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Dynamics of droplets on COVID-19 transmission via a soft wireless device and Particle Tracking Velocimetry JIN-TAE KIM, HYOYOUNG JEONG, YOUN J. KANG, Northwestern University, LEONARDO P. CHAMORRO, University of Illinois at Urbana-Champaign, JOHN A. ROGERS, Northwestern University — Fundamental understanding of droplet dynamics generated by various breathing activities and testing strategies for COVID-19 with widespread availability become critical components for containing the pandemic and preventing other droplet transmission diseases. To directly address needs in COVID-19 monitoring and investigation of droplet dynamics, simultaneous measurements are performed via a thin, flexible, wireless, wearable sensor that consists of a wide-bandwidth inertial measurement unit as well as a precision temperature sensing unit, and Particle Tracking Velocimetry (PTV). The flexible sensor mounts on the suprasternal notch for accurate recordings of the respiratory activity, and offers the advantage of non-invasive and continuous monitoring. PTV allows for the quantification of the size distribution of generated droplets and Lagrangian dynamics of individual droplet trajectories. We particularly focused on the frequency, intensity, and duration of several respiratory activities, such as coughing, talking, and laughing. The work provides a framework for ongoing clinical studies on actual patients at the Northwestern Memorial Hospital in Chicago and a crucial understanding of unusual infectious individuals, the so-called "Superspreaders".

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