

# Oceanography Seminar

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### *"OOI for the rest of us: Emergent low-cost electronics and open-source software for democratizing ocean sensor technology"*

Environmental sciences suffer from undersampling. Enabling sustained and unattended data collection typically involves expensive instrumentation and infrastructure deployed as cabled observatories or moorings with little flexibility in deployment location following initial installation. High cost of commercially-available or custom electronic packages have not only limited the number of sensor sites that can be targeted by reasonably well-funded academic researchers, but have also entirely prohibited widespread engagement with 7-12, public non-profit, 'citizen scientist', and even undergraduate and graduate STEM audiences.

Presented here is a novel, low-cost, open-source instrumentation and software platform to enable wireless data transfer of biogeochemical sensors in the coastal zone. The platform is centered upon widely available, low-cost, single board computers and microcontrollers. The development of the platform represents a balanced blend of on-hand research-grade sensors and low-cost open-source electronics that can be assembled by tech-savvy non-engineers. Robust, open-source code that remains customizable for specific *miniNode* configurations can match a specific site's measurement needs, depending on the scientific research priorities.

We have demonstrated prototype capabilities and versatility through lab testing and field deployments of multiple sensor nodes with multiple sensor inputs, all of which are streaming near-real-time data from Kaneohe Bay over wireless RF links to a shore-based base station. On shore, first-pass data processing QA/QC takes place and near-real-time plots are made available on the World Wide Web:

[http://grogdata.soest.hawaii.edu/project\\_info/](http://grogdata.soest.hawaii.edu/project_info/)

We have worked closely with an environmental and cultural management and restoration non-profit organization, Paepae o He'eia, and middle and high school science classes, engaging their interest in STEM application to local watershed processes. Ultimately, continued successful development of this pilot project could ultimately lead to a coastal oceanographic analogue of the popular *Weather Underground* personal weather station model.

**Thursday    January 19<sup>th</sup>, 2017    3:00 p.m.    MSB 100**