

Open-design seawater sampler: Conceptualization, block diagram, and parts list

By Peter Girguis

November 25, 2024

Collecting and preserving water samples over time is a key part of ocean sciences.

Coastal scientists and shipboard scientists often rely on personnel to collect time series samples.

Deep sea scientists typically use bespoke, high-cost autonomous samplers for working in the deep sea.

The primary goal of this project is to develop an open-design water samplers to collect seawater fluids from in and around oysters. A secondary goal of this project is to ensure that this sampler has broader reaching applications to other aquaculture applications, etc

Open-design seawater sampler: Conceptualization, block diagram, and parts list

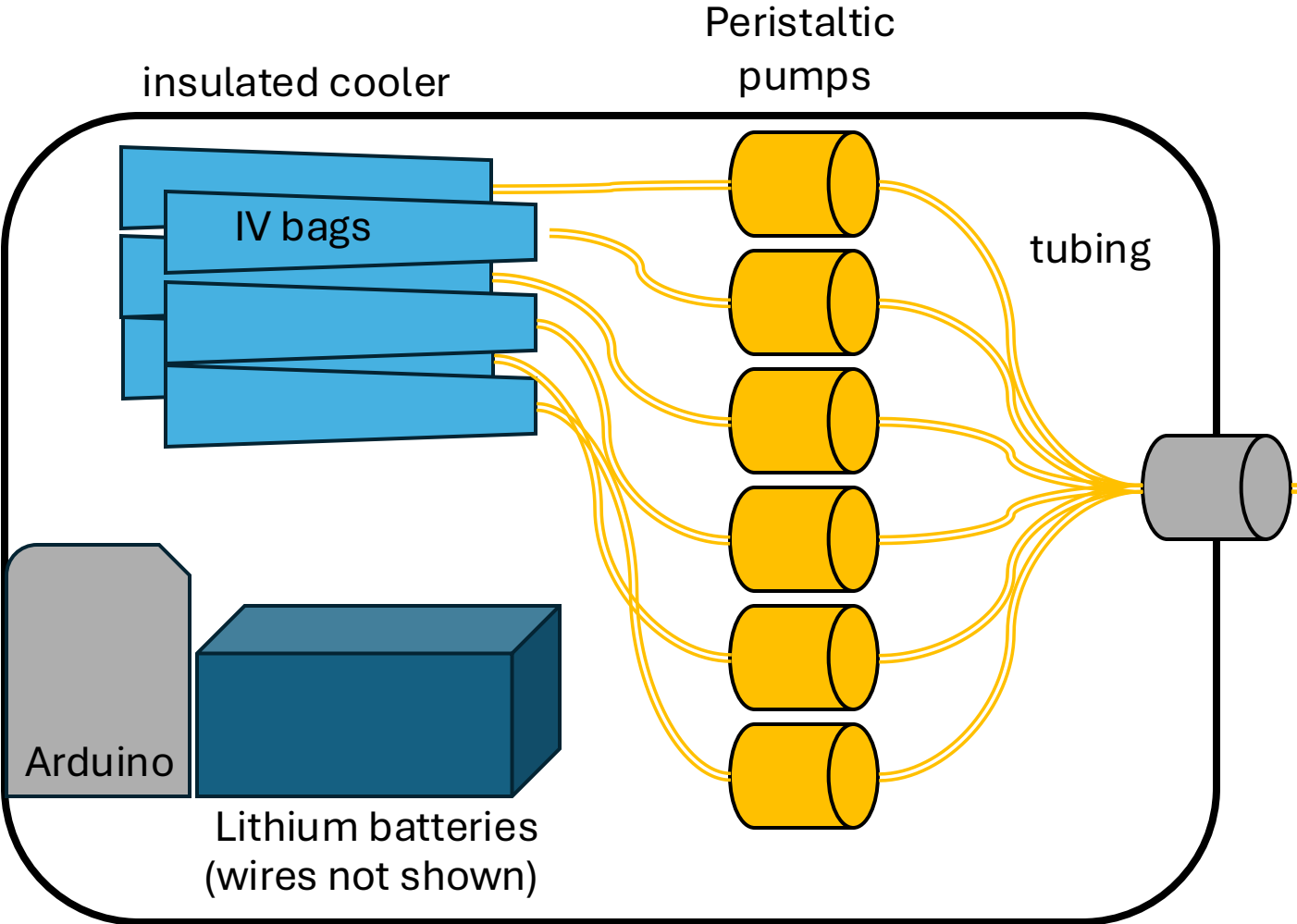
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WATER SAMPLER REQUIREMENTS

- 1) Made of commercial off the shelf components.
- 2) Have a price point between \$100 and \$500 depending on component choices.
 - 1) *For example, the user can use a lower cost \$25 cooler for use in aquaculture facilities but may choose to use a more robust \$300 cooler for use on a rocky shoreline.*
- 3) Be capable of collecting fluids samples over time, using either an Arduino or a programmable on-off controller (we chose to test this with a programmable sprinkler controller)
- 4) Be capable of preserving samples in a fixative solution of choice
- 5) Battery operated and fully autonomous for up to 7 days

Conceptual block diagram of open-design seawater sampler



SUGGESTED PARTS LIST page 1

Peristaltic pumps =

https://www.amazon.com/dp/B01IUVHB8E/ref=syn_sd_onsite_desktop_0?ie=UTF8&psc=1&pd_rd_plhdr=t&aref=YJ3lvzQj9E

Tubing =

https://www.amazon.com/Gikfun-Silicone-Flexible-Transparent-Peristaltic/dp/B08H1ZD5VZ?psc=1&pd_rd_w=LdzJj&content-id=amzn1.sym.55c0153f-1fb7-42ff-8241-d1c0f3732289&pf_rd_p=55c0153f-1fb7-42ff-8241-d1c0f3732289&pf_rd_r=MG7GV2TNTJZ2ZJRKHR79&pd_rd_wg=YCGiz&pd_rd_r=18ba4d06-fa0b-4a28-9f45-496161c30133&ref_=sspa_dk_detail_1&sp_csd=d2lkZ2V0TmFtZT1zcF9kZXRhaWxfdGhlfWF0aWM=

Intravenous sterile saline bags (unfilled) =

https://www.amazon.com/Reusable-1200ML-N-utrition-Gravity-Disposable/dp/B0CJRJZCND/ref=sr_1_5?dib=eyJ2IjoiMSJ9.SYcuKNL7G4G-J6q_eNo4mLE2UJtFAOJxCDUGghoXZ2p_TV8mG0zgzDZ3lOXuP3Nje5cS3ZTVRArpeMsHiytzctapzF_IzrMwYtVDIdLTzSGQqqeR4FxBJqtMF7K_hWpNRll4U-ZWhsZdlSqvcX_e-flojkZPYODOVpvrMm9sf_W8shrovQZ2lbMBeB1w4BZJglejMeF9XsSY6qn4FhWbRMubyOJKvTz6XM3ioBPm9VrosCjSRHK04sF1EIHC2EgBCE0X_U_5xeVLNt-BzoVZBlZWL aFQ7SBHVJC8HPBVv8l.1ox2LeyfQFv_DoQPETFirPhcMn6JkpObCY8d0-b7aP4&dib_tag=se&keywords=IV+bags&qid=1731620978&sr=8-5

SUGGESTED PARTS LIST page 2

Lithium battery pack (wires not shown) =

https://www.amazon.com/gp/product/B082VG6N78/ref=ppx_yo_dt_b_search_asin_title?ie=UTF8&psc=1

YETI Tundra 45 insulated cooler =

[https://www.amazon.com/YETI-Tundra-Cooler-Rescue-Red/dp/B0BTTQPYQW/ref=sr_1_1_sspa?crid=Q5JN1TBS3PAW&dib=eyJ2IjoiMSJ9.B5hmwPJbN11VL7jQJu2xtmKXH9lzJ5d6-yRlDJdmfTgT7-Gx80WnUi40es-WZGrOuZ5GUrVQsDfv8pXt2GbBSieBrFl_VEq6looUBvTJTIFzB5xrSERwed9xoiDKX1WS3LMgbh-J930DfHee4PiMgl_upnSr51w5S9YVhhp10gBe179utj4zlMiF3Jiw6QnigXlukE1LdphL18KyzmWMEOQxRSHoaDQOwZxhvs0tAcjX5yxsDvnRdlO0RAsQkhoKXSGwoNded_eEXzK4VnS5A--IYm8XqHYKqbn8OLY9OTc.HOd_4nEpLbTFhaKQ_vZzffhshtKClMpoX3poOEC-](https://www.amazon.com/YETI-Tundra-Cooler-Rescue-Red/dp/B0BTTQPYQW/ref=sr_1_1_sspa?crid=Q5JN1TBS3PAW&dib=eyJ2IjoiMSJ9.B5hmwPJbN11VL7jQJu2xtmKXH9lzJ5d6-yRlDJdmfTgT7-Gx80WnUi40es-WZGrOuZ5GUrVQsDfv8pXt2GbBSieBrFl_VEq6looUBvTJTIFzB5xrSERwed9xoiDKX1WS3LMgbh-J930DfHee4PiMgl_upnSr51w5S9YVhhp10gBe179utj4zlMiF3Jiw6QnigXlukE1LdphL18KyzmWMEOQxRSHoaDQOwZxhvs0tAcjX5yxsDvnRdlO0RAsQkhoKXSGwoNded_eEXzK4VnS5A--IYm8XqHYKqbn8OLY9OTc.HOd_4nEpLbTFhaKQ_vZzffhshtKClMpoX3poOEC-os&dib_tag=se&keywords=YETI+Tundra+45+Cooler&qid=1732591353&sprefix=yeti+tundra+45+cooler%2Caps%2C148&sr=8-1-spons&sp_csd=d2lkZ2V0TmFtZT1zcF9hdGY&psc=1)

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[J930DfHee4PiMgl_upnSr51w5S9YVhhp10gBe179utj4zlMiF3Jiw6QnigXlukE1LdphL18KyzmWMEOQxRSHoaDQOwZx](https://www.amazon.com/YETI-Tundra-Cooler-Rescue-Red/dp/B0BTTQPYQW/ref=sr_1_1_sspa?crid=Q5JN1TBS3PAW&dib=eyJ2IjoiMSJ9.B5hmwPJbN11VL7jQJu2xtmKXH9lzJ5d6-yRlDJdmfTgT7-Gx80WnUi40es-WZGrOuZ5GUrVQsDfv8pXt2GbBSieBrFl_VEq6looUBvTJTIFzB5xrSERwed9xoiDKX1WS3LMgbh-J930DfHee4PiMgl_upnSr51w5S9YVhhp10gBe179utj4zlMiF3Jiw6QnigXlukE1LdphL18KyzmWMEOQxRSHoaDQOwZxhvs0tAcjX5yxsDvnRdlO0RAsQkhoKXSGwoNded_eEXzK4VnS5A--IYm8XqHYKqbn8OLY9OTc.HOd_4nEpLbTFhaKQ_vZzffhshtKClMpoX3poOEC-os&dib_tag=se&keywords=YETI+Tundra+45+Cooler&qid=1732591353&sprefix=yeti+tundra+45+cooler%2Caps%2C148&sr=8-1-spons&sp_csd=d2lkZ2V0TmFtZT1zcF9hdGY&psc=1)

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Arduino controller for custom programmed routines =

https://www.amazon.com/Arduino-UNO-WiFi-ABX00087-Bluetooth/dp/B0C8V88Z9D/ref=sr_1_4?crd=RESG3UMT6T8I&dib=eyJ2ljojMSJ9.X6XX4n-frnOFX3oJeoqE1x0xbsZht3LjB4lQscLlumwr5Qt0uULoU0RDsoOBBOZ5CzVmZjMYGJrmFZLcU6WtPNE3C25cs_Vi4rjE pq6Q-_t_EWwgokOTsnZrPfZRZwN2NloGH05Z0Fq0t5dCUayPssiKptXNKbtUZolAjgxTAAxt3_BTVjSWlAWI0Y_E5tlrb65V-cBYkl2fxuHqU3pybGnNo-pTnni55PEiaPZ4luM.YnymERUu3VH3IVCdekaxXUDvWXRAQpC_BM-18ySu3pE&dib_tag=se&keywords=arduino&qid=1731621035&sprefix=arduino%2Caps%2C128&sr=8-4

https://drive.google.com/file/d/1Ji2-BLKwmVx8_Otq1fE3CTZn6BLXpOLS/view

Arduino code (modified from www.electricdiylab.com) =

https://drive.google.com/file/d/1Ji2-BLKwmVx8_Otq1fE3CTZn6BLXpOLS/view

Also see <https://blog.arduino.cc/2023/02/22/a-diy-peristaltic-pump-controlled-by-an-arduino/>

ALTERNATIVE to the arduino controller: ORBIT B-Hyve 12 zone automated sprinkler timer =

https://www.amazon.com/Orbit-57950-12-Station-Controller-Compatible/dp/B01D15HOTU/ref=sr_1_13_sspa?dib=eyJ2ljojMSJ9.pUleupCMrkseL3n6mv0goXQllCLBf9AJN32oS-nTro6vSQINk3o09oNAcefSCJLl8Bscn5TrcjmN-UTPqiw2wdF5hzmbZbRZV8KmMVs7LhjRs5_RhLUy7jFUncCZ4ffaU7lYfLNESfbnE-Oq2cDhlyKYC67-0UD8qWkDhkvVec-e-e3SODi0eTBf_M9OQ-s3egpvRELnIVnMU0VSvpOZsOl8Z7jVA_C916yXu8UhKAa6AMtjQGlgI3FH2KoZsbl4HQwMc_kxxQ_C5-ELEhDUnyX8L3Qth2YrF-EJHYlvYAg.HPR9-JGNvtJ4DvKHfcy5p_5n1xv41maJ7RWeAOJell&dib_tag=se&keywords=eight%2Bchannel%2Bsprinkler%2Btimer%2Bbattery%2Boperated&qid=1732591795&sr=8-13-spons&sp_csd=d2lkZ2V0TmFtZT1zcF9tdGY&th=1

