# **2019 IEEE Healthcare Innovations and Point of Care Technologies (HI-POCT 2019)**

Bethesda, Maryland, USA 20 – 22 November 2019



**IEEE Catalog Number: CFP19AMA-POD ISBN**:

978-1-7281-3813-8

### Copyright © 2019 by the Institute of Electrical and Electronics Engineers, Inc. All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

IEEE Catalog Number:CFP19AMA-PODISBN (Print-On-Demand):978-1-7281-3813-8ISBN (Online):978-1-7281-3812-1

#### **Additional Copies of This Publication Are Available From:**

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA Phone: (845) 758-0400

Fax: (845) 758-2633

E-mail: curran@proceedings.com Web: www.proceedings.com



## **Program in Chronological Order**

(Copyrighted Papers)

\* Author Name - Corresponding Author • \* Following Paper Title - Paper not Available

### Wednesday, November 20, 2019

A1P-B: 12:15-14:15  Health and Wellness Across the Lifespan 1 (Poster)	Upper Foyer Balcony
12:15-14:15  Scoring System for Conditioning and Wellness Assessment in Athletic Population  Babak Moatamed*, Sajad Darabi, Majid Sarrafzadeh  University of California, Los Angeles, United States	Poster 1 1-4
12:15-14:15  Motion and Noise Artifact Detection in Smartphone Photoplethysmograph Signals using Personalized Classifier  Fatemehsadat Tabei*, Behnam Askarian, Jo Woon Chong  Texas Tech University, United States	Poster 3 5-8
12:15-14:15  Facial Expression-Based Emotion Classification using Electrocardiogram and Respiration Dilranjan S. Wickramasuriya <sup>1</sup> , Mikayla K. Tessmer <sup>2</sup> , Rose T. Faghih* <sup>1</sup> **University of Houston, United States; **Missouri University of Science and Technology, United States	Poster 5 Signals 9-12
12:15-14:15  Emotion Recognition by Point Process Characterization of Heartbeat Dynamics  Akshay Sujatha Ravindran, Sho Nakagome, Dilranjan S. Wickramasuriya, Jose L. Contreras-Vidal,  University of Houston, United States	
12:15-14:15  Development of an Extensible, Wireless Framework for Personalized Muscle Rehabilitation Angad Jasuja* <sup>1,2</sup> , Varan Gupta <sup>4,5</sup> , NS Sreenivasalu <sup>5</sup> , Mary Liu <sup>2</sup> , John Monz <sup>2</sup> , Jagatpreet Singh Nir <sup>3</sup> , Shalender Bhasin <sup>1</sup> **Harvard Medical School, United States; **Weston High School, United States; **Northeastern University, United States; **FPT LLC, NeurlOT Technologies LLP, India; **Indian Institute of Technology Delhi, India**	
12:15-14:15  Deep Learning of Biomechanical Dynamics in Mobile Daily Activity and Fall Risk Monitorin Qingxue Zhang* Indiana University-Purdue University at Indianapolis, United States	Poster 11 <b>g</b> 21-24
12:15-14:15  Get Up!: Assessing Postural Activity and Transitions using Bi-Directional Gated Recurrent Units (Bi-GRUs) on Smartphone Motion Data  Kavin Chandrasekaran*, Luke Buquicchio, Walter Gerych, Emmanuel Agu, Elke Rundensteiner  Worcester Polytechnic Institute, United States	

A1P-C: 12:15-14:15  Monitoring Chronic Disease and Response to Treatment 1 (Poster)	Upper Foyer Balcony
12:15-14:15	Poster 21
Automatic Diagnosis by Compact Portable Ultrasound Robot: State Estimation of	
Internal Organs with Steady-State Kalman Filter  Yudai Sasaki* <sup>1</sup> , Fumio Eura <sup>1</sup> , Kento Kobayashi <sup>1</sup> , Ryosuke Kondo <sup>1</sup> , Kyohei Tomita <sup>1</sup> , Yu Nishiyama	29-32
Yudai Sasaki*, Fumio Eura', Kento Kobayashi', Ryosuke Kondo', Kyohei Tomita', Yu Nishiyama Hiroyuki Tsukihara <sup>2</sup> , Naoki Matsumoto <sup>3</sup> , Norihiro Koizumi <sup>1</sup>	,
<sup>1</sup> University of Electro-Communications, Japan; <sup>2</sup> The University of Tokyo, Japan; <sup>3</sup> Nihon University, Japan	
12:15-14:15	Poster 23
Acoustic Assessment of Treatment Response for Children with Acute Asthma Exacerbation	33-36
Adam Rao <sup>1</sup> , Grant Pemberton <sup>2</sup> , Sean Rubin* <sup>3</sup> , Elizabeth Wu <sup>4</sup> , Aaron Kornblith <sup>1</sup> <sup>1</sup> University of California, San Francisco, United States; <sup>2</sup> University of California, Berkeley, United States; <sup>3</sup> Touro University United States; <sup>4</sup> Johns Hopkins University, United States	r California,
12:15-14:15	Poster 25
Integrated Point-of-Care Device for Anemia Detection and Hemoglobin Variant Identification	37-40
Ran An, Muhammad Noman Hasan, Yuncheng Man, Umut A. Gurkan* Case Western Reserve University, United States	
12:15-14:15	Poster 27
Nighttime Sleep Duration Prediction for Inpatient Rehabilitation using Similar Actigraphy Sec	<b>Juences</b> 41-44
Allison Fellger* <sup>1</sup> , Gina Sprint <sup>1</sup> , Alexa Andrews <sup>1</sup> , Douglas Weeks <sup>2</sup> , Elena Crooks <sup>3</sup> <sup>1</sup> Gonzaga University, United States; <sup>2</sup> St. Luke's Rehabilitation Institute, United States; <sup>3</sup> Eastern Washington University, Un	nited States
12:15-14:15	Poster 29
Portable and Wearable Device for Microwave Head Diagnostic Systems	45-48
Imran Saied*, Syed Ali Akbar Hussainy University of Edinburgh, United Kingdom	
12:15-14:15	Poster 31
Gaze-Based Video Games for Assessment of Attention Outside of the Lab  Joseph Snider <sup>1</sup> , Leanne Chukoskie* <sup>2</sup> <sup>1</sup> BrainLeap Technologies, United States; <sup>2</sup> University of California, San Diego, United States	49-52
A1P-D: 12:15-14:15 Infectious Disease Diagnostics and Anti Microbial Resistance 1 (Poster)	Upper Foyer Balcony
12:15-14:15 Smartphone-Based Method for Detecting Periodontal Disease	Poster 41
Behnam Askarian*, Fatemehsadat Tabei, Grace Anne Tipton, Jo Woon Chong Texas Tech University, United States	33-33
A1P-E: 12:15-14:15	Upper Foyer Balcony
Early Detection of Disease or Toxicity 1 (Poster)	
12:15-14:15	Poster 47
Predicting Dementia Risk using Paralinguistic and Memory Test Features with	
Machine Learning Models  Yilun You <sup>1</sup> , Beena Ahmed* <sup>1</sup> , Polly Barr <sup>2</sup> , Kirrie Ballard <sup>2</sup> , Michael Valenzuela <sup>2</sup>	56-59
Yilun You', Beena Ahmed*', Polly Barr <sup>-</sup> , Kirrie Ballard <sup>-</sup> , Michael Valenzuela <sup>-</sup> 1 University of New South Wales, Australia; 2 University of Sydney, Australia	
12:15-14:15	Poster 49
Novel Keratoconus Detection Method using Smartphone Behnam Askarian*, Fatemehsadat Tabei, Grace Anne Tipton, Jo Woon Chong Texas Tech University, United States	60-62
12:15-14:15	Poster 51
A Novel Nanoscale Electrode for Biosensing  Alperen Guver <sup>1</sup> , Peker Milas <sup>1</sup> , Michael Guy <sup>1</sup> , Mustafa T. Sigindere <sup>1,3</sup> , Mehmet V. Yigit <sup>2</sup> , Birol Oztu	63-66
Alperen Guver <sup>-</sup> , Peker Milas <sup>-</sup> , Michael Guy <sup>-</sup> , Mustafa T. Sigindere <sup>-</sup> , Menmet V. Yigit <sup>-</sup> , Birol Oztu <sup>1</sup> Morgan State University, United States; <sup>2</sup> State University of New York at Albany, United States; <sup>3</sup> University of Maryland Baltimore County, United States	IK

12:15-14:15  Non-Invasive Screening Tool to Detect Anemia  A.A. Ajmal* <sup>1</sup> , S. Shankarnath <sup>1</sup> , Mohamed Athif <sup>2</sup> , E.H. Jayatunga <sup>1</sup> <sup>1</sup> University of Ruhuna, Sri Lanka; <sup>2</sup> Boston University, United States	Poster 53 67-70
12:15-14:15  Prototyping and Initial Feasibility Study of Palpation Display Apparatus using Granular Jamming	Poster 55 71-74
12:15-14:15 Effects of Relative Humidity, Temperature, and Geometry on Fluid Flow Rate in Lateral Flow Immunoassays	Poster 57
Nipun Thamatam, Jennifer Blain Christen*  Arizona State University, United States	
12:15-14:15  Colorimetric Point-of-Care Human Papillomavirus Diagnostic Reader  Ryan Flores <sup>1</sup> , Sahra Afshari <sup>2</sup> , Jennifer Blain Christen* <sup>2</sup> <sup>1</sup> Mesa Community College, United States; <sup>2</sup> Arizona State University, United States	Poster 59 80-82
12:15-14:15  A Portable Colorimetric Reader for Early and Rapid Diagnosis of Sepsis  Malay Ilesh Shah* <sup>1</sup> , Jayaraj Joseph <sup>1</sup> , Richa Kedia <sup>2</sup> , Shalini Gupta <sup>2</sup> , Venkataraman Sritharan <sup>3</sup> <sup>1</sup> Indian Institute of Technology Madras, India; <sup>2</sup> Indian Institute of Technology Delhi, India; <sup>3</sup> NanoDx Healthcare Pvt. Ltd, India	Poster 61 83-86
Thursday, November 21, 2019	
DAD D. 40:20 44:20	
B1P-B: 12:30-14:30 Upper Foy Health and Wellness Across the Lifespan 2 (Poster)	er Balcony
	Poster 2
Health and Wellness Across the Lifespan 2 (Poster)  12:30-14:30  Daily Locomotor Movement Recognition with a Smart Insole and a Pre-Defined Route Map:  Towards Early Motor Dysfunction Detection  Rui Hua*, Ya Wang	Poster 2 87-90 Poster 6
Health and Wellness Across the Lifespan 2 (Poster)  12:30-14:30  Daily Locomotor Movement Recognition with a Smart Insole and a Pre-Defined Route Map: Towards Early Motor Dysfunction Detection Rui Hua*, Ya Wang Texas A&M University, United States  12:30-14:30  WeedGait: Unobtrusive Smartphone Sensing of Marijuana-Induced Gait Impairment by Fusing Gait Cycle Segmentation and Neural Networks Ruojun Li², Emmanuel Agu*², Ganesh Balakrishnan², Debra Herman¹, Ana Abrantes¹, Michael Stein¹, Jane Metri	Poster 2 87-90  Poster 6 91-94 ik1  Poster 8
12:30-14:30  Daily Locomotor Movement Recognition with a Smart Insole and a Pre-Defined Route Map: Towards Early Motor Dysfunction Detection Rui Hua*, Ya Wang Texas A&M University, United States  12:30-14:30  WeedGait: Unobtrusive Smartphone Sensing of Marijuana-Induced Gait Impairment by Fusing Gait Cycle Segmentation and Neural Networks Ruojun Li², Emmanuel Agu*², Ganesh Balakrishnan², Debra Herman¹, Ana Abrantes¹, Michael Stein¹, Jane Metri¹Butler Hospital, United States; ²Worcester Polytechnic Institute, United States  12:30-14:30  Machine Learning Algorithm to Predict Coronary Artery Calcification in Asymptomatic Healthy Population Kranthi Kolli*¹, Donghee Han²-³, Heidi Gransar³, Ji Hyun Lee², Su-Yeon Choi⁴, Eun Ju Chun⁴, Hae Ok Jung⁵, Jidong Sung⁶, Hae-Won Han², Sung Hak Park², James K. Min¹, Hyuk-Jae Chang² ¹Welll Cornell Medical College, United States: ²Yonsei University. South Korea: ³Cedars Sinai Medical Center, United States: ⁴Seoul	Poster 2 87-90  Poster 6 91-94 ik¹  Poster 8 95-98

B1P-C: 12:30-14:30	Upper Foyer Balcony
Monitoring Chronic Disease and Response to Treatment 2 (Poster)	
12:30-14:30	Poster 20
Robust Discrimination of Phonocardiogram Signal with Normal Heart Sounds and Murmur using a Multiscale Frequency Analysis	107-110
Divaakar Siva Baala Sundaram <sup>1</sup> , Suganti Shivaram <sup>1</sup> , Rogith Balasubramani <sup>2</sup> , Anjani Muthyala <sup>1</sup> ,	
Shivaram P. Arunachalam* <sup>1</sup> <sup>1</sup> Mayo Clinic, United States; <sup>2</sup> Velalar College of Engineering and Technology, India	
12:30-14:30	Poster 22
Point-of-Care 3D Body-Mapping for Determining Total Body Surface Area of Severely Burned Julia Loegering* <sup>1</sup> , Kevin Krause <sup>1</sup> , Jesse Ahlquist <sup>1</sup> , Kevin Webb <sup>2</sup> , Karen Xu <sup>3</sup> , Nam Tran <sup>1</sup> , David Greenhalgh <sup>1</sup> , Tina Palmieri <sup>1</sup>	
<sup>1</sup> University of California, Davis, United States; <sup>2</sup> Mayo Clinic, United States; <sup>3</sup> Indiana University School of Medicine, United	d States
12:30-14:30	Poster 24
Deep Metric Learning with Triplet Networks: Application to Hand-Grip Myotonia Quantification Lei Lin*, Beilei Xu, Wencheng Wu, Trevor Richardson, Edgar A. Bernal, Bill Martens, Charles Thornton, Chad Heatwole University of Rochester, United States	on 115-118
12:30-14:30  Smartphone based Microfluidic Biosensor for Leukocyte Quantification at the Point-of-Care Muhammad A. Sami, Kurt Wagner, Priya Parikh, Umer Hassan* Rutgers University, United States	Poster 26 119-122
12:30-14:30	Poster 28
Wearable and Stationary Point-of-Care IoT Air Pollution Sensors for	
Pediatric Asthma Research and Management Quan Dong, Baichen Li, R. Scott Downen, Nam Tran, Elizabeth Chorvinsky, Dinesh Pillai, Mona Zaghloul, Zhenyu Li* The George Washington University, United States	123-126
12:30-14:30	Poster 30
Harnessing the Power of Deep Learning Methods in Healthcare: Neonatal Pain Assessment from Crying Sound  Md Sirajus Salekin* <sup>1</sup> , Ghada Zamzmi <sup>1,2</sup> , Rahul Paul <sup>1</sup> , Dmitry Goldgof <sup>1</sup> , Rangachar Kasturi <sup>1</sup> , Thao <sup>1</sup> University of South Florida, United States; <sup>2</sup> National Institutes of Health, United States	127-130 Ho <sup>1</sup> , Yu Sun <sup>1</sup>
B1P-D: 12:30-14:30 Infectious Disease Diagnostics and Anti Microbial Resistance 2 (Poster)	Upper Foyer Balcony
12:30-14:30  Magnetic Phagocyte Quantification Framework for Point-of-Care Diagnostics  Corey B. Norton, Kurt Wagner, Umer Hassan*  Rutgers University, United States	Poster 40 131-134
12:30-14:30	Poster 42
Improved Classification of Malaria Parasite Stages with Support Vector Machine using	125 120
Combined Color and Texture Features  Md. Khayrul Bashar*  Ochanomizu University, Japan	133-136
B1P-E: 12:30-14:30 Early Detection of Disease or Toxicity 2 (Poster)	Upper Foyer Balcony
12:30-14:30  Conjugated Barcoded Particles for Multiplexed Biomarker Quantification with a Microfluidic Shreya Prakash <sup>1</sup> , Maxwell Nagarajan <sup>2</sup> , Patrick Doyle <sup>2</sup> , Rashid Bashir <sup>3</sup> , Umer Hassan* <sup>1</sup> Rutgers University, United States; Massachusetts Institute of Technology, United States;  Juniversity of Illinois Urbana-Champaign, United States	Poster 48 <b>Biochip</b> 139-142

12:30-14:30 3D Printing for Whole Blood Filters Designed for Simple Integration with a Variety of Sensor Platforms Benjamin Ingis*, Eon Soo Lee New Jersey Institute of Technology, United States	Poster 50 143-146
12:30-14:30  Performance Assessment of Machine Learning based Models for Diabetes Prediction  Ridhi Deo*, Suranjan Panigrahi  Purdue University, United States	Poster 52 147-150
12:30-14:30  Weighted Extreme Learning Machine for Dengue Detection with Class-Imbalance Classification  Wanchaloem Nadda*, Waraporn Boonchieng, Ekkarat Boonchieng  Chiang Mai University, Thailand	Poster 54 151-154
12:30-14:30 3D Printed Microfluidic Actuation System for Multi-Step Paper-Based Assays Sumeyra Agambayev, Mark Bailly, Jennifer Blain Christen* Arizona State University, United States	Poster 56 155-158
12:30-14:30  Mobile and Efficient Temperature and Humidity Control Chamber for Point-of-Care Diagnostics  Brittany Hertneky, Josh Eger, Mark Bailly, Jennifer Blain Christen*  Arizona State University, United States	Poster 58 159-162
12:30-14:30  A Motion Free Image based TRF Reader for Quantitative Immunoassay  Srinivasa Karthik*, Malay Ilesh Shah, Satheesh Natarajan, Mahesh J. Shetty, Jayaraj Joseph Indian Institute of Technology Madras, India	Poster 60 163-166