

A big world of tiny motions

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We have developed a “motion microscope” to visualize small motions by synthesizing a video with the desired motions amplified. The project began as an algorithm to amplify small color changes in videos, allowing color changes from blood flow to be visualized. Modifications to this algorithm allow small motions to be amplified in a video. I’ll describe the algorithms, and show color-magnified videos of adults and babies, and motion-magnified videos of throats, pipes, cars, smoke and pregnant bellies. These algorithms are being used in biological, civil, and mechanical engineering applications.

Having this tool led us to explore other vision problems involving tiny motions. I’ll describe recent work in analyzing fluid flow and depth by exploiting small motions in video or stereo video sequences caused by refraction of turbulent air flow (joint work with the authors below and Tianfan Xue, Anat Levin, and Hossein Mobahi). We have also developed a “visual microphone” to record sounds by watching objects, like a bag of chips, vibrate (joint with the authors below and Abe Davis and Gautam Mysore).

Collaborators: Michael Rubinstein, Neal Wadhwa, and co-PI Fredo Durand.

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