## Touch experience without contact

## Abstract

Haptic reproduction technologies can enhance experiences in virtual reality or educational systems. However, presenting diverse haptic sensations typically requires wearing large and heavy mechanical devices. This study proposes a noncontact haptic technology presenting diverse haptic sensations using focused ultrasound. Haptic sensations primarily consist of two elements: pressure and vibration. While conventional ultrasound technology can present only vibration sensations, our method can present both vibration and pressure sensations. By combining these two elements, diverse textures, such as rough surfaces, can be reproduced. This technology can lead to the development of a novel medium, enabling users to virtually touch remote people or objects and share realistic haptic experiences.



## References

[1] T. Morisaki, M. Fujiwara, Y. Makino, H. Shinoda, "Noncontact haptic rendering of static contact with convex surface using circular movement of ultrasound focus on a finger pad," *IEEE Transactions on Haptics*, Vol. 17, No. 3, pp. 334-345, 2024.
[2] T. Morisaki, Y. Ujitoko, "Towards intensifying perceived pressure in midair haptics: Comparing perceived pressure intensity and skin displacement between LM and AM stimuli," in *Proc. Eurohaptics conference 2024*, pp. 107-119, 2024.

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