

# KEEHOON KIM

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Dept. of Mechanical Engineering  
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## Research Interests

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- Robotics
  - Bio-Medical Robotics (Bionics, Rehabilitation, Surgical Robots)
  - Bionic Interfaces
  - Power Assistant Robotics
  - Haptics & Teleoperation
  - Design of Haptic Devices & Medical Instruments
- System & Control Theory
  - Kinematics (Parallel Mechanism)
  - Advanced Control Theory (H-infinity, mu-synthesis)

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## Education

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| <b>B.S.</b>  | Mar. 1996 –<br>Aug. 1999 | <ul style="list-style-type: none"><li>- Pohang University of Science and Technology, Pohang, Korea</li><li>- Mechanical Engineering</li><li>- GPA 3.72/4.3</li><li>- Diploma of Honors for 7 semesters</li><li>- Honor Graduation with Magna Cum Laude</li></ul>             |
| <b>M.S.</b>  | Sep. 1999<br>– Aug. 2001 | <ul style="list-style-type: none"><li>- Pohang University of Science and Technology, Pohang, Korea</li><li>- Mechanical Engineering</li><li>- Advisor: Prof. Wan Kyun Chung</li><li>- Thesis: Design and Control of 6 DOF Parallel Manipulator for Haptic Display</li></ul>  |
| <b>Ph.D.</b> | Sep. 2001<br>- May 2006  | <ul style="list-style-type: none"><li>- Pohang University of Science and Technology, Pohang, Korea</li><li>- Mechanical Engineering</li><li>- Advisor: Prof. Wan Kyun Chung</li><li>- Thesis: Quantitative Comparison Framework of Bilateral Teleoperation Systems</li></ul> |

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## Research Experience

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- Sep. 2019  
- present      Pohang University of Science and Technology (POSTECH), Pohang, Korea  
**Associate Professor, Dept. of Mechanical Eng.**
- July 2018  
- June 2020      University of Texas at Austin, Austin, TX, USA  
**Visiting Professor, Dept. of Mechanical Eng.**
- Mar. 2015  
- Sep. 2019      Korea Institute of Science and Technology (KIST), Seoul, Korea  
**Principal Research Scientist, Center for Robotics Research**
- Sep. 2018  
- Sep. 2019      KIST School, University of Science and Technology (UST)  
**Professor, Dept. of Nano-IT**
- Jun. 2015  
- Present      Ministry of Food and Drug Safety  
**Expert Adviser, Dept. of Medical Devices**
- Sep. 2014  
- Aug. 2018      University of Science and Technology (UST), Korea  
**Associate Professor, Dept. of HCI & Robotics**
- May 2009  
- Feb. 2015      Korea Institute of Science and Technology (KIST), Seoul, Korea  
**Senior Research Scientist, Center for Cognitive Robotics Research**
- Sep. 2010  
- Aug. 2014      University of Science and Technology (UST), Korea  
**Assistant Professor, Dept. of HCI & Robotics**
- July 2006  
- April 2009      Northwestern University, Illinois, USA  
**Post-Doctoral Researcher**  
**Director: J. Edward Colgate**
  - Developed haptic feedback interface for upper extremity prosthesis to restore sense of touch, pressure, vibration, shear, and temperature by a grant of DARPA Revolutionizing Prosthetics 2009.
- Sep. 2003  
- May 2004      Case Western Reserve University, Ohio, USA  
**Visiting Student**  
**Advisor: M. Cenk Cavusoglu**
  - Developed a systematic performance evaluation method for bilateral teleoperation systems using  $\mu$ -synthesis.
- Feb. 1999  
- May 2006      Pohang University of Science and Technology (POSTECH), Pohang, Korea  
**Research Assistant in Robotics & Bio-Mechatronics Laboratory**  
**Advisor: Wan Kyun Chung**
  - Developed a human guided spine bone fusion surgical robot interface using bilateral teleoperation scheme by a grant of Korean Ministry of Health and Welfare.
  - Developed a haptic interface for extreme industrial environments by a grant of POSCO.
  - Developed a 7-DOF parallel type haptic device by grant of Korean Ministry of Science and Technology.
- Sep. 1999  
- Aug. 2002      Pohang University of Science and Technology (POSTECH), Pohang, Korea  
**Teaching Assistant in Robotics & Bio-Mechatronics Laboratory**
  - Graded tests and homework for an undergraduate course on System Control (MECH322).
  - Graded tests and homework, and developed experimental setup for graduate courses, Advanced Robotics (MEIE639) and Advanced Automatic Control (MEIE525).

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## Honors and Awards

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- Aug. 1999 - **Diploma of Honors for 7 semesters**  
- **Honor Graduation with Magna Cum Laude**
- Dec. 2005 **Grand Prize Winner of 11<sup>th</sup> POSCO Thesis Competition by POSCO** “Development of a Haptic Interface for O<sub>2</sub> Lance Manipulator in Electric Furnace.” (Award: \$7,000 & Japan-China Observation Tour)
- Nov. 2013 **Commendation awarded by Minister of Science, ICT and Future Planning**  
\* 미래창조과학부 장관 표창
- Dec. 2013 **Unsung Hero Award, Korea Institute of Science and Technology**
- Oct. 2014 **2014 Top 10 Mechanic Technology of the Year Award, The Korean Federation of Mechanical Engineering Societies**  
\* 올해의 10 대 기계기술, 한국기계기술총연합회
- Nov. 2014 **KIST Outstanding Research Award**  
\* 이달의 KIST 인 상, KIST
- Dec. 2014 **Assistive Robot Technology (ART) Award, Korean Robotics Society**  
\* 학보 ART 상, 한국로봇학회
- Feb. 2015 **Commendation awarded by Chairman of National Research Council of Science and Technology**  
\* 국가과학기술연구회 이사장상
- Nov. 2015 **Bronze Medal, 2016 Korea Invention Promotion Association**  
\* 대한민국지식재산대전 동상, 한국발명진흥회
- Mar. 2016 **KIST Excellent Development Team Award**  
\* KIST 우수개발팀상, KIST
- July 2016 **2016 National R&D Excellence Award, Minister of Science, ICT and Future Planning**  
\* 2016 년 국가연구개발 우수성과 100 선, 미래창조과학부
- Dec. 2016 **2016 Young Robotic Scientist Award, Korean Robotics Society**  
\* 2016 년 젊은로봇공학자상, 한국로봇학회
- Dec. 2017 **2025 Top 100 technologies and leaders, the National Academy of Engineering of Korea**  
\* 2025 대한민국을 이끌 100 대 기술과 주역, 한국공학한림원
- Dec. 2018 **Platinum Winner, 2018 Spark Design Awards**
- Dec. 2019 **Finalist, 2019 IDEA, International Design Excellence Awards**

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## Publications

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### Journal Articles

1. Donghyeon Lee, Dongwoo Ko, Wan Kyun Chung Fellow, IEEE, and Keehoon Kim Member, IEEE, "Quadratic Programming-based Task Scaling for Safe and Passive Robot Arm Teleoperation," *IEEE/ASME Transactions on Mechatronics*, 2022.
  2. Keehoon Kim, "A review of haptic feedback through peripheral nerve stimulation for upper extremity prosthetics," *Current Opinion in Biomedical Engineering*, vol. 21, 2022, 100368.
  3. Dukchan Yoon, Keehoon Kim, "Fully Passive Robotic Finger for Human-Inspired Adaptive Grasping in Environmental Constraints," *IEEE/ASME Transactions on Mechatronics*, 2022.
  4. Jae Hyung Lee, Ye Eun Oh, Hyun Joo Lee, Keehoon Kim, Song Joo Lee, "Quantification of Upper Limb Isometric Force Control Abilities for Evaluating Upper Limb Functions Among Prosthetic Users", *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, vol. 29, pp.2559-2568, 10.1109/TNSRE.2021.3133539, 2021.
  5. Min Woo Lee, Namseon Jang, Nara Choi, Sungwook Yang, Jinwoo Jeong, Hyeong Soo Nam, Sang-Rok Oh, Keehoon Kim, Donghyun Hwang, "In Vivo Cellular-Level 3D Imaging of Peripheral Nerves Using a Dual-Focusing Technique for Intra-Neural Interface Implantation," *Advanced Science*, <https://doi.org/10.1002/advs.202102876>, Nov 2021.
  6. Ikjong Park, Han Sang Park, Hong Kyun Kim, Wan Kyun Chung, Keehoon Kim, "Real-time measurement of intraocular pressure variation during automatic intravitreal injections: An ex-vivo experimental study using porcine eyes," *PLOS ONE*, DOI: 10.1371/journal.pone.0256344, 2021.
  7. Minjae Kim, Yaejin Moon, Jasmine Hunt, Kelly A. McKenzie, Adam Horin, Matt McGuire, Keehoon Kim, Levi J. Hargrove, Arun Jayaraman, "A Novel Technique to Reject Artifact Components for Surface EMG Signals Recorded During Walking with Transcutaneous Spinal Cord Stimulation: A Pilot Study," *Frontiers in Human Neuroscience*, 2021.
  8. Hyung Gon Shin, Ikjong Park, Keehoon Kim, Hong Kyun Kim, Wan Kyun Chung, "Sensor-embedded Automatic Grasping Forceps for Precise Corneal Suture in Penetrating Keratoplasty," *Micromachines*, 2021.
  9. Keondo Lee, Seong-Eun Kim, Junsang Doh, Keehoon Kima and Wan Kyun Chung, "User-friendly image-activated microfluidic cell sorting technique using an optimized, fast deep-learning algorithm," *Lab on a chip*, DOI: 10.1039/D0LC00747A, 2021
  10. Hyung Gon Shin, Ikjong Park, Keehoon Kim, Hong Kyun Kim, and Wan Kyun Chung, "Corneal Suturing Robot Capable of Producing Sutures With Desired Shape for Corneal Transplantation Surgery," *IEEE Transactions on Robotics*, vol. 37, issue 1, pp. 304-312, Feb. 2021.
  11. Minjae Kim, Wan Kyun Chung, Keehoon Kim, "Subject-Independent sEMG Pattern Recognition by Using a Muscle Source Activation Model," *IEEE Robotics and Automation Letters*, vol.5, no.4, pp. 5175-5180, 2020.
  12. Namseon Jang, Yong Seok Ihn, Nara Choi, Gangyong Gu, Jinwoo Jeong, Sungwook Yang, Sehyuk Yim, Keehoon Kim, Sang-Rok Oh, Donghyun Hwang, "Compact and Lightweight End-effectors to Drive Hand-operated Surgical Instruments for Robot-assisted Microsurgery," *IEEE/ASME Transactions on Mechatronics*, vol.25, issue 4, pp.1083-4435, 2020.
  13. Ikjong Park, Hong Kyun Kim, Wan Kyun Chung, Keehoon Kim, "Deep Learning Based Real-Time OCT Image Segmentation and Correction for Robotic Needle Insertion Systems," *IEEE Robotics and Automation Letters*, vol. 5, issue 3, pp. 4517-4524, 2020.
  14. Sungwoo Park, Namseon Jang, Yong Seok Ihn, Sungwook Yang, Jinwoo Jeong, Sehyuk Yim, Sang-Rok Oh, Keehoon Kim, Donghyun Hwang, "A Tele-operated Microsurgical Forceps-Driver with a
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Variable Stiffness Haptic Feedback Master Device," IEEE Robotics and Automation Letters, vol. 5, issue 2, pp. 1946-1953, 2020.

15. Seokho Nam, Woongyong Lee, Sunkyum Yoo, Keehoon Kim, Wan Kyun Chung, "Development of Backdrivable Servovalve with Feedback Spring for Enhanced Electro-Hydraulic Torque Actuator", IEEE Robotics and Automation Letters, vol. 5, issue 2, pp. 3145-3152, 2020.
  16. Woongyong Lee, Sunkyum Yoo, Seokho Nam, Keehoon Kim, Wan Kyun Chung, "Passivity-Based Robust Compliance Control of Electro-Hydraulic Robot Manipulators with Joint Angle Limit", IEEE Robotics and Automation Letters, vol. 5, issue 2, pp. 3190-3197, 2020.
  17. Seongsik Park, Wan Kyun Chung, and Keehoon Kim, "Training-Free Bayesian Self-Adaptive Classification for sEMG Pattern Recognition Including Motion Transition," IEEE transactions on Biomedical Engineering, Oct. 2020 10.1109/TBME.2019.2947089.
  18. Seongsik Park, Wan Kyun Chung, and Keehoon Kim, "Hierarchical Segmentation of Continuous Motions through sEMG Signal Analysis," IEEE Robotics and Automation Letters, vol. 4, issue 4, pp. 4402-4409, Oct., 2019.
  19. Tongil Park, Keehoon Kim, Sang-Rok Oh, Youngsu Cha, "Electro-hydraulic actuator for a soft gripper," Soft Robotics, Sep. 2019 DOI: /10.1089/soro.2019.0009.
  20. Man Bok Hong, Sin Jung Kim, Yong Seok Ihn, Gu-Cheol Jeong, and Keehoon Kim, "KULEX-Hand: An Underactuated Wearable Hand for Grasping Power Assistance," IEEE Transactions on Robotics, DOI: 10.1109/TRO.2018.2880121. (SCI, IF 4.264, JCR 5.769%)
  21. Seongsik Park, Woongyong Lee, Wan Kyun Chung, and Keehoon Kim, "Programming by Demonstration using the Tele-Impedance Control Scheme: Verification by an sEMG-Controlled Ball-Trapping Robot," IEEE Transactions on Industrial Informatics, vol. 15, issue 2, pp. 998-1006, Feb. 2019. (SCI, IF 5.430, JCR 1.064%)
  22. Sehyuk Yim, Ye-Eun Oh, Jinwoo Jeong, Yong Seok Ihn, Donghyun Hwang, Sang-Rok Oh, Keehoon Kim, "Handheld Nerve Electrode Insertion Tool," IEEE/ASME Transactions on Mechatronics, vol. 23, issue 5, pp. 2525-2530, October 2018. (SCI, IF 3.936, JCR 6.641%)
  23. Minjae Kim, Keehoon Kim, Wan Kyun Chung, "Simple and Fast Compensation of sEMG Interface Rotation for Robust Hand Motion Recognition," IEEE Transactions on Neural Systems and Rehabilitation Engineering, vol. 26, no. 12, pp. 2397-2406, Dec. 2018. (SCIE, IF 3.972, JCR 3.846%)
  24. Donghyun Hwang, Yong Seok Ihn, Keehoon Kim, "Compact Modular Cycloidal Motor with Embedded Shape Memory Alloy Wires," IEEE transactions on Industrial Electronics, Vol. 65, Issue 5, pp. 4028-4038, May, 2018. (SCI, IF 7.168, JCR 1.6%, 2016)
  25. Maria Florencia Deslivia, Hyun-Joo Lee, Rizki Fajar Zulkarnain, Bin Zhu, Arnold Adikrishna, In-ho Jeon, Keehoon Kim, "The Effect of Split Nerve on Electromyography Signal Pattern in a Rat Model," Journal of Reconstructive Microsurgery, vol. 34, no. 2, pp.95-102, 2018. (SCIE, IF 2.216, JCR 36.0%, 2016)
  26. Jaemin Lee, Min Kyu Kim, and Keehoon Kim, "A Control Scheme to Minimize Muscle Energy for Power Assistant Robotic Systems under Unknown External Perturbation," IEEE transactions on Neural Systems and Rehabilitation Engineering, vol. 25, no. 12, December, 2017. (SCIE, IF 3.41, JCR 6.1%, 2016)
  27. Donghyun Hwang, Jaemin Lee, Keehoon Kim, "On the Design of a Miniature Haptic Ring for Cutaneous Force Feedback Using Shape Memory Alloy Actuators," Smart Materials and Structures, 26, 2017. (SCI, IF 2.91, JCR 15.5%, 2016)
  28. Maria Florencia Deslivia, Hyun-joo Lee, Rizki Fajar Zulkamain, Zhu Bin, Arnold Adikrishna, In-ho Jeon, Keehoon Kim, "Reinnervated Split-muscle Technique for Creating Additional Myoelectric Sites in Animal Model," Journal of Plastic and Reconstructive Surgery, Vol.138, No.6, pp.997-1010, December, 2016. (SCI, IF 3.84, JCR 11.7%, 2016)
  29. Youngsu Cha, Jin Hong, Jaemin Lee, Jung-Min Park, Keehoon Kim, "Flexible piezoelectric energy harvesting from mouse click motions," Sensors, vol 16, No. 7, 2016. (SCIE, IF 2.68, JCR 17.2%, 2016)
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30. Young Eun Huh, Seonhong Hwang, Keehoon Kim, Won-Ho Chung, Jinyoung Youn, Jin Whan Cho, "The Association of Postural Sensory Deficit with Freezing of Gait in Parkinson's Disease," *Parkinsonism & Related Disorders*, vol. 25, pp. 72-77, April 2016. (SCIE, IF 4.84, JCR 16.5%)
31. Keehoon Kim, J. Edward Colgate, "Haptic Feedback Enhances Grip Force Control of sEMG-Controlled Prosthetic Hands in Targeted Reinnervation Amputees," *IEEE transactions on Neural Systems and Rehabilitation Engineering*, vol. 20, no.6, pp. 798-805, Nov. 2012. (SCIE, IF 3.26, JCR 4.7%)
32. Paul D. Marasco, Keehoon Kim, J. Edward Colgate, Michael A. Peshkin, Todd A. Kuiken, "Robotic Touch Shifts Perception of Embodiment to a Prosthesis in Targeted Reinnervation Amputees," *Brain*, vol. 134, no. 3, pp. 747-758, Mar. 2011. (SCI, IF 9.46, JCR 2.1%)
33. Keehoon Kim, J. Edward Colgate, Julio J. Santos-Munne, Alex Makhlin, Michael A. Peshkin, "On the Design of Miniature Haptic Devices for Upper Extremity Prosthetics," *IEEE-ASME transactions on Mechatronics*, vol. 15, no. 1, pp. 27-39, Feb. 2010. (SCI, IF 2.58, JCR 2.6%)
34. Keehoon Kim, Wan Kyun Chung, M. Cenk Cavusoglu, "Description of Restriction Space in Position Sensor Based Multi-DOF Bilateral Teleoperation Systems," *IEEE transactions on Robotics*, vol. 25, no. 5, pp. 1150-1158, Oct. 2009. (SCI, IF 2.04, JCR #2/16 in robotics)
35. Jongwon Lee, Inwook Hwang, Keehoon Kim, Seungmoon Choi, Wan Kyun Chung, Young Soo Kim, "Cooperative robotic assistant with drill-by-wire end-effector for spinal fusion surgery," *Industrial Robot: An International Journal*, vol. 36, no. 1, pp. 60-72, Jan. 2009. (SCIE, IF 1.00, JCR 56.7%)
36. Keehoon Kim, M. Cenk Cavusoglu, and Wan Kyun Chung, "Quantitative Comparison of Bilateral Teleoperation Systems Using  $\mathcal{H}_\infty$ -Synthesis," *IEEE Transactions on Robotics*, vol. 23, no. 4, pp. 776-789, Aug. 2007. (SCI, IF 1.98, JCR #1/13 in robotics)
37. Keehoon Kim, and Wan Kyun Chung, Sang Yep Nam, "Accurate Force Reflection Method for Multi-DOF Haptic Interface Using Instantaneous Restriction Space without Force Sensor at Unstructured Environment," *Advanced Robotics*, vol. 21, no. 1, pp.87-104, Jan. 2007. (SCIE, IF 0.50, JCR #8/13)

### Refereed Conference Papers

1. Donghyeon Lee, Dongwoo Ko, Wan Kyun Chung, Keehoon Kim, "Maximal Manipulation Framework using Quadratic Programming for a Teleoperated Robotic System with Articulated bodies," International Conference on Robotics and Automation (ICRA), 2022.
2. Donghyeon Lee, Wan Kyun Chung, Keehoon Kim, "Safety-oriented Bilateral Teleoperation Framework for Contact-rich Tasks in Hazardous Workspaces," IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021.
3. Minjae Kim, Wan Kyun Chung, Keehoon Kim, "Subject-Independent sEMG Pattern Recognition by Using a Muscle Source Activation Model," IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2020.
4. IkJong Park, Hong-Kyun Kim, Wan Kyun Chung, Keehoon Kim, "Deep Learning Based Real-Time OCT Image Segmentation and Correction for Robotic Needle Insertion Systems," IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2020.
5. Donghyeon Lee, Woongyong Lee, Wan Kyun Chung, Keehoon Kim, "Robust Micro-Particle Manipulation in a Microfluidic Channel Network Using Gravity-Induced Pressure Actuators," IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2020.
6. Minjae Kim\*, Wan Kyun Chung, Keehoon Kim, "Motion Intensity Extraction Scheme for Simultaneous Recognition of Wrist/Hand Motions," International Conference on Robotics and Automation (ICRA), 2020
7. Sungwoo Park, Namseon Jang, Yong Seok Ihn, Sungwook Yang, Jinwoo Jeong, Sehyuk Yim, Sang-Rok Oh, Keehoon Kim, Donghyun Hwang, "A Tele-operated Microsurgical Forceps-Driver with a

Variable Stiffness Haptic Feedback Master Device," International Conference on Robotics and Automation (ICRA), 2020.

8. Sungwoo Park, Namseon Jang, Jinwoo Jeong, Yong Seok Ihn, Sehyuk Yim, Sungwook Yang, Keehoon Kim, Sang-Rok Oh, Donghyun Hwang, "Development of a Surgical-Forceps Driver with an Embedded High-Precision Tiny Force Sensor Module," IEEE International Conference on Cyborg and Bionic Systems (CBS), 2019.
9. Seongsik Park, Donghyeon Lee, Wan Kyun Chung, Keehoon Kim, "Hierarchical Segmentation of Continuous Motions through sEMG Signal Analysis," IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2019.
10. Byeongkyu Lim, Keehoon Kim, Sang-Rok Oh, Donghyun Hwang, "HaptiCube: A Compact 5-DoF Finger-Wearable Tactile Interface," IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2019.
11. Minjae Kim, Wan Kyun Chung, Keehoon Kim, "Preliminary Study of Virtual sEMG Signal-Assisted Classification," IEEE 16th International Conference on Rehabilitation Robotics (ICORR) 2019.
12. Gu-Cheol Jeong, Yoeun Kim, Woo-seong Choi, Gangyong Gu, Hyun-Joo Lee, Man Bok Hong, Keehoon Kim, "On the Design of a Novel Underactuated Robotic Finger Prosthesis for Partial Hand Amputation," IEEE 16th International Conference on Rehabilitation Robotics (ICORR) 2019.
13. Namseon Jang, Yong Seok Ihn, Jinwoo Jeong, Sungwook Yang, Sehyuk Yim, Sang-Rok Oh, Keehoon Kim, Donghyun Hwang, "A Miniature Suction-gripper with Passive and Active Microneedle Arrays to Manipulate Peripheral Nerves," IEEE International Conference on Robotics and Automation (ICRA), May 2019.
14. Jinwoo Jeong, S. Yim, Donghyun Hwang, Sang-Rok Oh, Keehoon Kim, Yong Seok Ihn, "Towards a high precision robotic platform for neural interface implantation," IEEE International Conference on Cyborg and Bionic Systems (CBS), Shenzhen, China, October 2018.
15. Donghyun Hwang, Member, IEEE, ByeongKyu Lim, Hyun Gi Jung, Yong Seok Ihn, Jinwoo Jeong, Sehyuk Yim, Sang-Rok Oh, Keehoon Kim, "A Pilot Study on the Novel Non-invasive Nerve-Holder with Negative-pressure Suctions," Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), 2018.
16. Jinwoo Jeong, Sehyuk Yim, Donghyun Hwang, Sang-Rok Oh, Keehoon Kim, Yong Seok Ihn, "Towards a high precision robotic platform for neural interface implantation," 2018 IEEE International Conference on Cyborg and Bionic Systems, October 2018.
17. Byeongkyu Lim, Yong Seok Ihn, Sehyuk Yim, Jinwoo Jeong, Sang-Rok Oh, Keehoon Kim, Donghyun Hwang, "An Experimental Study on the Insertion of Neural Interfaces into Peripheral Nerve Using a Piezoelectric Vibrator," ACTUATOR 2018: 16th International Conference on New Actuators, Bremen, Germany, June 2018.
18. S. Yim, Y.-E. Oh, W. Choi, H. Park, J. Jeong, Y. Ihn, D. Hwang, S.-R. Oh, J. Kim, K. Kim, "Preliminary Results of a Handheld Nerve Electrode Insertion Device," IEEE International Conference on Robotics and Automation, pp.1504-1510, Brisbane, May 21-25, 2018.
19. Sehyuk Yim, Donghyun Hwang, Yong Seok Ihn, Jinwoo Jeong, Sang-Rok Oh, and Keehoon Kim, "A Handheld Device for Magnetically Inserting a Neural Interface into a Peripheral Nervous System," Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), pp.226-229, 2017.
20. Byeongkyu Lim ; Keehoon Kim ; Donghyun Hwang, "On the Design of the 5-DoF Finger-wearable Cutaneous Haptic Device," 2017 IEEE International Conference on Robotics and Biomimetics (ROBIO), Dec. 2017.
21. Jinwoo Jeong, Woohyun Jung, Ockchul Kim, Jun-Uk Chu, Inchan Youn, Keehoon Kim, Sang Rok Oh, Jong Woong Park, Jinseok Kim, "64-channel double-layered sieve electrode with increased porosity for improved axon regeneration and high spatial resolution," 2016 6th IEEE International

- Conference on Biomedical Robotics and Biomechatronics (BioRob), pp. 1148 - 1153, Singapore, June 26-29, 2016.
22. Donghyun Hwang, Yong Seok Ihn, Seonhong Hwang, Sang-Rok Oh, Keehoon Kim, "A preliminary study on the method for stable and reliable implantation of neural interfaces into peripheral nervous system," 2016 6th IEEE International Conference on Biomedical Robotics and Biomechatronics (BioRob), pp. 561 - 566, Singapore, June 26-29, 2016.
  23. MinKyu Kim, Jaemin Lee, Keehoon Kim, "Enhancement of sEMG-based gesture classification using mahalanobis distance metric," 2016 6th IEEE International Conference on Biomedical Robotics and Biomechatronics (BioRob), pp. 1117 - 1122, Singapore, June 26-29, 2016.
  24. Jaemin Lee, Donghyun Hwang, Minkyu Kim, Keehoon Kim, "A feasibility test of underactuated robotic prosthetic fingers actuated by shape memory alloy," 2016 6th IEEE International Conference on Biomedical Robotics and Biomechatronics (BioRob), pp. 554 - 560, Singapore, June 26-29, 2016
  25. MinKyu Kim; Jaemin Lee; Keehoon Kim, "Tele-operation system with reliable grasping force estimation to compensate for the time-varying sEMG feature," 2016 IEEE International Conference on Robotics and Automation (ICRA), pp. 5561 - 5567, Stockholm, Sweden, May 16-21, 2016.
  26. Jaemin Lee, MinKyu Kim, and Keehoon Kim, "A Robust Control Method of Multi-DOF Power-Assistant Robots for Unknown External Perturbation Using sEMG Signals," IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), September 28-October 2, 2015, Hamburg, Germany.
  27. Joohyun Kim; Kwon Joong Son; Keehoon Kim, "An empirical study of rendering sinusoidal textures on a ultrasonic variable-friction haptic surface," 12th International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), pp. 593 - 596, KINTEX, Goyang, Korea, 2015.
  28. Jonghoon Park; Keehoon Kim, "Tracking on lie group for robot manipulators," 11th International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), pp. 579 - 584, Kuala Lumpur, Malaysia, Nov. 12-15, 2014.
  29. Jaemin Lee, Minkyu Kim, Hyunkyu Ko and Keehoon Kim, "A Control Method for a Power-Assisted Robot for Upper Limbs considering Intention-based Motion Using sEMG Signal," International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), Kuala Lumpur, Malaysia, Nov. 12-15, 2014.
  30. Minkyu Kim, Jaemin Lee, Hyunkyu Ko and Keehoon Kim, "A preliminary analysis of window size and voting size with a time delay for a robust real-time sEMG pattern recognition," International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), Kuala Lumpur, Malaysia, Nov. 12-15, 2014.
  31. Kwon Joong Son and Keehoon Kim, "The use of degenerate mode shapes in piezoelectric variable-friction tactile displays," The 12th International Conference on Motion and Vibration (MOVIC), Sapporo, Japan, August 3-7, 2014.
  32. Jaemin Lee, Minkyu Kim, Sang-Rok Oh, Keehoon Kim, "Integrated Control Method for Power-Assisted Rehabilitation: Ellipsoid Regression and Impedance Control," IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), September 14-18, 2014. Chicago, IL, USA.
  33. Kwon Joong Son and Keehoon Kim, "The use of degenerate mode shapes in piezoelectric variable-friction tactile displays," The 12th International Conference on Motion and Vibration (MOVIC), August 3-7, Sapporo, Japan, 2014.
  34. MinKyu Kim, Kwanghyun Ryu, Yonghwan Oh, Sang-Rok Oh, and Keehoon Kim, "Implementation of Real-Time Motion and Force Capturing System for Tele-manipulation based on sEMG Signals and IMU Motion Data," IEEE International Conference on Robotics and Automation (ICRA), Hong Kong, 2014
  35. Man Bok Hong, Sin Jung Kim, Keehoon Kim, "KULEX: An ADL Power-Assistance Demonstration," International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), Jeju, 2013.



36. Man Bok Hong, Sin Jung Kim, Keehoon Kim, "KULEX: ADL Power Assistant Robotic System for the Elderly and the Disabled (Abstract for VIDEO)," International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), Jeju, 2013.
37. Min Kyu Kim, Keehoon Kim, "Increasing performance of a pattern recognition system using a sEMG signal by setting multi-reference," International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), Jeju, 2013.
38. Min Kyu Kim, Keehoon Kim, "Pilot Study on Prediction of Human Hand Configuration Using Transient State of Surface-Electromyography Signals," 13th International Conference on Control, Automation and Systems (ICCAS 2013), 2013
39. Kwon Joong Son, Minkyu Kim and Keehoon Kim, "Analytical Modeling of Disk-Type Piezoelectric Variable Friction Tactile Displays," *IEEE/ASME International Conference on Advanced Intelligent Mechatronics*, Wollongong, Australia, pp. 1725-1730, July 9-12, 2013.
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41. Jiyeon Kang, Keehoon Kim, Sin Jung Kim, Sang Rok Oh, "On the Comfortableness of Muscle Power Assistive Robotic System," *IEEE International Conference on Biomedical Robotics and Biomechatronics (BioRob)*, Rome, Italy, pp. 1759-1764, June 24-27, 2012.
42. HanJin LEE, Keehoon Kim, Myoung Soo Park, Jong Hyeon Park and Sang-Rok Oh, "Verification of A Fast Training Algorithm for Multi-channel sEMG Classification Systems to Decode Human Configuration," *IEEE International Conference on Robotics and Automation (ICRA)*, St. Paul, USA, pp. 3167-3172, May 14-18, 2012.
43. HanJin LEE, Sin-Jung Kim, Keehoon Kim, Myoung Soo Park, Sung-Kyun Kim, Jong Hyeon Park and Sang-Rok Oh, "Online Remote Control of a Robotic Hand Configurations using sEMG Signals on a Forearm," *IEEE International Conference on Robotics and Biomimetics (ROBIO)*, Phuket, Thailand, pp. 2243-2244, Dec 8-10 2011.
44. Myoung Soo Park, Keehoon Kim, Sang-Rok Oh, "A Fast Classification System for Decoding of Human Hand Configurations Using Multi-Channel sEMG Signals," *International Conference on Intelligent Robots and Systems (IROS)*, San Francisco, USA, Sep. 25-30, 2011.
45. Sin-Jung Kim, Keehoon Kim, Sungon Lee, Bum-Jae You, Sang-Rok Oh, "3-D Reconstruction Using a Touch Sensor for Mouse Stereotactic Surgery in Unstructured Environment," *The 7<sup>th</sup> International Conference on Ubiquitous Robots and Ambient Intelligence (URAI)*, Busan, Korea, Nov. 24-27, 2010. BEST PAPER AWARD
46. Keehoon Kim, Wan Kyun Chung, M. Cenk Cavusoglu, "Restriction Space Projection Method for Position Sensor Based Force Reflection of Multi Degrees-of-Freedom Bilateral Teleoperation Systems in Unstructured Environments," *International Conference on Robotics and Automation (ICRA)*, Alaska, USA, May 3-8, 2010.
47. Jongwon Lee, Keehoon Kim, Wan Kyun Chung, Seungmoon Choi, Young Soo Kim, "Development of Human Guided Surgical Robot System for Spinal Fusion, CMSS-I," *International Conference on Robotics and Automation (ICRA)*, California, USA, May 19-23, 2008.
48. Keehoon Kim, J. Edward Colgate, Michael A. Peshkin, "On the Design of a Thermal Display for Upper Extremity Prosthetics," *16<sup>th</sup> Symposium on Haptic Interfaces for Virtual Environments and Teleoperator Systems*, Reno, Nevada, USA, March 13-14, 2008.
49. Keehoon Kim, J. Edward Colgate, Michael Peshkin, Julio Santos-Munne, Alex Makhlin, "A Miniature Tactor Design for Upper Extremity Prosthesis," *Special Sessions on Haptics, Proc. Of the Frontiers in the Convergence of Bioscience and Information Technologies*, Jeju, Korea, Oct. 11-13, 2007.
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52. Keehoon Kim, M. Cenk Cavusoglu, Wan Kyun Chung, "A Framework for Quantitative Comparison of Bilateral Teleoperation Systems Using  $\mu$ -Synthesis," *International Conference on Robotics and Automation (ICRA)*, Rome, Italy, April 10-14, 2007.
53. Keehoon Kim, M. Cenk Cavusoglu, Wan Kyun Chung, "Quantitative Comparison of Bilateral Teleoperation Systems with Various Drive Mechanisms and Sensory Configurations," *Proc. of International Conference on Control, Automation, and Systems (SICE-ICCAS)*, Busan, Korea, Oct. 18-21, 2006.
54. Keehoon Kim, Jongwon Lee, Wan Kyun Chung, and Young Soo Kim, "Development of a Bilateral Teleoperation System for Human Guided Spine Bone Fusion Surgery: BiTESS II," *World Congress on Medical Physics and Biomedical Engineering*, Seoul, Korea, Aug. 27-Sep. 1, 2006.
55. Keehoon Kim and Wan Kyun Chung, "Accurate Force Reflection for Kinetically Dissimilar Bilateral Teleoperation Systems Using Instantaneous Restriction Space," *International Conference on Robotics and Automation (ICRA)*, Orlando, USA, May 15-19, 2006.
56. Keehoon Kim, Wan Kyun Chung, and Youngil Youm, "Accurate Multi-DOF Kinesthetic Haptic Display Using Instantaneous Restriction Space," *International Conference on Intelligent Robots and Systems (IROS)*, Edmonton, Canada, Aug.3-5, 2005.
57. Keehoon Kim, M. Cenk Cavusoglu, Wan Kyun Chung, "Quantitative Comparison of Bilateral Teleoperation Systems using  $H_\infty$  Framework," *International Conference on Intelligent Robots and Systems (IROS)*, Sendai, Japan, Sep. 28- Oct. 2, 2004.
58. Keehoon Kim, W.K. Chung, "Design and Analysis of a New 7-DOF Parallel Type Haptic Device PATHOS-II," *International Conference on Intelligent Robots and Systems (IROS)*, Bally's Las Vegas Hotel, October 27 - 31, 2003.
59. Keehoon Kim, W.K. Chung, "Design and Analysis of a New 7-DOF Parallel Type Haptic Device: PATHOS-II," *20th International Symposium on Automation & Robotics in Construction*, September 21-25, 2003.
60. Keehoon Kim, Y. Youm, W.K. Chung, "Human Kinematic Factor for Haptic Manipulation: The Wrist to Thumb," *10th International Symposium on Haptic Interfaces for Virtual Environment and Teleoperator System, Florida*, pp. 319-326, March 24-25, 2002.
61. Keehoon Kim, Doik Kim, Wan Kyun Chung, and Youngil Youm, "Human Factor for Kinematic Design of a Haptic Device," *Proc. of the 32nd International Symposium on Robotics*, Seoul, Korea, pp. 135-140, April 19-21, 2001.
62. Keehoon Kim, W.K. Chung, and Y. Youm, "On the Design Method of Haptic Interface Controller with Virtual Coupling," *Proc. of International Conference on Control, Automation, and Systems (SICE-ICCAS)*, Jeju, Korea, pp. 71-74, Oct., 2001.

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## Technology Transfers & Start-Ups

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1. Power Assistant Robotic Systems, Gemtech Co. LTD, 2014. (\$150,000, 5% Royalty)
2. Stereotactic Surgical Robotic System, Neuromeka Co., 2015 (\$100,000, 5% Royalty)
3. Motion Capturing Algorithm based on sEMG, Hyoil CTA, 2015 (\$100,000, 3% Royalty)
4. sEMG-based Sports Coaching System, 2015 (\$150,000, 5% Royalty)
5. Logon.U Co., a start-up company, 2015

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## Patents

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### Registered

1. END EFFECTOR FOR SPINE BONE FUSION SYSTEMS  
뼈 융합 수술 시스템을 위한 엔드 이펙터 (Patent No. 10-0705998, KR)
2. HAPTIC INTERFACE FOR OXYGEN LANCE MANIPULATOR IN ELECTRIC FURNACE  
힘 반영 전기로 산소 취입기 조작을 위한 햅틱 인터페이스 장치 (Patent No. 10-0823095, KR)
3. RESTRICTION SPACE CALCULATION METHOD USING POSITION SENSORS OF MULTI DEGREES-OF-FREEDOM MANIPULATOR  
다관절 매니퓰레이터의 위치 센서를 이용한 제한공간 산출 방법 (Patent No. 1145243, KR)
4. MATERIAL SCREENING APPARATUS  
재료 감별 장치 (Patent No. 1402862 KR, 13/812290 US, PCT/KR2010/004917,)
5. APPARATUS FOR SUPPORTING A MUSCULAR STRENGTH OF ARM  
상지 근력 보조장치 (Patent No. 10-1280364KR)
6. PRECISE PLACEMENT DEVICE FOR PRECISE INSERTION OF INSERT  
뇌정위 수술을 위한 전극 삽입 장치 (Patent No. 1205891 KR, Patent No. 9498299 US)
7. EXOSKELETON MECHANISM FOR LIMB POWER ASSISTANCE,  
근력보조를 위한 외골격장치 (Patent No. 1295004 KR, Patent No. 9592174 US)
8. SPHERICAL TRANSMISSION JOINT  
경사 축의 회전동력전달을 위한 구형 조인트 (Patent No. 1283933 KR, PATENT No. 8,763,490 US)
9. TACTILE DISPLAY AND ITS CONTROL METHOD USING SQUEEZE FILM EFFECT  
스퀴즈막 효과를 이용한 촉감 디스플레이를 구비한 전자 장치 (PATENT No. 1383012 KR, Application No. 13/768,292 US)
10. WEARABLE ELECTROMYOGRAM SENSOR SYSTEM  
착용형 근전도 시스템 (PATENT No. 10-1501661 KR, Patent No. 9999391 US)
11. PLANT STATUS AUTOMATIC ANALYSIS DEVICE AND ANALYSIS METHOD USING THEREOF  
식물상태 자동화 분석장치 및 이를 이용한 식물 분석 방법 (Patent No. 10-156426 KR, 001041 PCT, Application No. 201580013834.9 CN)
12. APPARATUS FOR SUPPORTING A MUSCULAR STRENGTH OF ARM  
상지 근력 강화 보조 장치 (Patent No. 10-1538407, Patent No. ZL201580017826.1 CN, PCT/KR2015/003550)
13. APPARATUS FOR SUPPORTING A MUSCULAR STRNGTH AND A KIT HAVING THE SAME  
상지 근력 강화 장치 및 이를 구비한 키트 (PATENT No. 10-1523014 KR, Application No. 201580017828.0 CN, PCT/KR2015/003767)
14. Apparatus for Upper Limb Rehabilitation  
상지재활기 (Patent NO. 30-0777253 KR)
15. Apparatus for supporting a muscular strength  
상지운동기 (Patent NO. 30-0777250 KR, 30-0777251 KR, 30-0777252 KR)
16. ROBOT FINGER STRUCTURE  
로봇손가락 구조체 (Patent No. 10-1610745 KR, 005986 PCT)
17. AUTOMATIC SYSTEM FOR PLANT PHENOTYPE ANALYSIS  
식물분석 자동화 시스템 (Patent No. 10-1600903 KR, Application No. 201580078067.X CN, PCT/KR2015/003124)
18. POTS FOR PLANT PHENOTYPING  
식물뿌리 표현형 측정을 위한 식물 생육 용기 (Patent No. 10-1666034 KR)

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**19. PLANT PHENOTYPE ANALYSIS APPARATUS**

식물 표현체 분석장치 (Patent No. 10-1600906 KR, PCT/KR2016/000773)

**20. WEARABLE DEVICE FOR HAPTIC DISPLAY**

착용형 촉감 전달 장치 (Patent No. 10-1658513 KR, Application No. 15/567421, PCT/KR2015/008332)

**21. SENSOR MODULE FOR BIONIC SIGNAL ACQUISITION**

생체 신호 측정용 센서 모듈 (Patent No. 30-0837978 KR)

**22. HIGH-TORQUE FLAT MOTOR WITH FLEXURE MECHANISM**

유연기구 기반 고토크 플랫 모터 (Patent No. 10-1703052 KR, Application No. 14/938324)

**23. NEURAL PROBE ARRAY OF HIGH PERFORMANCE AND FOR MINIMIZED DAMAGE OF NEURON**

신경 손상을 최소화한 고성능 신경 탐침 구조체 (Patent No. 10-1700886 KR, Application No. 15-077172 US, Application No. 201680041169.9 CN, Application No. 16830771.8 EU, PCT/KR2016/008035)

**24. APPARATUS FOR INVASIVE INSERTION OF ELECTRODE STRUCTURE**

침습형 신경전극 삽입 장치 (Patent No. 10-1842618 KR, Application No. 15/678894 US)

**Pending****1. DETECTOR AND STIMULATOR FOR FEEDBACK IN A PROSTHESIS (Application No. 11/677564, US)****2. PLANAR NEURAL PROBE STRUCTURE AND ITS ASSEMBLY STRUCTURE FOR CHRONIC IMPLANTATION**

체내 이식이 가능한 평면구조의 침습형 신경전극과 소형삽입기구 (Application No. 2016-0149218 KR, 15/721217 US)

**3. APPARATUS FOR INSERTION OF NERVE ELECTRODES**

반침형 신경고정부가 통합된 기계식 신경전극 삽입장치 (Application No. 2017-0108811 KR, 15/907832 US)

**4. TACTILE TRANSMISSION DEVICE AND USER INTERFACE SYSTEM**

손가락 착용형 다자유도 촉감 전달 장치 (Application No. 2017-0164960 KR)

**5. PERIPHERAL NERVE FIXING APPARATUS**

음압기반 말초신경 고정 장치 (Application No. 2018-0043058 KR)

**6. HIGH PRECISION ROBOTIC PLATFORM MANIPULATING**

말초 신경 미세 조작이 가능한 로봇 플랫폼 (Application No. 2018-0056323 KR)

**7. APPARATUS FOR HOLD AND RELEASE OF ELECTRODE**

전극 고정 및 릴리즈 장치 (Application No. 2018-0057576 KR)

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**Grants (as a Principal Investigator)**

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**1. Principal Investigator, \$1,950,000, 2010~2014**

ADL Support System for the Elderly and Disabled, Ministry of Knowledge and Economy,  
연구책임자, 1,950,000,000 원, 2010~2014  
노약자/장애인을 위한 근력보조 시스템 개발, 산업원천기술개발사업, 지식경제부

**2. Principal Investigator, \$1,600,000, 2010~2012 (Phase I)**

Decoding of Human Intention and Restoration of Sensory Perception based on Bionic Interface,  
Global Frontier R&D Program, Ministry of Science, ICT, and Future Planning..  
연구책임자, 1,600,000,000 원, 2010~2012 (1 단계 2 년)  
바이오톤 인터페이스 기반 의도인식 및 감각전달 기술 개발, 글로벌프론티어사업, 교육과학부

**3. Principal Investigator, \$2,400,000, 2012~2015 (Phase II)**

Prediction of human motion intention based on surface electromyogram and restoration of multi-sensory feedback for sensory-motor skills through remote-controlled avatar, Global Frontier R&D Program, Ministry of Science, ICT, and Future Planning..

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연구책임자, 2,400,000,000 원, 2012~2015 (2 단계 3 년)  
원격존제를 통한 감각-운동 작업을 위한 근전도 신호 기반의 동작의도 예측 및 능동 촉감 복원 기술 개발,  
글로벌프론티어사업, 미래창조과학부

4. Principal Investigator, \$3,000,000, 2015~2019 (Phase III)  
Prediction of motion intention based on surface-electromyogram and wearable tactile display for sensory-motor skills, Global Frontier R&D Program, Ministry of Science, ICT, and Future Planning..  
연구책임자, 2,400,000,000 원, 2015~2019 (3 단계 4 년)  
감각-운동 작업을 위한 근전도 신호 기반의 동작의도 예측 및 착용형 촉감 디스플레이 기술 개발,  
글로벌프론티어사업, 미래창조과학부
5. Principal Investigator, \$200,000, 2015~2017  
Decoding of High Speed Motion Intention using sEMG signals, Ministry of Science, ICT, and Future Planning.  
연구책임자, 200,000,000 원, 2015~2017 (2 년)  
근전도 신호 기반 고속 동작 인식 기술 상용화, 미래창조과학부
6. Principal Investigator, \$600,000, 2015~2017  
Development of sEMG based Motion Capturing System, Start-Up Supporting Program (Phase II), Korea Institute of Science and Technology  
연구책임자, 600,000,000 원, 2015~2017 (2 년)  
근전도 기반 모션캡처 시스템 개발, 창업지원프로그램(디딤돌 II), 한국과학기술연구원
7. Principal Investigator, \$2,820,000, 2014~2017 (Phase I)  
Development of Measurement and Analysis System for Decoding of Motor and Sensory Bionic-Signals and Bionic Arms Controlled by Bionic Interfaces, Ministry of Science, ICT, and Future Planning  
연구책임자, 2,820,000,000 원, 2014~2017 (1 단계 3 년)  
동작과 촉감 전달을 위한 생체신호 측정 분석 시스템 및 생체신호 기반 제어기능을 갖는 bionic arm 개발,  
미래창조과학부
8. Principal Investigator, \$7,450,000, 2017~2020 (Phase II)  
System Integration and Demonstration of Bionic Arms Controlled by Bionic Interfaces, Ministry of Science and ICT  
연구책임자, 7,450,000,000 원, 2017~2020 (2 단계 3 년)  
생체신호 기반 제어기능을 갖는 bionic arm 시스템 인테그레이션 및 실증, 과학기술정보통신부
9. Co-Principal Investigator, \$150,000, 2020  
Virtual Reality Force Feedback Controller Based User Biosignal Interface and Contents Control Technology, Ministry of Science and ICT  
참여기관 연구책임자, 150,000,000 원, 2020 (1 년)  
가상현실 역감 컨트롤러 기반 사용자 생체신호 인터페이스 및 콘텐츠 조작 기술, 과학기술정보통신부
10. Principal Investigator, \$80,000, 2020  
Development of Haptic Interface for Tele-Robotic Systems at POSCO Blast Furnace  
연구책임자, 80,000,000 원, 2020  
고로 출선구 지금 제거 작업을 위한 로봇 원격 조종 (teleoperation) 햅틱 마스터 장치 개발, POSCO
11. Co-Principal Investigator, \$200,000, 2020~2021  
Development and Validation of Real-Virtual Blended Exhibits for In-Depth Embodied Learning of Scientific Principles, Ministry of Science and ICT  
참여기관 연구책임자, 200,000,000 원, 2020~2021  
과학적 원리의 심도 있는 체화 학습을 위한 실제-가상 혼합형 전시물 개발 및 효과 검증, 과학기술정보통신부
12. Principal Investigator, \$1,200,000, 2020~2024  
Development of Intelligent Autonomous Disinfection Robot System for Multi-use Facilities and Living Space, Ministry of Science and ICT  
연구책임자, 1,200,000,000 원, 2020~2024  
지능형 자율 방역로봇을 위한 작업설계 및 제어 알고리즘 개발, 과학기술정보통신부

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## Invited Talks

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1. "Bionic Interface: Decoding Human Motion Intention and Haptic Feedback," Sungkyunkwan Univ (SKKU)., March 10, 2022.
2. "Bionic Interface: Decoding Human Motion Intention and Haptic Feedback," Sungkyunkwan Univ (SKKU)., Nov. 18, 2021.
3. "Bionic Interface: Decoding Human Motion Intention and Haptic Interface," Samsung Electronics, Aug. 6, 2021
4. "Assistant Robotic Technologies: Research to Commercialization," National Rehabilitation Institute, July 1, 2021.
5. "Assistant Robotic Technologies: Research to Commercialization," POSCO, Jan. 27, 2021.
6. "A microsurgical robotic system for nerve manipulation," The 1st KNUH Future Medicine International Symposium, Dec. 4, 2020.
7. "Decoding Human Motion Intention Using Bionic Interface," RIST, April 3, 2020.
8. "Assistant Robotic Technologies: Research to Commercialization," University of Texas at Austin, Sep. 21, 2018.
9. "Assistant Robotic Technologies: Research to Commercialization," POSTECH, Sep. 3, 2018.
10. "Robotic Technologies in Science Fiction," Korea Ministry of Science and ICT, June 19, 2018.
11. "Robotic Technologies in Science Fiction," Korea Job World, May 16, 2018.
12. "Prediction of Human Motion Intention Using Bionic Interface: Research to Commercialization," Joong-Ang University, March 15, 2018.
13. "Prediction of Human Motion Intention Using Bionic Interface," Republic of Korea Army Training and Doctrine Command, Dec. 6, 2017.
14. "Prediction of Human Motion Intention Using Bionic Interface: Research to Commercialization," World Robot Conference, Beijing, China, Aug. 27, 2017.
15. "Prediction of Human Motion Intention Using Bionic Interface," Korean Medical Association, July 1, 2017.
16. "Robotic Technologies in Science Fiction," Korea Job World, June 8, 2017.
17. "Robotic Technologies in Science Fiction," Gyeonggi Science High School for the Gifted, Mar. 25, 2017.
18. "Robotic Technologies in Science Fiction," Science Station, Sangwolgot Station, Mar. 17, 2017.
19. "Prediction of Human Motion Intention Using Bionic Interface," Asan Hospital, May 10, 2017.
20. "Robotic Technologies in Science Fiction," TOZ study, Mar. 18, 2017.
21. "Prediction of Human Motion Intention: Research to Commercialization," UNIST, Ulsan, Nov. 16, 2016.
22. "Prediction of Human Motion Intention: Research to Commercialization," KAIST, Daejeon, Nov. 2, 2016
23. "Prediction of Human Motion Intention: Research to Commercialization," World Robot Conference, Beijing, China, Oct. 22, 2016
24. "Prediction of Human Motion Intention: Research to Commercialization," Sungkyunkwan Univ., Oct. 6, 2016
25. "Robotic Technologies in Science Fiction," Seongbuk-Gu, KIST Science Talk, Aug. 4, 2016.
26. "Assistant Robotic Technologies in Bio-Medical Applications," World Robot Conference, Beijing, China, Nov. 24, 2015.
27. "KULEX, KIST Upper Limb Exoskeleton," Korea-Swiss Life Science Symposium, Oct. 22, 2015.
28. "Development of sEMG Sensor Systems and Industrial Applications," Korea Development Bank, Oct. 16, 2015.
29. "Decoding of Human Motion Intention Using Bionic Interface," DGIST, Sep. 16, 2015.
30. "Development of sEMG Sensor Systems and Industrial Applications," Educational Center for Future Technology, Sep. 11, 2015.

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31. "Prediction of Human Motion Intention Using Bionic-Interface," Korea-Japan Robotics Workshop, Sep. 4, 2015.
  32. "Robotic Technologies in Science Fiction," Seongbuk-Gu, KIST Science Talk, Aug. 4, 2015.
  33. "Assistant Robotic Technologies in Bio-Medical Applications," Bionics Forum, July 2, 2015.
  34. "Assistant Robotic Technologies in Bio-Medical Applications," Yonsei University, April 3, 2015.
  35. "Assistant Robotic Technologies in Bio-Medical Applications," Korea University, Dec. 9, 2014
  36. "Robotic Technologies in Science Fiction", Science Talk on Saturday, Dec. 6, 2014.
  37. "Assistant Robotic Technologies in Bio-Medical Applications," Kookmin University, Nov. 24, 2014.
  38. "Assistant Robotic Technologies in Bio-Medical Applications," Pohang University of Science and Technology (POSTECH), Oct. 29, 2014.
  39. "Assistant Robotic Technologies in Bio-Medical Applications," The Institute of Electronics and Information Engineers (IEIE), Oct. 15, 2014.
  40. "Assistant Robotic Technologies in Bio-Medical Applications," Seoul Samsung Hospital, Sep. 1, 2014.
  41. "Assistant Robotic Technologies in Bio-Medical Applications," Asan Hospital, Annual Symposium of Center for Biomedical Engineering Research Center, Nov. 27, 2013
  42. "Robotic Technologies in Science Fiction", Science Touch on Friday, Nov. 8, 2013.
  43. "Robotic Technologies in Science Fiction", Center for Women in Science Engineering and Technology, July 30, 2013.
  44. "Decoding of Motion Intention & Restoration of Haptic Sensation for Upper Extremity Amputees", Bulgaria-Korea Science and Technology Forum, Jun. 3, 2013
  45. "Decoding of Motion Intention and Restoration of Haptic Sensation for Upper Extremity Amputees", Asan Hospital, Dec. 14, 2012.
  46. "Assistant Robotics in Bio-Medical Applications", Seoul National University, Oct. 31, 2012.
  47. "Assistant Robotics in Bio-Medical Applications", Daegu-Kyungbuk Institute of Science and Technolgy (DGIST), Sep. 12, 2012.
  48. "Assistant Robotics in Bio-Medical Applications", Hanyang University WCU, July 25, 2012.
  49. "Assistant Robotics in Bio-Medical Applications", Bulgaria-Korea Science and Technology Forum, Jun. 28, 2012.
  50. "Restoration of Haptic Sensation for Upper Extremity Amputees", International Workshop on Cognition, Control and Learning, Jan. 6, 2012
  51. "Assistant Robotics in Bio-Medical Applications", Dept. of Orthopedics, Asan Hospital, Oct. 25, 2011.
  52. "Assistant Robotics in Bio-Medical Applications", Dept. of Radiology, Asan Hospital, Aug. 25, 2011.
  53. "Toward Neurocontrolled Upper Extremity Prosthesis: Decoding of Human Motion Intention & Restoration of Haptic Sensation," Technische Universitat Munchen, Germany, May 26, 2011.
  54. "Restoration of Haptic Sensation: Toward Neurocontrolled Upper Extremity Prosthesis," ETH, Switzerland, May 23, 2011.
  55. "Restoration of Haptic Sensation: Toward Neurocontrolled Upper Extremity Prosthesis," Sungkyunkwan University, Apr. 25, 2011.
  56. "Assistant Robotics Technologies in Bio-Medical Application," Robotic Surgery Symposium, Asan Hospital, Feb. 11, 2011.
  57. "Assistant Robotics Technologies in Bio-Medical Application," Robotic Surgery Center, Asan Hospital, Feb. 8, 2011.
  58. "Toward Neurocontrolled Upper Extremity Prosthesis: Trends, Issues, and Perspectives," the Guro Industrials, Dec. 21, 2010.
  59. "Assistant Robotics Technologies in Bio-Medical Application," Asan-KIST Symposium, Asan Hospital, Nov. 16, 2010.
  60. "Toward Neurocontrolled Upper Extremity Prosthesis: Trends, Issues, and Perspectives," Korea University, Nov. 8, 2010.
  61. "Assistant Robotics Technologies in Rehabilitation Applications," Hyundai Rotem, Oct. 21, 2010.

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62. "Toward Neurocontrolled Upper Extremity Prosthesis: Restoration of Haptic Sensation," KAIST, Daejeon, June 10, 2010.
  63. "Restoration of Haptic Sensation for Upper Extremity Prosthesis," Seoul National University, Seoul Korea, Dec. 1, 2009.
  64. "Assistant Robotics in Bio-Medical Applications: Restoration of Haptic Sensation for Upper Extremity Prosthesis," Korea Institute of Industrial Technology, Ansan, Korea, July 17, 2009
  65. "Assistant Robot Technologies in Bio-Medical Applications," Korea Institute of Science and Technology (KIST), Seoul, Korea, January 9, 2009.
  66. "Assistant Robot Technologies in Bio-Medical Applications," Kyungpook National University, Daegu, Korea, January 7, 2009.
  67. "Haptic Feedback for Upper Extremity Prosthetics," Rehabilitation Institute of Chicago, Chicago, USA, February 29, 2008
  68. "Assistant Robot Technologies in Bio-Medical Application," Gwangju Institute of Science and Technology (GIST), Gwangju, Korea, February 4, 2008
  69. "Research on Upper Extremity Prosthetics", Pohang Institute of Intelligent Robotics, Pohang, Korea, October 9, 2007.
  70. "Towards Tele-Presence", Korea Institute of Industrial Technology, Ansan, Korea, April 5, 2006.
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## Professional Service

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Served as a committee member for international conference, including:

- 2011 IEEE International Conference on Mechatronics and Automation (ICMA), Program Committee
- 2012 IEEE International Conference on Intelligent Robots and Systems (IROS), Associate Editor
- 2012 Korea Robotics Society Annual Conference (KROC), Local Chair
- 2013 IEEE International Conference on Intelligent Robots and Systems (IROS), Associate Editor
- 2013 Korea Robotics Society Annual Conference (KROC), Financial Chair
- 2013 IEEE International Conference on Intelligent Robots and Systems (IROS), Associate Editor
- 2013 International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), Local Chair
- 2014 IEEE International Conference on Robotics and Automation (ICRA), Associate Editor
- 2014 IEEE International Conference on Intelligent Robots and Systems (IROS), Associate Editor
- 2014 International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), Finance Chair
- 2015 IEEE International Conference on Robotics and Automation (ICRA), Associate Editor
- 2015 Workshop of IEEE International Conference on Robotics and Automation (ICRA), Co-Organizer
- 2015 IEEE International Conference on Intelligent Robots and Systems (IROS), Editor
- 2016 IEEE International Conference on Intelligent Robots and Systems (IROS), Editor
- 2016 Journal of Korea Robotics Society, Editor.
- 2016-2018 IEEE Robotics and Automation Society, Technical Committee, Telerobotics, Co-Chair
- 2017 Korea Robotics Society Annual Conference (KROC), Exhibition Chair
- 2017 IEEE International Conference on Robotics and Automation (ICRA), Associate Editor
- 2017 IEEE International Conference on Intelligent Robots and Systems (IROS), Editor
- 2017 International Conference on Ubiquitous Robots and Ambient Intelligence (URAI)
- 2017 IEEE International Conference on Intelligent Robots and Systems (IROS), Editor
- 2018 IEEE International Conference on Intelligent Robots and Systems (IROS), Editor
- 2018 Korea Robotics Society Annual Conference (KROC), Exhibition Chair
- 2019 Korea Robotics Society Annual Conference (KROC), Tutorial Chair
- 2018 IEEE International Conference on Intelligent Robots and Systems (IROS), Editor
- 2019 IEEE International Conference on Robotics and Automation (ICRA), Associate Editor
- 2019 IEEE International Conference on Intelligent Robots and Systems (IROS), Editor
- 2020 IEEE International Conference on Robotics and Automation (ICRA), Associate Editor
- 2020 IEEE International Conference on Intelligent Robots and Systems (IROS), Session Chair
- 2021 IEEE Transactions on Haptics – the World Haptics Conference 2021, Guest Editor
- 2021 Korea Robotics Society Annual Conference (KROC), Program Chair
- 2021 Intelligent Service Robotics, Editor
- 2022 IEEE international Conferences on Robotics and Automation (ICRA), Associate Editor



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- 2022 IEEE Transactions on Haptics – Haptics Symposium 2022, Guest Editor

Served as a reviewer for international journals, including:

- IEEE Transactions on Robotics
- IEEE Transactions on Neural Systems and Rehabilitation Engineering
- IEEE Transactions on Haptics
- IEEE Transactions on Biomedical Engineering
- IEEE Transactions on Mechatronics
- IEEE Spectrum
- International Journal of Robotics Research
- Advanced Robotics
- Robotica
- ASME Journal of Dynamic Systems Measurement and Control
- International Journal of Control, Automation, and Systems (IJCAS)
- Journal of Mechanical Science and Technology
- Journal of Biomedical and Health Informatics

Served as a reviewer for international conference, including:

- IEEE International Conference on Robotics and Automation
- IEEE/RSJ International Conference on Intelligent Robots and Systems
- Symposium on Haptic Interfaces
- IEEE International Symposium on Robots and Human Interactive Communications
- IEEE International Conference on Mechatronics and Automation.
- IEEE RAS & EMBS International Conference on Biomedical Robotics and Biomechatronics