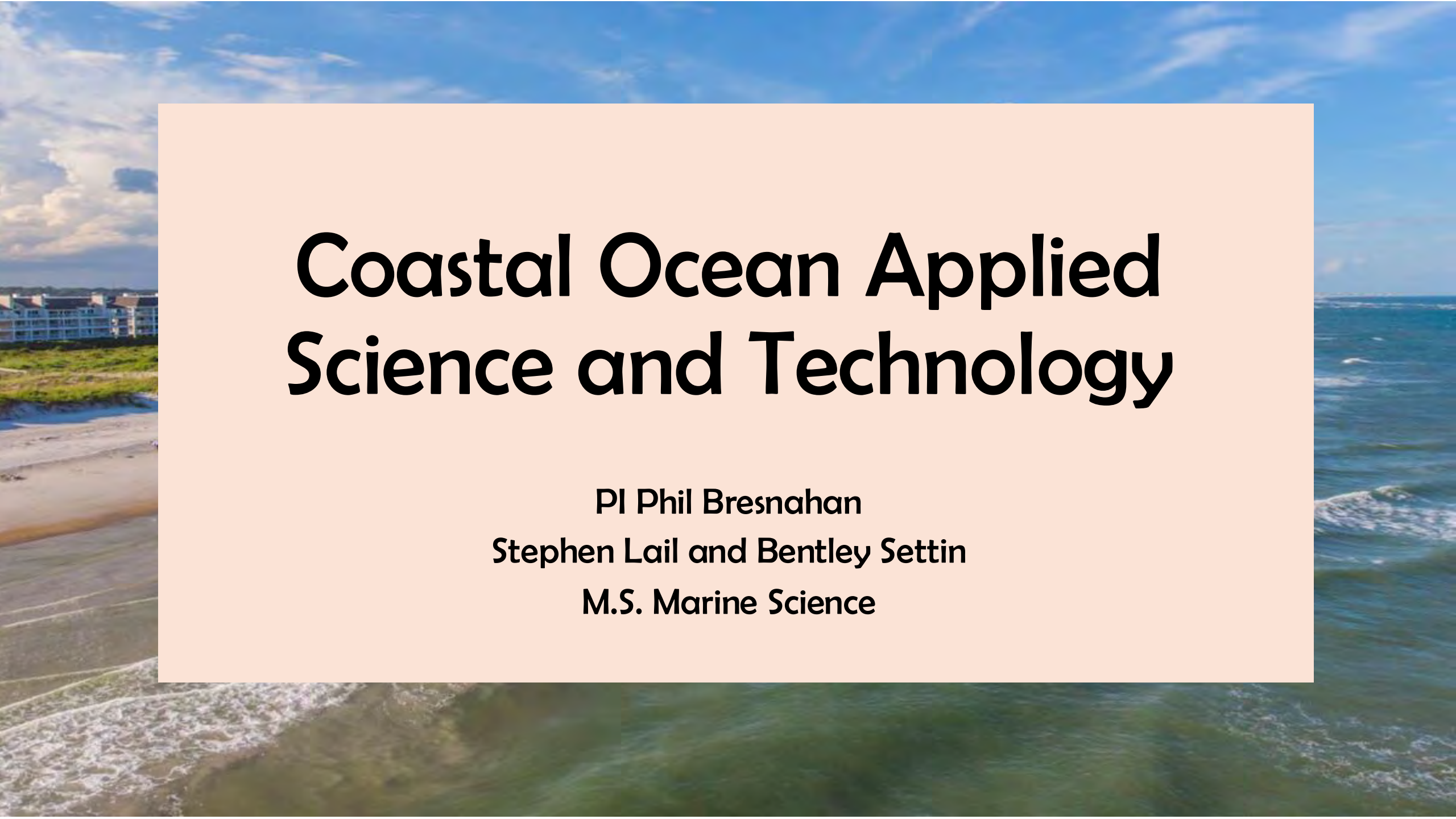


Coastal Ocean Applied Science and Technology

PI Phil Bresnahan
Stephen Lail and Bentley Settin
M.S. Marine Science

What is the COAST Lab?

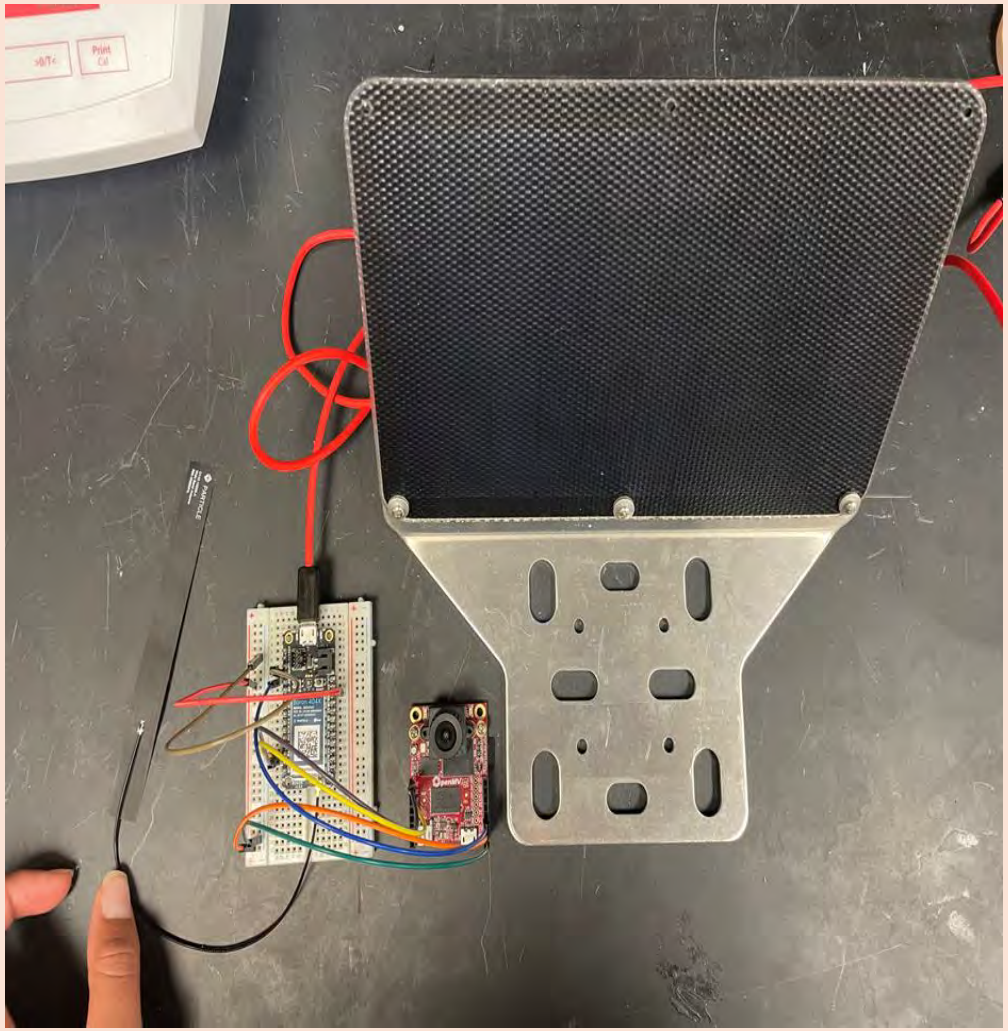
- PI: Phil Bresnahan
- Researchers range from undergraduate to PhD students

- In short, we seek to contribute to Smart Coasts by:
  - **inventing and deploying** cutting-edge connected sensors and platforms,
  - **engaging with coastal communities** in the study and real-time dissemination of critical information, and
  - **working toward improved** ocean, climate, and coastal literacy for students of all ages.

TinyCamML (Tiny Camera with Machine Learning)

Components:

- Microcontroller (Boron) +antenna
- OpenMV Camera
- Solar Panel + battery



What does it do?

- An on-device machine learning and cellular transmission camera to facilitate real-time monitoring and alerting of coastal flooding.

TinyCamML: Community Engagement

- Increase alertness of coastal flooding for emergency officials
  - Almost immediate knowledge of flooding occurrence and when it recedes
  - Optimize road closure
- Near term community education of climate change resilience
  - Climate change impacts are visible and consistent with coastal flooding which can maximize effectiveness of teaching tools
- Long term collection and monitoring of data will aid in climate change predictions and overall understanding

Water Level Sensor

Components:

- Boron +antenna
- Adalogger Featherwing (SD capabilities)
- Solar System + battery
- MaxSonar (distance sensor)

What does it do?

Measures water level by recording the time it takes for the ultrasonic pulse to reflect off the water and return to its receiver. By comparing this time against a known speed of sound, the device calculates the distance between the sensor and surface.

Water Level Sensor + CCRG Grant

- Improving Coastal Literacy and Resilience in Classrooms and Communities in the City of Wilmington

Classroom Engagement:

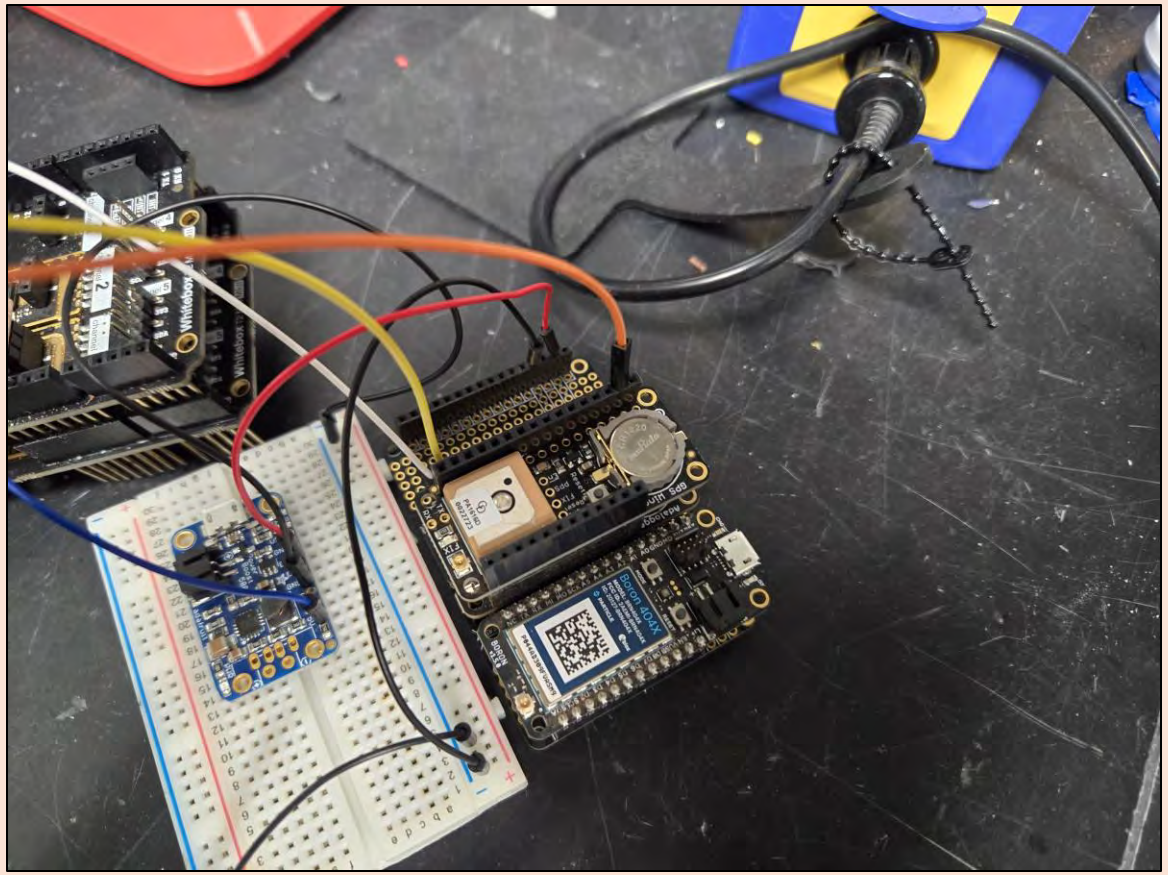
- Classroom visits to Snipes, Forest Hill Elementary, and DC Virgo in order to teach:
  - How to identify flood risks
  - Engineer a tool to collect water level
  - Interpret data and create solutions

Community Engagement:

- Kickoff workshop at DREAMS of Wilmington
  - Listen and understand community needs
  - Communicate initiatives we are taking
  - Education of actions the community can take

Biogeochemical Drifter

- Designed to measure pH, dissolved oxygen, salinity and temperature
- Provides the ability to measure changes in these variables as water parcel moves through a system
- Integrates Atlas sensors with Particle Boron Microcontroller



Biogeochemical Drifter

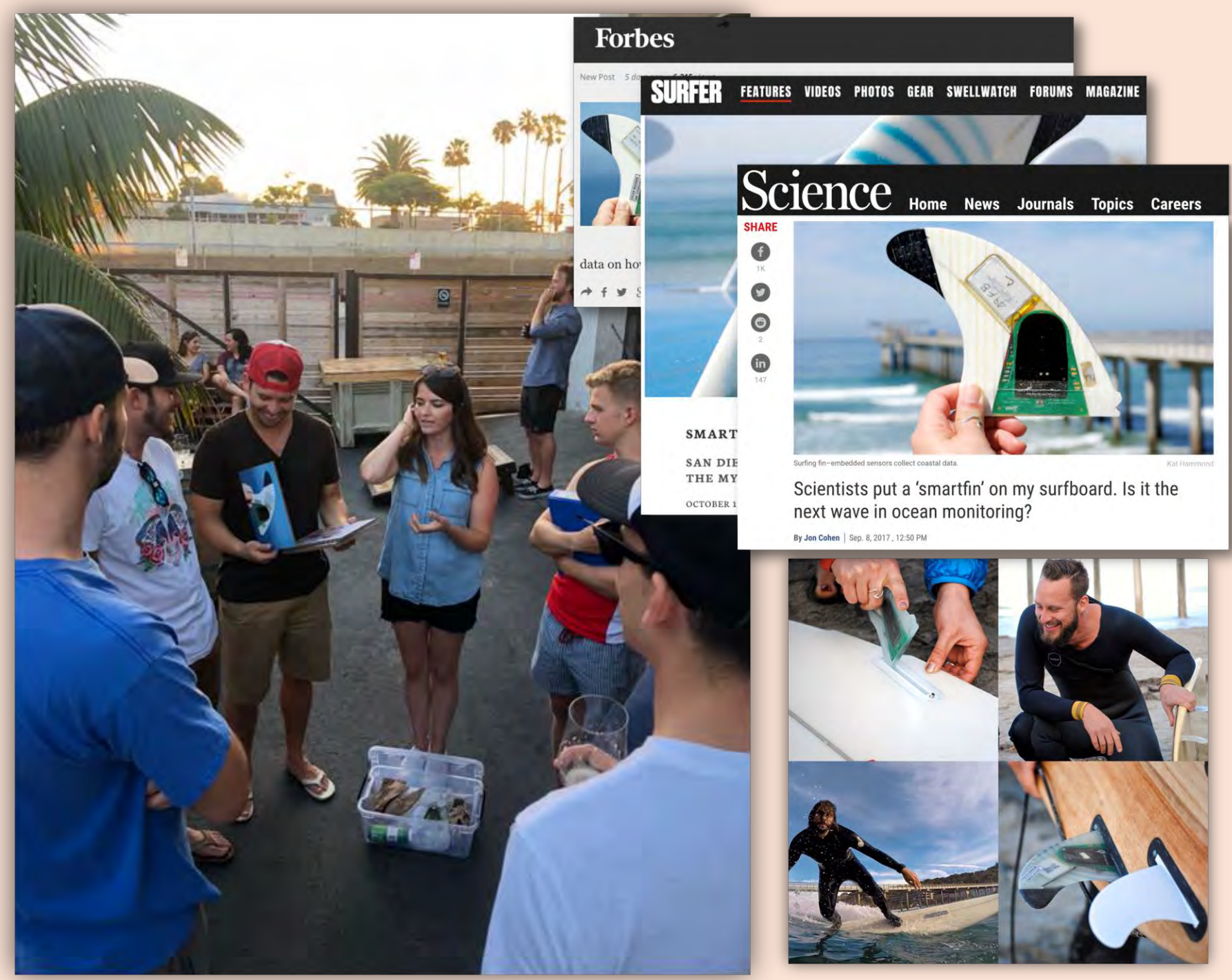
- Planned to be low cost compared to similar models used by researchers
- Open-source design and code for public utilization available on GitHub

```
//#include "Ezo_I2c_lib-master.h"
#include <Wire.h>
#include <Ezo_i2c.h>
#include <Ezo_i2c_util.h>
#include <iot_cmd.h>
#include <sequencer4.h>
void step1();
void step2();
void step3();
void step4();
void receive_reading(Ezo_board & Sensor);

Ezo_board ph = Ezo_board(99, "PH");
Ezo_board rtd = Ezo_board(102, "TEMP");
Ezo_board DO = Ezo_board(97, "DO");
Ezo_board ec = Ezo_board(100, "EC");
```

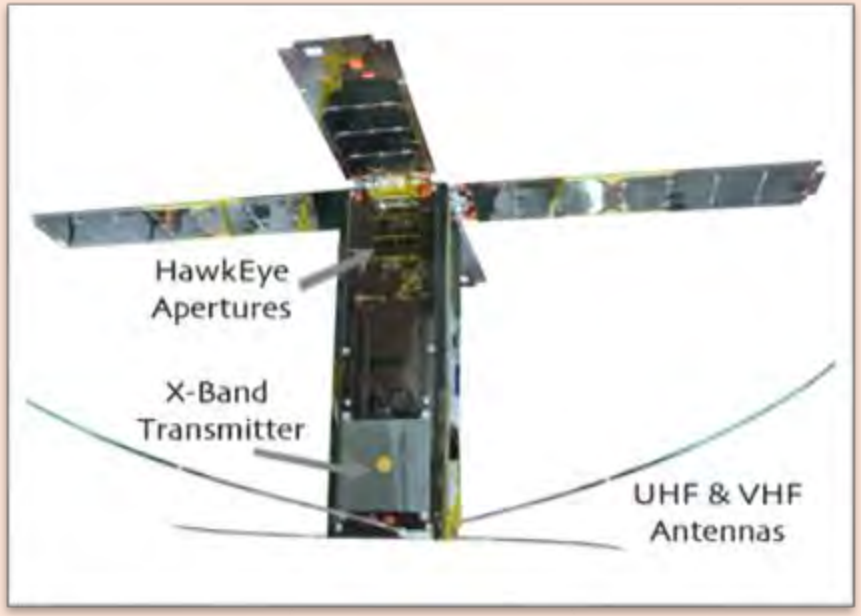
Smartfin

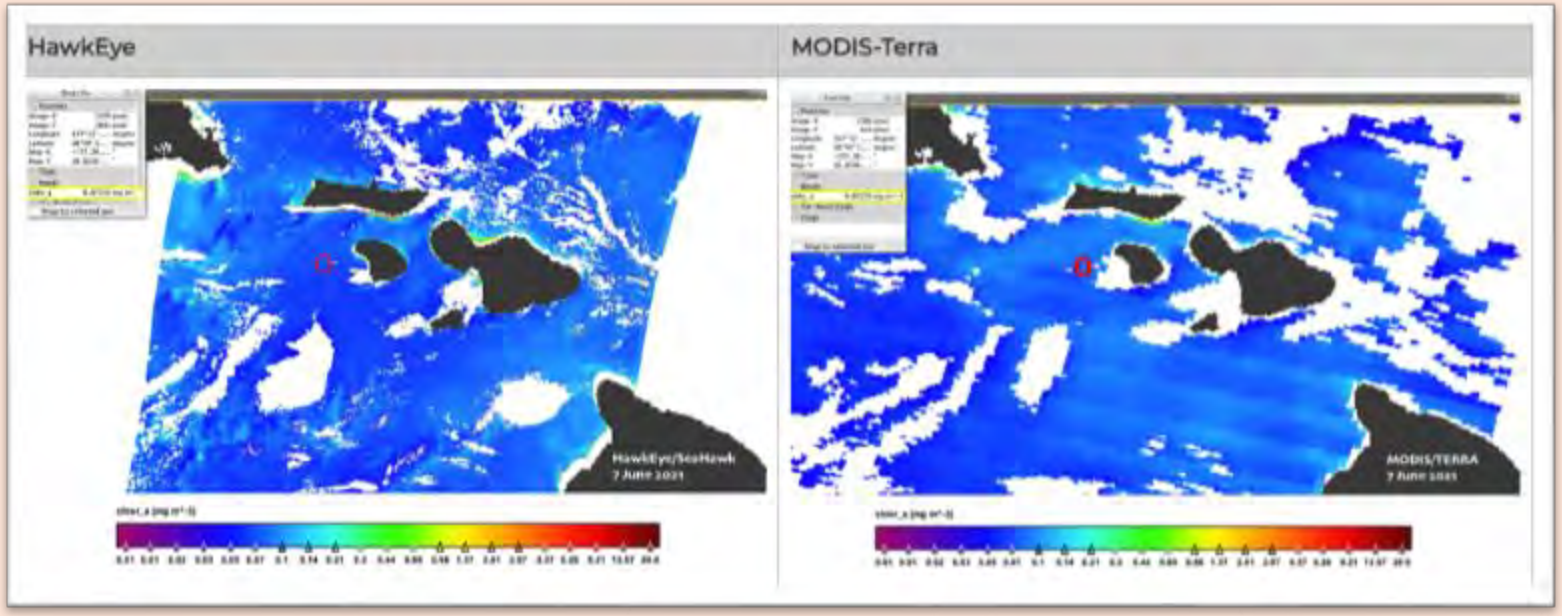
- Goal: to learn more about our coastal waters and **promote a better understanding** of the value of and threats to our oceans.
- While surfing, Smartfin will **collect geolocated temperature and wave motion** data—critical to understanding how our coasts are changing over minutes to years.
- With the help of the **Surfrider foundation** there are over 300 fins distributed world-wide.



HawkEye Satellite

- Advanced CubeSat
- Part of NASA's Ocean Color Mission
- Higher resolution in comparison to other satellites such as MODIS





What we all have in common: Github!

- Platform used for building, editing, sharing, and collaborating on code based projects.
- Our projects contain clear instructions, diagrams, and readme files for participatory science.
- GitHub is **open source** which increases **reproducibility and utility.**

COAST Lab GitHub


Thank you for your time!
Any Questions?