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Open-source surface watercraft for Riverscape mapping

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Most river system analyses use either intensive, small-area surveys, or extensive, low-resolution surveys. Recent research trends have shown that both high-resolution and river-extent information are necessary to understand fundamental questions of river processes including patterns of critical habitat, sediment links, and river instability. As part of a larger NSF-funded research project, we have developed an open-source, boat-based mapping approach to measure river geometry, sediment size patterns, hydraulic habitats, and riverbank erosion patterns. The custom catamaran design we have developed integrates off-the-shelf, lower-cost sensors including high-resolution RTK/PPK GPS, inertial measurement (IMU), side-scan sonar, single-beam sonar, temperature, and a multi-camera array for 3D mapping above and below water. The design is meant to be “garage build friendly”, utilizing a minimum number of common tools and basic construction techniques. The sensor package will be user-friendly enough for non-expert use, allowing the boat to be deployed for citizen-science based data collection by loaning it to groups like watershed councils or volunteer conservation organizations. This will allow data to be collected over larger areas in less time than would be possible by “expert” researchers. The boat designs and software are developed as an open-source project and all hardware and software and will be made public as our testing and validation progress.