

TideRiders: Toward a Citizen-Scientist-Enabled and Institution-Supported Distributed Sensor Network for Water Quality



PRESENTER:
Mike Jakuba

MOTIVATION: We are developing low cost (\$1000-\$2000) coastal profiling devices we call TideRiders that can be built and operated by students and private citizens. Our intention is to aid the public's understanding of their local coastal ocean and foster a sense of stewardship via accessible and inexpensive observing technology. Low cost (\$100-\$200) off-the-shelf water quality monitoring sensors may ultimately allow TideRiders to augment existing professional water quality monitoring programs.

CONCEPT OF OPERATION: TideRiders use pump-less semi-passive buoyancy control to transition between drifting at the surface and anchoring on the seafloor. TideRiders are not actuated in the horizontal direction. Instead, they will navigate coastal embayments by deliberately timing profiles to coincide with favorable tidal currents. TideRiders avoid the need for an expensive pump by using a thruster (<\$200 from Blue Robotics) to transition between passively floating at the surface and sinking to the seafloor. TideRiders use the cellular network to communicate and take commands.

OPERATIONAL STATUS: The first prototype TideRider, designed and built by co-author Zhang as an undergraduate, proved the buoyancy control concept. The second generation prototype, built by co-author McGuire as a high school student, demonstrated control and data acquisition over the cellular network and demonstrated free-swimming operation including "virtual mooring" in a salt pond. High school engineering students at Tabor Academy are currently refining the design.

Student-built coastal profiling floats for \$1000?

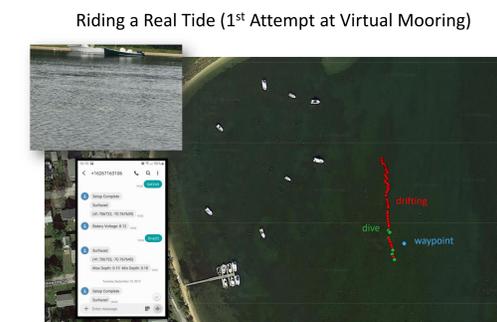
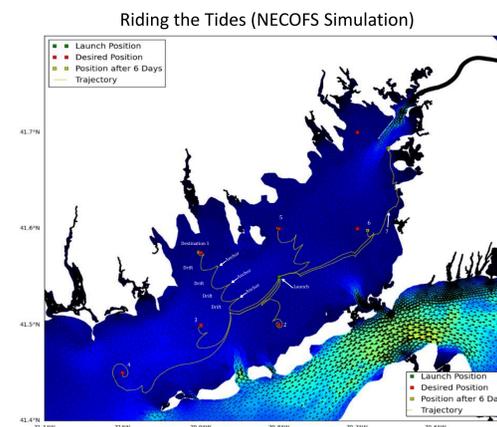
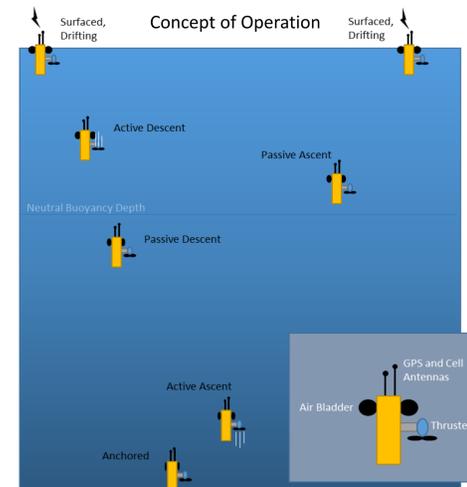
Come talk to us about integrating a TideRider into your education or monitoring program - or building one yourself!



Photo Credit: Tabor Academy



Take a picture to see a **video** of a prototype working in a tank.



Electronics Backplane		Price List	
Electronics	Blue Robotics DSI 10K Throttle	\$	100.00
	Blue Robotics Blue DSI	\$	250.00
	Automan NMEA 0183 I/O	\$	40.00
	Blue Robotics Depth Sensor	\$	40.00
	Blue Robotics Thruster	\$	100.00
	MicroSD Card (SanDisk Ultra)	\$	5.00
	Arduino Uno R3	\$	15.00
	Battery pack (1000mAh 3.7V Lithium-Ion)	\$	15.00
	GPS module (u-blox NEO-M8N)	\$	15.00
	GPS antenna	\$	20.00
	GPS module and antenna	\$	35.00
	Cellular (via SIM card)	\$	10.00
	Arduino Uno R3	\$	15.00
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	Atlas Scientific Sensors (DO, ORP, pH, EC, Microcontroller)	\$	100.00
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