

Ki-Uk Kyung (경기욱 *in Korean*)

PERSONAL

Date of Birth January 28, 1977
Place of Birth Gwangyang, Korea
Contact IT-Convergence Research Laboratory, ETRI, 161 Gajeong-dong, Yuseong-gu,
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POSITION

Electronics and Telecommunications Research Institute(ETRI)

Senior Research Engineer, IT-Convergence Research Laboratory, May 2006 ~ present

MAJOR RESEARCH INTEREST

Human Machine Interaction

Human-Robot/Computer Interaction, Haptics, Multi-modal Interaction, Brain-Computer Interface

EDUCATION

Feb. 2006 **Ph.D., Korea Advanced Institute of Science and Technology**
Dept. of Mechanical Engineering, Thesis: Development of a Broadband Tactile Display and Role of Vibration in Tactual Perception, Under supervision of Prof. Dong-Soo Kwon, Director of the Human-Robot Interaction Researcher Center at KAIST.
Government Full Scholarship

April 2004~ **Visiting Student, Massachusetts Institute of Technology(MIT)**
Nov. 2004 Department of Mechanical Engineering
Government Full Scholarship

Feb. 2001 **M.S., Korea Advanced Institute of Science and Technology**
Department of Mechanical Engineering
Government Full Scholarship

Feb. 1999 **B.S., Korea Advanced Institute of Science and Technology**
Department of Mechanical Engineering

WORK EXPERIENCE

- 2008.2 ~ 2009.2** Visiting Scientist, Massachusetts Institute of Technology(MIT)
Research Laboratory of Electronics, Laboratory for Human-Machine Haptics
- 2007.3 ~ present** Adjunct Professor (Assistant Professor), University of Science and Technology(Korea), Department of Computer Software and Engineering
- 2006.5 ~ present** Senior Member of Engineering Staff, Electronics and Telecommunications Research Institute (ETRI, Korea), IT-Convergence Technology Research Laboratory

PROFESSIONAL ACTIVITIES

- **Committee Member**, ISO(International Organization of Standardization) TC159/SC4 Human-System Interaction, 2007.4 ~ present
- **Editorial Member**, Ergonomics of human-system interaction - Part 910: Framework for Tactile and Haptic Interaction(ISO 9241-910), 2007.9 ~ present
- **Korean Representative**, ISO TC159/SC4/WG9 Haptic and Tactile Interaction, 2007.04 ~ present
- **Expert Member**, Korea Agency of Technology and Standards, TC159/SC4 Human-System Interaction, 2007.4 ~ present
- **Expert Member**, Standardization Forum for Next Generation PC/Five-Sense Working Group (Korea), 2007.4 ~ present
- **Program Committee Member**, International Workshop on Haptic and Audio Interaction Design (HAID 2007), 2007.11.30
- **Program Committee Member**, Korea HCI Conference 2008, 2008.2, Korea HCI Conference 2009, 2009.2

PROFESSIONAL AFFILIATIONS

- **Committee Member**, Korea Haptics Society
- **Member**, Korea Institute of Control, Robotics and Systems
- **Member**, IEEE Technical Committee on Haptics
- **Member**, International Society of Haptics

TEACHING EXPERIENCE

- 2001.3 ~ 2005.2** Teaching Assistant, Department of Mechanical Engineering, KAIST
MAE307 Applied Electronics,
MAE360 Modeling and Control of Engineering Systems (SYSTEM DYNAMICS),
MAE683 Human Robot Interaction: Haptics
- 2009.3 ~** Course Instructor, Department of Computer Software and Engineering, UST
04711 Human-System Interaction

HONORS AND AWARDS

- **Best Paper Award / Prize of Minister of Information and Communication, IT Standardization Outstanding Paper Contest, 2007.12.26**
Development of the standard for haptic interaction method and strategy for the international standard, Sponsor: Korea Ministry of Information and Communication
- **Encouragement Award, Next Generation Computing Idea Contest, 2007.10.19**
Brain-Computer Interface based on Sensory Neurofeedback, Sponsor: Korea Ministry of Information and Communication
- **Outstanding Best Paper Award, Korea HCI2007 Conference, 2007.02.06**
Development of a Compact Tactile Display and Its Application to a Haptic Stylus, Sponsor: The HCI Society of Korea
- **Best Paper Award, Next Generation PC 2005 International Conference, 2005.11.13**
A Novel Interactive Computer Interface: Enabling Tangible Interaction Using a Tactile Feedback Mouse, Sponsor: Next Generation PC 2005 International Conference Committee
- **Best Student Paper Award at Student Paper Competition, 2000 Korea Society of Medical and Biological Engineering Spring Conference, 2000.05.12**
Needle Puncturing Mechanics and Creating Realistic Force for a Needle Biopsy Simulator, Sponsor: Korea Society of Medical and Biological Engineering

RESEARCH PROJECT PARTICIPATION

- | | |
|-----------------|---|
| 2008.03~2009.2 | Project Coordinator, Non-Contact Multi-Point Realistic Interaction Technology , Sponsor: Ministry of Knowledge Economy |
| 2008.03~2009.2 | Researcher, Noninvasive Brain-machine Interfaces for advanced communication and control , Sponsor: HONDA |
| 2008.03~2009.2 | Project Leader, Multi Channel Brain Interface based on Reinforced Sensory Neurofeedback , Sponsor: Korea Research Foundation |
| 2007.03~2008.02 | Researcher, Development of an Intelligent Service Technology based on the Personal Life Log , Sponsor: The Ministry of Information and Communication |
| 2006.05~2007.02 | Researcher, Five Senses information Proceeding Technology Development for Network based Reality Service , Sponsor: The Ministry of Information and Communication |
| 2004.03~2007.02 | Researcher, Development of Smart Haptic Interface Device , Sponsor: The Ministry of Information and Communication |
| 2005.03~2005.12 | Researcher, Development of a Compact and Light Multi-fingered Tactile Display , Sponsor: Korea Institute of Science and Technology |
| 2004.03~2004.11 | Project Leader, Tactile Interface based on Human Neural Communication , Sponsor: Korea Science and Engineering Foundation |
| 2002.03~2004.12 | Researcher, Tactile Display Using a Haptic Mouse , Sponsor: Korea Institute of |

Science and Technology

2001.03~2002.02 **Researcher, Development of a Toe Laster and Heel/Side Laster for Adaptive Manufacturing**, Sponsor: The Ministry of Science and Technology

2000.05~2001.02 **Researcher, Development of Spine Biopsy Simulator with Visual and Force Feedback**, Sponsor: The Ministry of Information and Communication

INVITED TALKS, SEMINARS AND COLLOQUIA

2009.03.12 **Usability and Haptic Interaction UI for Smart Phone Application**, KOREA INDUSTRIAL EDUCATION INSTITUTE

2008.01.23 **Overview on Tactile Displays: Material, Design and Human Factors**, Dept. of Internet Media Engineering, KOREA UNIVERSITY OF TECHNOLOGY AND EDUCATION

2008.01.23 **Haptic Interface for the Next Generation Computer**, Dept. of Control Engineering, KWANGWOON UNIVERSITY

2007.06.28 **Haptic Interface and Its Application to Mobile Devices**, DIGITAL INNOVATION CONFERENCE 2007

2007.05.18 **State-of-the-Art and R&D Perspectives on Haptics**, SAMSUNG SDI R&D Center

2007.01.19 **State-of-the-Art and R&D Perspectives on Haptics**, School of Engineering, ICU

2006.11.25 **General Principle of Touch Sense & Tactile Display**, Department of Mechanical Engineering, KAIST

2006.08.18 **State-of-the-Art and R&D Perspectives on Haptics**, Department of Psychology, YONSEI UNIVERSITY

2003.08.21 **Haptic Interface Technologies**, KAIST-Tsinghua Korea-China HIGH-TECH EXPO, Beijing International Convention Center

PUBLICATION LIST

◇ **International Journal Papers**

- **Ki-Uk Kyung** and Jun-Young Lee, Ubi-Pen: A Haptic Interface with Texture and Vibrotactile Display, **IEEE Computer Graphics and Applications**, Vol. 29 (1), 56-64, 2009.01
- **Ki-Uk Kyung** , Jun-Young Lee and Junseok Park, Haptic Stylus and Empirical Studies on Braille, Button and Texture Display, **Journal of Biomedicine and Biotechnology**, Vol. 2008, Article ID369651, 2008.02
- Sang-Youn Kim, **Ki-Uk Kyung**, Jinah Park and Dong-Soo Kwon, Real-time area-based haptic rendering and the augmented tactile display device for a palpation simulator, **Advanced Robotics**, 21(9), 961–981, 2007.09
- **Ki-Uk Kyung**, Seung-Chan Kim and Dong-Soo Kwon, Texture Display Mouse: Vibrotactile Pattern

and Roughness Display, **IEEE/ASME Transaction on Mechatronics**, 12 (3),356-360, 2007.06

- **Ki-Uk Kyung**, Minseung Ahn, Dong-Soo Kwon and Mandayam A. Srinivasan, A Compact Planar Distributed Tactile Display and Effects of Frequency on Texture Judgment, **Advanced Robotics**, 20(5), 563–580, 2006.06
- **Ki-Uk Kyung**, Dong-Soo Kwon and Gi-Hun Yang, A Novel Interactive Mouse System for Holistic Haptic Display in a Human-Computer Interface, **International Journal of Human Computer Interaction**, 20(3), 247–270, 2006.05

◇ **Domestic Journal Papers** (*written in Korean*)

- Seung-Chan Kim, **Ki-Uk Kyung**, Jin-Hun Sohn and Dong-Soo Kwon, An Evaluation of Human Sensibility on Perceived Texture for Real Haptic Representation, **Journal of the Korean institute of Information Scientists and Engineers, Software and Application**, 34(10),900-909, 2007.10
- **Ki-Uk Kyung**, Seung-Woo Son, Gi-Hun Yang, Dong-Soo Kwon and Munsang Kim, Development of an Integrated Mouse Type Tactile Display System, **Journal of Control, Automation and System Engineering**, 11(5), 445-450, 2005.05
- Seung-Woo Son, **Ki-Uk Kyung**, Gi-Hun Yang and Dong-Soo Kwon, Study of Human Tactile Sensing Characteristics using Tactile Display System, **Journal of Control, Automation and System Engineering**, 11(5), 451-456, 2005.05
- **Ki-Uk Kyung**, Se-Kyong Song, Seong-Young Ko, Jeong-Hong Park and Dong-Soo Kwon, Development of a Heel/Side Laster and Control GUI for Adaptive Manufacturing, **Journal of Korean Society of Industrial Application**, 6(4),379-386, 2003.11
- Dong-Soo Kwon, **Ki-Uk Kyung**, Heung-Sik Kang , Jin-Kook Kim and Jong-Beom Ra, Force Reflection for a Spine Needle Biopsy Simulator, **Journal of Biomedical Engineering Research**, 21(6),575-581 2000.12

◇ **International Conference Proceedings** (*Including Presentations*)

- **Ki-Uk Kyung** and Jun-Young Lee, wUbi-Pen: Windows Graphical User Interface Interacting With Haptic Feedback Stylus, **SIGGRAPH 2008 - New Tech Demo**, Los Angeles, CA, 2008.08.11~2008.08.14, ACM SIGGRAPH
- **Ki-Uk Kyung**, Jun-Young Lee and Junseok Park, Comparison of Force, Tactile and Vibrotactile Feedback for Texture Representation Using a Combined Haptic Feedback Interface, **Lecture Notes in Computer Science (International Workshop on Haptic and Audio Interaction Design 2007)**, Eds.: I. Oakley and S. Brewster, Seoul, Korea, 4813, 34-43, 2007.11
- **Ki-Uk Kyung** and Jun-Seok Park, Ubi-Pen: Development of a Compact Tactile Display Module and Its Application to a Haptic Stylus, **Proceedings of World Haptics 2007: 2nd Joint Eurohaptics Conf. And Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems**,109-114, Tsukuba, Japan, 2007.03, IEEE Computer Society

- Seung-Chan Kim, **Ki-Uk Kyung** and Dong-Soo Kwon, The Effect of Sound on Haptic Perception, How to Effectively Display Surface Properties, **Proceedings of World Haptics 2007: 2nd Joint Eurohaptics Conf. And Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems**, Tsukuba, Japan, 2007.03, IEEE Computer Society
- **Ki-Uk Kyung** and Dong-Soo Kwon, Multi-sensory Perception of Roughness: Empirical Study on Effects of Vibrotactile Feedback and Auditory Feedback in Texture Perception, **Lecture Notes in Computer Science(ICAT2006)**, 4282, 406-415, Hangzhou, China, 2006.11
- **Ki-Uk Kyung**, Seung-Chan Kim and Dong-Soo Kwon Mandayam A. Srinivasan, Texture Display Mouse KAT: Vibrotactile Pattern and Roughness Display, **Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2006**, 478-483, Beijing, China, 2006.10, IEEE/RSJ
- **Ki-Uk Kyung**, Jinah Park, Dong-Soo Kwon and Sang-Youn Kim, Real-Time Area-Based Haptic Rendering for a Palpation Simulator, **Lecture Notes in Computer Science(ISBMS2006)**, 4702, 131-140, Zurich, Switzerland, 2006.07
- **Ki-Uk Kyung**, Seung-Woo Son, Gi-Hun Yang and Dong-Soo Kwon, How to Effectively Display Surface Properties Using an Integrated Tactile Display System, **International Conference on Robotics and Automation (ICRA) 2005**, Barcelona, Spain, 2005.04.30, IEEE Robotics Society
- **Ki-Uk Kyung**, Minseung Ahn, Dong-Soo Kwon and Mandayam A. Srinivasan, A Compact Broadband Tactile Display and Its Effectiveness in the Display of Tactile Form, **Proceedings of World Haptics 2005: 1st Joint Eurohaptics Conf. And Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems**, 18-20, Pisa, Italy, 2005.03, IEEE Computer Society
- **Ki-Uk Kyung**, Minseung Ahn, Dong-Soo Kwon and Mandayam A. Srinivasan, Perceptual and Biomechanical Frequency Response of Human Skin: Implication for Design of Tactile Displays, **Proceedings of World Haptics 2005: 1st Joint Eurohaptics Conf. And Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems**, Pisa, Italy, 2005.03.25, IEEE Computer Society
- **Ki-Uk Kyung**, Heejin Choi, Dong-Soo Kwon and Seung-Woo Son, Interactive Mouse Systems Providing Haptic Feedback During the Exploration in Virtual Environment, **Lecture Notes in Computer Science(ISCIS2004)**, 3280, 136-146, Antalya, Turkey, 2004.10
- **Ki-Uk Kyung**, Dong-Soo Kwon, Sung-Min Kwon, Heung Sik Kang and Jong Beom Ra, Force Feedback for a Spine Biopsy Simulator with Volume Graphic Model, **IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2001**, Maui, Hawaii, 2001.10.29, IEEE/RSJ
- Dong-Soo Kwon, **Ki-Uk Kyung**, Sung Min Kwon, Jong Beom Ra, Hyun Wook Park, Heung Sik Kang, Jianchao Zeng, and Kevin R Cleary, Realistic Force Reflection in a Spine Biopsy Simulator,

International Conference on Robotics and Automation (ICRA) 2001, Seoul, Korea, 2005.05.21,
IEEE Robotics Society

◇ **Book Chapters**

- **Ki-Uk Kyung** and Dong-Soo Kwon, **Chapter 23. Tactile Displays with Parallel Mechanism**, In: **Parallel Manipulators, New Developments** (Ed: J.H. Ryu), ISBN 978-3-902613-20-2, pp.445~456, 2008.04, Vienna Austria, I-Tech Press

◇ **Patents (issued)**

- **JP4242400**, 4th inventor / 4 inventors, Method and Apparatus for Efficiently Providing Tactile Information, **2009.01, SAMSUNG ELECTRONICS**
- **US7339574**, 1st inventor / 5 inventors, Haptic mouse interface system for providing force and tactile feedbacks to user's fingers and arm, **2008.03, KAIST**
- **JP4053532**, 1st inventor / 4 inventors, Tactile Feeling Generating Mouse Interface Device Transmitting Material Feeling, Shearing and Contact Reaction Force to User, **2007.12, KAIST**
- **KR0889726**, 1st inventor / 3 inventors, Tactile Stimulation Device and Apparatus Using the Same, **2009.03, ETRI**
- **KR0867408**, 2nd inventor / 5 inventors, Tactile display device with vibrotactile and thermal feedback , **2008.10, KAIST/KIST**
- **KR0860412**, 1st inventor / 4 inventors, System and Method for Haptic Experience Service, **2008.09, ETRI**
- **KR0847139**, 1st inventor / 4 inventors, Navigation Service Method and Apparatus, **2008.07, ETRI**
- **KR0828185**, 2nd inventor / 3 inventors, Graphic-to-tactile production method, **2008.04, KAIST**
- **KR0778761**, 2nd inventor / 4 inventors, Tactile Transmission Device with Rheological Fluid and Method Thereby, **2007.11, KAIST**
- **KR0769981**, 1st inventor / 5 inventors, Method for Information Storing and Co-sharing Sensory Information In/Output Electronic Pen, **2007.10, ETRI**
- **KR0769980**, 1st inventor / 8 inventors, Sensory Information In/Out Electronic Pen and Method for Outputting Smell Information Using the Same, **2007.10, ETRI**
- **KR0703701**, 4th inventor / 4 inventors, Method and apparatus for providing tactile information effectively, **2007.03, SAMSUNG ELCTRONICS**
- **KR0626683**, 1st inventor / 4 inventors, Broadband Tactile and Braille Display Mouse System and Method Thereby, **2006.09, KAIST/ MIT**
- **KR0536621**, 1st inventor / 5 inventors, Mouse Interface System for Providing Kinesthetic and Tactile Feedback, **2005.12, KAIST**
- **KR0511204**, 2nd inventor / 3 inventors, A haptic mouse with arm and finger force feedback, **2005.08, KAIST**

- **KR0431642**, 4th inventor / 5 inventors, Method for Setting Shoe Drawing and Actuator Operation, for Managing Work Sequence, and for Conducting Heel/Side Lasting Using Heel/Side Lasting System Equipped with GUI, **2004.05, KAIST**

◇ **Patents (pending, International Patents Only)**

- **US12/275731**, 1st inventor / 6 inventors, Point Apparatus Capable of Providing Haptic feedback, and Haptic Interaction System and Method Using the Same, **2008.12, ETRI**
- **US20080186152A1**, 1st inventor / 4 inventors, Haptic Experience Service Method and System, **2008.08, ETRI**
- **US12/137706**, 1st inventor / 5 inventors, Device and System for Providing User with Sensation Effect on Touch Screen, **2008.06, ETRI**
- **US20080131849A1**, 1st inventor / 4 inventors, Apparatus and Method for Generating Tactile Sensation by Using Constellation Metaphor, **2008.06, ETRI**
- **PCT/KR2007/004207**, 1st inventor / 4 inventors, Method and Apparatus for Personal Information Using Sensory Information, **2007.08, ETRI**
- **PCT/KR2007/004156**, 1st inventor / 4 inventors, Method and apparatus for Navigation Service, **2007.08, ETRI**
- **PCT/KR2007/004032**, 1st inventor / 9 inventors, Electronic Sensory Pen and Method for Inputting Outputting Sensory information using the Same, **2007.08, ETRI**
- **PCT/KR2007/000396**, 2nd inventor / 5 inventors, Apparatus for Providing Sensing Information, **2007.01, ETRI**
- **US20070211032A1**, 2nd inventor / 4 inventors, Device and Method for Transmitting Shape Information of Image through Tactile Sensation using Rheological Fluid, **2007.02, KAIST**
- **US20060279537A1**, 4th inventor / 4 inventors, Method and Apparatus for Efficiently Providing Tactile Information, **2006.06, SAMSUNG ELECTRONICS**
- **US20050110758A1**, 1st inventor / 5 inventors, Tactile Mouse Interface System, **2004.09, KAIST**
- **DE102004001870A1**, 1st inventor / 5 inventors, Haptisches Mausschnittstellensystem zum Bereitstellen von Kraft- und Taktill-Rückkopplungen an die Finger und den Arm eines Anwenders (Haptic computer mouse interface system, has tactile feedback unit that drives pins, according to signals that corresponds to surface properties of virtual object, for exhibiting surface properties of object to user fingers), **2004.08, KAIST**
- **JP2004-220593**, 1st inventor / 5 inventors, Mouse Interface Device Transmitting Reaction Force to User's Arm and Finger, **2003.12, KAIST**
- **CA 248257**, 1st inventor / 4 inventors, A Tactile Mouse Interface System for Providing Texture, Shear and Kinaesthetic Force, **2003.10, KAIST**

◇ Standards

- **ISO 9241 Ergonomics of human-system interaction - Part 920: Guidance on tactile and haptic interactions**, Korea Representative (8 countries), 2008
- **ISO 9241 Ergonomics of human-system interaction - Part 910: Framework for tactile and haptic interaction**, Korea Representative, Editor (7 countries), 2009
- **TTAS.KO-10.0274 Haptic Interaction Metadata**, Main developer (Korean domestic standard), 2007

REFERENCES

Prof. Dong-Soo Kwon

Professor of Mechanical Engineering, Korea Advanced Institute of Science and Technology (KAIST)
Director of Human-Robot Interaction Research Center, KAIST
Director of Telerobotics and Control Lab, KAIST
Email: kwonds@kaist.ac.kr, Web: <http://robot.kaist.ac.kr>

Dr. Mandayam A. Srinivasan

Senior Research Scientist, Research Laboratory of Electronics, Massachusetts Institute of Technology
Director of Laboratory for Human-Machine Haptics (Touch Lab), MIT
Email: srini@mit.edu, Web: <http://touchlab.mit.edu>

Prof. Stephen Brewster

Advanced Research Fellow, Engineering and Physical Sciences Research Council (EPSRC)
Professor of Human-Computer Interaction, Department of Computing Science, University of Glasgow
Organizer of the Annual International Workshop on Haptic and Audio Interaction Design (HAID)
Email: stephen@dcs.gla.ac.uk, Web: <http://www.dcs.gla.ac.uk/~stephen>

Prof. Jung Kim

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Director of Biorobotics Lab, KAIST
Email: jungkim@kaist.ac.kr, Web: <http://medev.kaist.ac.kr>