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EDUCATION

INSTITUTION	DEGREE	YEARS	FIELD OF STUDY
University of Illinois at Urbana-Champaign	Ph.D.	1999.08 – 2003.12	Biophysics and Computational Biology
Seoul National University	M.S.	1996.03 – 1998.02	Physics
Pohang University of Science and Technology	BS.	1991.03 – 1996.02	Physics (Minor in Mathematics)

DISSERTATION

SUPERVISOR	DEGREE	TITLE
Enrico Gratton (Physics, UIUC)	Ph.D.	Cerebral Hemodynamics and Its Oxygenation: Study of Baseline Spontaneous Oscillation
Moo-Young Choi (Physics, SNU)	M.S.	Spatio-temporal Analysis of Associative Neural Network at Finite Temperatures
Woo-Kyung Sung (Physics, POSTECH)	B.S.	Adsorption-Desorption Transition of Polyelectrolyte Polymer to a Charged Membrane in Ionic Solvent: In Conjunction of Molecular Dynamics Simulation and Statistical Mechanics with Random Walk Model and Path Integral Method

POSITIONS and EMPLOYMENTS

2006.03 – Present	Principal Research Scientist (senior 2006~2014), Center for Neuroscience KIST
2006.09 – Present	Professor (Asst/Assoc 2006~2014), Division of Bio-Med Sci & Tech, KIST School, University of Science and Technology (UST)
2012.10 – 2018.04	Visiting Associate Professor, Dept of Psychiatry, Harvard Medical School
2004.01 – 2006.02	Senior Scientist, SAIT, Samsung Electronics, S. Korea
1998.09 – 1999.08	Research Associate, POSTECH Brain Research Center, S Korea
1997-8 winter	Business Analyst, LG CNS, S. Korea

GRANT SUPPORT as P.I.

2018.05 – 2018.12	Principal Investigator, the Frontier Project, National Research Council of Science & Technology (\$100M won)
2018.05 – 2018.12	Principal Investigator, Assessment of Impulsivity of the Soldiers, K-DARPA (\$150M won)
2017.03 – 2022.02	Principal Investigator, National Science Foundation (\$200M won/YR)
2015.12 – 2018.11	Principal Investigator, Diagnosis of dementia using wearable devices (\$590M won/YR)
2014.07 – 2019.06	Co-Investigator (P.I. Robert McCarley, Harvard University), NIH R01 Synaptic Grant,

	<i>Synaptic Basis of Sleep Cycle Control</i> (\$ 550,000/YR)
2014.01 – 2016.12	Principal Investigator, KIST Global Research Lab Grant, <i>Macroscopic Functional Brain Connectomics</i> (7100M won/YR)
2011.08 – 2019.08	Principal Investigator, Global Frontier Project, <i>Functional Study of Somatosensory Cortex for Bi-directional Actual Sensation Exchange Technology</i> (400M won/YR)
2011.05 – 2014.04	Principal Investigator, NRF Investigator Grant, <i>Systemic Research on Phase Transition Phenomena in Brain States</i> (60M/YR)
2010.05 – 2015.04	Principal Investigator, Brain Research Program, <i>Optogenetic interrogation of neural circuitry and multimodal recording of volition</i> (70M won/YR)
2010.04	Principal Investigator, KIST Instrumentation Grant, <i>128 Ch Neural Data Acquisition System</i> (120M won)
2008.09 – 2010.06	Principal Investigator, KRCF Young Investigator of Excellence Grant, <i>Role of Thalamo-cortical Circuit in Phase Transition between Conscious and Unconscious States</i> (50M won/YR)
2006.06	Principal Investigator, KIST Research Project Initiation Grant, <i>Noninvasive Functional Brain Mapping</i> (5M won)
2001.09	Principal Investigator, Francis M. and Harlie M. Clark Research Support Grant
2002.03, 2003.03	Graduate College Conference Travel Grant
2000.04, 2002.04	Travel Grant, Optical Society of America

MEGA / BLOCK-GRANT SUPPORT

2014 – 2016	KIST Flagship Project, <i>Neuroscience of Neurodegenerative Disease</i> (P.I. Justin Lee, 500 M won/YR)
2007 – 2011.	NRF Proteomics Project, <i>Neural Circuit Study using RNA Interference</i> (P.I. Hee-Sup Shin, 500M won/YR)
2009 – 2014	NRF WCI Project, <i>Functional Connectomics using Optogenetics</i> (P.I. George Augustine, 7,000M won/YR)
2005 – 2014	KIST Intramural Grant, <i>Brain Function Study using Multidisciplinary Methods</i> (P.I. Hee-Sup Shin, Justin Lee, 2,500~4,600M won/YR)
2000 – 2004	Vascular Insufficiency in ADHD Children (P.I. Enrico Gratton, \$1,000,000/YR)
2000- 2003	<i>Laboratory for Fluorescence Dynamics</i> as a national research resource center for biomedical fluorescence spectroscopy, supported by the NIH (P.I. Enrico Gratton)

PUBLICATIONS (* correspondent author)

Kim, B., Shin, J., Kim, Y., **Choi, J. H.*** (2020). "Destruction of ERP responses to deviance in an auditory oddball paradigm in amyloid infusion mice with memory deficits." *PLoS One* 15(3): e0230277.

Kim, B., Hwang, E., Strecker, R.E., **Choi, J.H.***, Kim, Y.*, Differential modulation of NREM sleep regulation and EEG topography by chronic sleep restriction in mice, *Sci Rep*. 2020 Jan 10;10(1):18.

Han, H., Lee, K.E., **Choi, J.H.***. Functionally dissociated theta oscillations in the frontal and visual cortices and their long-range network during sustained attention, *eNeuro* 0248-19. (2019) DOI:

<https://doi.org/10.1523/ENEURO.0248-19.2019>

Lee, S., Hwang, E., Lee, M. & **Choi, J. H.*** Distinct Topographical Patterns of Spike-Wave Discharge in Transgenic and Pharmacologically Induced Absence Seizure Models. *Experimental neurobiology* 28, 474-484, doi:10.5607/en.2019.28.4.474 (2019).

Kum, J., Kim, J.W., Braubach, O., **Choi, J.H.***, Yoon J-H*. (2019), Neural Dynamics of Olfactory Perception: Low- and High-frequency Modulations of Local Field Potential Spectra in Mice Revealed by an oddball Stimulus Choi, J.H., Neurodynamics of Olfaction, *Frontiers in Neuroscience* doi.org/10.3389/fnins.2019.00478

Hwang, E., Brown, R., Kocsis, B., Kim, T., McKenna, J., McNally, J., Han, H.-B., **Choi, J.H.*** (2019) Optogenetic stimulation of basal forebrain parvalbumin neurons modulates the cortical topography of auditory steady state responses Brain Structure and Function, *Brain Structure & Function* doi: 10.1007/s00429-019-01845-5.

Hwang E., Lee, H.S., **Choi, J.H.*** (2018) Desynchronization of Theta Oscillations in Prefrontal Cortex during Self-stimulation of the Medial Forebrain Bundles in Mice", *Exp Neurobiol* 27(3): 181-188.

Kim, K. W., Choi JD, Lee H, Lee NK, Park S, Chin J, Lee BH, Shin J, Kim Y, Jang H, **Choi JH***, Na DL*. (2018). "Social Event Memory Test (SEMT): A Video-based Memory Test for Predicting Amyloid Positivity for Alzheimer's Disease." *Sci Rep* 8(1): 10421.

Lee, S., Kim, S., **Choi, J.H.*** (2017) A Novel Visualization Method for Sleep Spindles Based on Source Localization of High Density EEG, *Exp Neurobiol* 26(6): 362-368.

Kim, B., Kocsis, B*, Hwang, E., Kim, Y., Strecker, R., McCalrey, R., **Choi, J.H.*** (2017) Differential modulation of global and local neural oscillations in REM sleep, *Proc Nat Sci Aca*, 114(9):E1727-E1736

Moon, J-Y., Kim, J., Ko, T-W., Kim, M., Medina, Y.I., **Choi, J.H.**, Lee, J., Mashour G., and Lee, U*, (2017) Structure Shapes Dynamics and Directionality in Diverse Brain Networks: Mathematical Principles and Empirical Confirmation in Three Species, *Sci Rep*, 2017 Apr 7:46606

Han, H.-B., Hwang, E., Lee, S., Kim, M.-S., **Choi, J.H.*** (2017) Gamma-Band Activities in Mouse Frontal and Visual Cortex Induced by Coherent Dot Motion, *Sci Rep*, 2017 Mar 2;7:43780

Lee, S., Hwang, E., Lee, D., **Choi, J.H.*** (2017) Pulse-tran stimulation of primary somatosensory cortex blocks pain perception in tail clip test, *Exp Neurobiol* 26(2):90-96

Shahriari, Y., Krusienski, D., Dadi, Y.S., Seo, M., Shin, H.S., and **Choi, J.H.*** (2016). Impaired auditory evoked potentials and oscillations in frontal and auditory cortex of a schizophrenia mouse model. *World J Biol Psychia* 17, 439-448.

Kum JE, Han HB, **Choi JH***, Pupil Size in Relation to Cortical States during Isoflurane Anesthesia. *Exp Neurobiol*. 2016 Apr;25(2):86-92.

Kang, J.H., **Choi, J.H.**, Hwang, E., and Kim, S.P*. (2016). Changes in effective connectivity of sensorimotor rhythms in thalamocortical circuits during the induction and recovery of anesthesia in mice. *J of Neurol Sci* 369, 165-175.

Kim T, Thankachan S, McKenna JT, McNally JM, Yang C, **Choi JH**, Chen L, Kocsis B, Deisseroth K, Strecker RE, Basheer R, Brown RE*, McCarley RW*, Cortically Projecting Basal Forebrain Parvalbumin Neurons Regulate Cortical Gamma Band Oscillations, *Proc Nat Sci Aca*, 2015 Mar 2. pii: 201413625

Park Y-G, **Choi JH**, Lee C, Kim S, Kim Y, Lee M, Chang K-Y, Kim D*, Essential tremor heterogeneity accessed by tremor-related cortical potentials in mice, *Molecular Brain* 2015 Jan 15;8(1):3.

Lee K-Y, Byeon H-H, Jang C, **Choi JH**, Choi I-S, Jung Y, Kim W, Chang J, Yi H*, . Hydrodynamic Assembly of Conductive Nanomesh of Single-Walled Carbon Nanotubes Using Biological Glue. *Adv Mater*. 2015;27(5):922-

Kim D, Hwang E, Lee M, Sung H, **Choi JH*** (2015), Characterization of Topographically Specific Sleep Spindles in Mice, *Sleep*, 2015 Jan 1;38(1):85-96.

Sin D, Kim J, **Choi JH**, and Kim SP* (2014), Neuronal Ensemble Decoding Using a Dynamical Maximum Entropy Model, *J of Appl Math*, vol. 2014, Article ID 218373, 10 pages, doi:10.1155/2014/218373

Kim B, Hwang E, Kim Y, **Choi JH*** (2013) Prolonged Sleep-Onset Latency during Chronic Sleep Restriction in Mice, *Sleep Medicine Research*, 4(1):1-5

Hwang, E., McNally, J.M., **Choi, J.H*** (2013) Reduction in cortical gamma synchrony during depolarized state of slow wave activity in mice. *Front Syst Neurosci* 7, 107.

Lee C, Oostenveld R, Lee SH, Kim LH, Sung H, **J.H. Choi*** (2013) Dipole source localization of mouse electroencephalogram using the fieldtrip toolbox. *PLoS One* 8: e79442.

R. A. Bergstrom, **J. H. Choi**, A. Manduca, H. S.7 Shin, G. A. Worrell, and C. L. Howe*, "Automated identification of multiple seizure-related and interictal epileptiform event types in the EEG of mice," *Sci Rep*, vol. 3, p. 1483, 2013.

Hwang E, Kim S, Han K, **Choi JH*** (2012) "Characterization of phase transition in the thalamocortical system during anesthesia-induced loss of consciousness". *PLoS One* 7: e50580.

S-P. Kim, E.J. Hwang, J. Kang, S. Kim, and **J.H. Choi***, "Changes in Thalamocortical Connectivity

during Anesthesia-Induced Transitions in Consciousness". *Neuroreport*, 23, 294-298 (2012)

U. Wolf, V. Toronov, **J. H. Choi**, R. Gupta, A. Michalos, E. Gratton*, and M. Wolf, "Correlation of functional and resting state connectivity of cerebral oxy-, deoxy-, and total hemoglobin concentration changes measured by near-infrared spectrophotometry," *J Biomed Opt*, 16(8), 087013, 2011

M. Lee, D. Kim, H.-S. Shin, H.-G. Sung, and **J. H. Choi***, "High-density EEG Recordings of the Freely Moving Mice using Polyimide-based Microelectrode," *J Vis Exp*, <http://www.jove.com/details.stp?id=2562> doi: 10.3791, e2562, 11 Jan 2011

J. H. Choi, K. P. Koch, W. Poppendieck, M. Lee, and H. S. Shin*, "High resolution electroencephalography in freely moving mice," *J Neurophysiol*, vol. 104, pp. 1825-34, Sep 2010.

S. Lee, M. Lee, D. Koh, B. M. Kim, and **J. H. Choi***, "Cerebral hemodynamic responses to seizure in the mouse brain: simultaneous near-infrared spectroscopy-electroencephalography study," *J Biomed Opt*, vol. 15, p. 037010, May-Jun 2010.

E. Hwang, S. Kim, H.-S. Shin, and **J. H. Choi***, "The forced walking test: A novel test for pinpointing the anesthetic-induced transition in consciousness in mouse," *J of Neuro Methods*, vol. 188, pp. 14-23, 2010.

U. Wolf, M. Wolf, **J. H. Choi**, L. A. Paunescu, A. Michalos, and E. Gratton*, "Regional differences of hemodynamics and oxygenation in the human calf muscle detected with near-infrared spectrophotometry," *J Vasc Interv Radiol*, vol. 18, pp. 1094-101, Sep 2007.

J. H. Choi*, Jeong-Whan Le, H. Hwang, K. Shin*, "Generalized Calorie Estimation Algorithm using 3-axis Accelerometer," *J. of Biomed. Eng. Res.*, vol. 27, pp. 301-309, 2006.

L. P. Safonova, A. Michalos, U. Wolf, M. Wolf, D. M. Hueber, **J. H. Choi**, R. Gupta, C. Polzonetti, W. W. Mantulin, and E. Gratton*, "Age-correlated changes in cerebral hemodynamics assessed by near-infrared spectroscopy," *Arch Gerontol Geriatr*, vol. 39, pp. 207-25, Nov-Dec 2004.

G. Morren, U. Wolf, P. Lemmerling, M. Wolf, **J. H. Choi**, E. Gratton, L. De Lathauwer, and S. Van Huffel*, "Detection of fast neuronal signals in the motor cortex from functional near infrared spectroscopy measurements using independent component analysis," *Med Biol Eng Comput*, vol. 42, pp. 92-9, Jan 2004.

J. Choi, M. Wolf, V. Toronov, U. Wolf, C. Polzonetti, D. Hueber, L. P. Safonova, R. Gupta, A. Michalos, W. Mantulin, and E. Gratton*, "Noninvasive determination of the optical properties of adult brain: near-infrared spectroscopy approach," *J Biomed Opt*, vol. 9, pp. 221-9, Jan-Feb 2004.

Toronov, V., A. Webb, S. Walker, R. Gupta, **J. H. Choi**, E. Gratton, and D. M. Hueber*. Study of the fMRI blood oxygen level dependent effect by near-infrared spectroscopy. *Proc. SPIE Int. Soc. Opt.*

Eng. 5068, 222 (2003).

Wolf, U., M. Wolf, **J. H. Choi**, M. Levi, D. Choudhury, S. Hull, D. Coussirat, L. A. Paunescu, L. P. Safonova, A. Michalos, W. W. Mantulin and E. Gratton*. Localized irregularities in hemoglobin flow and oxygenation in the calf muscle in patients with peripheral vascular disease detected by near-infrared spectrophotometry. **J. Vasc. Surgery** 37, 1017-1026 (2003).

Toronov*. V. S. Walker, R. Gupta, **J. H. Choi**, E. Gratton, D. Hueber and A. Webb. The roles of changes in deoxyhemoglobin concentration and regional cerebral blood volume in the fMRI BOLD signal. **NeuroImage** 19 (4), 1521-1531(2003).

Wolf, M., U. Wolf **J.H. Choi**, V. Toronov, L. A. Paunescu, A. Michalos, and E. Gratton*. Fast cerebral functional signal in the 100ms range detected in the visual cortex by frequency-domain near-infrared spectroscopy. **Psychophysiology** 40, 521-528 (2003).

Wolf, M., U. Wolf, **J. H. Choi**, R. Gupta, L. P. Safonova, L. A. Paunescu, A. Michalos and E. Gratton*. Detection of the fast neuronal signal on the motor cortex using functional frequency domain near infrared spectroscopy. **Adv. Exp. Med. Biol.** 510, D. F. Wilson, S. M. Evans, J. Biaglow, A. Pastuszko, eds., 193-197 (2003).

Wolf, U., M. Wolf, **J. H. Choi**, L. A. Paunescu, A. Michalos, L. Safonova and E. Gratton*. Mapping of hemodynamics with near infrared spectroscopy of the human calf tissue and the influence of the adipose tissue thickness. **Adv. Exp. Med. Biol.** D. F. Wilson, S. M. Evans, J. Biaglow, A. Pastuszko, eds., 225-230 (2003).

Wolf, M., U. Wolf, **J.H. Choi**, R. Gupta, L. P. Safonova, L. A. Paunescu, A. Michalos and E. Gratton*. Functional Frequency-Domain Near-Infrared Spectroscopy Detects Fast Neuronal Signal in the Motor Cortex, **NeuroImage** 17(4), 1868-1875 (2002).

Wolf, M., U. Wolf, V. Toronov, A. Michalos, L. A. Paunescu, **J.H. Choi** and E. Gratton*. Different time evolution of oxyhemoglobin and deoxyhemoglobin concentration changes in the visual and motor cortices during functional stimulation: A near-infrared spectroscopy study. **NeuroImage** 16, 704-712 (2002).

Morren, G., M. Wolf, P. Lemmerling, U. Wolf, **J. H. Choi**, E. Gratton, L. De Lathauwer, and S. Van Huffel. Extraction of fast neuronal changes from multichannel functional near-infrared spectroscopy signals using independent component analysis. **Proc. SPIE 4623 , Functional Monitoring and Drug-Tissue Interaction.** M. D. Kessler, G. J. Mueller; eds., 68-76 (2002).

Toronov, V., A. Webb, **J-H. Choi**, M. Wolf, and E. Gratton*. Simultaneous assessment of human brain functional hemodynamics by magnetic resonance and near-infrared imaging. **Proc. SPIE 4320, Medical Imaging** 2001: Physics of Medical Imaging. L. E. Antonuk, M. J. Yaffe, eds., 861-867 (2001).

Toronov, V. Y., A. G. Webb, **J. H. Choi**, M. Wolf, L. P. Safonova, U. Wolf, E. Gratton*. Functional cerebral activation detected by frequency-domain near-infrared spectroscopy. **Proc. SPIE, Optical Technologies in Biophysics and Medicine III**; aratov Fall Meeting, V. V. Tuchin; ed., Vol. 4707, 92-96 (2001).

Toronov, V., A. Webb, **J-H. Choi**, M. Wolf, L. Safonova, U. Wolf and E. Gratton*. Study of local cerebral hemodynamics by frequency-domain near-infrared spectroscopy and correlation with simultaneously acquired functional magnetic resonance imaging. **Optics Express** 9(8), 417-427 (2001).

Toronov, V., A. Webb, **J. H. Choi**, M. Wolf, A. Michalos, E. Gratton* and D. Hueber. Investigation of human brain hemodynamics by simultaneous near-infrared spectroscopy and functional magnetic resonance imaging. **Medical Physics** 28(4) 21-527 (2001).

Toronov, V., A. Webb, **J. H. Choi**, M. Wolf, E. Gratton*, and D. M. Hueber. Simultaneous functional magnetic resonance and near-infrared imaging of adult human brain. **Proc. SPIE 4320, Medical Imaging 2001: Physics of Medical Imaging**. L. E. Antonuk, M. J. Yaffe, eds., 861-867 (2001).

Paunescu, L. A., A. Michalos, **J. H. Choi**, U. Wolf, M. Wolf, and E. Gratton*. In vitro correlation between reduced scattering coefficient and hemoglobin concentration of human blood determined by near-infrared spectroscopy. **Proc. SPIE Proc. BIOS 2001; International Biomedical Optics Symposium. Optical Tomography and Spectroscopy of Tissue IV**. B.Chance, R.R. Alfano, B.J. Tromberg, M. Tamura, E.M. Sevick-Muraca, eds., Vol. 4250, pp. 319-326 (2001).

M. Y. Choi*, **J. H. Choi**, and K. Park, "Temporal association in neural networks at finite temperatures," **Physical Review E**, vol. 58, pp. 7761-7768, Dec 1998.

BOOK CHAPTER

J.H. Choi*, E.J. Hwang, High density electroencephalography in freely moving mice, A series of *Electrophysiological Recording Techniques*, Springer Protocols

PEER-REVIEWED CONFERENCE PROCEEDINGS (* correspondent author)

J.H. Choi*, E.J. Hwang, Cortically projecting basal forebrain parvalbumin positive neurons alter the scale-free properties of auditory steady-state responses, *Cognitive Computational Neuroscience* 3000156 2017

J.H. Choi*, Biphasic responses of frontal gamma network to repetitive sleep deprivation during REM sleep, *Computational Neuroscience Society*, 2016

J.H. Choi*, Induced gamma oscillations in mouse frontal cortex during coherent motion perception, *International College of Neuropsychopharmacology*, 2016

Hwang E.J. and **J.H. Choi***, Optogenetic interrogation of frontal gamma oscillation in mice, Computational Neuroscience Society, 2016

Lee S.H. and **J.H. Choi***, Opto-EEG : A novel method for functional connectome in mouse brain based on optogenetics and high density electroencephalography, Computational Neuroscience Society, 2016

Hwang E.J. and **J.H. Choi***, Regulation of top-down processing by cortically-projecting parvalbumin positive neurons in basal forebrain, Computational Neuroscience Society, 2016

J.H. Choi*, GABAergic Regulation of the Centromedian Thalamus and Control of Cortical Activation in the Mouse, International Society for Sleep Spindles, 2015

J.H. Choi*, Opto-EEG: A novel method for mapping brain networks in freely moving mice using combined optical neuromodulation and EEG, International Symposium on Brain Stimulation, 2015

Lee, C., Oostenveld, R., Lee, S.H., Kim, L.H., Sung, H., **J.H. Choi***, 2013. Cortical source localization of mouse extracranial electroencephalogram using the fieldtrip toolbox. Conf Proc IEEE Eng Med Biol Soc 2013, 3307-3310.

G.B. Kim, J.R. Cho, H.-S. Shin, and **J.H. Choi***, "Cortical Mapping of the Optically Evoked Responses in Channelrhodopsin-2 Mouse Model," in Engineering in Medicine and Biology Society, 2011 EMBC 2011. Annual International Conference of the IEEE, 2011, pp. 6769-6772

M. Lee, D. Kim, H.-S. Shin, and **J.H. Choi***, "Simultaneous recording of brain activity and functional connectivity in the mouse brain," in Engineering in Medicine and Biology Society, 2009. EMBC 2009. Annual International Conference of the IEEE, 2009, pp. 2934-2936.

E. Hwang, S. Kim, and **J.H. Choi***, "Estimating transition point of anesthetic-induced loss of consciousness in mice by detecting motion in response to forced movement," in Engineering in Medicine and Biology Society, 2009. EMBC 2009. Annual International Conference of the IEEE, 2009, pp. 4974-4977.

J.H. Choi*, K. P. Koch, W. Poppendieck, M. Lee, T. Doerge, and H. S. Shin, "A flexible microelectrode for mouse EEG," in Engineering in Medicine and Biology Society, 2009. EMBC 2009. Annual International Conference of the IEEE, 2009, pp. 1600-1603.

D.-H. Baek, E.-J. Lee, J.-h. Moon, **J.H. Choi***, and S.-H. Lee, "Polyimide-based multi-channel arrayed electrode for measuring EEG signal on the skull of mouse," in Engineering in Medicine and Biology Society, 2009. EMBC 2009. Annual International Conference of the IEEE, 2009, pp. 7022-7025.

J. Youn, N. Won, S. Kim, and **J.H. Choi***, "Near-Infrared Quantum Dots Imaging in the Mouse Brain," in OSA Biomedical Optics, St. Petersburg, FL, USA 2008, paper BSuE2.

S. Lee, M. Lee, D. Koh, B.-M. Kim, and **J.H. Choi***, "A Simultaneous NIRS-EEG Study of Seizure in the Mouse Brain," in OSA Biomedical Optics, St. Petersburg, FL, USA 2008, paper BMD22.

J.H. Choi*, M. Lee, J.-h. Kim, and H.-S. Shin, "A Flexible Multichannel Electrode for Mouse Brain and Its Application to Mouse EEG," in Noninvasive Functional Source Imaging of the Brain and Heart and the International Conference on Functional Biomedical Imaging, 2007. NFSI-ICFBI 2007. Joint Meeting of the 6th International Symposium on, 2007, pp. 230-231.

J.H. Choi*, J. Lee, H. T. Hwang, J. P. Kim, J. C. Park, and K. Shin, "Estimation of Activity Energy Expenditure: Accelerometer Approach," in Engineering in Medicine and Biology Society, 2005. IEEE-EMBS 2005. 27th Annual International Conference of the, 2005, pp. 3830-3833.

J.H. Choi, M. Wolf, V. Y. Toronov, A. Michalos, and E. Gratton, "Spatio-temporal analysis of the cerebral spontaneous oscillation," in Complex Dynamics, Fluctuations, Chaos, and Fractals in Biomedical Photonics, 2004, pp. 29-37.

V. Toronov, A. Webb, S. Walker, R. Gupta, **J.H. Choi**, E. Gratton*, and D. M. Hueber, "Study of the fMRI blood oxygen level dependent effect by near-infrared spectroscopy " in Optical Technologies in Biophysics and Medicine IV, 2003.

M. Wolf, U. Wolf, **J. H. Choi**, L. P. Safonova, R. Gupta, V. Toronov, A. Michalos, L. A. Paunescu, and E. Gratton*, "Functional fast neuronal signals in the visual and motor cortex detected by frequency-domain near-infrared spectroscopy," in OSA Biomedical Optics, 2002, pp. 205-207

V. Toronov, A. G. Webb, **J. H. Choi**, M. Wolf, L. P. Safonova, U. Wolf, and E. Gratton*, "Functional cerebral activation detected by frequency-domain near-infrared spectroscopy " in Optical Technologies in Biophysics and Medicine III, 2002, pp. 92-96.

G. Morren, M. Wolf, P. Lemmerling, U. Wolf, **J. H. Choi**, E. Gratton, L. D. Lathauwer, and S. V. Huffel*, "Extraction of fast neuronal changes from multichannel functional near-infrared spectroscopy signals using independent component analysis," in Functional Monitoring and Drug-Tissue Interaction, 2002, pp. 68-76.

A. Michalos, L. P. Safonova, U. Wolf, M. Wolf, **J. Choi**, H. , R. Gupta, C. Polzonetti, W. W. Mantulin, and E. Gratton*, "Reduced cerebral hemodynamic response in sleep disorders: A NIRS frequency-domain study," in OSA Biomedical Optics, Miami, FL, USA, 2002, pp. 248-250

J. H. Choi, W. Martin, L. P. Safanova, A. Michalos, and E. Gratton*, "Noninvasive determination of optical properties of adult brain with frequency-domain near-infrared spectroscopy," in OSA Biomedical Optics, Miami, FL, USA, 2002, pp. 144-147

PRESENTATIONS at SOCIETY for NEUROSCIENCE (* correspondent author)

Eunjin Hwang, Ritchie E. Brown, Hio-Been Han, Bernat Kocsis, Tae Kim, James T. McKenna, Robert W. McCarley, **J.H. Choi***, Time-dependent stimulation of PV+ neurons in the basal forebrain reorganizes cortical gamma-band oscillations network, Washington DC, 2017

Hio-Been Han, Eunjin Hwang, Soohyun Lee, Min-Shik Kim, **J.H. Choi***, Fronto-visual cortical gamma network induced by perceptual binding, Washington DC, 2017

E. Hwang, R. Brown, Y. Surekha, T. Kim, J.T. McKenna, R. McCarley, **J.H. Choi***, Cortically projecting basal forebrain parvalbumin positive neurons regulate topdown processing in mice, San Diego, 2016

B. Kim, B. Kocsis, E. Hwang, Y. Kim, R. Strecker, R. McCarley, **J.H. Choi***, Differential modulation of slow and fast oscillation in REM sleep by chronic sleep restriction, San Diego, 2016

J.H. Choi*, Opto-EEG : A novel method toA macroscopic functional connectome based on using optogenetics and high density electroencephalography electroencephalogram, San Diego, 2016

D. Lee, B. Kim, E. Hwang, B. Kim, S. Lee, **J.H. Choi***, Somatosensory-motor rhythmical responses to direct optgenetic stimulation, Chicago, 2015

E. Hwang, R. Brown, Y. Surekha, T. Kim, J.T. McKenna, R. McCarley, **J.H. Choi***, Topographic mapping of neocortical oscillations elicited by optogenetic modulation of basal forebrain parvalbumin neurons, Chicago, 2015

E. Hwang, R. Brown, Y. Surekha, T. Kim, J.T. McKenna, R. McCarley, **J.H. Choi***, High density EEG responses to different frequency stimuli on parvalbumin-positive interneurons in basal forebrain, Washington DC, 2014

R. Brown*, J.T. McKenna, C. Yang, L. Chen, M. Gamble, A. Hulverson, P. Wood, B. Kim, **J.H. Choi,** GABAergic regulation of the centromedian thalamus and control of cortical gamma band oscillations, Washington DC, 2014

Y. Shahriari, S. Macdonald, Y. Surekha, D.J. Krusienski, **J.H. Choi***, Using Auditory Steady State Responses to Characterize Neural Connectivity in Mice Models of Schizophrenia, Washington DC, 2014

B. Kim, E. Hwang, Y. Kim, R. Strecker, R. McCarley, **J.H. Choi***, Chronic sleep restriction alters theta and gamma oscillations during REM sleep in mice, Washington DC, 2014

D. Lee, B. Kim, E. Hwang, B. Kim, S. Lee, **J.H. Choi***, Downshift of peak frequency in sensorimotor system under the optogenetic stimulation of primary somatosensory cortex evidenced by EEG and behavioral responses, Washington DC, 2014

T. Kim, Y. Jung, C.K. Lee, E. Hwang, Y.-K. Song, **J.H. Choi***, Cortical topography of auditory steady

state response in mice using high density EEG, Washington DC, 2014

C. Lee, D. Sin, S. Lee, E. Hwang, B. Kim, **J.H. Choi***, Source localization of somatosensory-motor circuit in mice, San Diego, 2013

Y. Kim, B. Kim, E. Hwang, D.-W. Kim, R.W. McCarley, R.E. Strecker, **J.H. Choi***, Chronic sleep restriction impairs NREM sleep generation in mice, San Diego, 2013

J.H. Kang, E. Hwang, **J.H. Choi***, S.P. Kim*, Characterization of connectivity in the thalamocortical network during anesthesia-induced transitions in consciousness, San Diego, 2013

E. Hwang, S. Kim, **J.H. Choi***, Change of local and global synchronization of gamma oscillations in relation to the depth of ketamine/xylazine anesthesia in mice, New Orleans 2012

T. Kim, J. T. Mckenna, J. M. McNally, S. Winston, C. Yang, L. Chen, **J.H. Choi***, B. Kocsis, K. Deisseroth, R. E. Strecker, R. Basheer, R. E. Brown, R. W. Mccarley*, Stimulating the basal forebrain parvalbumin-positive neurons entrains cortical gamma oscillations, New Orleans 2012

J.H. Choi*, E. Hwang, B. Kim, S. Lee, S. Lee, S. Han, Y. Kim, R. Strecker, Functional mouse brain mapping and its application to sleep study, New Orleans 2012

E. Hwang, S. Kim, and **J.H. Choi***, Continuous phase transition and existence of hysteresis in anesthesia-induced loss of consciousness and recovery, Washington D.C. 2011

J.K. Shin, S.Kim, E. Hwang, **J.H. Choi***, and G. Mashour*, Dynamic backbone analysis reveals constitutive and variable network properties across behavioral state transitions, Washington D.C. 2011

M. Lee, D. Kim, H.S. Shin, **J.H. Choi***, Dynamical and topographical characterization of spike-and-wave discharges in phospholipase C-beta 4 (PLC β 4) knock-out mice, San Diego 2010

D. Kim, M. Lee, H.S. Shin, **J.H. Choi***, Dynamic characterization of topographically different sleep spindles in mice, San Diego 2010

G.B. Kim, J.H. Cho, H.S. Shin, **J.H. Choi***, Dynamic functional mapping of mouse brain using optogenetic tool, San Diego 2010

E. Hwang, S. Kim, **J.H. Choi***, Hysteretic phase transition in an anesthetically induced loss of consciousness, San Diego 2010

J.H. Choi*, D. Kim, M. Lee, H.S. Shin, H. Sung, Functional Connectivity and Information Flow Maps in the Thalamocortical Circuit: A Mouse Model, San Diego 2010

J.H. Choi*, J. Rhim, M. Lee, H.S. Shin, Mapping and Assessment of 4-Aminopyridine-Induced

Seizures in the Mouse Brain, Society for Neuroscience, Chicago 2009

M. Lee, H.S. Shin, **J.H. Choi***, Simultaneous Recording of Brain Activity and Connectivity in the Mouse Brain, Society for Neuroscience, Chicago 2009

D. Kim, H.S. Shin, **J.H. Choi***, Spatiotemporal Analysis of Sleep Spindles using High-density Mouse EEG, Society for Neuroscience, Chicago 2009

E. Hwang, S. Kim, H.-S. Shin, **J.H. Choi***, Phase transitions between consciousness and unconsciousness under ketamine-xylazine-induced anesthesia in mice, Society for Neuroscience, Chicago 2009

J.H. Choi*, K. Koch, W. Poppendieck, H.S. Shin, A flexible multichannel electrode for mouse brain and its application to mouse EEG, Society for Neural Science, 101.6/VV1, 2008

J. Lim, S.Y. Lee, H.S. Shin, **J.H. Choi***, Development of source localization for mouse EEG, Society for Neural Science, 694.23/UU83, 2008

PATENTS (* as primary inventor)

나덕렬(20) 김고운(15) 최종두(15) 진주희(10) 이병화(10) **최지현**(10) 이해주(10) 한효빈(10) 신경 질환 진단용 가상현실 장치, 시스템 및 제공방법 한국출원번호 2017-0124778 (2017-09-27)

최지현*(40), 정영인하(10), 송윤규(40), 장정우(10) 군집활동 연구를 위한 실시간 뇌파 분석 및 측정 시스템 한국출원번호 2015-0164749 (2015-11-24) 한국등록번호 1737930 (등록일 20170515)

황은진(10), 이충기(10), 이동명(10), 이수현(10), **최지현**(10), (재)실감교류인체감응솔루션연구단(50) 멀티미디어와 연동하여 현실감을 증진하는 뇌 자극 장치 및 방법 한국출원번호 2015-0070364 (2015-05-20) 한국등록번호 1670736 (등록일 20161025)

황은진(50), **최지현**(50) 청성 지속 반응을 이용한 뇌 상태 표시기 및 방법 한국출원번호 2015-0070294 (2015-05-20) 한국등록번호 1668298 (등록일 20161017)

최지현*(20), 이충기(20), 신두호(10), 황은진(10), 이수현(10), 유범재(10), 김준식(10), 정천기(10), 멀티채널 촉각 유도 뇌자극 한국출원번호 2013-0093697 (2013-08-07) 한국등록번호 1540273 (등록일 20150723)

송진동(73), **최지현**(22), 이주현(5), 생체 자극용 탐침형 발광다이오드 칩 모듈 및 그 제조방법 (KR2012-0000141, 13/412,695) 한국등록번호 1401414 (등록일 20140523)

최지현*(40) 신희섭(10) 성호근(40) 김신근(5) 신기수(5), 미세전극 어레이 제조방법 및 이를 이용한 커넥터 연결방법 (2010-0016293, PCT/KR2010/004848) 한국등록번호 1033907 (등록일 20110502)

최지현*(40) 신희섭(10) 성호근(40) 김신근(5) 송호영(5), 미세전극 어레이 제조방법 (2010-0016300, PCT/KR/004850) 한국등록번호 1125603 (등록일 20120305)

최지현*(40) 신희섭(20) 김국배(10) 성호근(30), 뇌 상태 측정 장치 (EP9290792.2, JP2009-229872, KR2009-0023156, US12/567,193) 한국등록번호 1034798 (등록일 20110506)

최지현* (30) 김국배(30) 신희섭(10) 성호근(30), 어레이형 광 자극 장치 (EP9290736.9, JP2009-211785, US12/551,613, KR2009-0025521) 미국등록번호 8,348,986 (2013-01-08), 일본등록번호 5006367 (2012-06-01), 한국등록번호 1081360 (2011-11-02), 유럽등록번호 2233173 (2015-11-11)

최지현* (40) 김국배(40) 신희섭(20), 뇌 자극 및 측정 장치 및 그의 제조 방법 (US12/551,599, KR2008-0132365) 한국등록번호 1051025 (2011-07-15) 미국등록번호 8,652,185 (2014-02-18)

최지현* (30) 김국배(30) 신희섭(10) 성호근(30), 광 자극 시스템 (2009-0025501) 한국등록번호 1019464 (등록일 20110225)

최지현* (35) 신희섭(35) Klaus Peter Koch(30), 실험용 동물 EEG 측정용 박막형 다채널 미세전극 및 미세전극을 이용한 실험용 동물 EEG 측정 방법 (PCT/KR2008/007671, 2008-0098655, 13/123,217) 한국등록번호 1007558 (등록일 20110105), 미국등록번호 US 8,978,707 B2 (등록일 20140805)

윤의성(20) 신희섭(30) **최지현**(20) 최일환(10) 박성진(10) 박석호(10), 복통을 측정하는 행동 분석 시스템 (2007-0010840), 한국등록번호0890953 (등록일 20090323)

J.H. Choi*, K. Shin, J.S. Hwang, H.T. Hwang, W.T. Han, "Method and apparatus for monitoring human activity pattern" (KR 2005-0003635) (US 2006-0161079) Issued # 7450002 (KR Patent number 0601981) Issued

W.C. Bang, J.I. Sohn, **J.H. Choi**, "Apparatus and method for generating musical tone according to motion " (KR 2007-0081948) (US2007-0186759) Issued # 7723604 (KR Patent number 1189214) Issued

J.H. Choi*, J.S. Hwang, K. Shin, "apparatus of calculating consumption of calory and method for operating the apparatus" (KR 2007-0028996) (KR Patent number 0697646) Issued

K. Shin, J.W. Lee, J.S. Hwang, W.T. Han, **J.H. Choi**, H.T. Hwang, H.S. Yeo, "Battery charger for mobile terminal for transmitting medical information, method and system for health management using the same" (KR 2006-0054974) (KR Patent number 0695132) Issued


W.T Han, H.S. Yeo, **J.H. Choi**, J.S. Hwang, J.W.Lee, "Method and apparatus for measuring bio signal" (KR 2006-0040500)

S. Vladmir, **J.H., Choi**, K. Shin, Method and apparatus for counting the number of times of walking of a walker" (KR 2005-0010618) (KR Patent number 0571849) Issued


J.H. Choi*, M.J. Song, W.T. Han, H.S. Yeo, S.C. Kim, "Apparatus and method of measuring bio signal" (KR 2005-0118252)

DEVELOPMENT FOR CUSTOMIZATION

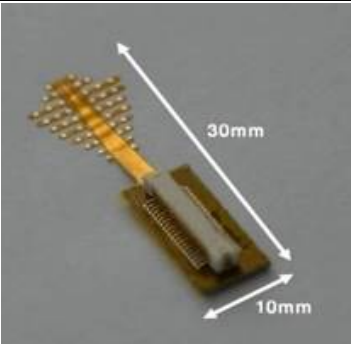
Wearable Health Monitor Project, 2004, SAIT (Samsung Electronics)

	<ul style="list-style-type: none">- Development for Activity Calorie Measurement Using 3-Axis Accelerometer<ul style="list-style-type: none">■ Phone Position Independent Tracker■ Personal Lifetime Activity Tracker■ Linkage to Expert System- Development for Wearable ECG Monitoring System<ul style="list-style-type: none">■ Location independent Hear Monitor■ Patch type ECG Monitor
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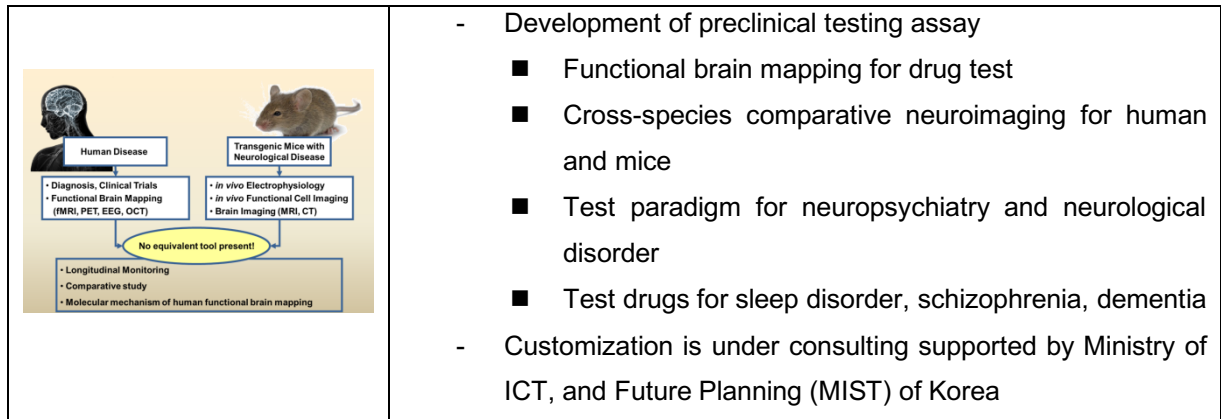
MEMS Motion Sensor based Man-Machine Interface for Mobile Phones, 2005, SAIT (Samsung Electronics)

	<ul style="list-style-type: none">- Development for Motion Recognition System for Mobile<ul style="list-style-type: none">■ Menu Scrolling Algorithm Using Gyroscope■ Calibration System for MEMS sensor- Business Modeling and Market Research of Motion Recognition Technology
--	--

Flexible Microelectrode for Mouse EEG (as Principal Investigator), 2006~Present, (KIST)

	<ul style="list-style-type: none">- Development of flexible microarray for mouse skull<ul style="list-style-type: none">■ Optimization of the design, layer structure, and material for dry skull mouse skull■ Surgery procedure for implantation■ Packaging technology for connection■ Inspection method using probe station- Customization is ongoing (Blackrock Microsystems Inc or Compumedics Inc)
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Preclinical Animal Testing of Brain Disease for Human Drug Development (as Principal Investigator), 2014~Present, (KIST)



CURRENT SOCIETY MEMBERSHIP

IEEE Engineering in Medicine & Biology Society, *Member* since 2004

Society for Neuroscience, *Member* since 2006

Korean Society for Computational Neuroscience, *Committee Member* since 2009

Korean Society for Human Brain Mapping, *Committee Member* since 2013

Korean Society for Brain and Neural Science, *Member* since 2013

GOVERNMENT SERVICES

Project Initiative Member, Brain-Neuron IT Neurotool, R&D Strategy & Planning, Ministry of Science and Technology, 2011-2012

Project Initiative Member, Wearable EEG and Stimulation Tool, Seoul Strategic Industry Support Program, 2011

Consultant, Advanced Item Search in Brain-Computer Interface for the Small and Medium Enterprises Administration, 2013

Consultant, Veteran Affair Merit Grant, Boston Healthcare VA Hospital, 2012-2013

ORGANIZATION OF INTERNATIONAL CONFERENCES

Local organizer, Korean-German Neuroscience Collaboration Workshop, Seoul, 2006

Co-Chair, Computational Neuroscience Meeting, Seoul, 2010

Chair, Harvard-KIST Collaborative Workshop on Neuroscience of Sleep, Seoul, 2011

Local Organizer, Computational Neuroscience Society, Jeju, 2016

TEACHING ACTIVITIES

(Current open class, regular)

Cognitive & Systems Neuroscience (KIST School, UST)

Trends in Neuroscience (team teaching, KIST School, UST)

(Current open class, irregular)

Statistics for Biological Scientists (KIST School, UST)

Computational & Theoretical Neuroscience (KIST School, UST)

(Past teaching)

Introduction to Neuroscience (KIST School, UST)

Biomedical Optics (KIST School, UST)

Critical Reading in Neuroscience (KIST School, UST)

Current Topics in Biotechnology (KIST School, UST)

Introduction to Biomedical Engineering (as TA, Biophysics, UIUC)

Experimental Physics (as TA, Physics, SNU)

JOURNAL Editor ACTIVITY

Frontiers in Neurosciences, Frontiers in Neurorobotics

JOURNAL REVIEWER ACTIVITY

Nature Communication, Neuroimage, European Journal of Neuroscience, Scientific Reports, PLoS One, Frontiers in Human Neurosciences, Frontiers in System Neurosciences, Frontiers in Neural Circuits, Frontiers in Neurorobotics, Frontiers in Neural Circuits, Epilepsy Research, Sleep Medicine Research, Transaction on Neural System and Rehabilitation Engineering, Journal of Neuroscience Methods