



The Importance of Biomimetics

Measuring and communicating how something feels has eluded product manufacturers for decades. While a wide range of specialized instrumentation exists to measure engineering properties such as friction coefficients or surface roughness, these measurements reveal very little about how things feel to human hands. And why should they? Standard tribology instruments were designed without an understanding of how humans perceive touch.

The Toccare was designed to produce measurements that relate to human perception. Several components go into human tactile perception, and we've recreated every one of them in our instrumentation:

- The mechanical properties of the skin and fingers define how they will interact with the objects they are touching. Since the BioTac was designed to mimic the mechanical properties of the human finger, we have confidence that it interacts with the world around it in a similar way to a fingertip.
- A wide range of sensory neurons in the skin and muscles beneath collect rich information about the forces, deformations, vibrations, and heat transfer between the skin and object it is touching. Our BioTac sensor is the only sensor that has been designed to capture all of these aspects of human tactile perception at the same time.
- When determining how things feel, humans make carefully selected exploratory movements to efficiently gather information. We have studied these movements in great detail and have developed a machine that faithfully reproduces them even more repeatably than humans can.
- The nervous system integrates the data from the sensory neurons and exploratory movements to create a perception of how an object feels. We have carefully studied the nervous system and human language when describing haptic characteristics to develop signal processing algorithms that faithfully reproduce this information. Using our proprietary AI we have determined which sources of information say the most about how things feel, resulting in the 15 dimensions of touch.

Perhaps the most significant validation of this approach is that it just works. We've tested over 10,000 surfaces and have not encountered a scenario where humans can detect a difference that the Toccare can't also detect and describe in a meaningful way. The Toccare quantifies everything that a human's fingers can feel with greater repeatability and precision than even the most sensitive of people. Contact us today to learn more.