A skin-deep secret—why a fingertip on the palm can be felt as vibration elsewhere

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Credit: Unsplash/CC0 Public Domain

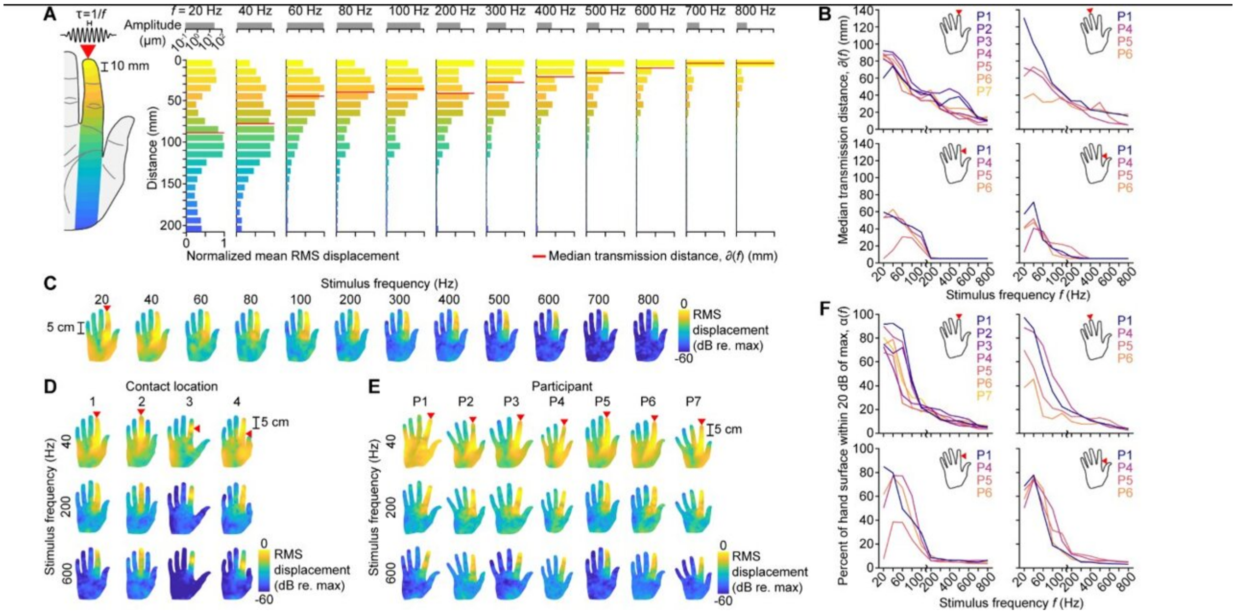
It is not unusual to feel vibrations at another spot on your hand when pressing your fingertip against your palm. It is how the body interprets reality. Your skin interprets and redistributes touch stimuli unexpectedly, serving as a neural sieve.

Imagine pressing your finger into one spot on your palm but feeling the faint vibration elsewhere on your hand. This isn't a trick of the mind; it's how your hand truly works. The skin doesn't just relay contact; it actively reshapes and spreads the signal in surprising ways. This hidden "wave machine" in the palm diversifies what our sensory neurons sense—a trick that ultimately makes our sense of touch more efficient.

What's unusual about this? By considering the Pacinian corpuscles (PCs) we can arrive at the answer. PCs are sensory structures in the skin that detect vibration and pressure deep within us. The fibers, generally referred to as PCs, show sensitivity to vibrations and react when there is a high-frequency (say, 200–300 Hz, i.e., fine vibration stimulus) stimulus occurring at a large receptive field (centimeter distance stimuli are received).

In most previous experiments involving touch perception, only the direct contact between an object and skin was studied. However, in actuality, the entire hand experiences mechanical stimulation with each touch.

To shed light on this phenomenon, in a new study, scientists have used a laser vibrometer with the model to measure skin vibrations caused by the same "impulse" touches given to different parts of the hand. The paper is published in the *Journal of the Royal Society Interface*.



This diagram illustrates how vibrations spread across the hand. Notice how low-frequency stimuli (e.g., 20 Hz) cause widespread oscillations across a larger area of the hand, while high-frequency stimuli (e.g., 800 Hz) remain concentrated near the point of contact. This visual demonstrates the hand's frequency-dependent biomechanical filtering. Credit: Neeli Tummala et al, Biomechanical filtering supports efficient tactile encoding in the human hand, *Journal of the Royal Society Interface* (2026). DOI: 10.1098/rsif.2025.0793

Your palm's secret bass and treble clef

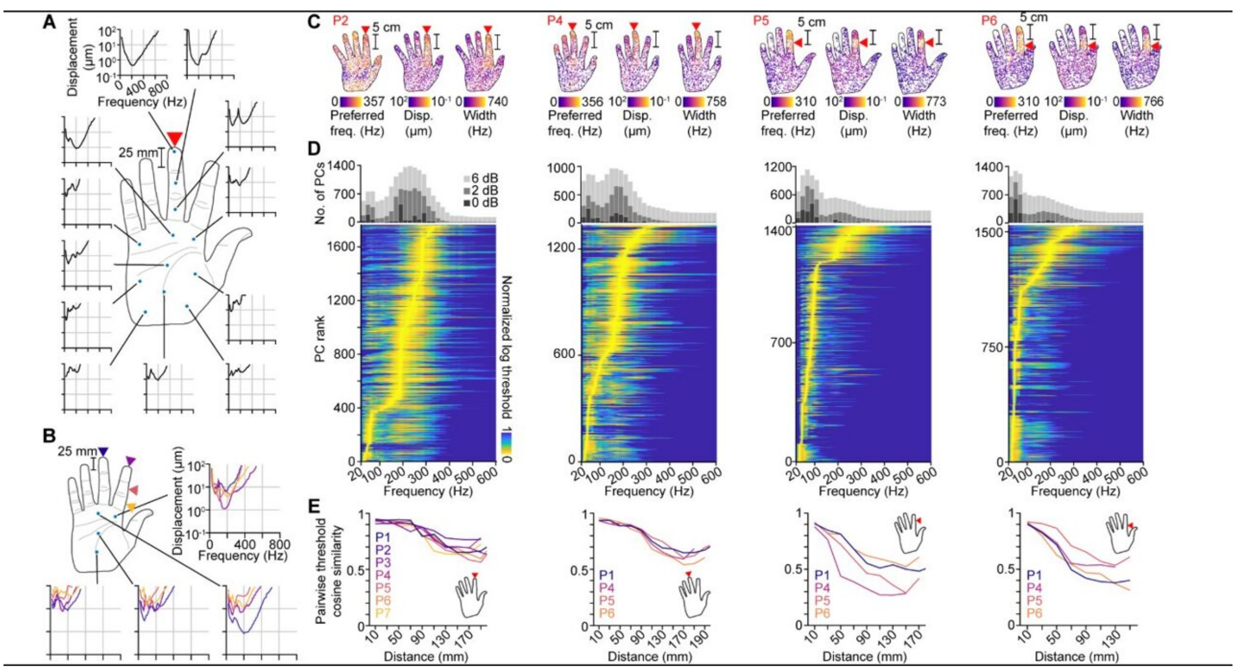
What came through was a very clear pattern: bass frequencies, which were less than 100 Hz, would travel quite some distance throughout the hand, but treble frequencies, which were more than 100 Hz, remained highly localized to the area where contact had occurred.

A slow thump on your palm shakes the whole hand like a bass drum, activating receptors across wide areas of the skin. A rapid buzz, on the other hand, is like a quick tickle that dies out within inches of the tap.

This frequency-dependent "biomechanical filtering" means distant receptors pick up information that fingertip receptors do not.

As the authors explain, "Biomechanics furnishes a pre-neuronal mechanism that facilitates efficient tactile encoding and processing." In plain terms, the structure of the hand itself is already sorting the touch signal, much like an auditory system filters sound in the ear, before any nerve signal even begins.

This filtering isn't just about frequency; it's also location-dependent, influenced by the hand's complex anatomy and tissue properties. For instance, [low-frequency vibrations]() were notably amplified near the metacarpophalangeal (MCP) joints, suggesting these areas are strategically important for sensing certain types of touch.



This infographic highlights the diverse tuning characteristics of Pacinian corpuscles (PCs) across the hand. PCs located near the contact point (top) show the expected U-shaped sensitivity to higher frequencies. However, PCs further away (bottom) exhibit a much wider range of preferred frequencies and sensitivities, demonstrating how biomechanical filtering diversifies their responses and contributes unique information to the brain. Credit: Neeli Tummala et al, Biomechanical filtering supports efficient tactile encoding in the human hand, *Journal of the Royal Society Interface* (2026). DOI: 10.1098/rsif.2025.0793

How scientists cracked the hand's code

The researchers mapped the "impulse responses" of the hand using high-resolution laser Doppler vibrometry, revealing the unique way each tap made the hand vibrate. This exact data was input into a model of Pacinian responses in a computer.

The team used this virtual method, backed with previous physiological data, to replicate spiking activity from thousands of the hand's PCs, which would be impossible to record in the nerve.

Let's keep this under wraps. It is worth the trouble. Different parts of the hand fire in a complementary way because the palm splits the touch into separate channels. Some receptors will respond to parts of the vibration that others miss. Neural signals vary greatly because of this event.

To quote one result, "Biomechanical filtering adds diversity to the spiking of PCs by enabling remote PCs to encode information that is not picked up by the PCs close to the contact point." In other words, the PCs close to the contact point might be responding to the familiar 200–300 Hz range, but the PC activity of a large fraction (mean 47% across participants) actually preferred frequencies less than 100 Hz. A mere minority of personal computers (below 20%) showed the canonical high-frequency preference.

In practical terms, this diversification reduces redundancy: instead of thousands of nerve cells repeating the same message, each cell may tell a slightly different part of the story. The brain then receives a richer, multi-angle picture of what's happening at the fingertip—whether it's a smooth surface, a sharp edge, or a tiny vibration pattern. This enhanced information encoding is crucial for our nuanced sense of touch.

Smarter tech, better prosthetics

These observations have serious implications. They show promise for the development of robotics, prosthetics, and virtual reality. Modeling artificial hands and haptic devices after natural filtering can create a realistic and efficient feedback mechanism that lets the user receive natural and beneficial feedback after a less-than-optimal interaction.

While the study involved a limited number of participants and contact locations and relied on simulations for neural activity, the consistent pattern of filtering across subjects provides strong evidence that the palm's mechanics play an active role in coding touch.

This groundbreaking research shows that touch isn't just in the skin or nerves—it's deeply embedded in the whole hand's architecture. By plumbing the hand with high-tech lasers and models, scientists discovered that our palms do much of the heavy lifting in sense-making.

Next time you feel a buzz or a tap, remember: part of that sensation has been sculpted by the mechanics of your own hand. It's a nifty, built-in trick that our body uses every time we touch the world.

More information: Neeli Tummala et al, Biomechanical filtering supports efficient tactile encoding in the human hand, *Journal of the Royal Society Interface* (2026). DOI: 10.1098/rsif.2025.0793

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