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Smartphone PIV DAVID ARMIJO, LORI CALDWELL, SARBAJIT MUKHERJEE, VLADIMIR KULYUKIN, ANGELA MINICHIELLO, TADD TRUSCOTT, Utah State University — We are developing a smartphone app that performs particle image velocimetry (PIV). This app is called Mobile Instructional Particle Image Velocimetry (miPIV). The intent is to increase the availability of PIV systems to high school and undergraduate students. PIV is used to measure the velocity within a flow field by illuminating neutrally buoyant particles with a laser sheet and recording the motion with a video camera. In miPIV the particles are illuminated with a laser pointer spread into a laser sheet, and the camera is a smartphone. Here, the work is advanced by integrating the image capture, pre-processing, PIV calculations, and vector output post-processing onto a mobile device. The Java app will be compatible with any smartphone running Android 5.0 Lollipop (API 21) or higher. The system accuracy is benchmarked by comparing a free stream flow field miPIV output with a lab grade system. Results indicate that the system performs well where the illumination quality is high and the flow speeds are below the motion blur limit. Even when these perfect scenarios are not met, students can see flow structures and average velocities that reveal information about the flow field in a way that can inspire them to further study fluid mechanics and its applications

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