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강연 제목: 비인간 영장류용 브레인칩 / A brain chip for non-human primates

Abstract:
Most brain neuroengineering researches have been limited to small-animal rodent models. It is highly challenging to develop a single integrated neural interface system that can record real-time brain neural signals, store data on a server, analyse signals, and combine different device functions including signal measurement, wireless powering, wireless communication, and device control into a single implantable device in primates for the study of brain neuronal dynamics of natural instinct. Also, the brain volume of NHPs is more than 100 times larger than that of rodents. Due to the large size of the brain, it is difficult to insert a long-length neural probe with low bending stiffness by mimicking the brain's softness (a few kPa). Additionally, NHPs naturally sit, stand, and hang in a flexible posture with their four limbs, adding a layer of obstacles to stably supply wireless power due to their freedom of movement and ability to change their head height and angle. Several researches have reported brain neural interface technology in non-human primates. However, due to aforementioned large-animal specific technical challenges, there is no neatly integrated wireless, battery-free, fully implantable neural interface for monitoring brain neural activity of NHP's natural instinctive behaviour in an unrestricted, wild-like environment. Here, we introduce a comprehensive set of material and engineering strategies focused on brain neuroscience research in untethered, conscious and freely-moving NHPs, covering (1) wireless, battery-free, fully implantable neural interface device with multichannel real-time neural signal recording and user-friendly device control schemes; (2) multielectrode flexible neural probe coated with mechanically transient, bioresorbable sucrose needle; (3) sub-meter scale wireless power transfer by precisely organized repeater-antenna system; and (4) AI modeling for brain neuroscientific analysis of natural instinctive behaviour of NHPs.

Brief Biosketch
중앙대학교 학사-연세대학교 박사-미 일리노이대학 박사후 연구원을 거치고, 현재 대구경북과학 기술원의 부교수 및 엔사이드 주식회사의 대표로서 의공학분야 기초 연구 및 기술사업화를 수행 중