
YEON SIK NOH, PhD

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EDUCATION

- Ph.D. in Biomedical Engineering**, Yonsei University, South Korea, 8/2013
Dissertation: "Design and Implementation of Intelligent Fitness Management (IFM) System based on Personalized Exercise Guidance for Obesity"
Advisors: Dr. Hyungro Yoon
- M.S. in Biomedical Engineering**, Yonsei University, South Korea, 2/2008
Thesis: "A Real-Time Autonomic Nervous System Evaluation System using Heart Instantaneous Frequency Signal during Exercise"
Advisors: Dr. Hyungro Yoon
- B.S. in Biomedical Engineering**, Yonsei University, South Korea, 2/2006

PROFESSIONAL EXPERIENCE

- Assistant Professor**, College of Nursing/Dept. of Electrical and Computer Engineering, University of Massachusetts Amherst, 9/2014-8/2017
- New generation healthcare system/ strategy based on Nursing Engineering.
- Postdoctoral Fellow**, Dept. of Biomedical Engineering, University of Connecticut, 9/2014-8/2017
- Developing wearable Devices for In-Home Monitoring System.
 - Developing of Flexible Carbon-Based Hydrophobic Electrodes for Skin Conductance Measurement.
- Senior Hardware Engineer (Consultant)**, Mobile Sense Technologies, Inc., 1/2016-8/2017
- Developing hardware (circuit design, firmware) for wearable healthcare system
- Postdoctoral Fellow**, Dept. of Biomedical Engineering, Worcester Polytechnic Institute, 9/2013-8/2014
- Developing novel Conductive Carbon Black and Polydimethylsiloxane ECG Electrode for underwater.
 - Developing hardware (circuit design, firmware) for ECG, EDA, and activity monitoring system.
- Graduate Research Assistant**, Dept. of Biomedical Engineering, Yonsei University, 3/2006-8/2013
- Developing total exercise management solution based on intelligent bio-feedback system (Development of intelligent bio-feedback exercise prescription algorithm in real-time based on interactive sensor networks and clinical database technology supports).
 - Developing exercise treatment system for paraplegia person and algorithm maximum oxygen consumption using Arm-ergometer.
 - Developing training system based on intelligent evaluation of autonomic nervous system and cardiac function using ECG based on wireless body area network.
 - Developing ultra-light portable device and analysis system for monitoring of ECG and motion activity using micro-sensor.
 - Developing multi-dimensional bio-signal detection devices for home healthcare system.

RESEARCH INTERESTS

- Wearable personalized health monitoring system
- Smart healthcare system based on sensor and communication network
- Individualized/ Personalized health management system based on sports medicine

▪ **AWARDS**

- Best Paper Presentation, The Korea Society of Medical & Biological Engineering, 11/2010
- 2016 SPART Technology Commercialization Fund Awards, University of Connecticut, 11/2016

▪ **FUNDS**

Funded

- 2016 UCONN SPART Technology Commercialization Fund Awards, \$50,000
Role: Co-PI (PI: Dr. Ki Chon), 11/2016-11/2017
Waterproof Leadless Armband For Continuous Wireless Monitoring For Atrial Fibrillation
- NIH SBIR Program Phase I (Grant #: 1R43HL135961-01A1) \$224,938
Role: Was PI (Taken over to Mr. Chae Ho Cho due to my appointment at UMass) 08/2017 – 08/2018
Waterproof Leadless Armband For Continuous Wireless Monitoring For Atrial Fibrillation

▪ **GRANT DEVELOPMENT**

- Co-Researcher, “Wearable Devices for In-Home Monitoring of Patients with Heart Failure at Risk of Decompensation,” PI: Dr. Ki Chon, Funded from National Science Foundation (NSF) Grant (10/01/2015-09/30/2019).
- Co-Researcher, “Development of Flexible Carbon-Based Hydrophobic Electrodes for Skin Conductance Measurement,” PI: Dr. Ki Chon, Funded from Office of Naval Research (ONR) Grant (03/10/2015-03/09/2017).

▪ **SCHOLARLY ACCOMPLISHMENTS (An asterisk * indicates a paper written in Korean)**

A. Book/Book Chapters

1. H. Posada-Quintero, N. Reljin, Y. Noh, B. Reyes, J. Florian, K. Chon, “Carbon Black/Polydimethylsiloxane Electrodes for Underwater Cardiac Electrical Activity Collection,” *Advances in Sensors: Reviews*, Book Series, Vol. 5, International Frequency Sensor Association (IFSA), 2017. In press.
2. Y. Noh, J. Yoon, and H. Yoon, “Automated Selection of Optimal ECG Lead Using Heart Instantaneous Frequency During Sleep,” Ch. 5 in *Advanced in Electrocardiograms: Methods and Analysis*, Richard M. Millis Eds.: InTech, 2012. (DOI: 10.5772/23940).

B. Peer Reviewed Journal Articles

1. Y. Noh, Y. Bai, J. White, J. Florian, P. Brink, and K. Chon, “Effect of shallow and deep depth SCUBA diving on the dynamics of the autonomic nervous system,” *Frontiers Bioengineering*, 2017. *Submitted*.
2. S. Sinha, Y. Noh, N. Reljin, G. Treich, S. Hajeb-Mohannadalipour, Y. Guo, K. Chon, and G. Sotzing, “Screen Printed PEDOT:PSS Electrodes on Commercial Finished Textiles for Electrocardiography,” *ACS Applied Materials & Interfaces*, 2017. *Under major review*.
3. H. Posada-Quintero, R. Rood, Y. Noh, K. Burnham, J. Pennace, K. Chon, “Dry Carbon/Salt Adhesive electrodes for recording Electrodermal Activity,” *Sensors & Actuators: A. Physical*, 2016 (DOI: <https://doi.org/10.1016/j.sna.2017.02.023>).
4. D. Dao, S. M. A. Salehizadeh, Y. Noh, J. Chong, C. Cho, D. McManus, C.E. Darling, Y. Mendelson and K. H. Chon, “A Robust Motion Artifact Detection Algorithm for Accurate Detection of Heart Rates from Photoplethysmographic Signals using Time-Frequency Spectral Features,” *IEEE Journal of Biomedical and Health Informatics*, 2016 (DOI: 10.1109/JBHI.2016.2612059).
5. Y. Noh, J. Bales, B. Reyes, J. Molignano, A. Clement, G. Pins, J. Florian, and K. Chon, “Novel Conductive Carbon Black and Polydimethylsiloxane ECG Electrode: A Comparison with Commercial Electrodes in Fresh, Chlorinated, and Salt Water,” *Ann Biomed Eng*, Vol. 44, No. 8, pp. 2464-2479, 2016. (DOI: 10.1007/s10439-015-1528-8).
6. J. Yoon, Y. Noh, Y. Kwon, S. Park, and H. Yoon, “Improvement of dynamic respiration monitoring through sensor fusion of accelerometer and gyro-sensor,” *Journal of Electrical Engineering & Technology*, Vol. 9, No. 1, pp. 334-343, 2014. (DOI: 10.5370/JEET.2014.9.1.334).

7. M. Sim, M. Kim, C. Yoon, J. Chung, Y. Noh, S. Park and H. Yoon, "Preceding research for estimating the maximal fat oxidation point through heart rate and heart rate variability," *The Transactions of KIEE*, Vol. 61, No. 9, pp. 1221-1225, 2012. (DOI: 10.5370/KIEE.2012.61.9.1340).
8. U. Yoon, Y. Noh, and H. Yoon, "Optimization Methods for Improving the Performance of Heart Rate Detection by a Wearable ECG System During High-intensity Exercise," *Biomed Eng Lett*, Vol.1, No. 2, pp. 143-150, 2011. (DOI: 10.1007/s13534-011-0023-x).
9. Hwang, Y. Noh, I. Jeong, and H. Yoon, "Optimized Exercise Load Control System Based on Heart Rate Variability," *Biomed Eng Lett*, Vol.1, No. 4, pp. 232-238, 2011. (DOI: 10.1007/s13534-011-0037-4).
10. *E. Kim, Y. Noh, K. Seo, S. Park, and H. Yoon, "The Novel Method of Segmental Bio-Impedance Measurement Based on Multi-Frequency for a Prediction of Risk Factors Life-Style Disease of Obesity," *J. Biomed. Eng. Res*, Vol. 31, pp. 375-384, 2010. (DOI: 10.9718/JBER.2010.31.6.375).
11. *T. Lim, K. Seo, I. Jeong, S. Jun, Y. Noh, E. Kim, and H. Yoon, "Novel Impedance Method for Analyzing Truncal Obesity," *The Transactions of KIEE*, Vol.58, No. 4, pp. 849-856, 2009.
12. Y. Noh, S. Park, S. Park, and H. Yoon, "Design of Real-Time Autonomic Nervous System Evaluation System Using Heart Instantaneous Frequency," *Journal of Electrical Engineering & Technology*, Vol. 3, No. 4, pp. 576-583, 2008. (DOI: 10.5370/JEET.2008.3.4.576).
13. S. Park, Y. Noh, S. Park, and H. Yoon, "An improved algorithm for respiration signal extraction from electrocardiogram measured by conductive textile electrodes using instantaneous frequency estimation," *Med Bio Eng Comput*, Vol. 46, pp. 147-158, 2008. (DOI: 10.1007/s11517-007-0302-y).

C. Conference Proceedings (oral presentations) († indicates an oral presentation in person)

1. H. Posada-Quintero, R. Rood, Y. Noh, K. Burnham, J. Pennace, K. Chon, "Novel Dry Electrodes for Recording Electrodermal Activity," in proceedings of 38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC'16), Boston, MA, USA, Aug. 16-20, 2016.
2. S. Salehizadeh, Y. Noh, and K. Chon, "Heart Rate Monitoring in Electrocardiogram Wearable Devices during Intense Physical Activities using A Motion Artifact Corrupted Signal Reconstruction Algorithm," The first IEEE Conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE 2016), Washington DC, USA, Jun. 27-29, 2016.
3. †Y. Noh, J. Bales, B. Reyes, J. Chong, and K. Chon, "Examination of The Novel CB/PDMS Electrode for ECG Monitoring Under Chlorine Water," ACSM 62nd Annual Meeting, Medicine and Science in Sports and Exercise, Vol. 47:5 Supplement, San Diego, CA, USA, May 26-30, 2015.
4. Y. Kwon, Y. Noh, J. Yoon, S. Park, and H. Yoon, "A Novel Approach to Classify Human motion in Smart Phone using 2D-projection Method," 10th IASTED International Conference on Biomedical Engineering (BioMed 2013), Innsbruck, Feb. 13-15, 2013. (DOI: 10.2316/P.2013.791-049).
5. †Y. Noh, Y. Han, U. Yoon, I. Hwang, J. Jung, I. Jeong, and H. Yoon, "Development of Sports Health Care System Suitable to the Fitness Club Environment," in 2010 IEEE EMBS Conference on Biomedical Engineering and Sciences (IECBES), pp. 93-96, Kuala Lumpur, Malaysia, Nov. 30-Dec. 2, 2010. (DOI: 10.1109/IECBES.2010.5742206).
6. J. Jung, Y. Noh, Y. Han, U. Yoon, I. Hwang, I. Jeong, and H. Yoon, "A Preliminary Study on Autonomic Nervous System Assessment during Aerobic Exercise using TEMPV," in 2010 IEEE EMBS Conference on Biomedical Engineering and Sciences (IECBES), pp. 261-264, Kuala Lumpur, Malaysia, Nov. 30-Dec. 2, 2010. (DOI: 10.1109/IECBES.2010.5742240).
7. U. Yoon, Y. Noh, Y. Han, M. Kim, J. Jung, I. Hwang, I. Jeong, and H. Yoon, "Electrocardiogram Signal Processing Method for Exact Heart Rate Detection in Physical Activity Monitoring System: Wavelet approach," in 2010 IEEE EMBS Conference on Biomedical Engineering and Sciences (IECBES), pp. 232-235, Kuala Lumpur, Malaysia, Nov. 30-Dec. 2, 2010. (DOI: 10.1109/IECBES.2010.5742234).
8. †Y. Noh, S. Park, S. Park, and H. Yoon, "Monitoring of Respiratory Frequency using Heart Instantaneous Frequency during Sleep," in u-Healthcare 2010: 7th International conference on ubiquitous healthcare, Jeju, South Korea, Oct. 28-30, 2010.
9. U. Yoon, I. Hwang, Y. Noh, I. Jeong, and H. Yoon, "Comparison of CWT with DWT for Detecting QRS Complex on Wearable ECG Recorder," in Wavelet Analysis and Pattern Recognition (ICWAPR), 2010

International Conference on, pp. 300-303, Qingdao, China, Jul. 11-14, 2010. (DOI: 10.1109/ICWAPR.2010.5576361).

10. †Y. Noh, S. Park, S. Park, and H. Yoon, "A Novel Approach to Classify Significant ECG Data Based on Heart Instantaneous Frequency and ECG-derived Respiration using Conductive Textiles," in proceedings of 29th annual conference of IEEE Engineering in Medicine and Biology Society, pp. 1503-1506, Lyon, France, Aug.22-26, 2007. (DOI: 10.1109/IEMBS.2007.4352586).

D. Conference Proceedings (Poster presentations)

1. Y. Noh, S. Sinha, S. Hajeb-Mohammadalipour, G. Treich, G. Sotzing, and K. Chon, "Conducting Synthetic Fabric Sensor Screen-Printed on Compression Shirt: ECG and Heart rate Monitoring during exercise," ACSM 64th Annual Meeting, Medicine and Science in Sports and Exercise. Submitted.
2. S. Sinha, Y. Noh, G. Treich, S. Hajeb-Mohammadalipour, K. Chon, and G. Sotzing, "Continuous electrocardiogram (ECG) measurement via optimization of electrochemical state of a conductive polymer on fabric," 253rd ACS (American Chemical Society) National Meeting in San Francisco, CA, 2016. Accepted.
3. Y. Noh, C. Cho, S. Salehizadeh, B. Reyes, J. Bales, and K. Chon, "A Novel CB/PDMS Electrode for ECG Monitoring during Swimming," ACSM 63rd Annual Meeting, Medicine and Science in Sports and Exercise, Vol. 48:5 Supplement, 2016.
4. Y. Noh, and H. Yoon, "Monitoring of Thermoregulatory Response during Regular Intermediate-Intensity Exercise by using Variations in Trunk Skin Temperature," ACSM 61st Annual Meeting, Medicine and Science in Sports and Exercise, Vol. 46:5 Supplement, 2014.
5. Y. Noh, Y. Kwon, J. Lee, J. Yoon, H. Yoon, "Classifying Physical Activity Patterns with a Smart Phone Accelerometer," ACSM 60th Annual Meeting, Medicine and Science in Sports and Exercise, Vol. 45:5 Supplement, 2013.
6. *J. Yoon, S. Chang, Y. Noh, Y. Kwon and H. Yoon, "The Development of a Fuzzy-based Activity Classification Algorithm to Improve the Accuracy of a Wrist-worn Calorimeter," in Conference of The Korean Society of Medical & Biological Engineering, Vol. 46, Nov 2012.
7. *Y. Kwon, Y. Noh, J. Yoon and H. Yoon, "Preprocessing Techniques for Gait Speed Recognition from Acceleration Data," in Conference of The Korean Society of Medical & Biological Engineering, Vol. 46, Nov 2012.
8. *J. Yoon, Y. Noh, Y. Han, Y. Kwon and H. Yoon, "Improvement of Accuracy for Energy Expenditure Estimation based on Accelerometer and heart rate in Period of Recovery," in Conference of The Korean Society of Medical & Biological Engineering, Vol. 45, May 2012.
9. *Y. Han, Y. Noh, J. Jung, J. Yoon and H. Yoon, "The Pattern Classification of Exercise Intensity using the RR Interval and the Standard Deviation for RR Interval," in Conference of The Korean Society of Medical & Biological Engineering, Vol. 43, May 2011.
10. *S. Yoo, Y. Noh, Y. Nam and H. Yoon, "Development of the Total Exercise Management System Based on Intelligent Bio-feedback," in Conference of the Korean Institute of Information Scientists and Engineers, Vol. 38(1B), 2011.
11. *J. Jung, Y. Noh, Y. Han, J. Yoon and H. Yoon, "A Preliminary Study on Trunk Skin Temperature Measurement during Treadmill Exercise," in Conference of The Korean Society of Medical & Biological Engineering, Vol. 43, May 2011.
12. *I. Hwang, Y. Noh, U. Yoon, J. Jung, Y. Han, I. Jeong and H. Yoon, "Design of a MISO PID Controller for Real-Time Biofeedback Exercise System," in Conference of The Korean Society of Medical & Biological Engineering, Vol. 42, Nov 2010.
13. *Y. Han, Y. Noh, J. Jung, I. Hwang, U. Yoon, I. Jeong and H. Yoon, "Real-Time Bio-signal Monitoring System using Android-based Smartphone," in Conference of The Korean Society of Medical & Biological Engineering, Vol. 42, Nov 2010.
14. *U. Yoon, J. Jung, Y. Han, I. Hwang, Y. Noh, I. Jeong and H. Yoon, "The Variation of ECG Signal RMS Value on Various Skin Moisture using Textile Electrode," in Conference of The Korean Society of Medical & Biological Engineering, Vol. 41, May 2010.

15. *Y. Noh, I. Hwang, J. Jung, Y. Han, U. Yoon and H. Yoon, "Measurement of Aerobic Exercise Capacity by Cardiac Output based on Pressure Recording Analytical Method (PRAM)," in Conference of The Korean Society of Medical & Biological Engineering, Vol. 41, May 2010.
16. *U. Yoon, Y. Noh, I. Hwang, J. Jung, Y. Han, I. Jeong and H. Yoon, "To Detect ECG using Wearable Sensor and Cancelling Noise using Wavelet during Exercise," in Conference of The Korean Society of Medical & Biological Engineering, Vol. 40, Nov 2009.
17. *I. Hwang, J. Jung, Y. Noh, U. Yoon, Y. Han, I. Jeong and H. Yoon, "Development of Real-Time Biofeedback Exercise Prescription System using PID," in Conference of The Korean Society of Medical & Biological Engineering, Vol. 40, Nov 2009.
18. *Y. Noh, Y. Han, U. Yoon, I. Hwang, J. Jung, I. Jeong and H. Yoon, "Consideration from Parameters based on Age for Estimation of Maximal Heart Rate," in Conference of The Korean Society of Medical & Biological Engineering, Vol. 40, Nov 2009.
19. *H. Shim, Y. Noh, S. Lee, H. Yoon and Y. Yoon, "The Management System for Emergency Holter ECG Data," in Conference of The Korean Society of Medical & Biological Engineering, Vol. 38, Nov 2008.
20. *S. Jung, W. Choi, Y. Noh, I. Jeong and H. Yoon, "A Treadmill Control using Standard Deviation of Heart Rate Variability," in Conference of The Korean Society of Medical & Biological Engineering, Vol. 36, Nov 2007.
21. *S. Park, Y. Noh, S. Park and H. Yoon, "Analysis of Heart Instantaneous Frequency using PPG Signal and Correlation with Heart Rate Variability," in Conference of The Korean Society of Medical & Biological Engineering, Vol. 36, Nov 2007.
22. *Y. Noh, S. Park, S. Park and H. Yoon, "A Study of ECG Measurement in Treadmill and Transmission using Chirp Spread Spectrum (CSS) Method," in Conference of The Korean Society of Medical & Biological Engineering, Vol. 34, Nov 2006.
23. Y. Noh, S. Park, K. Hong, Y. Yoon, and H. Yoon, "A Study of Significant Data Classification between EDR Extracted and Frequency Analysis of Heart Rate Variability from ECG using Conductive Textile," in World Congress of Medical Physics and Biomedical Engineering (WC 2006), pp.3958-3961, 2006.

▪ **PATENTS**

1. S. M. A. Salehizadeh, K. H. Chon and Y. Noh, "Method And Apparatus For Heart Rate Monitoring Using An Electrocardiogram Sensor," Application No. 15/178,218 (Jun. 9. 2016), USA.
2. S. M. A. Salehizadeh, K. H. Chon and Y. Noh, "Method And Apparatus For Removing Motion Artifacts From Biomedical Signals," Application No. 15/178,089 (Jun. 9. 2016), USA.
3. J. Jang, Y. Lee, I. Kong, Y. Noh, I. Kwon, H. Yoon, "System and Method for Monitoring Paraplegia Patient's Heart Rate," Registration No. 1015610890000 (Oct. 12. 2015), South Korea
4. H. Yoon, I. Hwang, Y. Noh, J. Jung, U. Yoon, S. Cho, H. Kim, J. Lee, I. Jeong, K. Lee, Y. Han, "Automatic Control System of Sport Apparatus by User's Condition," Registration No. 1013555060000 (Jan. 20. 2014), South Korea.
5. H. Yoon, T. Shin, T. Kim, W. Choi, J. Jung, Y. Han, J. Yoon, Y. Noh, S. Cho, J. Lee, I. Jeong, K. Lee, S. Jung, U. Jeong, "Novel Method to Detect Ventilatory-Threshold in Real-Time," registration No. 1013335110000 (Nov. 21. 2013), South Korea.
6. H. Kim, H. Yoon, Y. Noh, U. Yoon, I. Hwang, J. Jung, S. Cho, I. Jeong, J. Lee, K. Lee, T. Shin, T. Kim, W. Choi, "Method of Exercise Prescription," Registration No. 1013013050000 (Aug. 22. 2013), South Korea.
7. H. Yoon, Y. Noh, U. Yoon, I. Hwang, J. Jung, S. Cho, I. Jeong, J. Lee, K. Lee, "Bio-Signal Measurement Unit of Exercise Prescription System," Registration No. 1012039020000 (Nov. 16. 2012), South Korea.
8. H. Yoon, K. Seo, K. Nam, S. Jun, I. Jeong, Y. Noh, J. Ko, "Bio-Signal Measurement Device of Mouse Type," Registration No. 1010428270000 (Jun. 13. 2011), South Korea.

▪ **PROFESSIONAL MEMBERSHIPS**

- ACSM (Americans College of Sports Medicine) 2/2013–present
- AAAS (American Association for the Advancement of Science) 10/2014–present

- IEEE (Institute of Electrical and Electronics Engineers)
- IEEE Engineering in Medicine and Biology Society

3/2016–present
3/2016–present