# EAS 199B
Fishtank Project

The focus of EAS 199B is the development of a fishtank where the BASIC Stamp II microcontroller is used to measure and control the temperature and salinity of a small volume of water. The project involves fabricating the following system components:

- fishtank chamber with a built-in conductivity sensor
- wooden platform for the system
- fresh water, salty water and overflow chambers with associated plumbing
- conductivity sensor

Several other components are brought together to complete the system:

- Thermistor temperature sensor
- the Arduino microcontroller
- an LCD panel for display of system status
- two solenoid valves
- a breadboard with several cascaded transistor / relay circuits
- a resistive heating element
- a DC pump
- external power supplies to run the pump, heater and solenoid valves
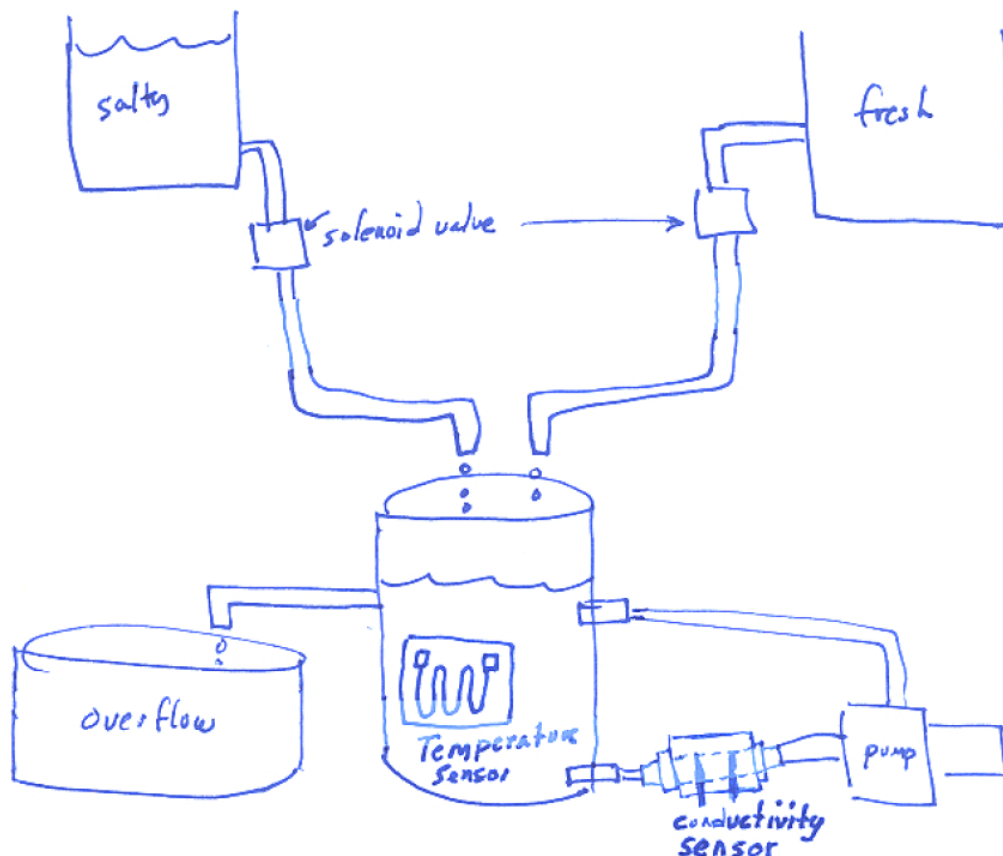
To control temperature and salinity in the fishtank, the conductivity and temperature sensors must both be calibrated. The aim is to determine the "control setpoints" for salinity and temperature that will be included in the Arduino control program. Calibration will provide these setpoints as a function of temperature and salinity so that the target salinity and temperature of the system can be quickly set in the control program. Instantaneous system status is displayed on a 20x4 character LCD panel.

The end result of the fabrication, assembly, calibration and programming will be a system that autonomously senses and controls salinity and temperature. The system will be able to maintain temperature and salinity equilibrium, and display status without human intervention, without being connected to a host computer. Working systems will be demonstrated during Class 17, and the project presentations will be presented during Class 18.

The technical presentation must include the following elements:

- 7 minute presentations where all group members participate
- System overview
- Salinity control system
  - Overview of operation (pictures)
  - Description of system components (pictures, specs, and cost)
  - Circuit diagram and explanation (power supply, transistor, relay, interface to the Arduino)
  - Calibration of conductivity sensor, equation
  - Programming and control
  - Reliability issues
- Temperature control system
  - Overview of operation (pictures)
  - Thermistor
    - Picture and operation
    - Overview of fabrication steps
    - Calibration steps and equation
  - Description of heater (design, fabrication, and specs)
  - Circuit diagram and explanation (power supply, transistor, relay, interface to the Arduino)
  - Programming and control
  - Reliability issues
- Overall system operation
- Discussion of what worked well and what could be improved

Project scores will be based on system performance and on the quality of the technical presentation.