

New research on touch could make digital experiences more immersive

A research investigating how human fingerprints process textures and touch could help reach the next level of immersion in digital experiences.

MUNICH, BAVARIA, GERMANY, August 16, 2021 /EINPresswire.com/ -- Virtual reality (VR, AR, XR), remote touch, robotic touch sensing, and digital haptic experiences, all try to emulate the human powerful sense of touch, with little success so far. Online gaming, shopping, and interacting vastly rely on vision and sound. A research presented at the Pangborn Sensory Science Symposium 2021 might well have unlocked the next level of digital touch sensing, by putting fingerprints under the microscope.

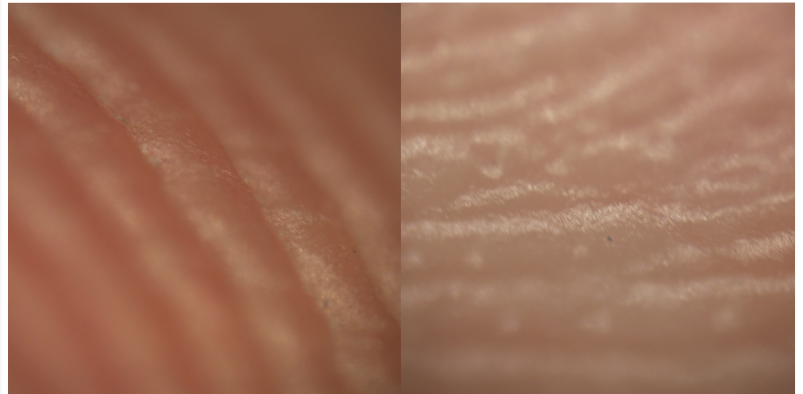


Fig. 1 – Fingerprints of averagely sensitive (left) and very sensitive subjects (imaging powered by the 3,8x Opto MVM (Machine Vision Microscope), courtesy of Opto and DervalResearch)

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*Prof. Derval, PhD, Chair of
DervalResearch*

Texture is a vibration perceived through the movement of the fingers. Fingerprints help grasp objects, filter and amplify the vibrations emitted by textures, and turn these vibrations into signals sent to the brain. Fingerprints' unique patterns made of whorls, arches, and loops are called dermatoglyphics, and are visible because delimited by narrow raised bands of skin called epidermal ridges.

[DervalResearch](#) explored people's favorite textures in terms of fabrics, materials, and cosmetics, and grouped them based on their sensitivity to touch. The fingerprints

of very sensitive to touch and averagely sensitive to touch individuals were compared using an [Opto](#) Machine Vision Microscope [Fig. 1].

Subjects very sensitive to touch, presented subtle epidermal ridges, with apparent receptors, and thin cut-like dermatoglyphic patterns going in different directions, had a difficult grip, were

able to easily identify fine textures, and perceived few textures as “soft”. Subjects averagely sensitive to touch, presented greater regularity and height in the epidermal ridges, had an easy grip, could identify fine textures, and perceived fewer textures as “not soft”.

“The orientation rather than the height of the epidermal ridges seems instrumental in textures’ easy identification and evaluation” highlights Prof. Derval, PhD, Chair of DervalResearch “The future of robotic and virtual touch perception might benefit from including refined and multidirectional dermatoglyphic patterns - rather than solely focusing on epidermal ridges.” The research team based in Germany and in China started by wondering why the same fabric was perceived as “soft” by some individuals and as “not soft” by others.

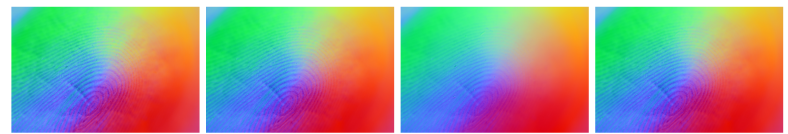


Fig. 2 – Finger dermatoglyphics 3D reconstruction by photometric stereo (blue, green, red, and mixed grayscale channels, from left to right) (imaging powered by the Opto Solino 10x10 Sensor, courtesy of Opto and DervalResearch)

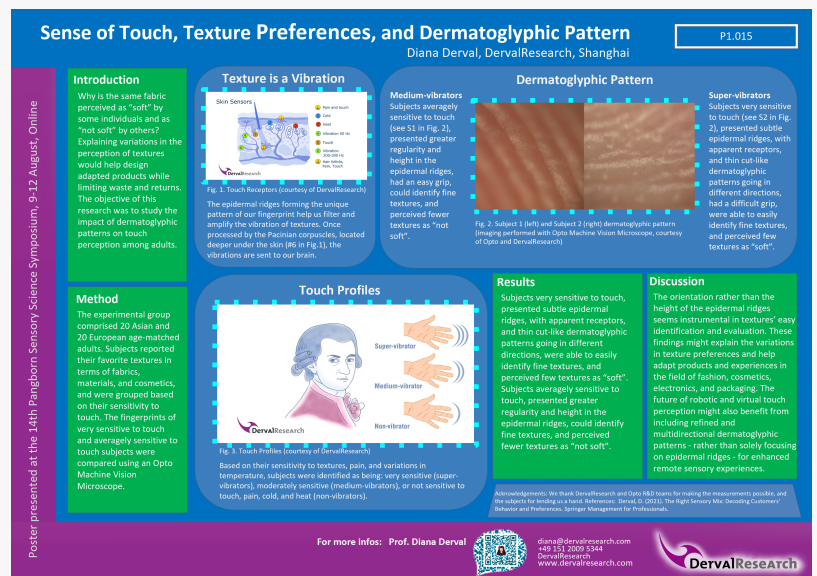


Fig. 3 – Sense of Touch, Texture Preferences, and Dermatoglyphic Pattern

Markus Riedi, CEO of Opto – known for a range of high-performance imaging solutions – shares that “based on this first imaging work on finger dermatoglyphics, the frequency of the patterns, their depth, and elasticity, seem to play a promising role in tactile perception.” Already used in dermatological contexts, to visualize skin reliefs, “the Photometric stereo views – consisting in inspecting an object from different light perspectives – performed with the 3,8x Opto MVM and the 10x10 Opto Solino Sensor make it easy to reconstruct dermatoglyphics in 3D, and have the potential to help advance research on the sense of touch [Fig. 2]”, observes Simon-Frédéric Desage, Research & Innovation Director at Opto.

The findings are expected to help adapt products and experiences in the field of fashion, cosmetics, electronics, gaming, and packaging, and are detailed among other surprising sensory insights in Prof. Diana Derval's book “[The Right Sensory Mix: Decoding Customers’ Behavior and Preferences](#)”, published by Springer Nature.

Further Reading

Derval, D. (2021, August). Sense of Touch, Texture Preferences, and Dermatoglyphic Pattern. [Fig. 3] Pangborn 2021, 14th Pangborn Sensory Science Symposium, online.

Prof. Derval's book The Right Sensory Mix: Decoding Customer's Behavior and Preferences
<https://www.springer.com/book/9783662637944>

About DervalResearch

DervalResearch is a pioneer research firm using biosciences and observation to decode and anticipate human behavior and preferences. With powerful predictive tools like the Derval Color Test, Sensory GeoMaps™, and the Hormonal Quotient (HQ)™, our colorful team of scientists and designers help firms increase their innovation rate and deliver engaging experiences from Paris to Shanghai. Additional information: <http://www.dervalresearch.com> and follow @dervalresearch

About Opto

For over 30 years, Opto GmbH has been a manufacturer of high reliability, embedded vision and inspection solutions to some of the most challenging machine-integrated imaging applications. Opto provides high-performance imaging solutions ranging from simple vision components all the way to complex imaging modules and subsystems. Most recently, Opto has developed a range of highly compact embedded imaging modules specifically for OEMs involved in building industrial and biomedical machines. With onboard cameras, lens, light, and intelligence, Opto's new fully integrated imaging modules enable OEMs to instantly achieve the very highest image performance and resolution, without the need for specialist optical expertise.

Additional information: <http://www.opto.de>

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