Caldwell’s dissertation research is sponsored by the Office of Naval Research STEM Education and Workforce Program. Her research involves working with an interdisciplinary team comprised of engineering education, mechanical engineering and computer science researchers to develop, evaluate, and broadly disseminate an open-source, mobile flow visualization and measurement tool for STEM outreach and engineering education in the area of fluid mechanics.

Because undergraduate engineering fluids courses focus almost exclusively on mathematical problem solving, fluid mechanics can serve as a “gate-keeper” course that dissuades students from pursuing degrees in engineering disciplines related to fluids, such as naval, ocean and mechanical engineering. The tool, called mobile Instructional Particle Image Velocimetry or “mI-PIV,” integrates state-of-the-art optical flow field imaging techniques used in research and industry with mobile hardware and LED laser pointers to provide learners capability to visualize and experiment with planar flow fields in real-time. Minichiello and Caldwell envision that mI-PIV can improve participation in fluid mechanics and associated engineering degrees by supporting early development of student interest and intuition about fluid flow concepts via hands-on activities in high school STEM outreach programs and in undergraduate engineering courses.

WE Local is a Society of Women Engineers program developed to bring the energy and networking of SWE annual conferences to members around the world on a regional scale.

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