Elisa Kallioniemi, MSc. (Tech), PhD
Curriculum Vitae

UT Southwestern Medical Center
Department of Psychiatry

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ACADEMIC TRAINING AND EDUCATION

2018- current	UT Southwestern Medical Center, Department of Psychiatry, Postdoctoral Researcher
2017-2018	Stanford Medicine, Department of Psychiatry and Behavioral Science, Postdoctoral Researcher
2012-2016	University of Eastern Finland/ Kuopio University Hospital, Department of Applied Physics and Clinical Neurophysiology PhD in Applied Physics (Medical Physics) Thesis: *Assessment of motor cortical excitation-inhibition balance and microstructure - studies combining navigated transcranial magnetic stimulation and magnetic resonance imaging* Graduated with distinction
2004-2012	Aalto University, School of Electrical Engineering MSc. (Tech.) and BSc. (Tech.) in biomedical engineering Thesis: *Electroencephalography responses evoked by transcranial magnetic stimulation on the primary visual cortex*
2010	La Trobe University, Melbourne, Australia, exchange student in biomedical engineering

RESEARCH ACTIVITIES

I am a neuromodulation and neurophysiology scientist interested in understanding the neural mechanisms and effects of non-invasive neuromodulation. In addition, I use neuromodulation combined with neurophysiological methods (concurrent TMS-EEG, concurrent TMS-EMG, EEG) to understand brain function associated with frontal brain regions and primary motor cortex in both healthy humans and in patients with psychiatric and neurological disorders (eg., depression, schizophrenia, pain, stroke). I also develop methods to improve current neuromodulation practices. My ultimate research goal is to enhance our understanding in the interplay between neuromodulation and brain function

OTHER WORK EXPERIENCE

2012-2017	Medical Physicist trainee, Diagnostic Imaging Centre, Kuopio University Hospital, Kuopio, Finland
2012	Research assistant, Brain Research Unit, O.V. Lounasmaa laboratory, Aalto University, Espoo, Finland

2011-2012	Research assistant, Cognitive science, University of Helsinki, Helsinki, Finland
2011	R&D Trainee, Nexstim Plc, Helsinki, Finland
2010	Trainee biomedical engineer, The Alfred Hospital, Melbourne, Australia
2009-2010	Assistant Engineer, Syndome Electronics Industry Co., Ltd., Bangkok, Thailand
2008	Trainee in research, Electronics and Telecommunications Research Institute, Daejeon, South Korea

FELLOWSHIPS, HONORS, AND AWARDS

2018, International Federation of Clinical Neurophysiology Fellowship ($1,000)
2018, Finnish Cultural Foundation (49,000€)
2017, European Chapter of International Federation of Clinical Neurophysiology Fellowship (1,000€)
2016, Päivikki ja Sakari Sohlberg Foundation (25,000€)
2016, International Society for Magnetic Resonance in Medicine Educational Stipend ($800)
2015, European Chapter of International Federation of Clinical Neurophysiology Fellowship (1,000€)
2015, Finnish Foundation for Technology Promotion (5,000€)
2015, Finnish Neuroradiology Society (2,000€)
2014-2015, Radiological Society of Finland (7,850€)
2013-2015, The Finnish Brain Research and Rehabilitation Center Neuron (10,000€)
2013-2018, The Finnish Society of Clinical Neurophysiology (2,500€)
2014, The Finnish Concordia Fund (4,000€)
2013-2014, Paulo Foundation (17,000€)
2013, Kaute Foundation (5,700€)
2013, Second runner-up, Best poster award, 5th International Symposium on Navigated Brain Stimulation in Neurosurgery
2013, Best poster award, International Doctoral Program in Biomedical Engineering and Medical Physics seminar

PEER REVIEWED RESEARCH PUBLICATIONS

[1.] Säisänen L, Määttä S, Julkunen P, Niskanen E, **Kallioniemi E**, Gröhn H, Kemppainen S, Lakka T, Lintu N, Eloranta A-M, Vanninen R, Makkonen I, Könönen M. *Structural and functional asymmetry in primary motor cortex in Asperger syndrome: A Navigated TMS and imaging study*. Brain Topograpy, 2019 (*accepted*).

[2.] **Kallioniemi E***, Kärkkäinen O*, Määttä S, Könönen M, Kivimäki P, Kaarre O, Velagapudi V, Kekkonen V, Lehto SM, Laukkanen E, Tolmunen T. *Repeated Transcranial Magnetic Stimulation-Induced Motor Evoked Potentials Correlate with the Subject-Specific Serum Metabolic Profile of Creatine*. Journal of Clinical Neurophysiology, 2019 (*in press*), doi: 10.1097/WNP.0000000000000568.
*shared first authors

[3.] Weiss Lucas C*, **Kallioniemi E***, Neuschmelting V, Nettekoven C, Pieczewski J, Jonas K, Goldbrunner R, Karhu J, Grefkes C, Julkunen P. *Cortical Inhibition of Face and Jaw Muscle Activity and Discomfort Induced by Repetitive and Paired-Pulse TMS During an Overt Object Naming Task*. Brain Topography, 2019 (*in press*), doi: 10.1007/s10548-019-00698-9.
*shared first authors

[4.] Määttä S, Säisänen L, **Kallioniemi E**, Lakka TA, Lintu N, Haapala EA, Koskenkorva P, Niskanen E, Ferreri F, Könönen M. *Maturation changes the excitability and effective connectivity of the frontal*

lobe: A developmental TMS-EEG study. Human Brain Mapping, 2019 (*in press*), doi: 10.1002/hbm.24525.

[5.] Pitkänen M, **Kallioniemi E**, Järnefelt G, Karhu J, Julkunen P. *Efficient Mapping of the Motor Cortex with Navigated Biphasic Paired-Pulse Transcranial Magnetic Stimulation*. Brain Topography. 2018;31(6):963-971, doi: 10.1007/s10548-018-0660-9.

[6.] Löfberg O, Julkunen P, **Kallioniemi E**, Pääkkönen A, Karhu J. *Modulation of motor cortical excitability with auditory stimulation*. Journal of Neurophysiology, 2018;120(3):920-925, doi: 10.1152/jn.00186.2017.

[7.] Julkunen P, Löfberg O, **Kallioniemi E**, Hyppönen J, Kälviäinen R, Mervaala E. *Abnormal motor cortical adaptation to external stimulus in Unverricht-Lundborg disease (progressive myoclonus type 1, EPM1)*. Journal of Neurophysiology, 2018;120(2):617-623, doi: 10.1152/jn.00063.2018.

[8.] Kaarre O, Äikiä M, **Kallioniemi E**, Könönen M, Kekkonen V, Heikkinen N, Kivimäki P, Tolmunen T, Määtta S, Laukkanen E. *Association of the N100 TMS-evoked potential with attentional processes: a motor cortex TMS–EEG study*. Brain and Cognition, 2018;122:9-16, doi: 10.1016/j.bandc.2018.01.004.

[9.] Saari J, **Kallioniemi E**, Tarvainen M, Julkunen P. *Oscillatory TMS-EEG-Responses as a Measure of the Cortical Excitability Threshold*. IEEE Transactions on Neural Systems and Rehabilitation Engineering, 2018;26(2):383-391, doi: 10.1109/TNSRE.2017.2779135.

[10.] Kaarre O, **Kallioniemi E**, Könönen M, Tolmunen T, Kekkonen V, Kivimäki P, Heikkinen N, Ferreri F, Laukkanen E, Määttä S. *Heavy alcohol use in adolescence is associated with altered cortical activity: a combined TMS-EEG study*. Addiction Biology, 2018;23:268-280, doi: 10.1111/adb.12486.

[11.] **Kallioniemi E**, Savolainen P, Järnefelt G, Koskenkorva P, Karhu J, Julkunen P. *Transcranial magnetic stimulation modulation of corticospinal excitability by targeting cortical I-waves with biphasic paired-pulses*. Brain Stimulation 2018;11(2):322-326, doi: 10.1016/j.brs.2017.10.014.

[12.] Pitkänen M, **Kallioniemi E**, Julkunen P, Nazarova M, Nieminen JO, Ilmoniemi RJ. *Minimum-norm estimation of motor representations in navigated TMS mappings*. Brain Topography, 2017;30(6):711-722, doi: 10.1111/adb.12486.

[13.] Pitkänen M, **Kallioniemi E**, Julkunen P. *Effect of inter-train interval on the induction of repetition suppression of motor-evoked potentials using transcranial magnetic stimulation*. PLoS One, 2017;12(7):e0181663, doi: 10.1371/journal.pone.0181663.

[14.] Määttä S, Könönen M, **Kallioniemi E**, Lakka T, Lintu N, Lindi V, Ferreri F, Ponzo D, Säisänen L. *Development of cortical motor circuits between childhood and adulthood: a navigated TMS-HdEEG study*. Human Brain Mapping, 2017;38(5):2599-2615, doi: 10.1002/hbm.23545.

[15.] **Kallioniemi E**, Pitkänen M, Könönen M, Vanninen R, Julkunen P. *Localization of cortical primary motor areas of small hand muscles using navigated transcranial magnetic stimulation, BOLD and arterial spin labeling fMRI*. Journal of Neuroscience Methods, 2016;273:138-148, doi: 10.1016/j.jneumeth.2016.09.002.

[16.] Julkunen P, Määttä S, Säisänen L, **Kallioniemi E**, Könönen M, Jäkälä P, Vanninen R, Vaalto S. *Functional and structural cortical characteristics after restricted focal motor cortical infarction evaluated at chronic stage – indications from a preliminary study*. Clinical Neurophysiology, 2016;127(8):2775-2784, doi: 10.1016/j.clinph.2016.05.013.

[17.] **Kallioniemi E**, Julkunen P. *Alternative stimulation intensities for mapping cortical motor area with navigated TMS*. Brain Topography, 2016;29(3):395-404, doi: 10.1007/s10548-016-0470-x.

[18.] **Kallioniemi E**, Könönen M, Säisänen L, Gröhn H, Julkunen P. *Functional neuronal anisotropy assessed with neuronavigated transcranial magnetic stimulation*. Journal of Neuroscience Methods, 2015;256:82-90, doi: 10.1016/j.jneumeth.2015.08.028.

[19.] **Kallioniemi E**, Pääkkönen A, Julkunen P. *Repetition suppression in transcranial magnetic stimulation- induced motor-evoked potentials is modulated by cortical inhibition*. Neuroscience, 2015;310:504-511, doi: 10.1016/j.neuroscience.2015.09.056.

[20.] Pitkänen M, **Kallioniemi E**, Julkunen P. *Extent and location of the excitatory and inhibitory cortical hand representation maps – A navigated transcranial magnetic stimulation study*. Brain Topography, 2015;28(5):657-665, doi: 10.1007/s10548-015-0442-6.

[21.] **Kallioniemi E**, Säisänen L, Pitkänen M, Könönen M, Karhu J, Julkunen P. *Input-output characteristics of late corticospinal silent period induced by transcranial magnetic stimulation*. Journal of Clinical Neurophysiology, 2015;32(4):346-351, doi: 10.1097/WNP.0000000000000177.

[22.] **Kallioniemi E**, Pitkänen M, Säisänen L, Julkunen P. *Onset latency of motor evoked potentials in motor cortical mapping with neuronavigated transcranial magnetic stimulation*. The Open Neurology Journal, 2015;9:62-69, doi: 10.2174/1874205X01509010062.

[23.] **Kallioniemi E**, Könönen M, Julkunen P. *Repeatability of functional anisotropy in navigated transcranial magnetic stimulation – coil-orientation versus response*. NeuroReport, 2015;26(9):515-521, doi: 10.1097/WNR.0000000000000380.

[24.] **Kallioniemi E**, Säisänen L, Könönen M, Awiszus F, Julkunen P. *On the estimation of silent period thresholds in transcranial magnetic stimulation*. Clinical Neurophysiology, 2014;125(11):2247-2252, doi: 10.1016/j.clinph.2014.03.012.

[25.] Julkunen P, **Kallioniemi E**, Könönen M, Säisänen L. *Feasibility of automated analysis and inter-examiner variability of cortical silent period induced by transcranial magnetic stimulation*. Journal of Neuroscience Methods, 2013;217(1-2):75-81, doi: 10.1016/j.jneumeth.2013.04.019.

PEER REVIEWED REVIEW ARTICLES

[1.] McClintock SM, **Kallioniemi E**, Martin DM, Kim JU, Weisenbach SL, Abbott CC. A Critical Review and Synthesis of Clinical and Neurocognitive Effects of Noninvasive Neuromodulation Antidepressant Therapies. Focus 2019;17(1):18-29, doi:10.1176/appi.focus.20180031.

BOOK CHAPTERS

[1.] **Kallioniemi E**, Määttä S. *TMS-EEG*. in Kliininen neurofysiologia, First Edition, Edited by Mervaala E, Haaksiluoto E, Himanen S-L, Jääskeläinen S, Kallio M, Vanhatalo S. Published 2019 by Duodecim. Pages: 370-372. (*TMS-EEG chapter in a Finnish text book in Clinical Neurophysiology*)

[2.] **Kallioniemi E**, Könönen M, Määttä S. TMS-EEG: Methods and Challenges in the Analysis of Brain Connectivity in Biomedical Engineering Challenges: A Chemical Engineering Insight. First Edition. Edited by Piemonte V, Basile A, Ito T, Marrelli L. Published 2018 by John Wiley & Sons Ltd. Pages: 175-197.

PROFESSIONAL ORAL PRESENTATIONS

[1.] **Kallioniemi E**, Säisänen L, Gröhn H, Ferreri F, Lakka T, Lintu N, Lindi V, Könönen M, Määttä S. *Developmental differences in motor cortex TMS-EEG responses associate with local white matter microstructure*. 31st International Congress of Clinical Neurophysiology of the IFCN, Washington DC, USA, 2018.

[2.] **Kallioniemi E**, Awiszus F, Pitkänen M, Julkunen P. Influence of intertrial interval on measures of motor cortical excitability, Can the resting motor threshold be calculated with a short intertrial interval? 8th International Symposium on Navigated Brain Stimulation in Neurosurgery and Neuromodulation, Berlin, Germany, 2016.

[3.] **Kallioniemi E**, Könönen M, Vanninen R, Säisänen L, Vaalto S, Julkunen P. *Functional and structural anisotropy of the motor cortex in chronic stroke: A TMS-DTI study*. Brain Stimulation and Imaging meeting, Geneve, Switzerland, 2016.

[4.] **Kallioniemi E**, Julkunen P. *Feasibility of spline interpolation to evaluate the shape of the TMS-mapped motor representations: A multiple case study with tumor patients*. 7th International Symposium on Navigated Brain Stimulation in Neurosurgery, Berlin, Germany, 2015.

[5.] Julkunen P, Pitkänen M, **Kallioniemi E**. *Non-invasive estimation of motor cortical functional anisotropy and muscle representation with neuronavigated transcranial magnetic stimulation*. The 10th International Conference on Bioelectromagnetism, Tallinn, Estonia, 2015.

[6.] **Kallioniemi E**, Pitkänen M, Könönen M, Vanninen R, Julkunen R. *Localizing cortical motor representation: A comparative study between navigated transcranial magnetic stimulation, BOLD contrast and arterial spin labeling fMRI*. World Congress on Medical Physics and Biomedical Engineering, Toronto, Canada, 2015.

PROFESSIONAL POSTER PRESENTATIONS

[1.] Nurmikko T, Sacco P, Bresnahan R, **Kallioniemi E**, Fallon N. *Enhanced functional connectivity within primary motor cortex correlates with pain relief induced by repetitive transcranial magnetic stimulation (rTMS)*. International Neuromodulation Society's 14th World Congress, Sydney, Australia, 2019.

[2.] **Kallioniemi E**, Pruitt T, Wang X, Husain MM, Liu H. *Effects of Transcranial Infrared Stimulation on Neural Information Flow in Healthy Volunteers*. American College of Neuropsychopharmacology Annual Meeting, Hollywood, Florida, USA, 2018.

[3.] **Kallioniemi E**, Määttä S, Könönen M, Mervaala E, Viinamäki H, Valkonen-Korhonen M. *Effects of repetitive transcranial magnetic stimulation on short-latency afferent inhibition: A study in treatment-resistant depression*. 31st International Congress of Clinical Neurophysiology of the IFCN, Washington DC, USA, 2018.

[4.] Säisänen L, Hyppönen J, **Kallioniemi E**, Mervaala E, Hallikainen-Pirskanen E, Huttunen Jukka, Fraunberg M. *RTMS therapy on M1 modifies the facial motor map in chronic neuropathic pain*. The 16th European Congress of Clinical Neurophysiology, Budapest, Hungary, 2017.

[5.] **Kallioniemi E**, Kärkkäinen O, Määttä S, Könönen M, Kivimäki P, Kaarre O, Kekkonen V, Laukkanen E, Tolmunen T. *Serum metabolic profile of creatine correlates with repeated motor evoked potentials: A study on TMS-induced repetition suppression*. The 16th European Congress of Clinical Neurophysiology, Budapest, Hungary, 2017.

[6.] Julkunen P, Löfberg O, **Kallioniemi E**, Kälviäinen R, Mervaala E. *Motor cortical adaptation to external stimuli is altered in Unverricht-Lundborg type myoclonus epilepsy*. The 16th European Congress of Clinical Neurophysiology, Budapest, Hungary, 2017.

[7.] Säisänen L, Hyppönen J, **Kallioniemi E**, Huttunen J, Fraunberg M, Mervaala E. *Local cortical excitability in chronic neuropathic facial pain before and after rTMS treatment*. Nordic Congress of Clinical Neurophysiology & Kuopio Epilepsy Symposium, Kuopio, Finland, 2017.

[8.] **Kallioniemi E**, Könönen M, Mervaala E, Viinamäki H, Valkonen-Korhonen M. *Effects of repetitive transcranial magnetic stimulation on short-latency afferent inhibition: a study in treatment-resistant depression*. Nordic Congress of Clinical Neurophysiology & Kuopio Epilepsy Symposium, Kuopio, Finland, 2017.

[9.] **Kallioniemi E**, Määttä S, Könönen M, Julkunen P, Mervaala E, Kaarre O, Laukkanen E, Tiihonen J, Tuppurainen H. *Abnormal response to a high frequency TMS partly restores to a healthy level after rTMS treatment in Schizophrenic patients*. 2nd International Brain Stimulation Conference, Barcelona, Spain, 2017.

[10.] **Kallioniemi E**, Määttä S, Könönen M, Julkunen P, Säisänen L, Mervaala E, Kaarre O, Laukkanen E, Tiihonen J, Tuppurainen H. *Repetition suppression in transcranial magnetic stimulation induced motor evoked potentials is impaired in schizophrenic patients*. 2nd International Brain Stimulation Conference, Barcelona, Spain, 2017.

[11.] **Kallioniemi E**, Palmgren JE, Fraunberg M, Könönen M, Vanninen R, Julkunen P. *Application of navigated TMS and DTI in pre-radiotherapy planning and the effect of radiation on motor function: A pilot study with two patients*. 8th International Symposium on Navigated Brain Stimulation in Neurosurgery and Neuromodulation, Berlin, Germany, 2016.

[12.] Säisänen L, Hyppönen J, **Kallioniemi E**, Mervaala E, Huttunen J, Fraunberg M. *rTMS therapy on M1 modifies the motor map in chronic neuropathic facial pain – a pilot study*. XXIInd Congress of the European Society for Stereotactic and Functional Neurosurgery, Madrid, Spain, 2016.

[13.] Säisänen L, Hyppönen J, Hallikainen-Pirskanen E, **Kallioniemi E**, Huttunen J, Mervaala E, Fraunberg M. *rTMS therapy on M1 modifies motor map in chronic neuropathic facial pain – a pilot study*. 6th International Conference on Transcranial Brain Stimulation, Göttingen, Germany, 2016.

[14.] Palmgren Jan-Erik, **Kallioniemi E**, Julkunen P. *Use of transcranial magnetic stimulation and diffusion tensor imaging to avoid motor cortex complications in robotic stereotactic radiotherapy planning*. American Society for Radiation Oncology 58 Annual Meeting, Boston, USA, 2016.

[15.] Weiss Lucas C, **Kallioniemi E**, Neuschmelting V, Nettekoven C, Reck N, Goldbrunner R, Karhu J, Grefkes C, Julkunen P. *Inhibitory online rTMS effects as revealed by cortical silent periods in facial muscles suggest polysynaptic inhibition of speech network*. Deutsche Gesellschaft für Klinische Neurophysiologie und Funktionelle Bildgebung, Düsseldorf, Germany, 2016.

[16.] Weiss Lucas C, **Kallioniemi E**, Neuschmelting V, Nettekoven C, Reck N, Goldbrunner R, Karhu J, Grefkes C, Julkunen P. *Characteristics and distribution of cortical silent periods elicited by high-frequency online rTMS in facial and jaw muscles during a speech task: evidence for polysynaptic TMS-effects on the speech network*. 7th International Symposium on Navigated Brain Stimulation in Neurosurgery, Berlin, Germany, 2015.

[17.] Julkunen P, **Kallioniemi E**. *Different options for stimulation intensity in mapping cortical motor area in navigated TMS*. World Congress on Medical Physics and Biomedical Engineering, Toronto, Canada, 2015.

[18.] **Kallioniemi E**, Julkunen P. *Repetition suppression in resting motor evoked potentials evidenced by an increase in intracortical inhibition*. The 15th European Congress on Clinical Neurophysiology, Brno, Czech Republic, 2015.

[19.] Julkunen P, Säisänen L, Määttä S, Könönen M, **Kallioniemi E**, Vanninen R, Jäkälä P, Vaalto S. *Cortical recovery from primary motor cortex infarction evaluated at chronic stage*. The 15th European Congress on Clinical Neurophysiology, Brno, Czech Republic, 2015.

[20.] **Kallioniemi E**, Könönen M, Säisänen L, Julkunen P, Vanninen R, Jäkälä P, Määttä S, Vaalto S. *Influence of M1 hand knob ischemic stroke on motor activation: An fMRI study in chronic stage*. The 15th European Congress on Clinical Neurophysiology, Brno, Czech Republic, 2015.

[21.] **Kallioniemi E**, Säisänen L, Julkunen P, Könönen M, Vanninen R, Jäkälä P, Määttä S, Vaalto S. *Focal lesion on the hand knob re-localizes motor function laterally compared to the unaffected hemisphere*. The 15th European Congress on Clinical Neurophysiology, Brno, Czech Republic, 2015.

[22.] **Kallioniemi E**, Könönen M, Säisänen L, Gröhn H, Julkunen P. *Interaction of neuronal anisotropy and motor cortex excitability: a navigated TMS-DTI study*. 30th International Congress on Clinical Neurophysiology (ICCN) of the IFCN, Berlin, Germany, 2014.

[23.] **Kallioniemi E**, Könönen M, Säisänen L, Gröhn H, Julkunen P. *Cortical excitability and neuronal anisotropy are related: TMS-DTI study*. Organization for Human Brain Mapping Annual Meeting, Hamburg, Germany, 2014.

[24.] **Kallioniemi E**, Säisänen L, Könönen M, Julkunen P. *A novel approach to evaluate corticospinal inhibition using silent period*. 5th International Symposium on Navigated Brain Stimulation in Neurosurgery, Berlin, Germany, 2013.

[25.] **Kallioniemi E**, Säisänen L, Könönen M, Julkunen P. *Individual silent period thresholds improve the sensitivity of cortical inhibition measurement*. Asian and Oceanian Congress of Clinical Neurophysiology, Bali, Indonesia, 2013.

[26.] **Kallioniemi E**, Könönen M, Julkunen P. *Degree of neuronal organization in motor cortex evaluated by navigated TMS*. Organization for Human Brain Mapping Annual Meeting, Seattle, USA, 2013.

[27.] **Kallioniemi E**, Säisänen L, Könönen M, Karhu J, Julkunen P. *Appearance of late cortical silent period is dependent on stimulation intensity*. 5th International Conference on Non-invasive Brain Stimulation, Leipzig, Germany, 2013.

[28.] Julkunen P, **Kallioniemi E**, Säisänen L, Könönen M. *Reliability of an automated protocol versus manual interpreters in analysing cortical silent period*. 5th International Conference on Non-invasive Brain Stimulation, Leipzig, Germany, 2013.

TEACHING EXPERIENCE

Instructor on Record:
2015-2017 Masters-level course, *Functional MRI for linguistics*, Kuopio University Hospital, Kuopio, Finland.

2014-2016 Masters-level course, Clinical neurophysiology, School of Medicine, University of Eastern Finland, Kuopio, Finland.

Guest lecturing:
2015 Fall, Masters-level course, *Functional MRI for physicists*, Department of Applied Physics, University of Eastern Finland, Kuopio, Finland.

MENTORING

Officially appointed mentor
Minna Pitkänen, D. Tech, 2013-2018. Co-mentor in both MSc. (Tech.) Thesis (*Mapping of cortical hand representations using navigated transcranial magnetic stimulation and functional imaging*) and D. Tech. Thesis (*Characterization of motor cortical function with navigated transcranial magnetic stimulation*). Currently a postdoctoral researcher at A.I. Virtanen Institute for Molecular Sciences, Kuopio, Finland.

Teemu Karjalainen, MD, 2016- 2017. Co-mentor in MSc thesis in medicine (*Arterial spin labeling – the effects of excessive alcohol use during adolescence to cerebral perfusion*).

Aleksi Montonen, MD, 2014-2015. Co-mentor in MSc thesis in medicine (*The use of transcranial magnetic stimulation in rehabilitation of stroke patients with motor deficits*).

Karita Salo, MSc. (Tech.) 2014. Co-mentor in MSc. (Tech.) thesis (*Combining Transcranial Magnetic Stimulation and Electroencephalography to Estimate Cortical Excitability*). Currently a doctoral candidate at Department of Neuroscience and Biomedical Engineering, Aalto University, Espoo, Finland.

Olli Rantula, BSc. (Tech.), 2014. Co-mentor in BSc. (Tech.) thesis (*Navigated magnetic stimulation combined with magnetoencephalography in clinical applications*). Currently a doctoral candidate at Department of Signal Processing and Acoustics, Aalto University, Espoo, Finland.

Rasmus Zetter, BSc. (Tech), 2014. Co-mentor in BSc. (Tech.) thesis (*Navigated transcranial magnetic stimulation and magnetoencephalography - Technology, applications and combined use*). Currently a doctoral candidate at Department of Neuroscience and Biomedical Engineering at Aalto University, Espoo, Finland.

INVITED LECTURES

Forensic Psychiatry Clinic of the University of Eastern Finland, Kuopio, Finland, (December 20, 2017), Talk titled *rTMS in Schizophrenia – results from Skiter study*.

PROFESSIONAL ACTIVITIES

2017, Co-chair at the Advances in Transcranial Magnetic Stimulation session, The joint conferences: European Medical and Biological Engineering and Nordic-Baltic Biomedical Engineering, Tampere, Finland.

2015, Chairperson at the Multimodal Imaging session, World Congress on Medical physics and Biomedical Engineering, Toronto, Canada.

PROFESSIONAL ORGANIZATIONS

2019- current	North American Neuromodulation Society
2019- current	International Neuromodulation Society
2017- current	Organization for Human Brain Mapping
2014- current	International Society for Magnetic Resonance in Medicine
2013- current	The Finnish Society of Clinical Neurophysiology
2013- current	Radiological Society of Finland
2013- current	European Society of Radiology

AD HOC REVIEWER

Journals (number reviewed)
Applied Sciences (2)
Brain Sciences (2)
Clinical Neurophysiology (6)
Coatings (1)
Frontiers in Neuroscience (1)
Journal of Neuroscience Methods (4)
Journal of Clinical Neurophysiology (1)
Methods and Protocols (1)
Micromachines (1)
Sensors (3)
The Journal of Physiology (1)