Monitoring Oregon Tide Gates

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Oregon State University - Hatfield Marine Science Center Innovation Lab - 2022

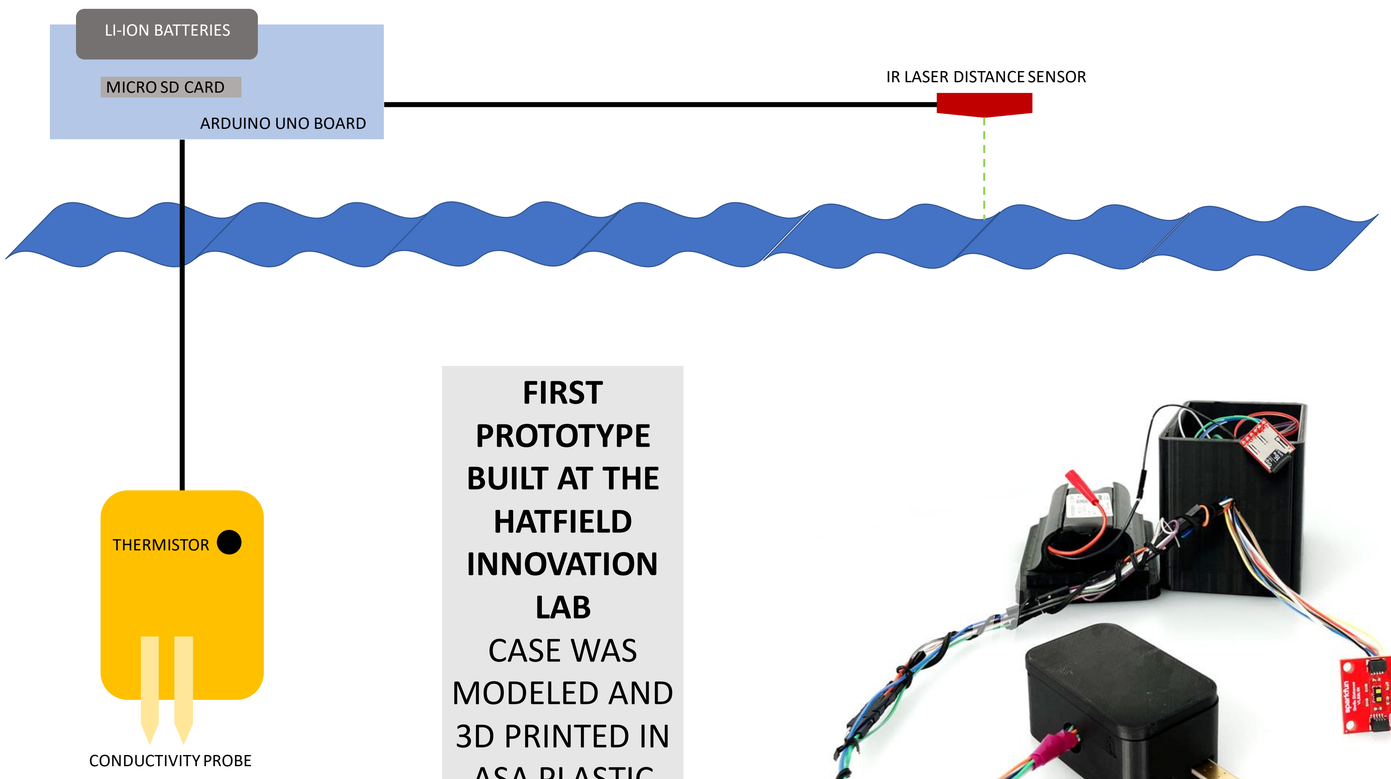
TIDE GATES AND ESTUARIES

TOP HINGE "FLAPPER" GATE

SIDE HINGE GATE

- Prevents seawater from entering estuaries to protect farmland and towns built there
- Limits tidal exchange, a process of estuarine ecosystems
- Can block migratory fish passage into streams
- Older designs controlled by water pressure holding the gate closed, preventing tidal exchange entirely
- Newer designs use floats to hold the gate open for longer so limited tidal exchange can still be facilitated
- Monitoring these different designs is essential in assessing their impacts on estuaries

DESIGN AND PROTOTYPING



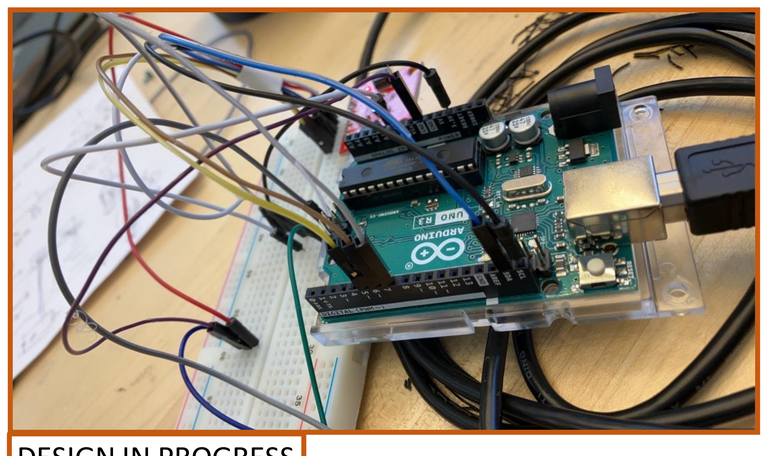
FIRST PROTOTYPE BUILT AT THE HATFIELD INNOVATION LAB
CASE WAS MODELED AND 3D PRINTED IN ASA PLASTIC

CONSTRAINTS:

- DATA RELIABILITY: Necessary data must be consistently collected from a field location
- COST: The overall package must cost significantly less to build and install than CTD installations currently available
- CONSISTENCY: The package must be made using parts, code, and 3D models that can be used to make more of the same packages

COMPONENTS:

- TEMPERATURE SENSOR: TMP-36 Adafruit thermistor
- CONDUCTIVITY / SALINITY SENSOR: Sparkfun soil moisture sensor
  - Measures voltage between two terminals using water as a resistor
- DEPTH SENSOR: Sparkfun VL53L1X IR Laser distance sensor
  - Measures distance from sensor to water, from which depth can be calculated based on the distance from the sensor to the bottom of the shallow channel
- CIRCUIT BOARD: Arduino UNO
- POWER SOURCE: Li-Ion battery pack
  - Low voltage, sensors run off 3.3V or lower Arduino pins
- DATA STORAGE: Sparkfun MicroSD breakout
- HOUSING: Designed using SolidWorks and 3D printed using ASA plastic on a Prusa 3D printer



DESIGN IN PROGRESS

GOALS FOR PROJECT CONTINUING THROUGH 2022-2023:

Flowmeter using DC motor and 3D printed anemometer device
Cell connection using SIM card for live data flow
Tide gate site selection, waterproofing, and field testing

Oregon State University Marine Studies Initiative
SEA-BIRD SCIENTIFIC
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Hatfield Marine Science Center Innovation Lab
The Roundhouse Foundation
The Nature Conservancy
Hatfield Marine Science Center
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