Demo Abstract

Title: NAMOS: Networked Aquatic Microbial Observing Systems
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As part of our research, we have designed and developed sensor-actuated network for marine monitoring. The network consists of ten static buoy nodes and one mobile robotic boat for real-time in-situ measurements and analysis of chemical, physical and biologically pertinent phenomena governing the abundance of micro-organisms at relevant spatio-temporal scales. The goal of the network is to obtain high-resolution information on the spatial and temporal distribution of plankton assemblages in aquatic environments using the in situ presence afforded by the network, and to make possible network-enabled robotic sampling of hydrographic features of interest. This work constitutes advances in (1) real-time observing in aquatic ecosystems and (2) sensor-actuated sampling for biological analysis.

Ultimately such systems will be able to establish patterns in the sensed data, and use their mobility to adapt sample collection, a major step forward in the use of embedded networked sensing in aquatic ecosystems. The field work has demonstrated the basic functionality of the system. The data collected from the deployments revealed interesting spatio-temporal patterns of chlorophyll, and were useful to validate the design of the buoys and the boat. Static buoys provide low-resolution spatial sampling with high temporal resolution while a mobile robot boat provides high resolution spatial sampling with low temporal resolution.

As part of the demonstration, we will be having our robotic boat at the event equipped with its sensor suite. The robotic boat is equipped with sensors for navigation, instrumentation for data gathering (temperature and chlorophyll) and can communicate with other entities in the environment over wireless 802.11b network and exchange information with them. As part of its capabilities, the boat can be hand-driven via an RC-controller or computer interface. Alternately, a user can specify a path for the boat in terms of gps locations to go to (in order) and the boat can than traverse the path autonomously and collect environmental data as it moves which can be streamed back and analyzed.

We will also have on display our results from experiments with autonomous boat navigation and navigation improvements by running a simple EKF.