Development of an Air Quality Measurement Module for an Aquatic Mobile Robot

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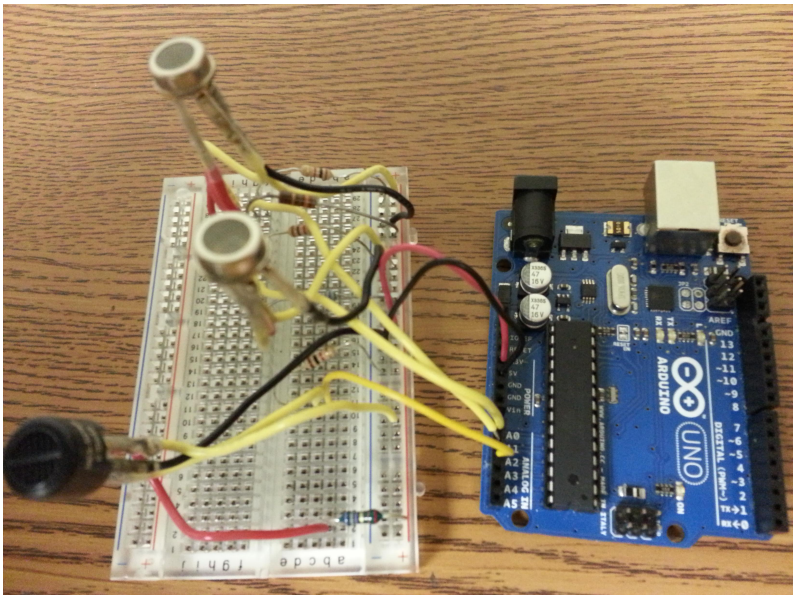
Research

Title: Development of an Air Quality Measurement Module for an Aquatic Mobile Robot

The Brooklyn Atlantis Project (the project) is a citizen science project which began in 2011. The objectives of the project are to: (1) develop a model which will enable members of the public to take part in scientific research through the combined use of machines and a web-based peer production system operated by volunteers, and (2) develop a cyber-human infrastructure for real-time monitoring and hazard detection of the natural environment. In the project, marine sensor units are mounted on an aquatic mobile robot (the robot). The robot is deployed into the Gowanus Canal in Brooklyn, NY, once each week to collect water quality data (dissolved oxygen, pH, water temperature, and conductivity) and take photographs both above and below water. Members of the public who wish to participate in the project assist with tagging images collected by the robot and have access to the water quality data. In this research project, we enhanced the environmental monitoring capabilities of the robot with the development of a module consisting of a sensor array to collect air quality data (Carbon monoxide/Volatile Organic Compounds (VOCs), Nitrogen Dioxide, Ozone) and associated weather data (humidity, temperature, barometric pressure).

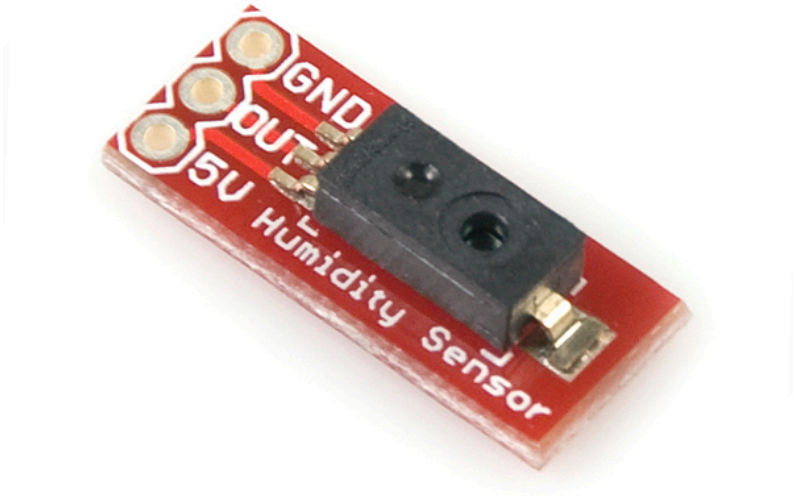


Prototype sensor circuitry interfaced with an Arduino Uno and Channa and Dwight in a boat with ARV to their left in Gowanus Canal

Lesson Plan

Title: Sensing Weather

Mechanical and electrical engineers are involved in the design and building of weather instruments and their electrical components. Scientists use these instruments to collect weather data for forecasting and analyzing trends. All engineers use the engineering design process to create the best solutions to a given problem. In this two-part lesson, students will learn how sensors are used in weather instruments and how scientists use weather instruments to track weather. In the first part of the activity, students will assemble a simple temperature and humidity sensor with electronics circuitry and microcontrollers and use the design process to create a housing for their sensory system. In the second part of the activity, students will use their weather sensors to collect weather data over the course of seven days, display the data, and analyze the data to determine trends and relationships between weather factors.



Temperature Sensor