Tampa Bay Becomes "Smart Bay" With Well-Placed Sensors

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A demonstration in July in which scientists and engineers from the University of South Florida placed sophisticated, small, rugged sensors at strategic points in Tampa Bay and downloaded data from them wirelessly illustrated how public, private, scientific and academic communities could remotely monitor a number of bay conditions.

"Our broadband wireless coastal sensor network project has developed and deployed multiple wireless sensors capable of monitoring biological, chemical and physical targets that affect Tampa Bay and send that 'real-time' information back to shore," said David Fries, the project's principle investigator from the College of Marine Science's Center for Ocean Technology.

The wireless capability, said Fries, is the newest step in making sensing systems more effective.

"The focus of the project is to develop a coastal security system and improve marine ecosystem protection and management," he explained. "Additional applications can be in waterway transportation and supporting ocean forecasting models."

The sensors are examples of micromachine technology called Micro-Electro-Mechanical-Systems (MEMS). One key demonstrated device was a low cost salinity sensor made of waterproof printed circuit MEMS materials.

According to Fries, for a large network to be deployed, sensors with communications abilities must be low power, inexpensive and rugged, standing up to whatever the marine environment dishes out, including hurricanes, changes in salinity and fresh water input, hazardous materials spills and land run-off.

The water quality component of the sensing network will eventually monitor chlorophyll, turbidity, dissolved oxygen and other biogeochemical qualities.

Ocean sensing systems are an emerging reality, but the pace of growth has been hindered by its expense.

"The immediate problem for ocean sensor network growth is not a lack of technologies, but the lack of a means to deploy a high density of measurement devices inexpensively," explained Fries.

Accordingly, the USF team believes many of the sensors needed for effective ocean observation can be further miniaturized.

"Sensors for imaging, pressure, temperature, biochemical traces and pathogens can all be reduced in size and combined and employed to get a better understanding of what is happening underwater," said Fries. "We have already developed a self-contained, network of fieldable microsensors fabricated with micromachine technology."

The next step, and one which is well underway, is integrating the broadband sensor network with small, autonomous vehicles and more sensors into an adaptive network.

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