

Sunghoon Ivan Lee, Ph.D.

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RESEARCH INTERESTS

Biomedical and health informatics, specialized in physical medicine and rehabilitation; human-centered design for mobile health monitoring system; wearable sensor and system design.

PROFESSIONAL POSITIONS

Assistant Professor September 2016 – Present
 College of Information and Computer Sciences, University of Massachusetts, Amherst, MA, USA
Adjunct Assistant Professor November 2018 – Present
 Department of Electrical and Computer Engineering, University of Massachusetts, Amherst, MA, USA
Postdoctoral Research Fellow July 2014 – August 2016
 Department of Physical Medicine and Rehabilitation, Harvard Medical School, Cambridge, MA, USA
Research Internship June 2013 – September 2013
 Embedded Processing Systems R&D Center, Texas Instruments, Dallas, TX, USA
Research Assistant September 2009 – June 2014
 Computer Science Department, University of California (UCLA), Los Angeles, CA, USA

EDUCATION / TRAINING

University of California (UCLA), Los Angeles, CA, USA	Ph.D. in Computer Science (with <i>Outstanding Research Award</i>)	2014
University of California (UCLA), Los Angeles, CA, USA	M.S. in Computer Science	2013
University of California (UCLA), Los Angeles, CA, USA	M.S. in Electrical Engineering	2010
Simon Fraser University, Burnaby, BC, Canada	B.A.Sc. in Computer Engineering (with <i>Honors</i>)	2008

HONORS AND RECOGNITION

Research Awards and Recognition

- **Senior Member** of the IEEE, 2021
- **Featured Article of the Issue**, IEEE TNSRE, 2020.
- **Cover Article of the Issue**, JBHI, 2019.
- **Best Paper Runner-up**, ACM SenSys, 2019.
- **Featured Article Nominee**, IEEE JBHI, 2019.
- **Elected Member** of the Technical Committee on Wearable Biomedical Sensors and System of the IEEE EMBS, 2018 – present
- **NIH Trailblazer Award** for Early Career Investigators, 2018.
- **NSF CRII Award** for Early Career Investigators, 2018.
- **Featured Article of the Issue**, MDPI Appl. Sci., 2017.
- **Featured Article Nominee**, IEEE JBHI, 2016.
- **Best Poster Nominee**, ACRM, 2016.
- **Northrup-Grumman Outstanding Research Student Award**, UCLA, 2014.
- **Featured Article of the Issue**, IEEE JBHI, 2014.

- **Best Demo Award**, ACM MobiSys, 2012.
- **Best Demo Honorable Mention**, IEEE SECON, 2012.

Teaching Awards

- **Lilly Fellow for Teaching Excellence**, UMass Amherst, 2021

Advisee Awards

- **Spaulding-Smith Fellowship Award**, Samuel Osebe (Ph.D. advisee), 2020.
- **NSF Student Travel Award**, Brandon Oubre (Ph.D. advisee), IEEE BHI/BSN, 2019.
- **NSF Graduate Research Fellowship Program - Honorable Mention**, Brandon Oubre (Ph.D. advisee), 2019.
- **UMass CICS Graduate School Fellowship**, Juhyeon Lee (Ph.D. advisee), 2018.
- **UMass Amherst 21st Century Leaders Award**, Xin Liu (B.S. advisee), 2018
(Awarded to 10 most exceptional graduating seniors out of 5500.)
- **UMass Amherst Outstanding Undergraduate Achievement Award**, Xin Liu (B.S. advisee), 2018.
(Awarded to 5 most outstanding seniors in computer science each year.)
- **NSF Student Travel Award**, Hee-Tae Jung (Ph.D. advisee), IEEE BHI/BSN, 2018.
- **UMass Amherst Rising Researcher Award**, Xin Liu (B.S. advisee), 2018.
(The highest honor for an undergraduate researcher across the university.)
- **Commonwealth Honors College Research Assistant Fellowship**, Youngkyun Lee, (B.S. advisee), 2018.
- **UMass CICS Graduate School Fellowship Award**, Brandon Oubre (Ph.D. advisee), 2018.
- **Commonwealth Honors College Research Assistant Fellowship**, Xin Liu (B.S. advisee), 2017.
- **NSF Student Travel Award**, IEEE/ACM CHASE, Xin Liu (B.S. advisee), 2017

FUNDED RESEARCH GRANTS

Total funding raise as PI or Co-PI: \$5,292,040
 Total funding raised as PI: \$3,752,218





[G10]	NIH – NIA R21 Patient-Centered Serious Games for Remote Cognitive Training in Older Adults with Mild Cognitive Impairment	\$436,836	04/21-03/23	Role: PI
[G9]	NIH - NIBIB R01 Achieving Optimal Motor Function in Stroke Survivors via a Human-Centered Approach to Design an mHealth Platform. (This grant application received a 6 th percentile).	\$2,425,577	08/20-07/25	Role: PI
[G8]	NIH - NIMH R01 Acoustic Sensing-Based Wearable system for Monitoring Social Dysfunction in Schizophrenia. (PI Xiong and I had put equivalent efforts when preparing the grant proposal)	\$1,144,121	09/19-08/23	Role: Co-PI
[G7]	Shirley Ryan AbilityLab Estimating Upper-Limb Impairment Level in Acute Stroke Survivors using Wearable Inertial Sensors and a Minimally-Burdensome Motor Task.	\$39,625	01/21-12/21	Role: PI
[G4]	NIH - NINDS R15 Using Wearable and Mobile Data to Diagnose and Monitor Movement Disorders.	\$395,701	12/18-11/21	Role: Site-PI
[G6]	Armstrong Fund for Research Enabling Batteryless Wearable Sensors via Intra-Body Power Transfer.	\$40,000	08/19-07/21	Role: PI
[G3]	NIH - NIBIB Trailblazer R21 A Wearable mHealth System for the Longitudinal Monitoring of Joint Function in Patients with Knee OA.	\$615,892	8/18-4/22	Role: PI



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| [G5] | NSF – CISE/IIS | \$10,000 | 06/19-05/20 | Role: PI |
| | Student-Author Travel Grant for the International Conference on Biomedical and Health Informatics 2019 and the International Conference on Wearable and Implantable Body Sensor Networks 2019. | | | |
| [G2] | NSF - SCH CRII | \$174,288 | 7/18-6/20 | Role: PI |
| | Applying Motor Control Theories for Ambulatory Monitoring of 3D Upper-Limb Movement. | | | |
| [G1] | UMass Institute of Applied Life Sciences | \$10,000 | 6/18-8/18 | Role: PI |
| | Development of a Body Area Networked System with Novel Finger-Worn Sensors to Monitor Hand and Arm Movements in Free Living Conditions. | | | |

PUBLICATIONS

Journal Publications

- [J30] M. Pedram, S. Mirzadeh, S. Rokni, R. Fallahzadeh, D. Woodbridge, S.I.Lee, H. Ghasamzadeh, “LIDS: Mobile System to Monitor Type and Volume of Liquid Intake,” IEEE Sensors Journal (SJ), To Appear.
- [J29] N. Mohammed, R. Wang, R. Jackson, Y. Noh, J. Gummeson*, **S.I.Lee***, “ShaZam: Charge-Free Wearable Devices via Intra-Body PowerTransfer from Everyday Objects,” ACM Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), To Appear, [*Co-corresponding authors].
- [J28] **S.I. Lee**, C. Adans-Dester, A. O’Brien, G. Vargara-Dias, R. Black-Schaffer, R. Zafonte, J. Dy, and P. Bonato, “Predicting and Monitoring Upper-Limb Rehabilitation Outcomes Using Clinical and Wearable Sensor Data in Brain Injury Survivors,” IEEE Transactions on Biomedical Engineering (TBME), To Appear.
- [J27] B. Oubre, J.-F. Daneault, K. Whritenour, N.C. Khan, C.D. Stephen, J.D. Schmahmann, **S.I. Lee***, A.S. Gupta*, “Decomposition of Reaching Movements Enables Detection and Measurement of Ataxia,” The Cerebellum, March 2021, [*Co-corresponding authors]
- [J26] R. Shukla, N. Kiran, R. Wang, J. Gummeson, **S.I. Lee**, “Enabling Batteryless Wearable Devices by Transferring Power Through The Human Body,” ACM GetMobile: Mobile Comp. and Comm., vol. 24, no. 3, pp 30-34, January 2021.
- [J25] B. Oubre, J-F Daneault, K. Boyer, J.H. Kim, M. Jasim, P. Bonato, **S.I. Lee**, “A Simple Low-Cost Wearable Sensor for Long-Term Ambulatory Monitoring of Knee Joint Kinematics,” IEEE Transactions on Transactions on Biomedical Engineering (TBME), vol. 67, no. 12, December 2020 .
- [J24] H. Jung, T. Park, N. Mahyar, S. Park, T. Ryu, Y. Kim, **S.I.Lee**, “Rehabilitation Games in Real-World Clinical Settings: Practices, Challenges, and Opportunities,” ACM Transactions on Computer-Human Interactions (ACM ToCHI, will be presented at ACM CHI’21), vol. 27, no. 6, November 2020.
- [J23] H. Jung, J-Fr Daneault, T. Nanglo, H. Lee, B. Kim, Y. Kim, **S.I. Lee**, “Effectiveness of A Serious Game for Cognitive Training in Chronic Stroke Survivors with Mild-to-Moderate Cognitive Impairment: A Pilot Randomized Controlled Trial.” Applied Sciences (Appl. Sci.), vol. 10, no. 9, September 2020.
- [J22] C. Adans-Dester, N. Hankov, A. O’Brien, G. Vergara-Diaz, R. Black-Schaffer, R. Zafonte, J. Dy, **S. I. Lee**, and P. Bonato, "Enabling Precision Rehabilitation Interventions Using Wearable Sensors and Machine Learning to Track Motor Recovery," npj Digital Medicine, vol. 3, no. 121, September 2020.
- [J21] C. Adans-Dester *et al.*, “Can mHealth Technology Help Mitigate the Effects of the COVID-19 Pandemic?,” IEEE Open Journal of Engineering in Medicine and Biology (OJEMB), vol. 1, pp. 243-248, September 2020.

- [J20]  B. Oubre, J-F Daneault, H.T. Jung, K. Whritenour, J.G.V. Miranda, J. Park, T. Ryu, Y. Kim, **S.I. Lee**, “Estimating Upper-Limb Impairment Level in Stroke Survivors using Wearable Inertial Sensors and a Minimally-Burdensome Motor Task,” IEEE Transactions on Neural Systems & Rehabilitation Engineering (TNSRE), vol. 28, no. 3, March 2020 [**Featured Article**].
- [J19] Y. Kim, H.T. Jung, J. Park, Y. Kim, R. Ramasarma, P. Bonato, E.K. Choe, **S.I. Lee**, “Towards the Design of a Ring Sensor-based mHealth System to Achieve Optimal Motor Function in Stroke Survivors,” ACM Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), vol. 3 no. 4, December 2019.
- [J18] L. Chen, J. Xiong, X. Chen, **S.I. Lee**, D. Zhang, T. Yan, D. Fang, “LungTrack: Towards Contactless and Zero Dead-Zone Respiration Monitoring with Commodity RFIDs,” ACM Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), vol. 3 no. 3, September 2019.
- [J17] P. Khaloo, B. Oubre, J. Yang, T. Rahman, **S.I. Lee**, “NOSE: Novel Odor Sensing Engine for Ambient Monitoring of the Frying Cooking Method in Kitchen Environments,” ACM Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), vol. 3, no. 2, June 2019.
- [J16]  H.T. Jung, H. Lee, K. Kim, B. Kim, S. Park, T. Ryu, Y. Kim and **S.I. Lee**, “Remote Assessment of Cognitive Impairment Level based on Serious Mobile Game Performance,” IEEE Journal of Biomedical and Health Informatics (JBHI), vol. 23, no. 3, pp 1269-1277, May 2019 [**Cover Page Article**].
- [J15] **S.I. Lee**, X. Liu, S. Rajan, N. Ramasarma, E.K. Choe, and P. Bonato, “A novel upper-limb function measure derived from finger-worn sensor data collected in a free-living setting,” PLOS One, vol. 14, no. 3, e0212484, 2019.
- [J14]  X. Liu, S. Rajan, N. Ramasarma, P. Bonato, **S.I. Lee**, "The Use of A Finger-Worn Accelerometer for Monitoring of Hand Use in Ambulatory Settings," IEEE Journal of Biomedical and Health Informatics (JBHI), vol. 23, no. 2, 2019 [**Cover Page Article Nominee**].
- [J13] **S.I. Lee**, C.P. Adans-Dester, M. Grimaldi, A.V. Dowling, P.C. Horak, R.M. Black-Schaffer, P. Bonato, J.T. Gwin, "Enabling Stroke Rehabilitation in Home and Community Settings: A Wearable Sensor-Based Approach for Upper-Limb Motor Training," IEEE Journal of Translational Engineering in Health and Medicine (JTEHM), vol. 6, no. 1, pp 1-11, 2018.
- [J12]  B.M. Eskofier, **S.I. Lee**, M. Baron, A. Simon, C.F. Martindale, H. Gaßner, J. KluckenAn, "Overview of Smart Shoes in the Internet of Health Things: Gait and Mobility Assessment in Health Promotion and Disease Monitoring," Applied Sciences (Appl. Sci.), vol. 7, no. 986, 2017 [**Featured Article**].
- [J11] **S.I. Lee**, A. Campion, A. Huang, E. Park, J.H. Garst, N. Jahanforouz, M. Espinal, T. Siero, S. Pollack, M. Afridi, M. Daneshvar, S. Ghias, M. Sarrafzadeh, D.C. Lu, " Finding Predictors for Postoperative Clinical Outcome in Lumbar Spinal Stenosis Patients using Smart-shoe Technology," Journal of NeuroEngineering and Rehabilitation (JNER), vol. 14, no. 77, 2017.
- [J10] J.F. Daneault, G. Vergara-Diaz, **S.I. Lee**, “Clinical Management of Drug-Induced Dyskinesia in Parkinson’s Disease: Why Current Approaches May Need to be Changed to Optimize Quality of Life”, European Medical Journal Reviews (EMJ-R), vol. 1, no. 4, pp 62-69, 2016.
- [J9] **S.I. Lee**, C. Li, H.A. Hoffman, D. S. Lu, R. Getachew, B. Mortazavi, J. H. Garst, M. Espinal, M. Razaghy, N. Ghalehsari, B. H. Paak, A. A. Chavam, M. Afridi, A. Ostowari, H. Ghasemzadeh, D. C. Lu, M. Sarrafzadeh, "Quantitative Assessment of Hand Motor Function in Cervical Spinal Disorder Patients Using Target Tracking Tests," Journal of Rehabilitation Research & Development (JRRD), vol. 55, no. 6, 2016.

- [J8] E. Park, **S.I. Lee**, J.H. Garst, A. Huang, A. Champion, N. Ghalehsariand, M. Arnell, S. Park, H.J. Chang, D.C. Lu, M. Sarrafzadeh, "Unobtrusive and continuous alcohol monitoring using a wearable device," *Methods of Information in Medicine (Methods Inf Med)*, vol. 38, no. 5, 2016.
- [J7] **S.I. Lee**, E. Park, A. Huang, B. Mortazavi, J.H. Garst, N. Jahanforouz, M. Espinal, T. Siero, S. Pollack, M. Afridi, M. Daneshvar, S. Ghias, D. C. Lu, M. Sarrafzadeh, "Objectively Quantifying Walking Ability in Degenerative Spinal Disorder Patients using Sensor Equipped Smart Shoes," *Medical Engineering & Physics (Med Eng Phys)*, vol. 38, no. 5, pp 442-449, 2016.
- [J6] B. Mortazavi, M. Pourhomayoun, **S.I. Lee**, S. Nyamathi, B. Wu, M. Sarrafzadeh, "User-Optimized Activity Recognition for Exergaming," *Pervasive and Mobile Computing (PMC)*, vol. 26, 2016.
- [J5]  **S.I. Lee**, B. Mortazavi, H. A. Hoffman, D. S. Lu, C. Li, B. H. Paak, J. H. Garst, M. Razaghy, M. Espinal, E. Park, D. C. Lu, M. Sarrafzadeh "A Prediction Model for Functional Outcomes in Spinal Cord Disorder Patients using Gaussian Process Regression," *IEEE Journal of Biomedical and Health Informatics (JBHI)*, vol. 22, no. 1, 2016 [**Cover Page Article Nominee**]
- [J4] H.A. Hoffman, **S.I. Lee**, J.H. Garst, D.S. Lu, C. Li, D.T. Nagasawa, N. Ghalehsari, N. Jahanforouz, M. Razaghy, M. Espinal, A. Ghavamrezaii, B.H. Paak, M. Sarrafzadeh, D. C. Lu, "Use of Multivariate Linear Regression and Support Vector Regression to Predict Functional Outcome After Surgery for Cervical Spondylotic Myelopathy," *Journal of Clinical Neuroscience (J Clin Neurosci)*, vol. 22, no.9, 2015
- [J3] R. Getachew, **S.I. Lee**, A. Yew, J. Kimball, D.S. Lu, J.H. Garst, N. Ghalehsari, B. H. Paak, M. Razaghy, M. Espinal, A. Ostowari, A. Ghavamrezaii, S. Pourtaheri, M. Sarrafzadeh, Daniel C. Lu, "Utilization of A Novel Digital Measurement Tool for Quantitative Assessment of Upper Extremity Motor Dexterity: A Controlled Pilot Study," *Journal of NeuroEngineering and Rehabilitation (JNER)*, vol. 11, no. 121, 2014.
- [J2]  B. Mortazavi, S. Nyamathy, **S.I. Lee**, T. Wilkerson, H. Ghasemzadeh, M. Sarrafzadeh, "Near-Realistic Mobile Exergames with Wireless Wearable Sensors," *IEEE Journal of Biomedical and Health Informatics (JBHI)*, vol 18, no. 2, pp. 449-456, 2014. [**Featured Article**]
- [J1] **S.I. Lee**, H. Ghasemzadeh, B.J. Mortazavi, M. Sarrafzadeh, "Pervasive Assessment of Motor Function: A Lightweight Grip Strength Tracking System," *IEEE Journal of Biomedical and Health Informatics (JBHI)*, vol. 17, no. 6, pp. 1023-1030, 2013

Peer-reviewed Conference Publications


- [C27] R. Shukla, N. Kiran, R. Wang, J. Gummeson, **S.I. Lee**, "SkinnyPower: Enabling Battery-less Wearable Sensors via Intra-Body Power Transfer," *The 17th ACM Conference on Embedded Networked Sensor Systems (ACM SenSys'19)*, New York, USA, November 2019.
- [C26]  L. Chen, J. Xiong, X. Chen, **S.I. Lee**, K. Chen, D. Han, D. Fang, Z. Tang, "WideSee: Towards Wide-Area Contactless Wireless Sensing," *The 17th ACM Conference on Embedded Networked Sensor Systems (ACM SenSys'19)*, New York, USA, November 2019 [**Best Paper Nominee**].
- [C25] D. Li, J. Liu, **S.I. Lee**, J. Xiong, "FM-Track: Pushing the Limits of Contactless Multi-target Tracking using Acoustic Signals," *The 18th ACM Conference on Embedded Networked Sensor Systems (ACM SenSys'20)*, Yokohama, Japan, November, 2020.
- [C24] B. Oubre, J-F. Daneault, H.T. Jung, J. Park, Y. Kim, **S.I. Lee**, "Estimating Quality of Reaching Movement Using a Wrist-Worn Inertial Sensor," *2020 IEEE Engineering in Medicine and Biology Conference (IEEE EMBC'20)*, Montreal, Canada, July, 2020.
- [C23] Y. Lee, X. Liu, J. Gummeson, **S.I. Lee**, "A Wearable RFID System to Monitor Hand Use for Individuals with Upper Limb Paresis," *The 16th IEEE International Conference on Wearable and Implantable Body Sensor Networks (IEEE BSN'19)*, Chicago, USA, May, 2019.


- [C22] H.T. Jung, H. Lee, K. Kim, B. Kim, S. Park, T. Ryu, Y. Kim, J-F. Daneault, **S.I. Lee**, "Predicting Cognitive Impairment Level after a Serious Game-based Therapy in Chronic Stroke Survivors," IEEE International Conference on Biomedical and Health Informatics (IEEE BHI'19), Chicago, USA, May, 2019.
- [C21] **S.I. Lee**, H.T. Jung, J. Park, J. Jeong, T. Ryu, Y. Kim, V.S. dos Santos, J.G.V. Miranda, J-F. Daneault, "Towards the Ambulatory Assessment of Movement Quality in Stroke Survivors using a Wrist-worn Inertial Sensor," 2018 IEEE Engineering in Medicine and Biology Conference (IEEE EMBC'18), Hawaii, USA, August, 2018.
- [C20] X. Liu, S. Rajan, N. Ramasarma, P. Bonato, **S.I. Lee**, "Finger-Worn Sensors for Accurate Functional Assessment of the Upper Limbs in Real-World Setting," 2018 IEEE Engineering in Medicine and Biology Conference (IEEE EMBC'18), Hawaii, USA, August, 2018.
- [C19] H.T. Jung, H. Lee, K. Kim, B. Kim, S. Park, T. Ryu, Y. Kim, **S.I. Lee**, "Estimating Mini Mental State Examination Scores using Game-Specific Performance Values: A Preliminary Study," 2018 IEEE Engineering in Medicine and Biology Conference (IEEE EMBC'18), Hawaii, USA, August, 2018.
- [C18] J. Park, H.T. Jung, J-F. Daneault, S. Park, T. Ryu, Y. Kim, **S.I. Lee**, "Feasibility of Using the RAPAEL Smart Board for Upper Limb Therapy in Stroke Survivors: A Randomized Controlled Trial," 2018 IEEE Engineering in Medicine and Biology Conference (IEEE EMBC'18), Hawaii, USA, August, 2018.
- [C17] H.T. Jung, J.W. Park, J.G. Jeong, T.K. Ryu, Y.S. Kim, **S.I. Lee**, "A Wearable Monitoring System for At-Home Stroke Rehabilitation Exercises: A Preliminary Study," 2018 IEEE International Conference on Biomedical and Health Informatics (IEEE BHI'18), Las Vegas, March, 2018 [**NSF Student Traveling Award for H.T. Jung**, acceptance rate: 14%].
- [C16] B.M. Eskofier, **S.I. Lee**, J-F Daneault, F.N. Golabchi, G. Ferreira-Carvalho, G. Vergara-Diaz, S. Sapienza, G. Costante, T. Kautz, J. Klucken, P. Bonato, "Recent Machine Learning Advancements in Sensor-based Mobility Analysis: Deep learning for Parkinson's Disease Assessment," 2016 IEEE Engineering in Medicine and Biology Conference (IEEE EMBC'16), Orlando, USA, August, 2016.
- [C15] **S.I. Lee**, J-F Daneault, L. Weydert, P. Bonato, "A Novel Flexible Wearable Sensor for Estimating Joint-Angles," 2016 IEEE Body Sensor Network Conference (IEEE BSN'16), San Francisco, USA, June, 2016.
- [C14] **S.I. Lee**, J-F Daneault, F.N. Golabchi, S. Patel, L. Shih, P. Bonato, "A Novel Technique for Assessing the Level of Drug-induced Dyskinesia using Wearable Sensors," 2015 IEEE Engineering in Medicine and Biology Conference (IEEE EMBC'15), Milano, Italy, August, 2015.
- [C13] **S.I. Lee**, M.Y. Ozsecen, L.D. Toffola, J-F Daneault, A. Puiatti, S. Patel, P. Bonato, "Activity Detection in Uncontrolled Free-living Conditions Using a Single Accelerometer," 2015 IEEE Body Sensor Network Conference (IEEE BSN'15), Cambridge, USA, June, 2015.
- [C12] B. Mortazavi, M. Pourhomayoun, S. Nyamathi, B. Wu, **S. I. Lee**, M. Sarrafzadeh, "Multiple Model Recognition for Near-Realistic Exergaming," IEEE International Conference on Pervasive Computing and Communications (IEEE PerCom'15), St. Louis, USA, March, 2015
- [C11] B. Mortazavi, M. Pourhomayoun, N. Alshurafa, M. Chronley, **S. I. Lee**, C. Roberts, M. Sarrafzadeh, "Support Vector Regression for METs of Exergaming Actions," IEEE Healthcare Innovation Point-of-Care Technologies Conference (HIC-POCT'14), Seattle, USA, October, 2014
- [C10] B. Mortazavi, **S. I. Lee**, M. Sarrafzadeh, "User-centric exergaming with fine-grain activity recognition: a dynamic optimization approach," ACM UbiComp International Workshop on Smart Health Systems and Applications (SmartHealthSys'14), Seattle, USA, September, 2014
- [C9] B. Mortazavi, M. Pourhomayoun, G. Alsheikh, N. Alshurafa, **S.I. Lee**, M. Sarrafzadeh, "Determining the Single Best Axis for Exercise Repetition Recognition and Counting with Smart Watches," 2014 IEEE Body Sensor Network Conference (IEEE BSN'14), Zurich, Switzerland, June, 2014

- [C8] **S.I. Lee**, H. Ghasemzadeh, B.J. Mortazavi, M. Lan, M. Ong, M. Sarrafzadeh, "Remote Patient Monitoring: What Impact Can Data Analytics Have on Cost?," ACM Wireless Health 2013 (WH2013), Baltimore, USA, November, 2013
- [C7] **S.I. Lee**, H. Ghasemzadeh, B.J. Mortazavi, A. Yew, R. Getachew, M. Razaghy, N. Ghalehsari, B.H. Paak, J.H. Garst, M. Espinal, J. Kimball, D. C. Lu, M. Sarrafzadeh, "Objective Assessment of Overexcited Hand Movements using a Lightweight Sensory Device," 2013 IEEE Body Sensor Network Conference (IEEE BSN'13), MIT, USA, May, 2013
- [C6] B. Mortazavi, N. Alsharufa, **S.I. Lee**, M. Lan, M. Chronley, C.K. Roberts, M. Sarrafzadeh, "MET Calculations from On-Body Accelerometers for Exergaming Movements," 2013 IEEE Body Sensor Network Conference (IEEE BSN'13), MIT, USA, May, 2013.
- [C5] H. Kalantarian, **S.I. Lee**, A. Mishra, H. Ghasemzadeh, M. Sarrafzadeh, "Multimodal Energy Expenditure Calculation for Pervasive Health: A Data Fusion Model using Wearable Sensors," Proceedings of IEEE PerCom Workshop on Smart Environment and Ambient Intelligence, San Diego, California, March, 2013
- [C4] T. Park, I. Hwan, U. Lee, **S.I. Lee**, C. Yoo, H. Jang, S. Choe, S. Park, J. Song, "ExerLink: Enabling Pervasive Social Exergames with Heterogeneous Exercise Devices" ACM MobiSys 2012 , Lake District, UK, June, 2012
- [C3] **S.I. Lee**, J. Woodbridge, A. Nahapetian, M. Sarrafzadeh, "MARHS: Mobility Assessment System with Remote Healthcare Functionality for Movement Disorders," ACM SIGHT IHI 2012, Miami, USA, January, 2012
- [C2] **S.I. Lee**, C. Ling, A. Nahapetian, M. Sarrafzadeh, "A Mechanism for Data Quality Estimation of On-Body Cardiac Sensor Networks," inProc. IEEE CCNC 2012, Las Vegas, Nevada, USA, January 2012
- [C1] **S.I. Lee**, H. Park, and M. van der Schaar, "Foresighted Joint Resource Reciprocation and Scheduling Strategies for Real-time Video Streaming over Peer-to-Peer Networks," Int. Packet Video Workshop 2009 (PV 2009), May 2009

Abstracts, Posters, and Demos

- [A29] R. Shukla, N. Kiran, R. Wang, J. Gummeson, **S.I. Lee**, "SkinnyPower: Enabling Battery-less Wearable Sensors via Intra-Body Power Transfer," The 17th ACM Conference on Embedded Networked Sensor Systems (ACM SenSys'19), New York, USA, November, 2019.
- [A28] K. Chen, L. Chen, D. Han, J. Xiong, **S.I. Lee**, X. Chen, Z. Tang, D. Fang, F. Wang, Z. Wang, "WideSee: Towards Wide-Area Contactless Wireless Sensing," The 17th ACM Conference on Embedded Networked Sensor Systems (ACM SenSys'19), New York, USA, November, 2019.
- [A27] N. Williams, E. Steiner, T. Nanglo, M. Jasim, J. Kim, J.-F. Daneault, K. Boyer, **S.I. Lee**, "A Low-Cost Wearable System to Estimate Free-Living 3D Ground Reaction Force," The 16th IEEE International Conference on Wearable and Implantable Body Sensor Networks (IEEE BSN'19), Chicago, USA, May, 2019
- [A26] J. Yang, A. Varga, K. Tung, A. Chandra, B. Oubre, N. Ramasarma, E.K. Choe, P. Bonato, **S.I. Lee**, "A Finger-Worn Sensor Network for Monitoring the Real-World Performance of Stroke Survivors," The 16th IEEE International Conference on Wearable and Implantable Body Sensor Networks (IEEE BSN'19), Chicago, USA, May, 2019
- [A25] A. Chandra, R. Zabounidis, K. Tung, H.T. Jung, J.-F. Daneault, and **S.I. Lee**, "SmartDiagnostics: A Mobile Application for the Monitoring and Management of Movement Disorders," IEEE International Conference on Biomedical and Health Informatics (IEEE BHI'19), Chicago, USA, May, 2019.
- [A24] **S.I. Lee**, J.F. Daneault, K. Boyer, "Estimating Ground Reaction Force and Center of Pressure During Gait Using a Low-Cost, Body-Networked Wearable System," 2018 IEEE International Conference on Biomedical and Health Informatics (IEEE BHI'18), Las Vegas, March, 2018.

- [A23] X. Liu, S. Rajan, G. Hollander, N. Ramasarma, P. Bonato, **S.I. Lee**, "A Novel Finger-Worn Sensor for Ambulatory Monitoring of Hand Use," The 2nd IEEE/ACM Conference on Connected Health: Applications, Systems, and Engineering Technologies (IEEE/ACM CHASE 2017), Philadelphia, July, 2017 [**NSF Student Traveling Award for X. Liu**].
- [A22] J.F. Daneault, **S.I. Lee**, F.N. Golabchi, S. Patel, L. Shih, S. Pagnoni, P. Bonato, "Estimating Bradykinesia in Parkinson's Disease with a Minimum Number of Wearable Sensors," The 2nd IEEE/ACM Conference on Connected Health: Applications, Systems, and Engineering Technologies (IEEE/ACM CHASE 2017), Philadelphia, July, 2017.
- [A21] S. Sapienza, C.P. Adans-Dester, A. O'Brien, G.V. Diaz, **S.I. Lee**, S. Patel, R. Black-Schaffer, R. Zafonte, P. Bonato, C. MEagher, A.M. Hughes, J. Burrige, D. Demarchi, "Using a Minimum Set of Wearable Sensors to Assess Quality of Movement in Stroke Survivors," The 2nd IEEE/ACM Conference on Connected Health: Applications, Systems, and Engineering Technologies (IEEE/ACM CHASE 2017), Philadelphia, July, 2017.
- [A20] S. Rajan, X. Liu, G. Hollander, N. Ramasarma, P. Bonato, **S.I. Lee**, "A Finger-Worn Ring Sensor to Capture Hand Movements in an Ambulatory Setting," 94th Annual Conference of American Congress of Rehabilitation Medicine (ACRM), Atlanta, USA, Oct, 2017.
- [A19] C.P. Adans-Dester, P. Bonato, A. Dowling, J. Gwin, **S.I. Lee**, A. O'Brian, "Wrist-Worn Sensors for Tele-Rehabilitation of the Hemiparetic Upper-Extremity: Stakeholder Interviews for Feedback and Usability," 94th Annual Conference of American Congress of Rehabilitation Medicine (ACRM), Atlanta, USA, Oct, 2017.
- [A18] G. Costante, E. Bonizzoni, A. Puiatti, **S.I. Lee**, P. Bonato, "MercuryLive 4.0 - A Web Platform to Enable Remote Monitoring of Patients with Parkinson's Disease Using Wearable Sensors," 2017 IEEE Body Sensor Network Conference (IEEE BSN'17), Eindhoven, The Netherlands, May, 2017.
- [A17] J.F. Daneault, C. Kanzler, S.I. Lee, F. Golabchi, G. Vergara-Diaz, G.F. Carvalho, E. Fabara, S. Sapienza, L. Sudarsky, J. Growdon, P. Bonato, "Exploring the Use of Wearable Sensors to Monitor Drug Response of Patients with Parkinson's Disease in the Home Setting," vol. 88, no. 16-Supplement, Neurology, April, 2017.
- [A16] X. Liu, S. Rajan, G. Hollander, M. Radensky, S.I. Lee, "A Novel Method for Quantifying Fine Hand Movements in Stroke Survivors," 23rd Annual Massachusetts Statewide Undergraduate Research Conference, Amherst, April, 2017
- [A15] C.M. Kanzler, **S.I. Lee**, J.F. Daneault, F.N. Golabchi, J. Hannink, C. Pasluosta, B.M. Eskofier, P. Bonato, "Home monitoring of drug response in patients with Parkinson's disease using wearable sensors," IEEE Wireless Health 2016 (IEEE WH'15), Bethesda, MD, October, 2016.
- [A14]  **S.I. Lee**, C. Adans-Dester, A. O'Brien, G. Vergara-Diaz, R.D. Zafonte, R.M. Black-Schaffer, P. Bonato, "Using Wearable Motion Sensors to Estimate Longitudinal Changes in Movement Quality in Stroke and Traumatic Brain Injury Survivors Undergoing Rehabilitation", 93rd Annual Conference of American Congress of Rehabilitation Medicine (ACRM), Chicago, USA, Oct, 2016 [**Best Poster Nomination**].
- [A13] J.F. Daneault, F.N. Golabchi, **S.I. Lee**, G. Vergara-Diaz, G.F. Carvalho, E. Fabara, S. Sapienza, P. Bonato, "Monitoring dyskinesia severity using wearable sensor data," the 20th International Congress of Parkinson's Disease and Movement Disorders, Berlin, Germany, June, 2016
- [A12] **S.I. Lee**, C.P. Adans-Dester, G.V. Diaz, G. Mascia, S. Patel, R. Black-Schaffer, R. Zafonte, P. Bonato, "Using Wearable Motion Sensors to Estimate Longitudinal Changes in Movement Quality in Stroke Survivors Undergoing Rehabilitation," Wireless Health 2015 (WH2015), Bethesda, MD, October, 2015
- [A11] M. Arnell, E. Park, **S.I. Lee**, C. Lee, A. Champion, R. Getachew, D.C. Lu, "Wireless technology to assess neuromotor function during substance use," Congress of Neurological Surgeons, Boston, MA, October, 2015

- [A10] **S.I. Lee**, N. Menard, B. Chen, M.Y. Ozsecen, P. Bonato, "MercuryLive+: Towards Robust Remote Monitoring of Patients with Neuromotor Deficits Using Wearable Sensor Networks," Mobile Health in Rehabilitation, Boston, MA, October, 2014
- [A9] M.Y. Ozsecen, **S.I. Lee**, N. Menard, N. Chen, P. Bonato, "Assessing the Usability of a Knee Range of Motion Monitoring Device (KROMM) for Long-term Home with OA Patients," Mobile Health in Rehabilitation, Boston, MA, October, 2014
- [A8] H. Hoffman, C.H. Li, S.I. Lee, J. Garst, M. Espinal, N. Jahanforouz, A.A. Ghavamrezai, M. Sarrafzadeh, D. C. Lu, "Use of Multivariate Linear Regression Models and Support Vector Regression Models to Predict Outcome in Patients Undergoing Surgery for Cervical Spondylotic Myelopathy," Congress of Neurological Surgeons 2014 Annual Meeting (CNS 2014), Boston, MA, October, 2014
- [A7] C. H. Li, **S. I. Lee**, D. S. Lu, P. Culmer, D. C. Lu, I. Wu, "Novel Mobile Devices for Assessing Efficacy of Cervical Epidural Steroid Injection," Western Regional Anesthesia Conference, Century City, USA, May, 2014.
- [A6] M. Arnell, **S. I. Lee**, E. Park, C. Li, R. Getachew, D. C. Lu, "Wireless Technology for Motor Assessment in Patients with Lumbar Spine Injury," 82nd American Association of Neurological Surgeons (AANS) Annual Scientific Meeting, San Francisco, USA, April, 2014.
- [A5] N. Au Yong, **S. I. Lee**, R. Getachew, J. Kimball, M. Sarrafzadeh, D. D. Lu, "Characterizing Transient Activation Hypertonia during a Handgrip Force Tracking Task in Cervical Myelopathy," Neuroscience, San Diego, California, USA, November, 2013.
- [A4] **S.I. Lee**, H. Ghasemzadeh, A. Yew, R. Getachew, J. Kimball, N. Ghalehsari, B.H. Paak, J.H. Garst, M. Razaghy, D.C. Lu, M. Sarrafzadeh, "Objective Assessment of Spastic Hand Hypertonia using a Novel Digital Device," The 20th IAGG World Congress of Gerontology and Geriatrics, Seoul, Korea, June, 2013
- [A3] R. Getachew, **S.I. Lee**, J. Kimball, A. Yew, N. Ghalehasari, B.H. Paak, D.C. Lu, M. Sarrafzadeh, "Utilization of a Novel Digital Measurement Tool for Quantitative Assessment of Upper Extremity Motor Dexterity in Cervical Spondylotic Myelopathy," (Abstract) 29th Annual Meeting of the AANS/CNS Disorders of the Spine and Peripheral Nerves, Phoenix, Arizona, USA, March, 2013
- [A2] **S.I. Lee**, R. Getachew, J. Kimball, A. Yew, N. Ghalehasari, B.H. Paak, J.H. Garst, D.C. Lu, M. Sarrafzadeh, "Utilization of a Novel Digital Device and an Analytic Method for Accurate Measurement of Upper Extremity Motor Function," (Abstract) 81st American Association of Neurological Surgeons (AANS) Annual Scientific Meeting, New Orleans, Louisiana, USA, April, 2013
- [A1]  T. Park, I. Hwan, U. Lee, **S.I. Lee**, C. Yoo, H. Jang, S. Choe, S. Park, J. Song, "ExerLink: Enabling Pervasive Social Exergames with Heterogeneous Exercise Devices," ACM MobiSys 2012 Demonstration, Lake District, UK, June, 2012. [**Best Demo Award**] Also demonstrated at IEEE SECON 2012 [**Best Demo Honorable Mention**]

Patents

- [P1] **S.I. Lee**, B.J. Mortazavi, M. Sarrafzadeh, "Method and Apparatus for Mobile Rehabilitation Exergaming" U.S. and International Patent (WO 2013/165557).

STUDENT SUPERVISION

Ph.D. Student Supervision

- Hee-Tae Jung, Graduated in 2019, Computer Science.
- Brandon Oubre, Expect to graduate in 2022, Computer Science.
- Juhyeon Lee, In-progress, Computer Science.
- Yunda Liu, In-progress, Computer Science

- Noor Mohammed, In-progress (co-advised with Jeremy Gummesson), Electrical and Computer Engineering.
- Sam Osebe, In-progress, Computer Science.

Ph.D. Thesis Committee

- Georgios Provelengios, Graduated in 2019, Electrical and Computer Engineering, Advisor: Russell Tessier.
- Mohammad Rostami, Expect to graduate in 2021, Computer Science, Advisor: Deepak Ganesan.
- Soha Rostaminia, In-progress, Computer Science, Advisor: Deepak Ganesan.

M.S. Student Supervision

- Neev Kiran, Graduated in 2018, Electrical and Computer Engineering – Incoming Ph.D. student at UMass Amherst in 2021.

B.S. Student Supervision

- Shirui Charles Cao, Expect to graduate in 2021, Computer Science, Incoming Ph.D. student at UMass Amherst in 2021.
- Xin Liu, Graduated in 2018, Computer Science, Currently a Ph.D. student at University of Washington.
- Youngkyun Kim, Graduated in 2018, Computer Science, Currently a software engineer at Amazon, Seattle.
- Smita Rajan, Graduated in 2018, Computer Science, Currently a MD student at the St. George's University.

TEACHING EXPERIENCES

UMass CS 590W	Health Informatics and Data Science	Spring'21.
UMass CS 240	Reasoning Under Uncertainty	Fall'17, Fall'18, Fall'19, Fall'20.
UMass CS 691WM	Wearable and Mobile Sensors in Clinical Sciences	
UMass CS 390N	Internet of Things	Spring'17, Spring'18, Spring'19.
UCLA CS 259	Wireless Health	Spring'13.
UCLA CS 152A	Introductory Digital Design Laboratory	Fall'09, Winter'10, Fall'10, Winter'11, Spring'11, Fall'11, Winter'12, Spring'12, Fall'12, Winter'13, Spring'13, Fall'13, Winter'14, Spring'14.
UCLA CS 152B	Advanced Digital Design Logic Laboratory	Summer'10, Summer'12.
UCLA CS 31	Introduction to Computer Science	Summer'11.

ACADEMIC ACTIVITIES AND SERVICE

Editorial

- **Editor** of the IEEE EMBC, 2021.
- **Associate Editor** of PLOS ONE, 2018 – present.
- **Associate Editor** of the IEEE OJEMB, 2019 – present.
- **Guest Editor** of the Special issue of PLOS ONE on “Digital Health Technology.”
- **Guest Editor** of the Special Issue of MDPI Applied Sciences (ISSN 2076-3417) on “Wearable Computing and Machine Learning for Applications in Sports, Health, and Medical Engineering.”
- **Guest Editor** of the Special Issue of MDPI Information Journal (ISSN 2078-2489) on “Smart Health.”

Grant Panel

- **Ad-hoc Panel Member** for the NCMRR Early Career Research Award, NICHD, NHI, 2020, 2021.
- **Ad-hoc Panel Member** for the Biomedical Computing and Health Informatics study section, NHI, 2018, 2019.
- **Panel Member**, DoD, 2020.
- **Panel Member**, NSF, 2016 (three times), 2017, 2020, 2021.

Conference Organizing

- **Organizing Committee Member** for the 2021 IEEE International Conference on Body Sensor Networks (IEEE BSN'21).
- **Organizing Committee Member** for the 2019 IEEE International Conference on Body Sensor Networks (IEEE BSN'19).
- **Workshop Chair** of the “First International Workshop on Challenges and Opportunities in the Next Generation Body Sensors & Systems, Analytics, Applications, and Interventions” in conjunction with the IEEE BSN 2018.
- **Workshop Chair** of the "Tutorial on Machine Learning and Data Mining with a Focus on Human Studies" in conjunction with the ACM Wireless Health Conference 2015.

Academic Community Service

- **Elected Technical Committee Member** on Wearable Biomedical Sensors and System of the IEEE Engineering in Medicine and Biology Society, 2018 – present.
- ACM UbiComp/ISWC Doctoral Colloquium Career Panel Member, 2019.

Program Committee

- 2021 IEEE Body Sensor Network Conference (IEEE BSN'21).
- 2020 IEEE/ACM Conference on Connected Health: Applications, Systems and Engineering Technologies (IEEE/ACM CHASE'20).
- 2019 IEEE/ACM Conference on Connected Health: Applications, Systems and Engineering Technologies (IEEE/ACM CHASE'19).
- 2019 IEEE Body Sensor Network Conference (IEEE BSN'19).
- 2018 IEEE Body Sensor Network Conference (IEEE BSN'18).
- 2018 ACM MobiHoc Workshop on Mobile IoT Sensing, Security, and Privacy.
- 2017 IEEE/ACM Conference on Connected Health: Applications, Systems and Engineering Technologies (IEEE/ACM CHASE'17).
- IEEE Consumer Communications & Networking Conference (IEEE CCNC'17).
- ACM 6th International Conference on Digital Health (ACM DH'15).
- International Workshop on Self-Powered Systems, Engineering Technologies and Applications (SETA'15).
- ACM Wireless Health Conference (WH'15).
- IEEE Consumer Communications & Networking Conference (IEEE CCNC'15).
- ACM 5th International Workshop on Pervasive Wireless Healthcare (MobileHealth'15).
- ACM 5th International Conference on Digital Health (ACM DH'15).
- ACM UbiComp Workshop on Smart Health Systems and Applications (SmartHealth'14).

Journal Reviewing

- ACM IMWUT, ACM TIOT, IEEE TBME, IEEE JBHI, IEEE JTEHM, IEEE OJEMB, IEEE SJ, IEEE THMS, IEEE TMech, IEEE Pervasive, PLOS One, JNER, Gait and Posture, Pervasive Mob Comput, Comput. Biol. Med., Med Eng Phys.

Conference Reviewing

- ACM ISWC, IEEE EMBC, IEEE BHI, IEEE BSN, ACM/IEEE CHASE, IEEE ICORR, ACM UbiComp, IEEE ICHI, ACM/IEEE WH, IEEE CCNC, IEEE GlobeSIP.

DEPARTMENTAL AND UNIVERSITY SERVICE

- Informatics Degree Program Committee (2020 – present).
- Departmental Award Committee (2018 – present).
- Steering Committee of the Center of Personalized Health Monitoring, Institute of Applied Life Sciences, UMass Amherst (2016 – present).
- Faculty Hiring Committee (2019 – 2020).
- Annual Faculty Review Committee (2018 – 2019).

- M.S. Admission Committee (2017 – 2019).
- Ph.D. Admission Committee (2016 – 2017).

INVITED TALKS

- “Personal Rehabilitation Informatics using Mobile Technologies,” Columbia University, May 2021.
- “Instrumenting Everyday Objects to Improve Motor Practice in Stroke Survivors,” Shriley Ryan AbilityLab of Northwestern University, January 2021.
- “Use of Mobile Technologies in Rehabilitation Medicine,” University of Vermont, November 2020.
- “The use of mobile sensors and systems in brain injury rehabilitation,” Huashan Rehabilitation Hospital of Fudan University, China, August 2020.
- “The use of mobile sensors and systems in brain injury rehabilitation,” Using mHealth Technology to Enable the Clinical Trial of the Future Workshop at the 2019 IEEE Body Sensor Network Conference (IEEE BSN'19), Chicago, USA, Mays 2019.
- “The Use of Wearable Sensors and Systems in Stroke Rehabilitation,” Boston University, Boston, USA, March 2018.
- “The Use of Wearable Sensors and Systems in Stroke Rehabilitation,” Northwestern University, Evanston, USA, October 2018.
- “The Use of Wearable Sensors and Systems in Stroke Rehabilitation,” Dartmouth College, Hanover, USA, September 2018.
- “Towards Optimal Motor Function in Stroke Survivors using Wearable and mHealth Technologies,” Inha University, Incheon, Korea, June 2018.
- “Towards Optimal Motor Function in Stroke Survivors using Wearable and mHealth Technologies,” Ehwa Women University, Seoul, Korea, June 2018.
- “The use of wearable sensors and systems in brain injury rehabilitation,” The 5th International Symposium on Automated Sensor Based Mobility Analysis for Disease Prevention and Treatment *in conjunction with* The 2018 IEEE Biomedical and Health Informatics, and Body Sensor Network Conference (IEEE BHI/BSN'18), Las Vegas, USA, March 2018.
- “The use of wearable sensors and systems in rehabilitation medicine,” University of Hokkaido – Graduate School of Information Science and Technology, Sapporo, Hokkaido, Japan, March 2017.
- “The use of wearable sensors and systems in rehabilitation medicine,” Worcester Polytechnic Institute (WPI) – Department of Electrical and Computer Engineering, Worcester, USA, December 2016.
- “The use of wearable sensors and systems in rehabilitation medicine,” Emerging Information & Technology Conference (EITC 2016), MIT, Cambridge, USA, August 2016.
- “Mobile and Connected Health: Towards a Proactive, Preventive, and Patient-centered Healthcare System using Wearable Sensors and Networks,” Texas A&M University, College Station, USA, April 2016.
- “Mobile and Connected Health: Towards a Proactive, Preventive, and Patient-centered Healthcare System using Wearable Sensors and Networks,” University of Massachusetts (CISC), Amherst, USA, March 2016.
- “Mobile and Connected Health: Towards a Proactive, Preventive, and Patient-centered Healthcare System using Wearable Sensors and Networks,” The Penn State University, State College, USA, March 2016.
- “Mobile and Connected Health: Towards a Proactive, Preventive, and Patient-centered Healthcare System using Wearable Sensors and Networks,” University of Massachusetts (Engineering & Nursing), Amherst, USA, February 2016.
- “Mobile and Connected Health: Towards a Proactive, Preventive, and Patient-centered Healthcare System using Wearable Sensors and Networks,” University of Minnesota, Twin Cities, USA, February 2016.
- “Mobile and Connected Health: Towards a Proactive, Preventive, and Patient-centered Healthcare System,” MSU-Catalyst Talks, College of Communication Arts and Sciences, Michigan State University, East Lansing, USA, October 2015.
- “The use of wearable sensors and systems in rehabilitation medicine,” 2015 IEEE Body Sensor Network Conference (IEEE BSN'15), Cambridge, USA, June 2015.