By Dhruv, Lucas Devadas, and Travis

Fish Monitor

Blue collar is the world's foundation

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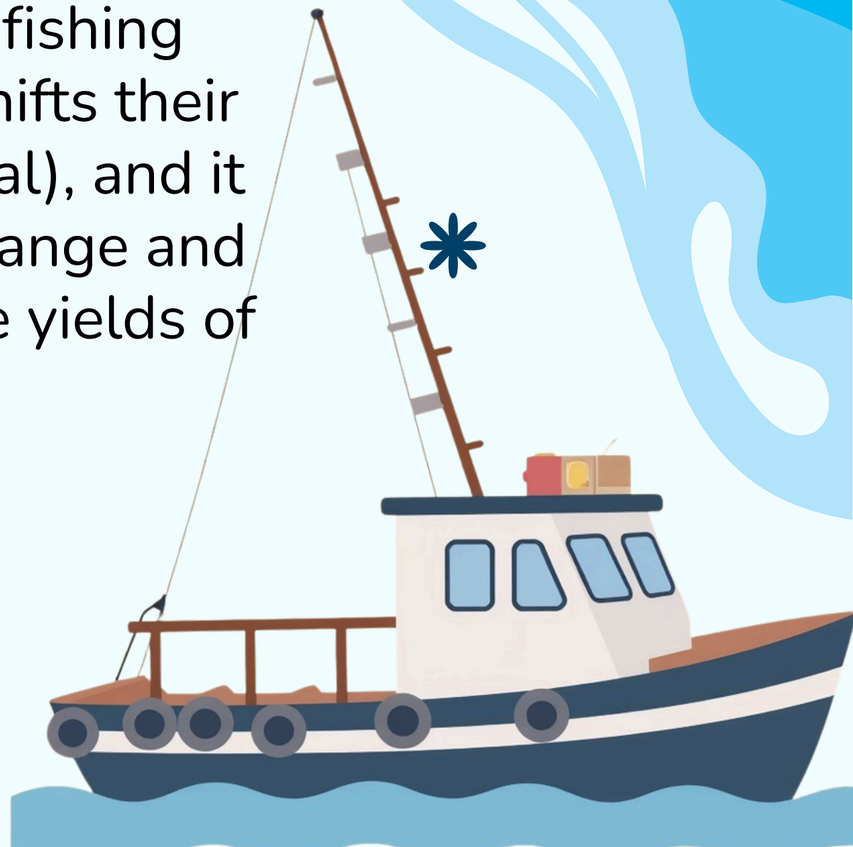
Question #1

How does climate change and weather impact the fishing industry?

Climate change and weather impact the fishing industry by affecting migration patterns, shifts their habitats, destroying vital fish nurseries(coral), and it reduces the sizes of fish. Hence, climate change and the weather both contribute in reducing the yields of fisherman.



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Question #2

Who is dependent on the fishing industry?

Over 60 million fisherman and fish farmers depend on the fishing industry. Millions of supply chain workers, on top of this 60, depend on the fishing industry. Additionally, millions rely on fish for their daily protein.

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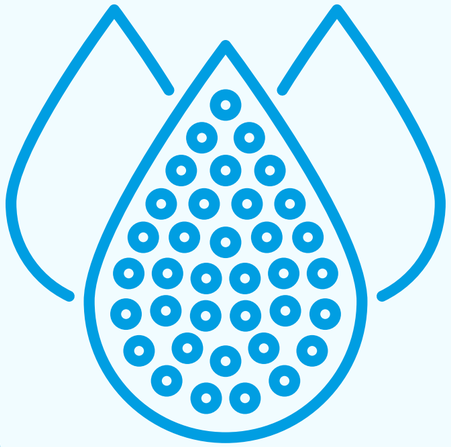
Question #3

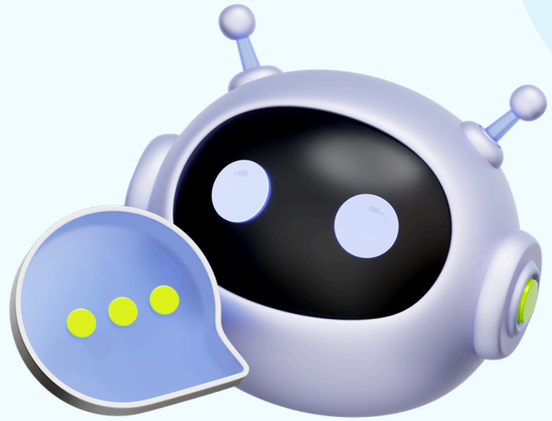
How might an understanding of Indigenous ways of knowing help us to utilize sustainable practices?

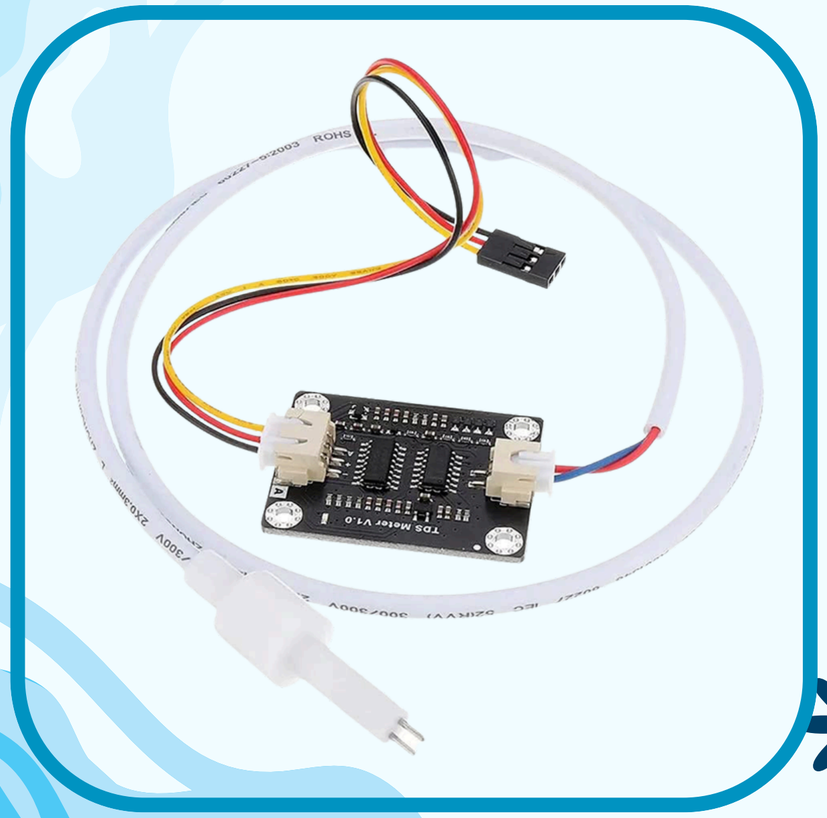
Understanding these ways allows us to focus on sustainable practices such as giving back to the ecosystem. It also helps us focus on practices such as thinking about how decisions will affect the future generation when deliberating them.

Our Device

Our device consists of a TDS, a water temperature sensor, and a camera. Together with an AI-Powered website, we are able to generate insights about fishing.







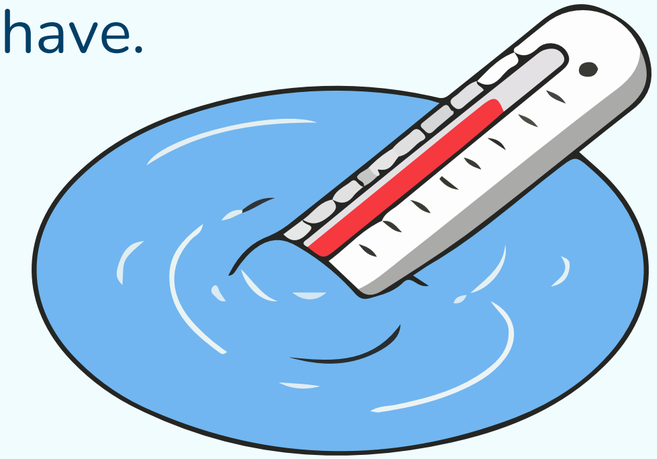
TDS SENSOR

The TDS sensor calculates the total dissolved solids like minerals, salts, and metals. It is useful to measure the conductivity of water.

Water Temperature Sensor

- This uses an embedded waterproof temperature sensor, casted in epoxy, that is dropped in water to measure the temperature.

- Water temperature dictates exactly where fish live, when they eat, and how they behave.



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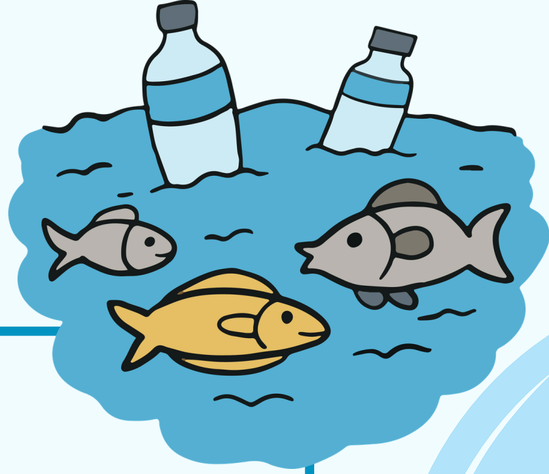
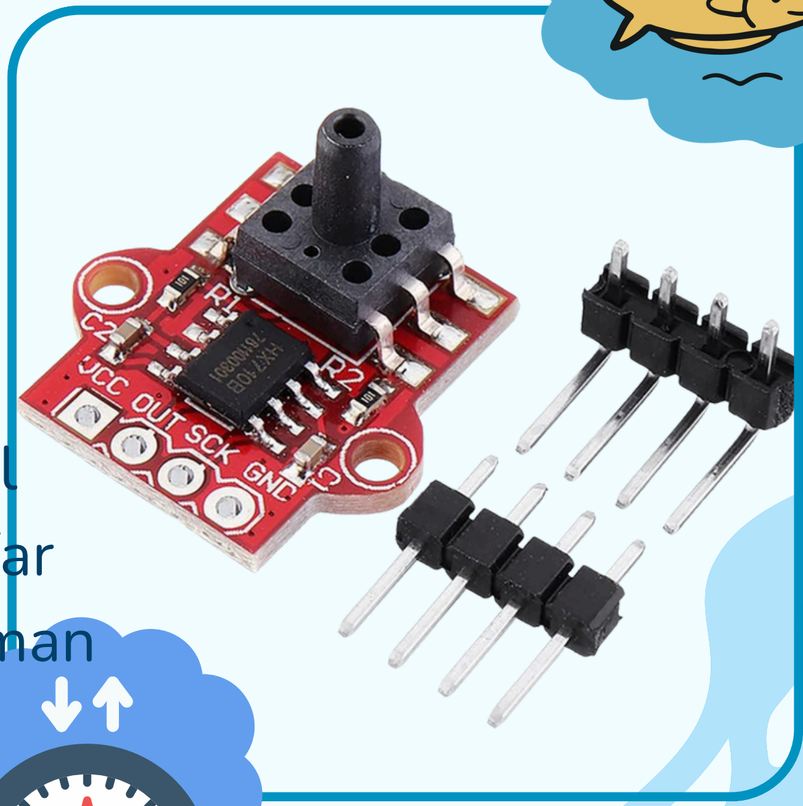
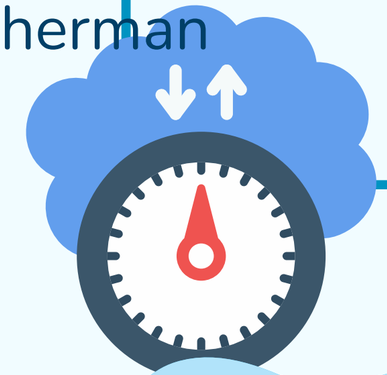
Barometric Pressure Sensor





- A barometric pressure sensor measures the atmospheric pressure.
- Even slight variations in barometric pressure will result in big changes in fish behaviour. Fish are far more in tune with their environment than fisherman realize.



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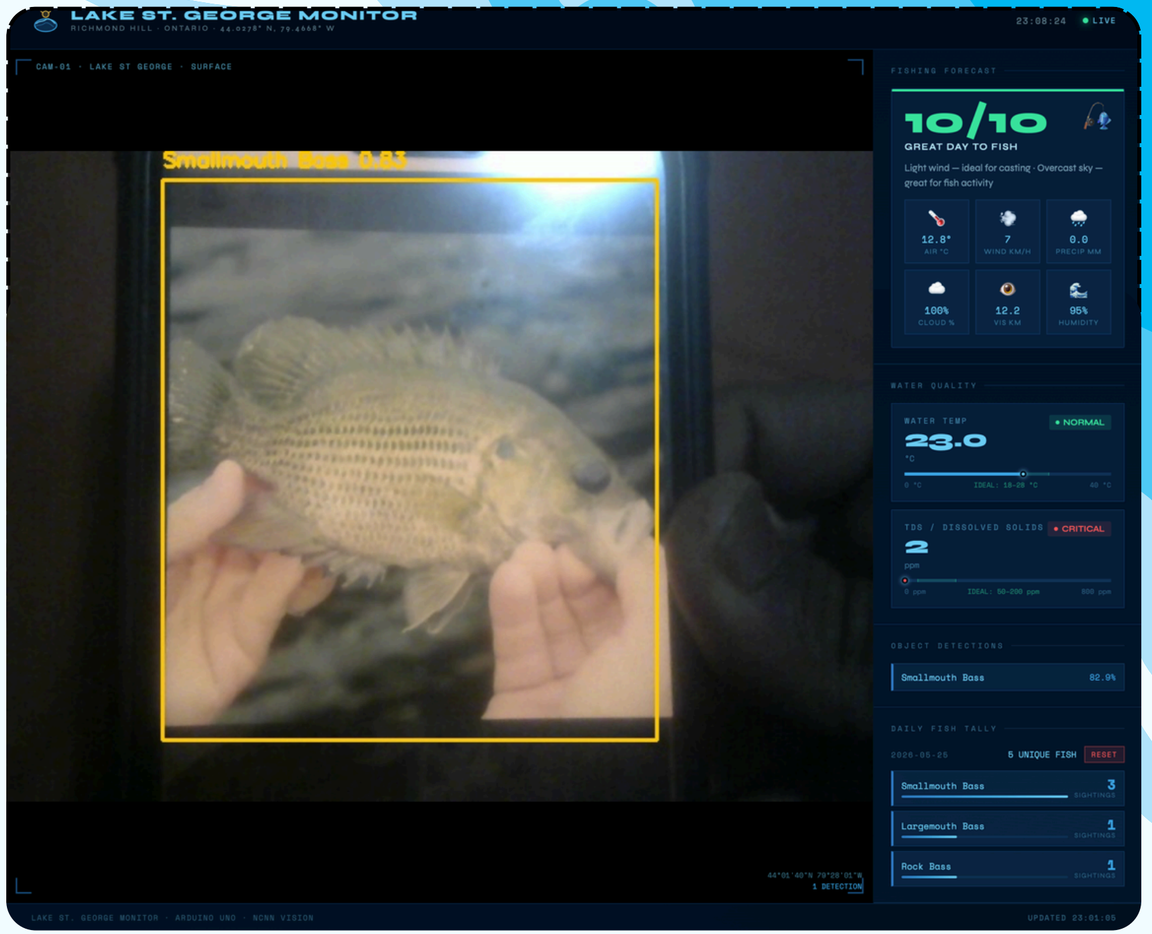
Website

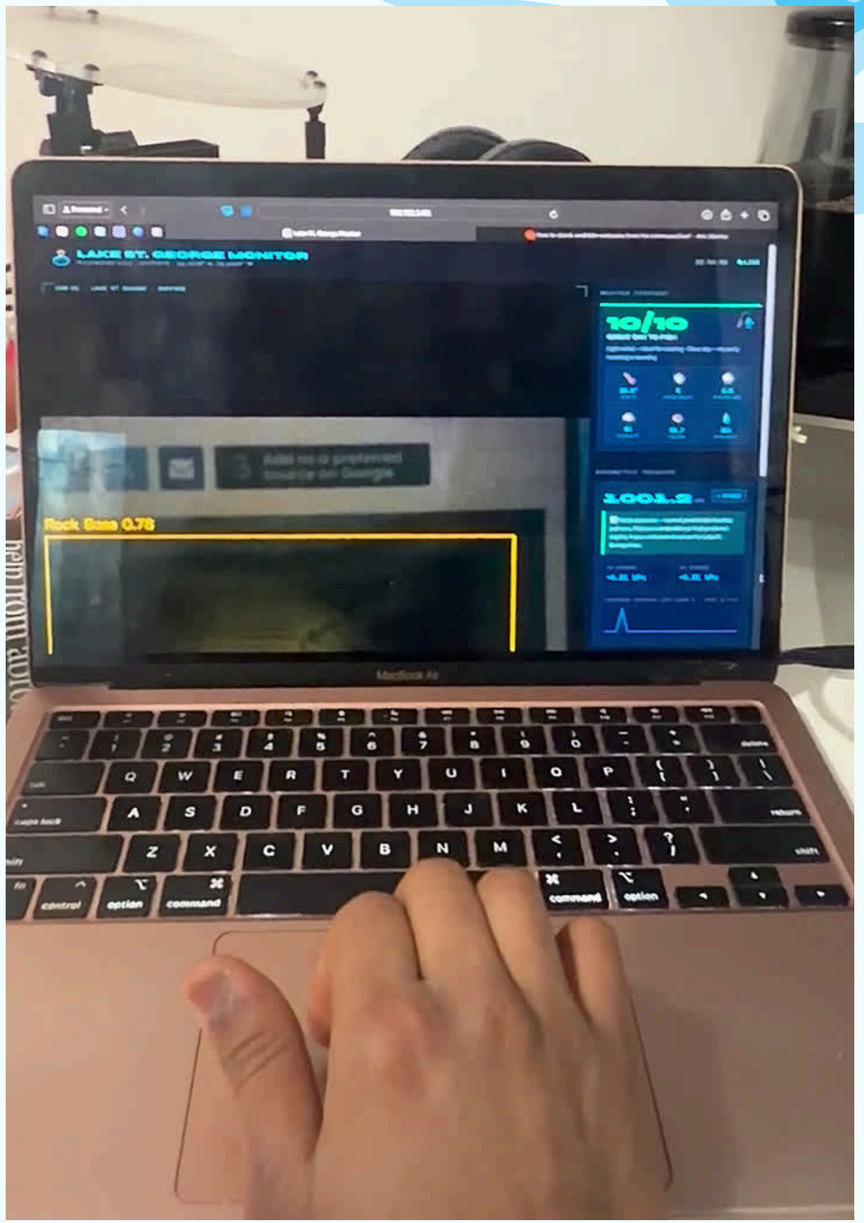
Our device has a locally-hosted website on WIFI that provides information about the different conditions in the lake.

It includes:

- API data
- Sensor data
- AI Model data



Video Demonstration



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Website Data - API

- Open Metro API is used here
- We use an API to get weather data at the lake, rating it to help fisherman determine at a glance if it's a good day to go fishing.
  - A out of 10 rating is provided to help determine conditions at a glance

- We display a compact weather forecast, along with a description at top with useful insights
  - This allows fisherman to get important insights without extensive browsing

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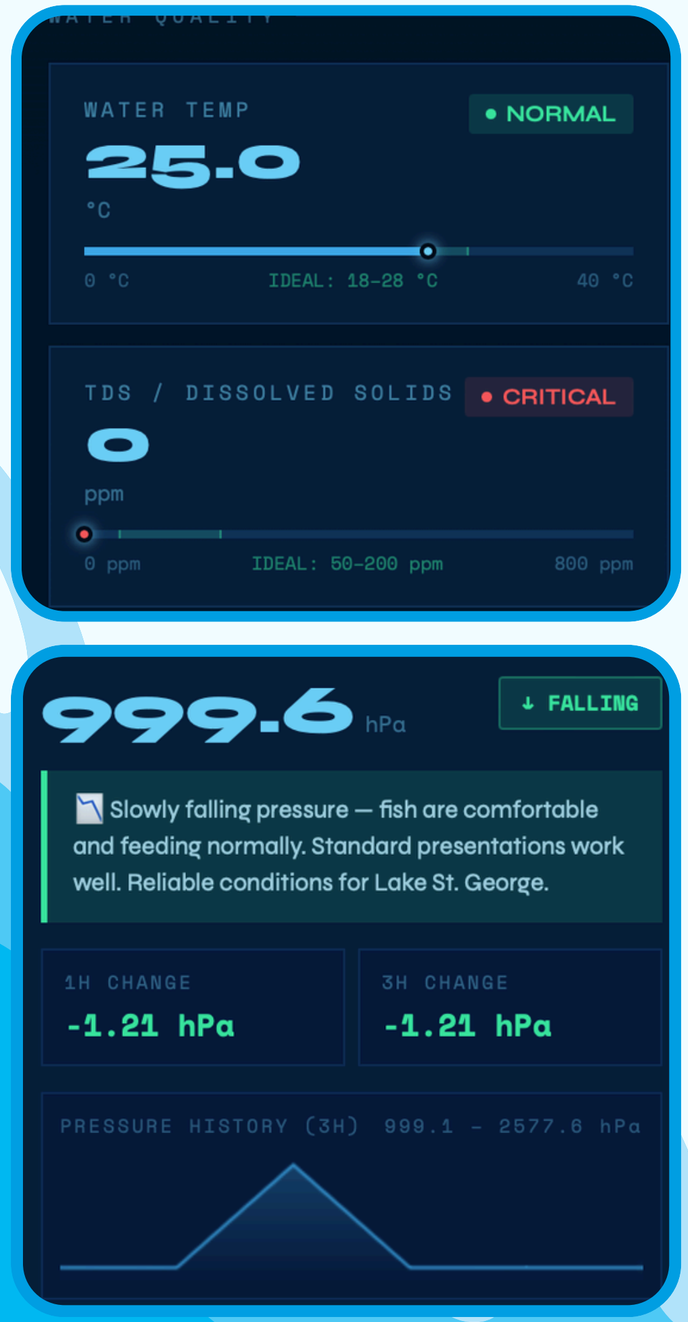

Website Data - Sensor

- This data is from the physical sensor
- The water temperature's data is detected by the water temperature sensor to help to track the lake's conditions and organisms' living environment.
  - A range is provided at the bottom to compare to ideal conditions
- We also displayed the conductivity of the water(TDS)
  - Similar to temperature, a range is also provided for this value

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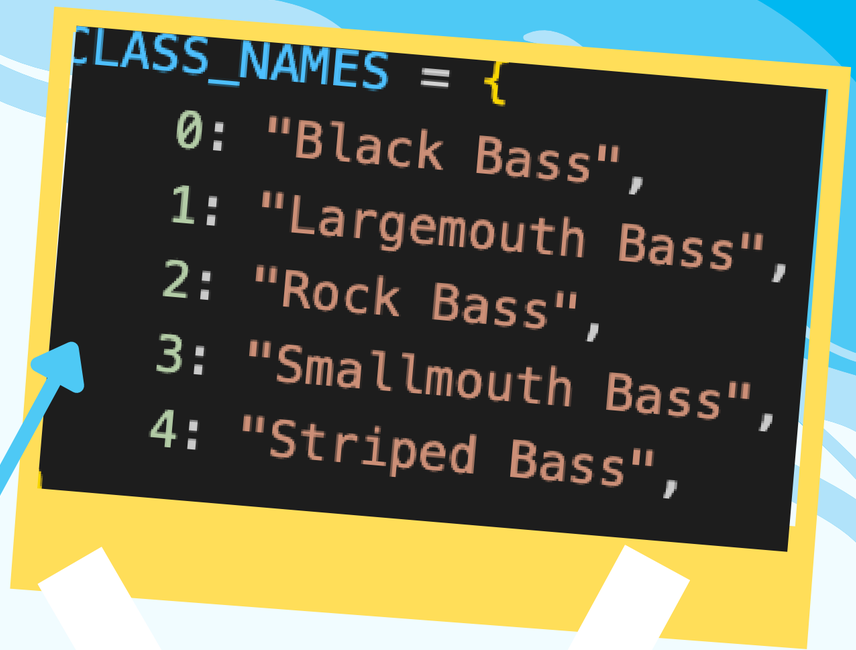
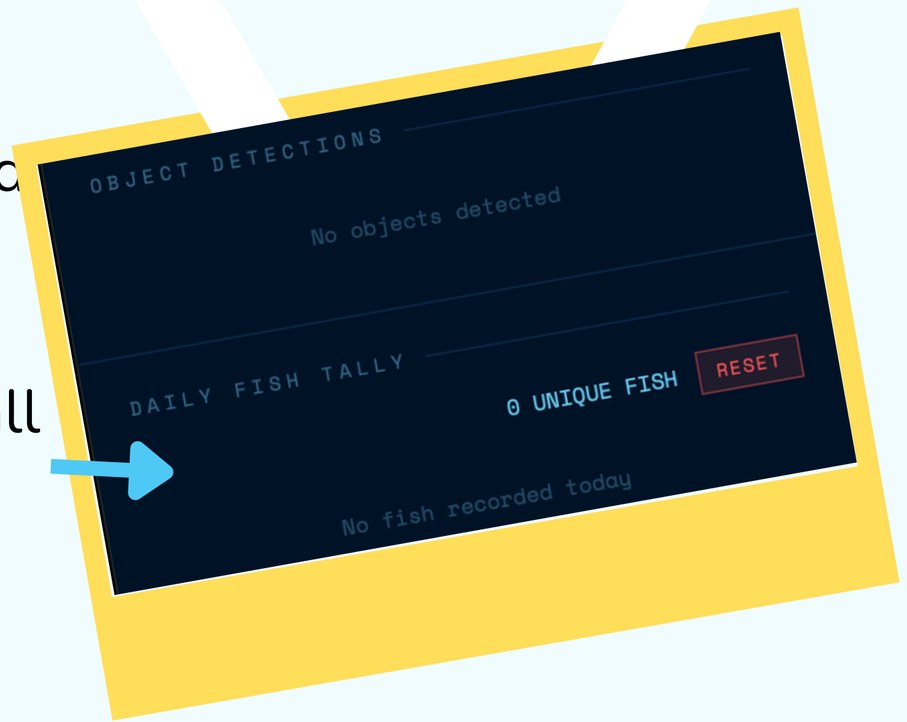
Website Data - AI Object

- We currently have an AI model that classify 5 different type of fishes (Black mass, Largemouth Bass, Rock Bass, Smallmouth Bass, and Striped Bass).
  - It classifies the fish shown in the camera feed from the camera inside the device
- This website also has an object detections and collect all the data into a show-bar that shows all the fish detected in the day .
  - It allows us to perform comparisons to ideal concentrations





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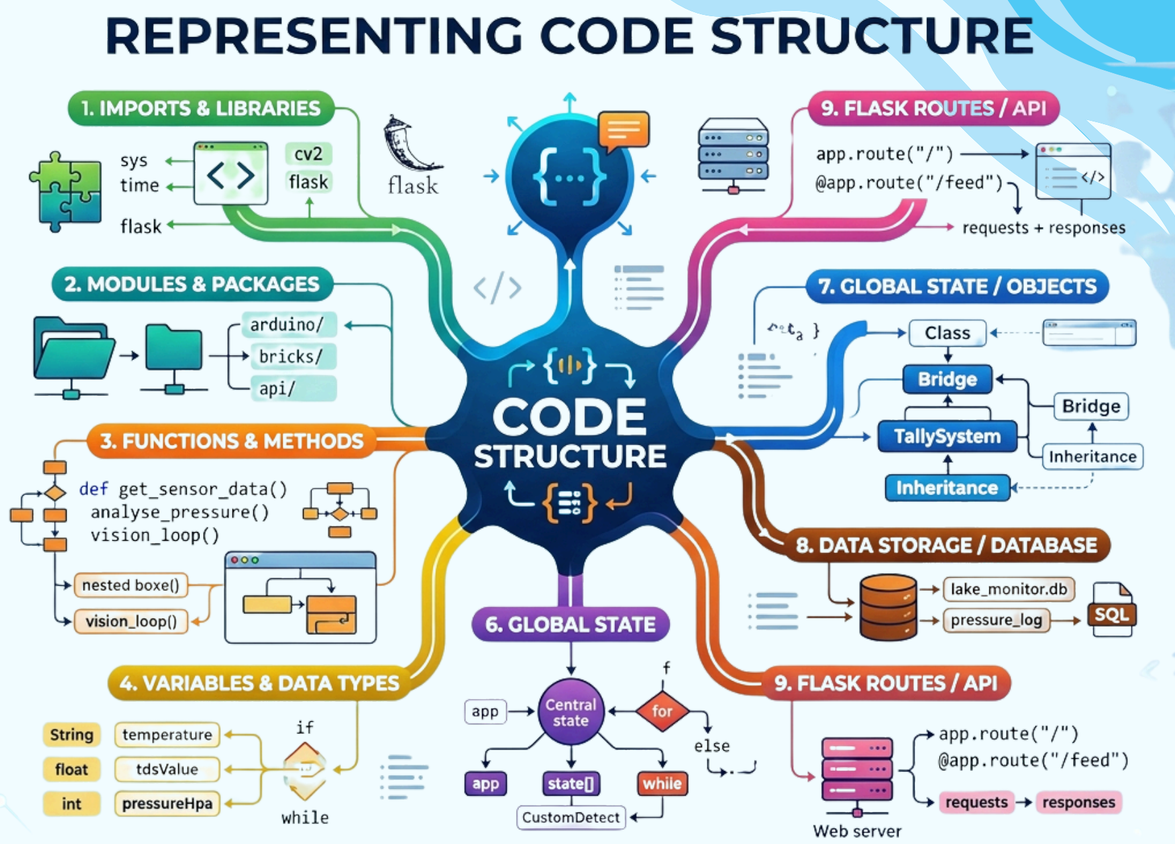
Simplified Code Structure

- Our code runs on a two-architecture microcontroller. This allows us to run both Python and C++ code
- Our C++ code measures sensor values and transfers the values to the Python code
- The Python code runs a web server, ncnn AI model, and also acts as the backend and frontend for the website using Flask

Disclaimer: the code was vibe-coded with Claude
Wiring and Design were by humans



Generated by Gemini

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APA 7 Citations

Free Open-Source Weather API/ Open-Meteo.com.(n.d). Open-Meteo.com.https://opem-Meteo.com/

Random Nerd Tutorials/ Learn ESP32,ESP8266. Arduino, and Raspberry Pi.(n.d). Random Nerd Tutorials.https://randomnerdtutorials.com/

Thank you!

Credits to:

-Claude for code generation

-Gemini for limited image generation

-Onshape for allowing us to design 3d Models for free

-Dhruv’s parents for giving him a 3d printer