



이름: 이재홍 / Jaehong Lee

직책: 조교수 / Assistant Professor

소속: 대구경북과학기술원 / DGIST

기타소속: 로봇및기계전자공학과 / Department of Robotics and  
Mechatronics Engineering

강연 제목: 체내삽입형 유연 센서의 임상 적용을 위한 전자봉합사

/ Electronic sensing sutures for clinical application of implantable soft sensors

#### Abstract:

Healthcare is important for modern societies because of the rapid increase in aging population and the strong desire to improve our quality of life. Especially, real-time measurements and preventative managements of information in the body become more urgent, resulting in the emergence of electronic sensors that can be integrated in the body. Most of previous implantable sensing devices have mainly been developed in a planar structure which is not suitable to be applied to complex structure of tissues and/or organs in the body. In addition, it is challenging to stably fix the planar soft sensing devices onto moving or pulsatile organs. Typically, the implanted devices are sutured onto a target tissue and/or organ for the fixation, but suturing of a soft implantable device is not efficient in clinical situations and could potentially damage the implanted sensor. To overcome such practical limitations of previous two-dimensional implantable devices in in-vivo applications, one-dimensional sensing devices can be a promising solution that meet all the requirements needed for clinical practice.

In this talk, an electronic suture for wireless in-vivo strain sensing, which can overcome the existing limitations of previous 2D electronic devices, is presented. To develop 1D electronic sensors, a fully biocompatible fiber electrode is fabricated via an in-situ formation process of Au nanoparticles in a fiber matrix. Based on the conductive fiber electrodes, a suturable strain sensing system which can be used for in-vivo applications is developed. The strain sensing system exhibits outstanding sensitivity, stability, wireless readout, solderless property, and suturability, which overcomes several practical issues of current 2D implantable devices which have been barely considered so far. Various functional sutures including sensing, drug-eluting, and biodegradable capabilities can also be developed based on the conductive fiber-based electronic devices. The sensing and functional sutures are expected to connect the existing implantable electronics with clinical and practical use.

#### Brief Biosketch

Dr. Jaehong Lee is currently working as an assistant professor in the Department of Robotics Engineering at Daegu Gyeongbuk Institute of Science and Technology (DGIST), Republic of Korea. He received his B.S. (2011) and Ph.D. degree (2017) in electrical and electronic engineering from

Yonsei University in Republic of Korea. He worked as an ETH postdoctoral fellow (2018-2020) at the Laboratory of Biosensors & Bioelectronics (LBB) at ETH Zurich, Switzerland. His research focuses on one-dimensional soft electronics for wearable and biomedical in-vivo applications. As one of earlier scientists in the field of fiber electronics, he has over 32 peer-reviewed papers with over 3300 citations despite his short career in academia.