

Designing a Robotic Buoy Controlled By an I-Device

Abstract

The Gowanus Canal, a body of water located in Brooklyn, is considered one of the dirtiest bodies of water in New York State. The goal of this project was to build a robotic buoy that would collect data using sensors and send that data to an i-device. The i-device could also control the location of the robot in the canal. The intended audience for this robot was the general public, who would learn about the environment through interacting with the robot. This project involved building a frame that could float and move in the water as well as carry the devices used to collect data on the body of water. The microcontroller had to be programmed to listen for commands from the i-device as well as send data to the i-device on a wireless network. The arduino uno was used as the microcontroller as well as the arduino motor and wifly shields. A graphic user interface was developed for an i-device that was able to send commands as well as display data from the robot's sensors. Objective c and x-code nib files were used for developing the graphic user interface.

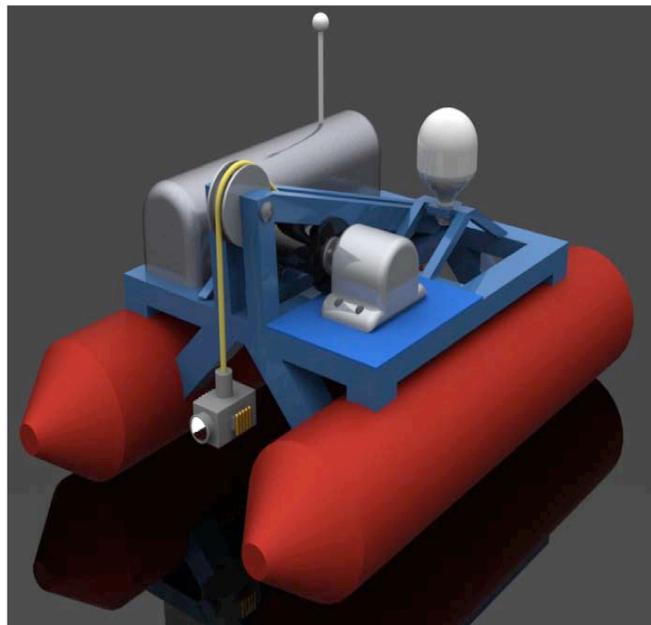
Gowanus Canal

On March 4, 2010 the Environmental Protection Agency of the United States, henceforth referred to as the EPA, placed the Gowanus canal on its Superfund National Priorities List. The EPA found the widespread presence of more than a dozen contaminants, including polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs) and various metals, including mercury, lead and copper, at high levels in the sediment in the Gowanus Canal. PAHs and metals were also found in the canal water¹.

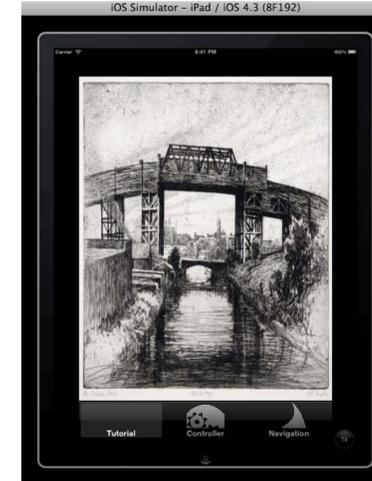


Environmental Data the Buoy Can Collect

There are several pieces of data associated with bodies of water but the ones the robotic buoy will focus on are dissolved oxygen, ph levels of the water, temperature of the water, video and the sediment of Gowanus Canal. Several of these factors have improved since the city installed a new flushing tunnel for the Gowanus but it would be a powerful learning tool for students to see how these indicators change throughout the year.



Welcome Screen



Navigation Screen



Results

Initially the robot was planned to have only the camera and temperature sensor but it would be more useful if the robot collected data on Dissolved Oxygen, pH level and sediment data. There are digital sensors available for detecting pH levels and dissolved oxygen in water. However, sediment sensors are not as available and might need to be designed. The original design did not include an anchor but one is needed. Due to time constraints the summer project stopped when it was time to add the motors to the robot. What was complete was the frame, the beginning of the GUI for the iDevice and initial programming of the arduino.

