Dong Han (Cassey)

dong.han@uconn.edu | linkedin.com/in/dong-han-a76641113 | github.com/Cassey2016 | Google Scholar

Education

University of Connecticut — Storrs, CT, US
Ph.D. Candidate — *Aug. 2016 – Now (Graduate expected in May, 2023)*

Beijing Jiaotong University — Beijing, China
Bachelor of Science — *Aug. 2012 – June 2016*

Professional Experience - Academic

Graduate Assistant (Research Assistant) — Aug. 2016 – Present
University of Connecticut — *Storrs, CT*

- Developing real-time heuristic and post-hoc machine learning/Deep Learning algorithms for atrial fibrillation (AF) detection using smartwatch (*Samsung Simband, Samsung Gear S3, Samsung Galaxy Watch, and Samsung Galaxy Watch 3*) photoplethysmography (PPG) data | *MATLAB, Python*
- Coordinating a clinical trial (ID: NCT03761394) funded by National Institute of Health (NIH) R01 grant (ID: 5R01HL137734-04) using smartwatch for long-term AF monitoring with *University of Massachusetts Medical School* (UMMC)
- Improved automatic channel selection algorithm for multi-channel electrocardiogram (ECG) armband

Graduate Assistant (Teaching Assistant) — Aug. 2016 – May. 2017
University of Connecticut — *Storrs, CT*

- BME4900: Biomedical Engineering Senior Design (Fall 2016)
- BME4500: Bioinstrumentation (Fall 2016)
- BME3900: Biomedical Engineering Junior Design (Spring 2017)

Department Website Administrator — Aug. 2018 – Present
University of Connecticut — *Storrs, CT*

- Performed daily maintenance of department and lab website, collected news pictures, and edited video recordings of virtual open house | *WordPress, HTML/CSS*

Professional Experience - Industry

Algorithm Developer and Coordinator of Smartwatch Project — May 2019 – Present
University of Connecticut — *Storrs, CT, US*

- Involving in the storyboard design, user-interface design, and the design of smartwatch service program for modulated PPG sensor on Tizen watches (*Samsung Gear S3, Samsung Galaxy Watch, Samsung Galaxy Watch 3*) used in long-term (30-day) AF monitoring clinical trial (ID: NCT03761394) | *Tizen Studio, Android Studio*
- Communicating the user demand of UMMC team with our hardware engineer, software engineers, and user-interface designers
- Debugging the embedded algorithms on the watch for our AF monitoring algorithms with software engineer | *Git*
- Testing smartwatch and smartphone APPs for real-time watch-to-phone and phone-to-cloud data transmission and long-term wearing stability
- Organizing cloud storage of Linux server for transmitted smartphone data | *Unix*
- Organizing smartwatch and smartphones after experiments for UMMC

Patents

- Ki H. Chon, **Dong Han**, Syed Khairul Bashar, and Fahimeh Mohagheghian, Heart Condition Treatment and Analysis, *US Patent*, Patent Number: US20220022765A1, Application No.: US17364684, Filed Date: 06/30/2021, Issue Date: 01/27/2022.

Publications

Book Chapters

[1] K. H. Chon, **D. Han**, F. Mohagheghian, "Recent advances involving hardware and algorithmic approaches to combat motion artifacts in photoplethysmographic data", *Encyclopedia of Sensors and Biosensors, (accepted for publication)* (July 2021).

Journal Articles

[2] E. Y. Ding, D. Lessard, Z. Wang, E. Dickson, D. DiMezza, **D. Han**, F. Mohagheghian, A. Peitzsch, K. H. Chon, D. D. McManus, "Usability of a smartwatch for atrial fibrillation detection in older adults after stroke", Accepted by CVDHJ (2022).

[3] E. Y. Ding, D. Lessard, Z. Wang, E. Dickson, D. DiMezza, **D. Han**, F. Mohagheghian, K. H. Chon, D. D. McManus, "Accuracy, usability, and adherence of smartwatches for atrial fibrillation detection in older adults after stroke", Under Preparation, Plan to Submit to Circulation (2022).

[4] **D. Han**, S. K. Bashar, J. Lázaro, F. Mohagheghian, A. Peitzsch, N. Nishita, E. Ding, E. L. Dickson, D. DiMezza, J. Scott, C. Whitcomb, T. P. Fitzgibbons, D. D. McManus, K. H. Chon, "A Real-Time PPG Peak Detection Method for Accurate Determination of Heart Rate during Sinus Rhythm and Cardiac Arrhythmia", Biosensors **12**, 82 (2022) 10.3390/bios12020082.

[5] **D. Han**, C. Chaeho, J. Haewook, D. Eric, E. Dickson, D. DiMezza, F. Mohagheghian, A. Peitzsch, D. McManus, K. H. Chon, "Design and Implementation of Smartphone and Smartwatch Applications for Long-term Paroxysmal Atrial Fibrillation Monitoring after Stroke", Under Preparation, Plan to Submit to JMIR mHealth and uHealth (2022).

[6] F. Mohagheghian, **D. Han**, E. Y. Ding, E. Dickson, D. DiMezza, J. Scott, A. Peitzsch, J. Saczynski, M. Moonis, T. P. Fitzgibbons, B. Barton, K. H. Chon, D. D. McManus, "An Autoencoder Denoising Method on Smartwatch Photoplethysmograph Data for Accurate Atrial Fibrillation Detection", Under Preparation (2022).

[7] F. Mohagheghian, **D. Han**, E. Y. Ding, E. Dickson, D. DiMezza, J. Scott, A. Peitzsch, J. Saczynski, M. Moonis, T. P. Fitzgibbons, B. Barton, K. H. Chon, D. D. McManus, "Optimized Signal Quality Assessment for Photoplethysmogram Signals using Feature Selection", Accepted by IEEE TBME (2022).

[8] F. Mohagheghian, **D. Han**, E. Y. Ding, E. Dickson, D. DiMezza, J. Scott, A. Peitzsch, J. Saczynski, M. Moonis, T. P. Fitzgibbons, B. Barton, D. D. McManus, K. H. Chon, "Novel Atrial Fibrillation Detection Methods using Deep Neural Network and Autoencoder on Smartwatch Photoplethysmography Data", Under Preparation (2022).

[9] E. L. Dickson, E. Y. Ding, J. S. Saczynski, **D. Han**, M. Moonis, T. P. Fitzgibbons, B. Barton, K. Chon, D. D. McManus, "Smartwatch Monitoring for Atrial Fibrillation After Stroke – The Pulsewatch Study: Protocol for a Multi-Phase Randomized Controlled Trial", Cardiovascular Digital Health Journal **0**, 10.1016/j.cvdhj.2021.07.002 (2021) 10.1016/j.cvdhj.2021.07.002.

[10] **D. Han**, F. Mohagheghian, E. Y. Ding, A. Peitzsch, D. D. McManus, K. H. Chon, "Premature Atrial and Ventricular Contraction Detection using Density Poincare Plot and Deep Neural Network", Under Preparation (2021).

[11] **D. Han**, B. Syed, J. Lazaro, E. Ding, C. Whitcomb, D. McManus, K. Chon, "A PPG Peak Detection Method for Accurate Determination of Heart Rate during Sinus Rhythm and Cardiac Arrhythmia", In Progress (2021).

[12] S. Bashar, **D. Han**, Z. Fearass, E. Ding, T. Fitzgibbons, A. Walkey, D. McManus, B. Javidi, K. Chon, "Novel Density Poincare Plot Based Machine Learning Method to Detect Atrial Fibrillation from Premature Atrial/Ventricular Contractions", IEEE Transactions on Biomedical Engineering, 1–1 (2020) 10.1109/TBME.2020.3004310.

[13] **D. Han**, S. K. Bashar, F. Mohagheghian, E. Ding, C. Whitcomb, D. D. McManus, K. H. Chon, "Premature Atrial and Ventricular Contraction Detection using Photoplethysmographic Data from a Smartwatch", Sensors **20**, 5683 (2020) 10.3390/s20195683.

[14] S. K. Bashar, **D. Han**, S. Hajeb-Mohammadalipour, E. Ding, C. Whitcomb, D. D. McManus, K. H. Chon, "Atrial Fibrillation Detection from Wrist Photoplethysmography Signals Using Smartwatches", Scientific Reports **9**, 15054 (2019) 10.1038/s41598-019-49092-2.

[15] E. Y. Ding, **D. Han**, C. Whitcomb, S. K. Bashar, O. Adaramola, A. Soni, J. Saczynski, T. P. Fitzgibbons, M. Moonis, S. A. Lubitz, D. Lessard, M. T. Hills, B. Barton, K. Chon, D. D. McManus, "Accuracy and Usability of a Novel Algorithm for Detection of Irregular Pulse Using a Smartwatch Among Older Adults: Observational Study", JMIR Cardio **3**, 10.2196/13850 (2019) 10.2196/13850.

Conference Proceedings

[16] E. Y. Ding, **D. Han**, E. Dickson, D. DiMezza, J. Scott, F. Mohagheghian, A. Peitzsch, J. Saczynski, M. Moonis, T. P. Fitzgibbons, B. Barton, K. H. Chon, D. D. McManus, "Accuracy, Usability, And Adherence Of Smartwatches For Atrial Fibrillation Detection In Older Adults After Stroke", American Heart Association Scientific Sessions 2021 (Nov. 2021).

[17] **D. Han**, F. Mohagheghian, A. Peitzsch, K. H. Chon, "Challenges of Atrial Fibrillation Detection Using Smartwatches", Conference IEEE BHI-BSN2021 IEEE-EMBS International Conference on Biomedical and Health Informatics (BHI'21) Jointly Organised with the 17th IEEE-EMBS International Conference on Wearable and Implantable Body Sensor Networks (BSN'21) (July 2021).

[18] S. K. Bashar, **D. Han**, F. Zieneddin, E. Ding, A. J. Walkey, D. D. McManus, K. H. Chon, "Preliminary Results on Density Poincare Plot Based Atrial Fibrillation Detection from Premature Atrial/Ventricular Contractions*", 2020 42nd Annual International Conference of the IEEE Engineering in Medicine Biology Society (EMBC) (July 2020), pp. 2594–2597, 10.1109/EMBC44109.2020.9175216.

[19] **D. Han**, S. K. Bashar, F. Zieneddin, E. Ding, C. Whitcomb, D. D. McManus, K. H. Chon, "Digital Image Processing Features of Smartwatch Photoplethysmography for Cardiac Arrhythmia Detection", 2020 42nd Annual International Conference of the IEEE Engineering in Medicine Biology Society (EMBC) (July 20–24, 2020), pp. 4071–4074, 10.1109/EMBC44109.2020.9176142.

[20] S. K. Bashar, **D. Han**, E. Ding, C. Whitcomb, D. D. McManus, K. H. Chon, "Smartwatch Based Atrial Fibrillation Detection from Photoplethysmography Signals*", 2019 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC) (July 2019), pp. 4306–4309, 10.1109/EMBC.2019.8856928.

[21] **D. Han**, S. K. Bashar, J. Lazaro, E. Ding, C. Whitcomb, D. D. McManus, K. H. Chon, "Smartwatch PPG Peak Detection Method for Sinus Rhythm and Cardiac Arrhythmia", 2019 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC) (July 2019), pp. 4310–4313, 10.1109/EMBC.2019.8857325.

[22] S. K. Bashar, **D. Han**, A. Soni, D. D. McManus, K. H. Chon, "Developing a novel noise artifact detection algorithm for smartphone PPG signals: Preliminary results", 2018 IEEE EMBS International Conference on Biomedical Health Informatics (BHI) (Mar. 2018), pp. 79–82, 10.1109/BHI.2018.8333374.

[23] E. Ding, D. Liu, A. Soni, O. Adaramola, **D. Han**, S. K. Bashar, Y. Noh, K. H. Chon, D. D. McManus, "Impressions of Older Patients with Cardiovascular Diseases to Smart Devices for Heart Rhythm Monitoring", 2017 IEEE/ACM International Conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE) (July 2017), pp. 270–271, 10.1109/CHASE.2017.97.

Professional Membership

Student Member: Institute of Electrical and Electronics Engineers, IEEE (since 2016)
Student Member: IEEE Engineering in Medicine and Biology Society, EMBS (since 2016)

Programming Skills

Natively fluent: MATLAB
Conversationally fluent: Python, Git, LaTeX(with Overleaf)
Tourist: High Performance Computing (HPC), Java, Android Studio, Tizen Studio, C, C++, WordPress, HTML/CSS, Unix