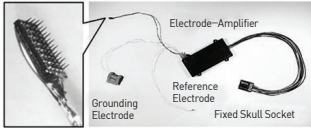


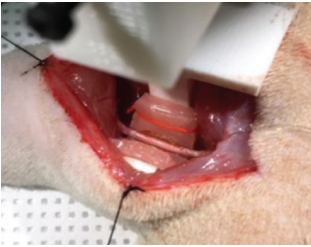
# Peripheral Nerve Signal Processing Technology

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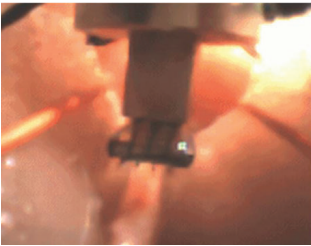
Neural Electrode/Implantable Neural Electrode-Amplifier System



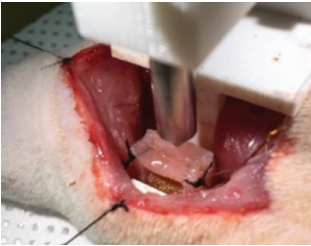
Insertion Device Installation



Neural Electrode Insertion



Neural Electrode Fixation



Peripheral nerve signal processing technology that selectively measures and stimulates peripheral nerves to restore the motor and sensory functions of amputees and paralyzed patients

### Client / Market

- Implantable electronic medical device
- Prosthetic hand and leg for amputee
- Electrical stimulator for paralyzed patient
- Degenerative nerve disease treatment device

### Necessity of this Technology

- Conventional peripheral nerve electrode system has difficulty in measuring and stimulating in a nerve fiber unit.
- Motor nerves are less distributed than the sensory nerves and are difficult to be measured due to the interference of muscle signals and motion artifacts.
- Need a surgical technique of stably inserting a multi-channel neural electrode in the peripheral nerve to measure and stimulate in the nerve fiber unit
- Need a measurement technology that guarantees a high signal to noise ratio and a technology to discriminate a motor nerve fiber from a peripheral nerve bundle

### Technical Differentiation

- A neural electrode implantation technology that inserts a multi-channel neural electrode at a precise location and depth in the peripheral nerve bundle and minimizes the damage in the neural electrode and nerve tissue
- By absorbing the multi-channel neural electrode with vacuum, transfer and implantation are stable. By implanting the multi-channel neural electrode with the shock impulse, implantation can be done easily regardless of the surface tension of the peripheral nerve bundle.
- Peripheral motor nerve signal measurement technology to minimize the contamination of nerve signals from muscle signals and motion artifacts and discriminate motor nerve signals among all nerve signals detected
- By locating the neural electrode inside the closure wrapped with a metal gauze, it can be shielded from muscle signals and motion artifacts, and by applying electrical stimulation to all channels of the neural electrode to check the availability of muscular motion, the motor nerve fibers can be distinguished.

### Excellence of Technology

- Provide motion commands to the prosthetic arm controller by analyzing the efferent motor nerve signals and recognizing the motion intention

### DESIRED PARTNERSHIP

Technology Transfer

Licensing

Joint Research

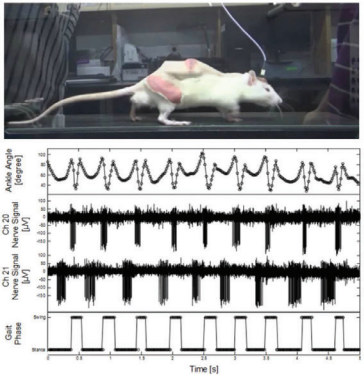
Other



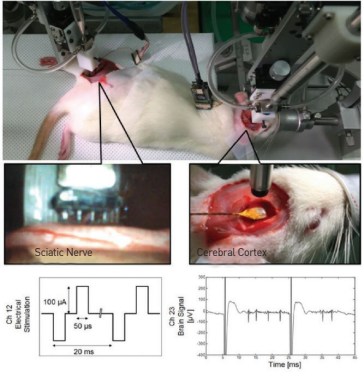
### TECHNOLOGY READINESS LEVEL [TRL]

- |                             |                                     |                              |                       |   |                           |  |                                  |   |
|-----------------------------|-------------------------------------|------------------------------|-----------------------|---|---------------------------|--|----------------------------------|---|
| Research, basic explanation | Project concept or idea development | Technology idea verification | Prototype development | Trial product production/ evaluation in similar environment | Pilot field demonstration | Development and optimization of commercial model | Commercial product demonstration | Mass production and initial market launch |
|-----------------------------|-------------------------------------|------------------------------|-----------------------|---|---------------------------|--|----------------------------------|---|

Motor Nerve Signal Measurement and Gait Phase Detection for during Walking on a Treadmill



Measurement of Cortical Sensory Signal during Electrical Stimulation of the Sciatic nerve



- Developed the multi-channel action potential detection and classification technology
- Verified the possibility of motion intention recognition based on analysis of movement of an animal model
- Developed a vision system for synchronization of motor nerve signals and motion analysis data
- Developed a gait phase detection algorithm that can discriminate stance phase and swing phase while walking on a treadmill
- Delivers the tactile sensory information by applying electrical simulation to afferent sensory nerves based on the prosthetic arm sensor
- Developed the technology for multi-channel stimulation pattern generation and interleaved stimulation
- Verified the possibility of tactile sensory information delivery by measuring the cortical sensory signal of an animal model
- Generated an electrical stimulation pattern according to cutaneous sensation area that can evoke a cortical sensory nerve signal
- Confirmed the similarity of the mechanical stimulation on skin and electrical stimulation of peripheral nerve to the evoked cortical sensory signal

### Current Intellectual Property Right Status

#### PATENT

- Nerve Electrode Insertion Device (KR1808254)
- Recording System of Peripheral Motor Nerve Activity and Method for Discriminating Peripheral Motor Nerve Activity (KR2017-0172501)

#### KNOW-HOW

- Neural electrode implantation in peripheral nerve and cerebrum
- Nerve signal amplifier and electrical stimulator design technology
- Multi-channel action potential detection and classification technology
- Multi-channel stimulation pattern generation and interleaved stimulation technology
- Motor nerve signal measurement-based motion intention recognition technology
- Sensory nerve electrical stimulation-based tactile sensory information delivery technology