



Prof. Tianwei Zhang  
Chinese University of Hongkong, China

## A Medical Robot for Physical-HRI based Nasopharyngeal Swab Sampling

In these three years, nasopharyngeal (NP) swab sampling and reverse-transcription Polymerase Chain Reaction (RT-PCR) test techniques have proven to be very effective and reliable tests for the early detection of COVID-19 infected individuals. However, this highly reliable RT-PCR testing is difficult to operate and must be operated by a dedicated swab and trained medical personnel. In this work, we present a robot that operates nasopharyngeal swabs for RT-PCR sampling. We designed new hardware system and developed advanced 3D vision and force sensing hybrid perception algorithms for the robot to accurately locate the nostril position, manipulate the swab into the nostril and then carefully advance the swab along the inferior nasal tract to the designated sampling position in the posterior nasal cavity. The experimental results of more than 8,000 volunteer experiments indicates the proposed robot PCR sampling results are as accurate as human. Questionnaires show that our robot NP swab sampling is more comfortable than manual sampling.



April 18<sup>th</sup> 2023

11:00-12:00

Hybrid: UT Hongō Campus  
Eng. Bld 2 (2F) room 223

[skype](#)

**Prof. Tianwei Zhang** is currently an Associate Research Scientist at Shenzhen Institute of Artificial Intelligence and Robotics for Society, Research Assistant Professor in the Chinese University of Hongkong, Shenzhen. He received Doctor Degree from the Department of Mechano-Informatics, The University of Tokyo, 2019. His research interests are visual manipulation and dynamic SLAM. He has published several articles in ICRA/IROS/RAL.

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