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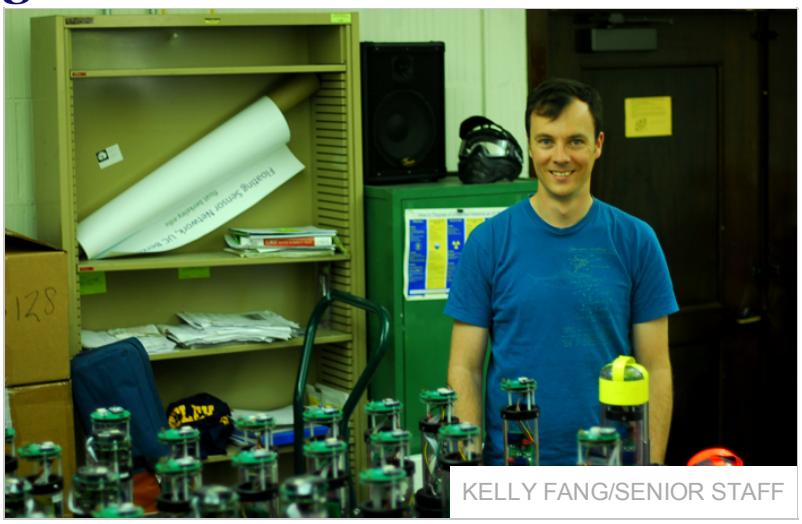
UC Berkeley robot fleet takes over California waterways to gather data



KELLY FANG/SENIOR STAFF

BY KELLY FANG | SENIOR STAFF LAST UPDATED 1 DAY AGO

Combining smartphone technology with robotics, a UC Berkeley research team created a fleet of floating robots that they first launched on May 9 to gather data about freshwater flows in rivers and deltas.

The goal of the project, officially called

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the Floating Sensor Network, is to use robots that will move with the water to provide detailed, real-time maps of water flow and other information to better understand California's inland waterways.

The robots come in two types of models — active and passive, according to Andrew Tinka, the project's lead graduate student researcher. The active models have the ability to navigate around obstacles in rivers and streams, while the passive models drift along with the water's current. While active models have built-in GPS systems, passive models are instead equipped with GPS-enabled smartphones that run an Android application that transmits data back to researchers.

According to Tinka, one reason for using smartphones in the passive models is the lower cost.

"The price for developing a specific measurement technology or tool for the robots costs around $500," Tinka said. "Compare that to a $200 smartphone. The cost is much lower, especially because we're only building 100 models."

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Associate Professor in Civil and Environmental Engineering Alexandre Bayen, the lead researcher on the project, used GPS-enabled smartphones to monitor traffic flows in his earlier research. Similar smartphone capabilities are being explored in the current project as well.

The research team is also collaborating with the Lawrence Berkeley National Laboratory, and has developed a computational platform that will eventually run online in real-time to interpret and assimilate the data gathered from the robot fleet.

Qingfang Wu, a UC Berkeley graduate student researcher heading the data assimilation side of the project, said that in contrast to using only two sensors at two different points in the

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river, such as the ones used by the U.S. Geological Survey, this project is able to gather data from 100 different points, covering the whole area and providing more information about waterways in California than before.

Wu helped to develop the statistical computing models that process and interpret the data the robots send back to researchers.

“The challenge on the computing side is to take all this information and find the most useful information, to be able to interpret it and to use all that data in the best way,” Wu said.

Carolyn Remick, director of the Berkeley Water Center who has been following the project, says the biggest difference is that it provides a stable monitoring system that can track water movement and give a better picture of California water flows.

Tinka said he was excited for the large number of robots being used to solve the problem of water monitoring and also the smartphone technology involved in the project.

“We are taking a numerical approach and the idea is to get the job done through numbers instead of using only one sophisticated robot,” Tinka said. “Robotics can be used in unexpected and strange ways. There are new options on the table for researchers.”

Alexandre Bayen, Andrew Tinka, Berkeley Water Center, Carolyn Remick, Floating Sensor Network, Lawrence Berkeley National Laboratory, Qingfang Wu, robots, U.S. Geological Survey

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