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(국문/영문)기타소속:

국문 강연제목: 딥러닝 기반 웨어러블 디바이스을 통한 침묵형음성인식 및 수화 인식 시스템

영문 강연제목: Deep learning based wearable device for silent speech recognition and sign language recognition

Abstract(영문):

Bridging communication gaps for individuals with speech or hearing impairments remains a critical challenge. This work presents a multidisciplinary approach combining advanced wearable bioelectronic devices with deep learning to realize two scalable and user-independent human-machine interfaces: a silent speech interface (SSI) and a sign language translation system.

For the SSI, we introduced an ultra-thin crystalline silicon-based stretchable strain sensor combined with a 3D convolutional neural network (CNN). This robust system, utilizing four biaxial strain sensors (eight channels) in a mesh-serpentine design, non-invasively tracks facial skin deformation. The system achieved a high word recognition accuracy of for a large 100-word vocabulary, demonstrating the high spatial resolution and robustness of this strain-gauge-based approach. In parallel, we developed a wirelessly-connected, modular ring-type sign language translator (WRSLT) to address the limitations of traditional glove-type systems. The WRSLT utilizes independent, flexible sensor rings with 3-axis accelerometers and Bluetooth multi-link technology to enable unrestricted finger movement and fully wireless inter-ring connectivity. By selectively using seven dominant fingers, the system demonstrated robust user-independent recognition performance on large datasets (100 ASL and 100 ISL words), achieving high accuracies of 88.65% under unseen-user conditions. A sequential word detection framework further enables real-time, sentence-level translation from continuous signing input.

These results highlight the significant potential of integrating advanced flexible/stretchable wearable bioelectronics with dedicated deep learning architectures to create scalable, robust, and user-independent platforms for real-time communication in diverse scenarios.

Brief Biosketch (간단한 이력, 연구/대외활동 소개,국문/영문)

- **현재 한국외국어대학교 바이오메디컬공학부 조교수**
- **연세대학교 전기전자공학부 석사, 박사**
- **다양한 wearable/implantable system 을 통한 손상된 인체 기능 대체에 관한 연구 수행**