Water Quality Sensor
CSU Chico Department of Civil Engineering

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PROJECT OVERVIEW

The purpose of this project was to develop a water quality sensor for use in laboratory exercises by freshman civil engineering students. The device was also to be at a much lower financial cost relative to professional devices which measure the same parameters.

Project Constraints
- Design must be useable in both creeks and fully submersed environments for periods exceeding a month or longer

- Easily change time intervals between measurements

- Use off-the-shelf instruments and components
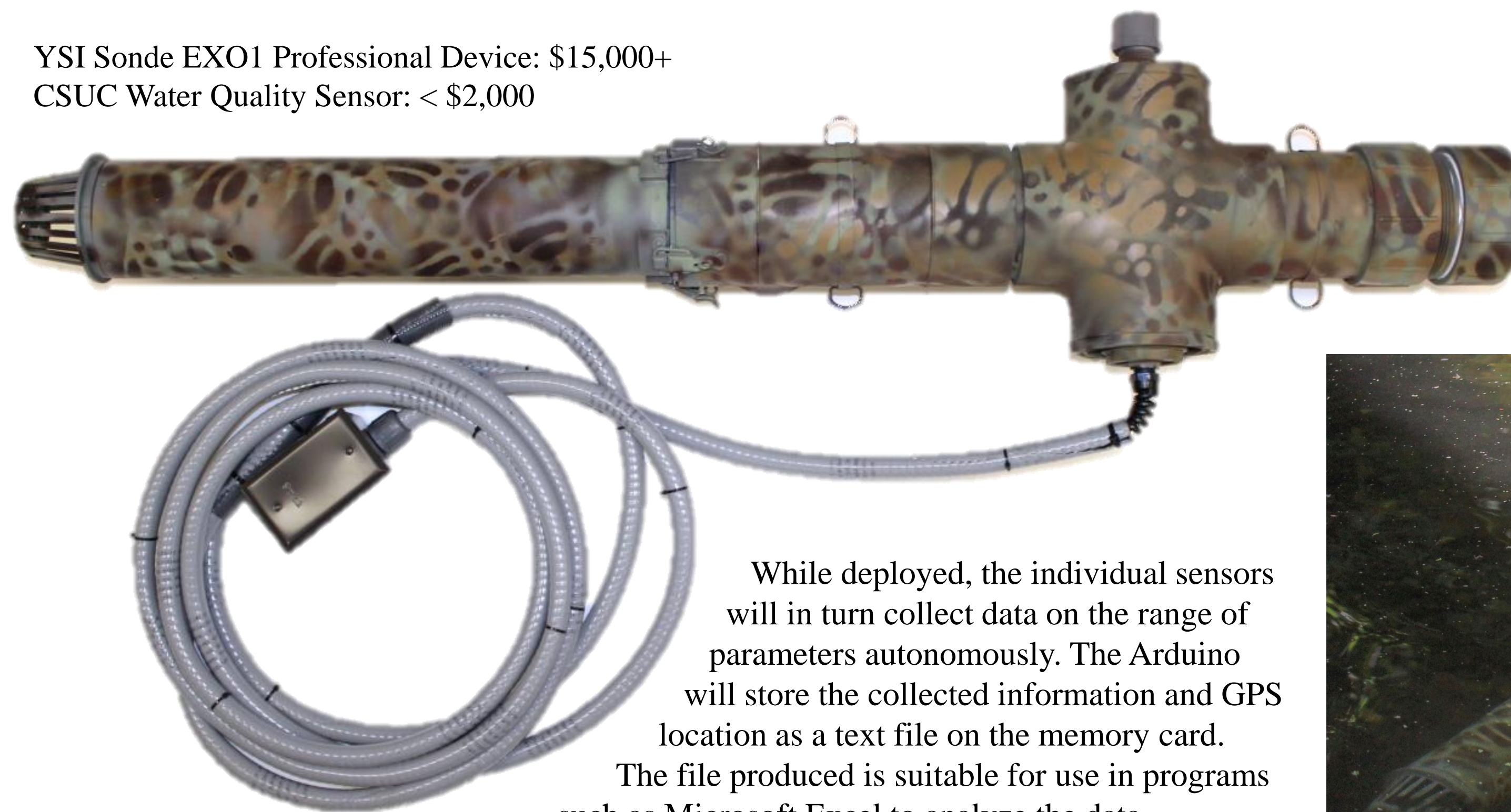
Project Objectives
- Device shall measure and calculate 7 parameters of water quality

- Device shall be submersible down to 10 feet of water

- Record deployment location and measured parameters

- Withstand fouling of instruments by algae, plants, and animals
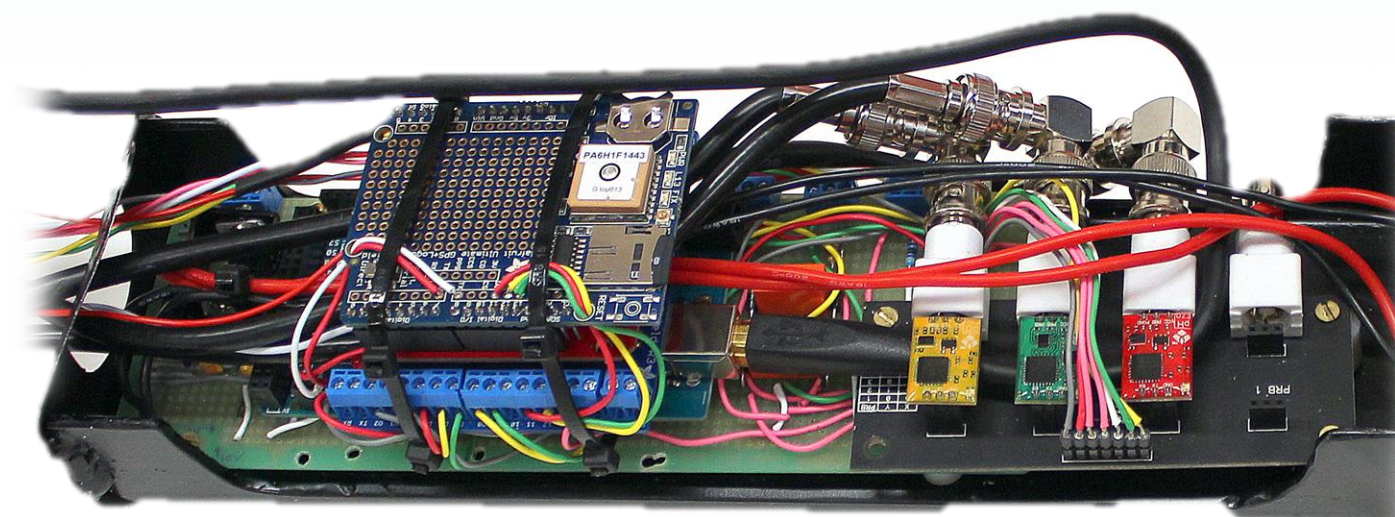
DESIGN SOLUTION

Components Selection:
- Arduino MEGA 2560 microcontroller
- (2x) 10,400mAh batteries
- PVC pipe for modular construction
- Carrying case for transportation
- USB cable to reach to surface/shore for mid-deployment interaction by the user

- Waterproofing measures:
  - Cable glands for sealing water out of electronics chamber
  - Watertight glues and seals in assembly

YSI Sonde EXO1 Professional Device: $15,000+
CSUC Water Quality Sensor: < $2,000

HOW IT WORKS

Upon powering the device, the user can then close up the case and anchor the device to its intended deployment site. While powered, the user can set up the measurement parameters and control the device remotely using the umbilical USB connection and the graphical user interface.

TESTING

Due to requirements for long-term device deployment, several extended-length tests were done, including a month-long battery drain test and setting up a simulated creek environment for monitoring bio-fouling over two months. Additional lab tests were used to validate the sensor manufacturers' specifications.
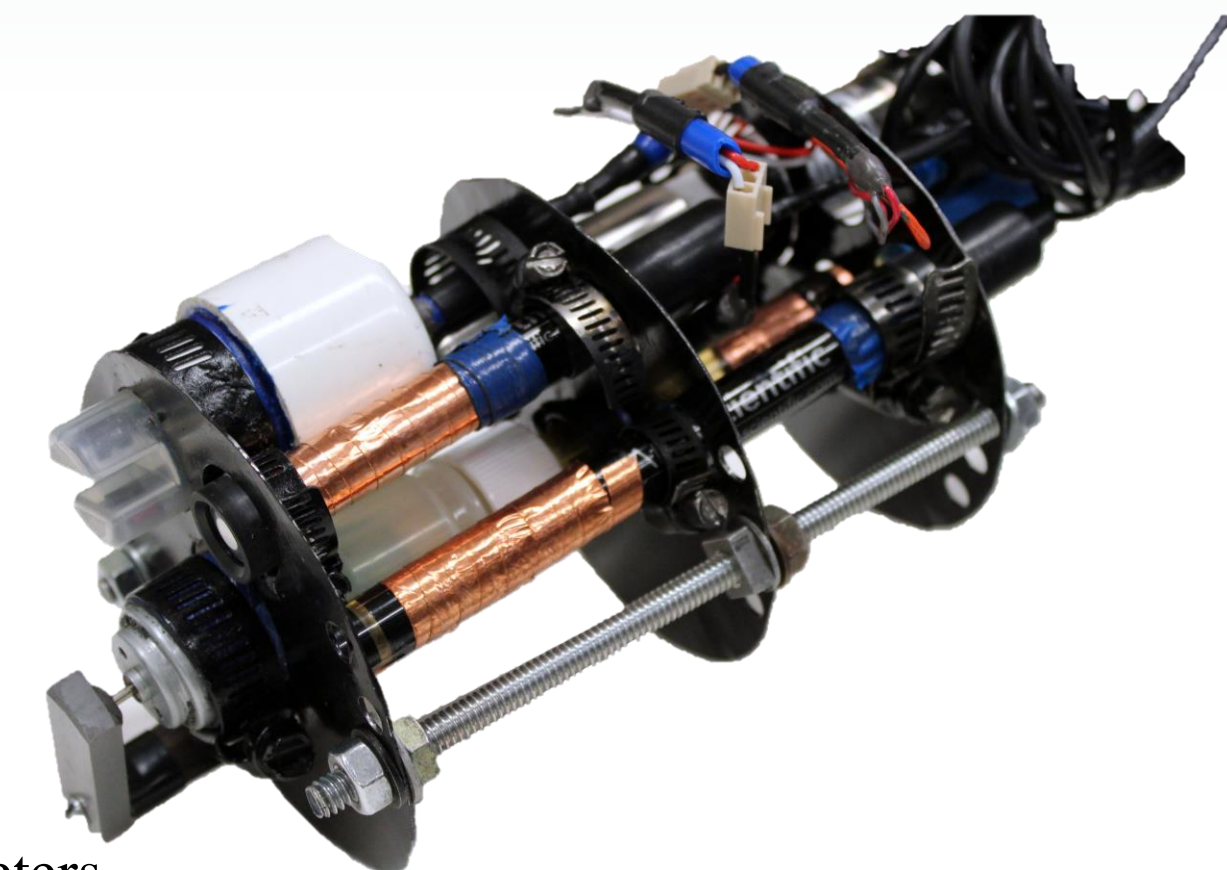
While deployed, the individual sensors will in turn collect data on the range of parameters autonomously. The Arduino will store the collected information and GPS location as a text file on the memory card. The file produced is suitable for use in programs such as Microsoft Excel to analyze the data.

Mechanical / Mechatronic Engineering Capstone Design Program

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