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STRIDR: Sea-Trekking Rechargeable Instrumented Drifter

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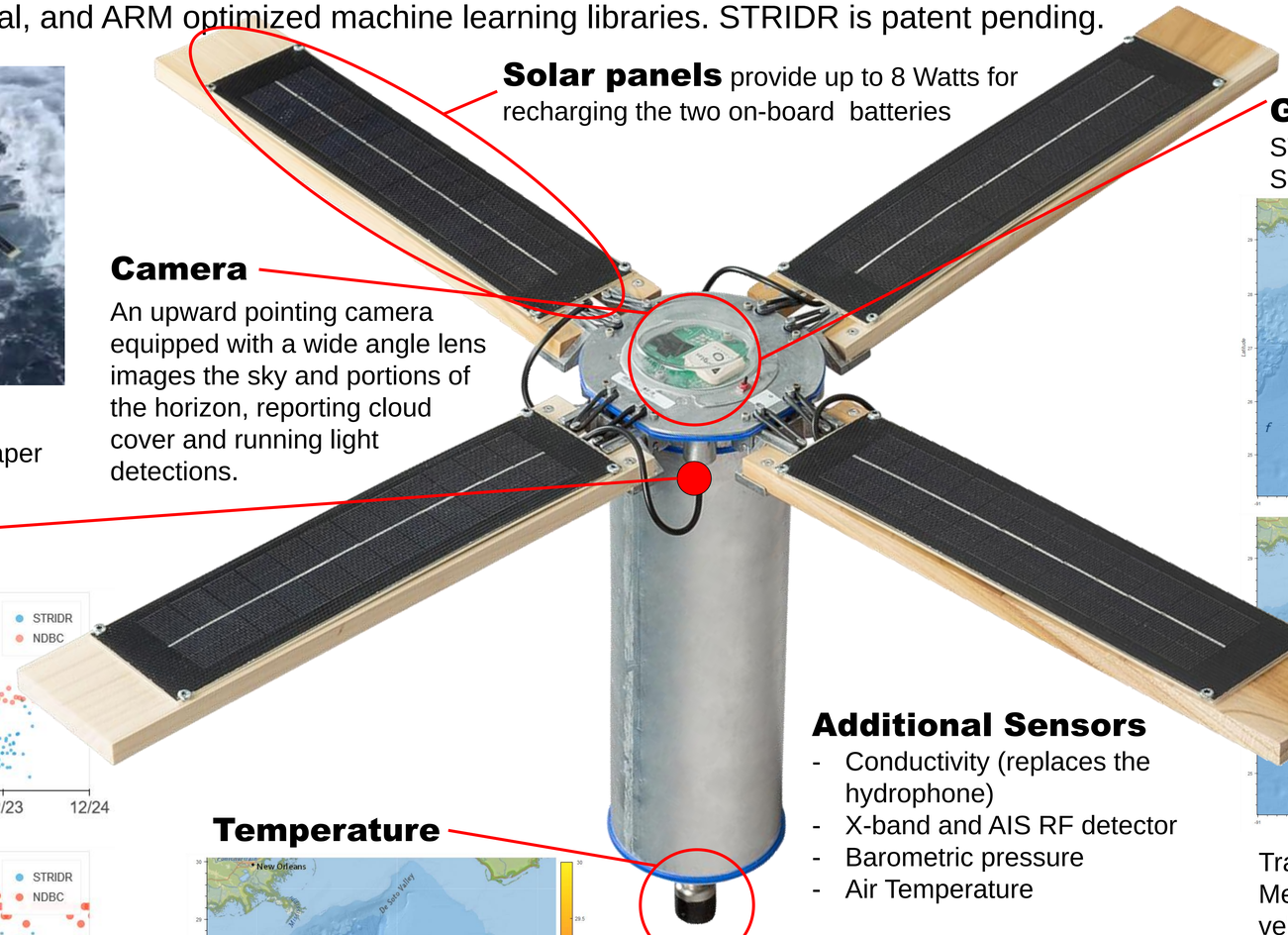
Areté

DISCOVER. DEVELOP. DELIVER.

STRIDR™ is an easy to deploy, low-cost drifter developed during DARPA's Ocean of Things (OoT) program.
STRIDR is a 0.37x0.10 m metal canister with four wooden wings (0.85 m diameter, 0.14 m when folded) that unfold for flotation and stability. Their is minimal plastic content consisting of a single nylon screw and a plastic encased valve. It weighs 2.7 kg (6 lbs.) and is easy to deploy by hand from vessels with up to 4.5 m (15 ft) of freeboard. A low-power microcontroller handles some sensor sampling and processing, while an ARM processor running Linux supports processing in Python 3 and C/C++ with access to common scientific, numerical, and ARM optimized machine learning libraries. STRIDR is patent pending.

Deployment

The wings are held in the down position by a water soluble paper. Once in the water, the paper quickly dissolves and the wings pop open to stabilize STRIDR.

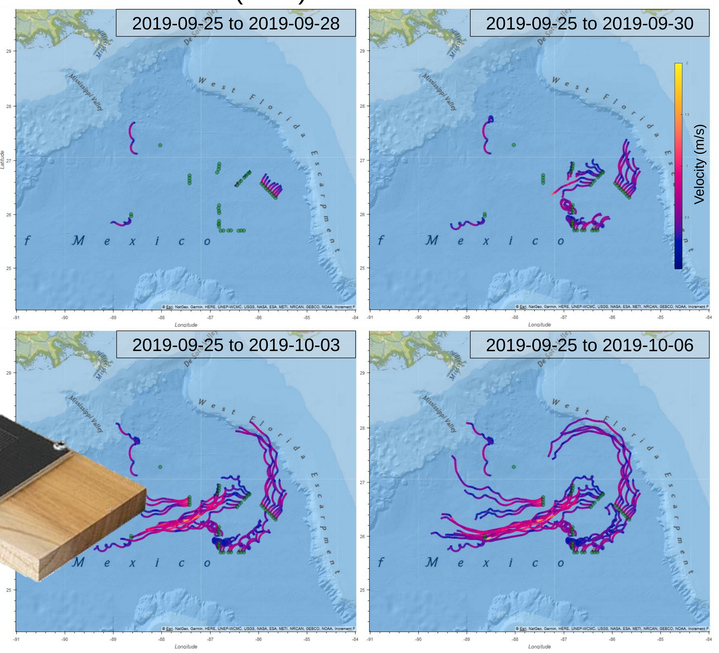


Solar panels provide up to 8 Watts for recharging the two on-board batteries

Camera
An upward pointing camera equipped with a wide angle lens images the sky and portions of the horizon, reporting cloud cover and running light detections.

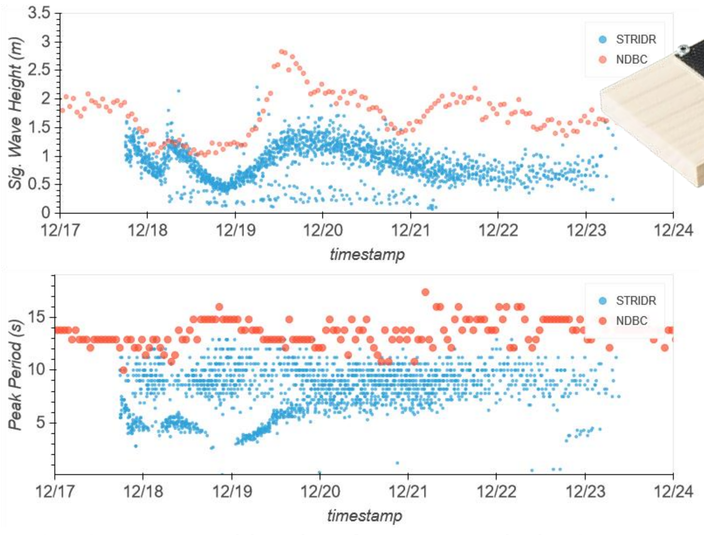
GPS and Iridium

STRIDR uses GPS for position information and Iridium Short Burst Data (SBD) to send data to shore.



Trajectories of a 50 STRIDR deployment in the Gulf of Mexico, Sept. 2019. Trajectories are color-coded by velocity.

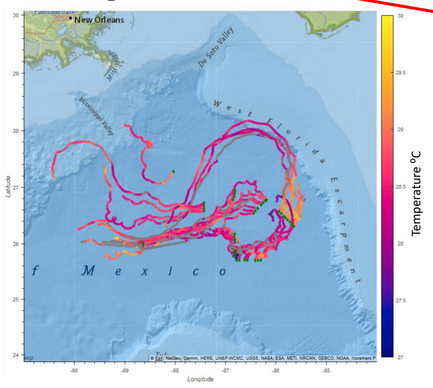
IMU



A 9-DOF IMU provides data for wave analysis. STRIDR currently reports significant wave height and dominant period, but will be expanded to include directional wave processing, as well as correction for STRIDR's spectral transfer function. In addition to wave analysis, the IMU is used for wake detection.

The plots at left show a week long deployment in Dec. 2019 near San Clemente Island. An NDBC buoy 3 km away is used for comparison.

Temperature

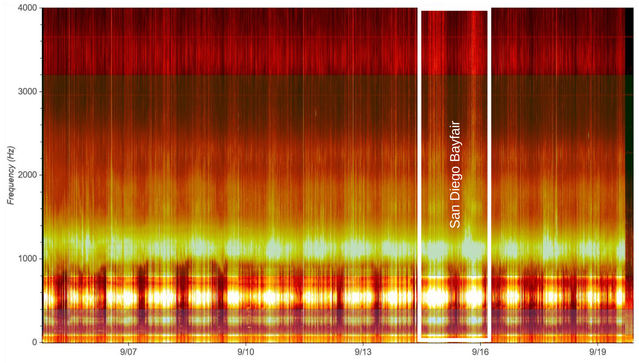


A thermistor (time constant 8.5 s) is mounted at the bottom of the hull, measuring water temperature at approximately 300 mm depth.

Additional Sensors

- Conductivity (replaces the hydrophone)
- X-band and AIS RF detector
- Barometric pressure
- Air Temperature

Hydrophone



A time-frequency image of hydrophone data collected in San Diego Bay. Two bands (100–400 Hz, 800–3200 Hz) are used to estimate for ship traffic and sea state. STRIDR can also detect marine mammals and some aircraft signatures. The boxed area is the weekend of San Diego Bayfair with increased recreational boat traffic and powerboat racing.
Units without a hydrophone use an on board microphone for audio sampling.

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