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Smartphones, Floating Robots Used To Track Water Flow

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Researchers at the University of California at Berkeley want to make tracking the flow of a body of water as simple as tracking other phenomena, like weather patterns or the flow of traffic.

In the pursuit of this goal, they have developed the Floating Sensor Network project, a system comprised of 100 motorized devices that measure temperature, salinity, and other information as they drift along a water surface.

The fleet of buoys, which was field tested last week, are equipped with a variety of sensors, a GPS device, and a smartphone that relays information back to a monitoring location. During the test, scientists launched the devices into the Sacramento-San Joaquin River Delta. The resulting data gathered from the river was at a level and resolution never seen before.

The project is led by associate professor Alexandre Bayen, a researcher at the UC Center for Information Technology Research in the Interest of Society (CITRIS). According to Bayen, the experimental network utilizes existing technology to upgrade the current water monitoring systems.

“We are putting water online,” said Bayen, who holds joint appointments in UC Berkeley’s departments of electrical engineering and computer sciences and of civil and environmental engineering. “Monitoring the state’s water supply is critical for the general public, water researchers and government agencies, which now rely upon costly fixed water sensor stations that don’t always generate sufficient data for modeling and prediction.”

Researchers say the network could be useful in a variety of ways. Recreational boaters or fishermen could use information gathered and archived online. Other scientists could use the information in conjunction with their

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research. The network could even be deployed in the event of an emergency, such as a chemical spill or flood.

“If something spills in the water, if there’s a contaminant, you need to know where it is now, you need to know where it’s going, you need to know where it will be later on,” said Andrew Tinka, the lead graduate student on the project. “The Floating Sensor Network project can help by tracking water flow at a level of detail not currently possible.”

Each device works by periodically sending information back to the monitoring station using the cellular phone network and short-range wireless radios. The research team developed an application for the Andriod OS that performs all the computational functions necessary for the device to work.

The buoys are outfitted with small motors that allow them to move around obstacles or area of interest. This means that the devices must be monitored closely for researchers to gather relevant data.

“The major constraint on floating sensors in inland environments is their tendency to get stuck on the shores,” said Tinka. “Currently, using floating sensors requires close human supervision. We are developing autonomous, actuated sensors that can use propulsion to avoid obstacles.”

In addition to the Floating Sensor Network, the UC Berkeley team is developing other aquatic sensors that are capable of diving to specified depths. These prototypes could also be equipped with sensors able to map out the shape of the channels and waterways in which they float.

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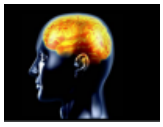
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