Autonomous Nutrient Analyzer

Student Team Members:

Andrew Silva (Team Lead)

Cameron Hayes

Timothy Ly

Tracy Hunter

Faculty Advisor: Dr. Crystal Han, Dr. Farzan Kazemifan, Dr. Maxime Grand

Project Scope and Objectives:
Design and construct an autonomous Nutrient Analyzer for measuring chemical composition of water samples.

1. Implement and integrate provided equipment including pump motors, valve motor, communication board, spectrophotometer, tubing, flow cells, auxiliary pump, holding coils, and Raspberry Pi.
   a. Developed communication protocol between microcomputer and communication board to control pumps and selector valve through communication board.
   b. Establish control of the auxiliary pump and light source using GPIO pins.
   c. Create a program that controls analyzer through developed assays for various chemical assays.
      i. Sequence involves synchronization of pumps, mixing two different chemicals, as well as repeating at desired time intervals.
   d. Integrate spectrophotometer for data collection
      i. Connect essential hardware and program for sample prep and data collection.
2. Create a housing for the components
   a. Design and build a watertight enclosure for all components.
      i. Allow for instrument to be operated in the lab and in the field.
   b. Storage container for chemical bags
      i. Container must be able to be flooded to reduce reagent contamination from oxygenation.

Project Results:
1. Successfully integrated components in splash proof enclosure.
2. Successfully designed a program for the required chemical assays
3. Designed and modified container for chemical storage.

Sponsors:

SJSU Moss Landing Marine Lab