

IoT が拓く未来
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タッチ IoT：触れるインターネット実現のための肌感覚送受信機の開発

研究成果の概要

In FY2022, as the third year of the project, we have succeeded in preliminary completion most of the proposed work-packages (WP) milestones. We also setup collaborations with researchers in/outside the Research Area for extensive elaboration of the proposed method, toward implementation of use-cases committed in this project. Those are considered important toward success of the project in the final year of the project. Summary can be found below:

- 1) We completed implementation of a platform SimTacLS, which is a simulation pipeline allowing optimization of the tactile device's design, big data acquisition, training using state-of-the-art Deep Neural Network, and Sim2Real process using one of the generative AI methods (GAN). The real-time performance of the proposed method was also evaluated with much faster rate compared with conventional analytical method. The platform now can simulate the vision-based tactile perception for any shape, size of the sensing device, reducing the development of the sensor remarkably. The faster prediction of the proposed method would obviously contribute to reducing the latency of the Tactile Internet using this device.
- 2) We succeeded in proposing Ontology model supporting vision-based Tactile Internet interoperability, and an application in development of WoTT, which extends the W3C Web of Things (WoT) to exchange haptic information from tactile sensing devices to cross-domain services via already proven Web technologies. In FY2022, we attempted to evaluate the latency of the system using WoTT, from which a distributed network setup with low end-to-end latency could be proposed. From here, it is expected that more elaboration and method can be proposed for reducing the latency in the future.

【代表的な原著論文情報】

- 1) Q. K. Luu, N. H. Nguyen, and Van Anh Ho, "Simulation, Learning, and Application of Vision-Based Tactile Sensing At large Scale" **IEEE Trans. Robotics**, Vol. 39 (2023) ,
<https://ieeexplore.ieee.org/document/10054516>