# 2023 IEEE/ACM Conference on **Connected Health: Applications, Systems and Engineering Technologies (CHASE 2023)**

Orlando, Florida, USA 21 – 23 June 2023



**IEEE Catalog Number: CFP23D42-POD ISBN**:

979-8-3503-4396-0

## **Copyright © 2023, Association for Computing Machinery (ACM) 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:
 CFP23D42-POD

 ISBN (Print-On-Demand):
 979-8-3503-4396-0

 ISBN (Online):
 979-8-4007-0102-3

ISSN: 2832-2967

#### 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



### 2023 IEEE/ACM Conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE) CHASE 2023

### **Table of Contents**

Message from the CHASE 2023 General Chair xi Committee Members of CHASE'2023 xiii
Full Papers
Parkinson's Disease Action Tremor Detection with Supervised-Leaning Models 1 Minglong Sun (William & Mary, USA), Woosub Jung (William & Mary, USA), Kenneth Koltermann (William & Mary, USA), Gang Zhou (William & Mary, USA), Amanda Watson (University of Pennsylvania, USA), Ginamari Blackwell (Virginia Commonwealth University, USA), Noah Helm (Virginia Commonwealth University, USA), Leslie Cloud (Virginia Commonwealth University, USA), and Ingrid Pretzer-Aboff (Virginia Commonwealth University, USA)
Social Visual Behavior Analytics for Autism Therapy of Children Based on Automated Mutual Gaze Detection
FoG-Finder: Real-Time Freezing of Gait Detection and Treatment
Ems-Bert: A Pre-Trained Language Representation Model for the Emergency Medical Services  (EMS) Domain

Active Reinforcement Learning for Personalized Stress Monitoring in Everyday Settings	44
Dove: Shoulder-Based Opioid Overdose Detection and Reversal Device  Anush Lingamoorthy (Drexel University, USA), Amanda Watson (University of Pennsylvania, USA), Korey Henderson (University of Pennsylvania, USA), Ayan Mandal (University of Pennsylvania, USA), David Gordon (Thomas Jefferson University, USA), Xiaonan Ma (University of Pennsylvania, USA), James Weimer (Vanderbilt University, USA), Nagarajan Kandasamy (Drexel University, USA), and Jacob S. Brenner (University of Pennsylvania, USA)	56
Detecting Eating and Social Presence with All Day Wearable RGB-T Soroush Shahi (Northwestern University, USA), Sougata Sen (Birla Institute Of Technology And Science, India), Mahdi Pedram (Northwestern University, USA), Rawan Alharbi (Northwestern University, USA), Yang Gao (Northwestern University), Aggelos K Katsaggelos (Northwestern University, USA), Josiah Hester (Georgia Institute of Technology, USA), and Nabil Alshurafa (Northwestern University, USA)	68
Using Geographic Location-Based Public Health Features in Survival Analysis	30
Virtual Therapy Exergame for Upper Extremity Rehabilitation using Smart Wearable Sensors Sensor Lauren Baron (University of Delaware, USA), Vuthea Chheang (University of Delaware, USA), Amit Chaudhari (University of Delaware, USA), Arooj Liaqat (University of Delaware, USA), Aishwarya Chandrasekaran (University of Delaware, USA), Yufan Wang (University of Delaware, USA), Joshua Cashaback (University of Delaware, USA), Erik Thostenson (University of Delaware, USA), and Roghayeh Leila Barmaki (University of Delaware, USA)	92
Efficient and Direct Inference of Heart Rate Variability using Both Signal Processing and Machine Learning	02
Interpreting High Order Epistasis using Sparse Transformers	14

Exploring Earables to Monitor Temporal Lack of Focus During Online Meetings to Identify Onset of Neurological Disorders
Garvit Chugh (Indian Institute of Technology Jodhpur, India), Suchetana Chakraborty (Indian Institute of Technology Jodhpur, India), Ravi Bhandari (JCKIF, IIT Jodhpur, India), and Sandip Chakraborty (IIT Kharagpur, India)
Short Papers
Short: Real-Time Bladder Monitoring by Bio-Impedance Analysis to Aid Urinary Incontinence 138 Ruoyu Zhang (University of California, Davis, USA), Ruijie Fang (University of California, Davis, USA), Zhichao Zhang (University of California, Davis, USA), Elahe Hosseini (University of California, Davis, USA), Mahdi Orooji (University of California, Davis, USA), Houman Homayoun (University of California, Davis, USA), and Gozde Goncu-Berk (University of California, Davis, USA)
Short: Racial Disparities in Pulse Oximetry Cannot Be Fixed With Race-Based Correction
Short: Integrated Sensing Platform for Detecting Social Isolation and Loneliness In the  Elderly Community
Short: Basal-Adjust: Trend Prediction Alerts and Adjusted Basal Rates for Hyperglycemia Prevention
Short: RF-Q: Unsupervised Signal Quality Assessment for Robust RF-Based Respiration  Monitoring
Short: Precision Polysubstance Use Episode Detection in Wearable Biosensor Data Streams

Short: Deep Learning Approach to Skeletal Performance Evaluation of Physical Therapy	
Exercises  Bhanu Garg (University of California San Diego, USA), Alexander  Postlmayr (University of California San Diego, USA), Pamela Cosman  (University of California San Diego, USA), and Sujit Dey (University  of California San Diego, USA)	168
Demos and Posters	
Demo: P-Fall: Personalization Pipeline for Fall Detection	173
Demo: Addressing Inter-Intra Patient Variability via Personalized Meta-Federated Learning in IoT-Enabled Health Monitoring	175
Poster: Tala Box: An Interactive Embedded System to Accompany Patients with Cognitive Disorders  Celia Sańchez-Girón Coca (Léonard de Vinci Pôle Universitaire, France), Luc Perera (École nationale supérieure des Arts Décoratifs, France), Mathis Boiteau (ENSIIE, France), Antoine Costanza (Lycée Monge, France), Jérôme Grison (Lycée Monge, France), Emmanuel Sarnette (Léonard de Vinci Pôle Universitaire, France), Michèle Kanhonou (Léonard de Vinci Pôle Universitaire, France), Frédéric Fauberteau (Léonard de Vinci Pôle Universitaire, France), Nga Nguyen (Léonard de Vinci Pôle Universitaire, France), and Pierre Jouvelot (Mines Paris - PSL University, France)	177
Poster: Foot-Floor Friction Based Walking Surface Detection for Fall Prevention using Wearable Motion Sensors	179
Poster: Machine Learning Based Real Time Detection of Freezing of Gait of Parkinson Patients Running on a Body Worn Device  Ali Haddadi Esfahani (IHP–Leibniz-Institut für innovative  Mikroelektronik, Germany), Oliver Maye (IHP–Leibniz-Institut für innovative Mikroelektronik, Germany), Max Frohberg (IHP–Leibniz-Institut für innovative Mikroelektronik, Germany), Maria Speh (Kliniken Schmieder Allensbach, Germany), Micheal Jöbges (Kliniken Schmieder Allensbach, Germany), and Peter Langendörfer (IHP–Leibniz-Institut für innovative Mikroelektronik, Germany; BTU Cottbus-Senftenberg, Germany)	181

Poster: Virtual Reality Exergame for Upper Extremity Rehabilitation using Smart Wearable Sensors	. 183
Lauren Baron (University of Delaware, USA), Vuthea Chheang (University of Delaware, USA), Amit Chaudhari (University of Delaware, USA), Arooj Liaqat (University of Delaware, USA), Aishwarya Chandrasekaran (University of Delaware, USA), Yufan Wang (University of Delaware, USA), Joshua Cashaback (University of Delaware, USA), Erik Thostenson (University of Delaware, USA), and Roghayeh Leila Barmaki (University of Delaware, USA)	
Poster: Design of a Music Intervention System using Social Robotics for Cognitive Enhancement  Tyler Morris (University of Tennessee Knoxville, USA), Darina Petrovsky (Rutgers School of Nursing, USA), Sai Swaminathan (University of Tennessee Knoxville, USA), and Xiaopeng Zhao (University of Tennessee Knoxville, USA)	185
Poster: Quantifying Signal Quality using Autoencoder for Robust RF-Based Respiration	107
Monitoring  Zongxing Xie (Stony Brook University, USA), Ava Nederlander (Stony Brook University, USA), Isac Park (Stony Brook University, USA), and Fan Ye (Stony Brook University, USA)	. 187
Poster: A Distributed Deep Reinforcement Learning System for Medical Image Segmentation Lanyu Xu (Oakland University, USA)	. 189
Poster: Towards Robust, Extensible, and Scalable Home Sensing Data Collection  Mohammed Elbadry (Stony Brook University, USA), Mengjing Liu (Stony Brook University, USA), Yindong Hua (Stony Brook University, USA), Zongxing Xie (Stony Brook University, USA), and Fan Ye (Stony Brook University, USA)	. 192
Poster: Highly Nonlinear Solitary Wave Transducers for Detecting Eye Pressure Changes	. 194
Poster: BioFactCheck: Exploring the Feasibility of Explainable Automated Inconsistency  Detection in Biomedical and Health Literature	. 196
Poster: Development of a Custom Wrist Wearable for Use in Nursing Homes	. 198

Poster: Noninvasive Respirator Fit Factor Inference by Semi-Supervised Learning	. 200
Poster: Automatic Compliance Analysis on Clinical Notes and Lifestyle Guidelines in Cancer Survivorship	. 203
Mostafa (University of North Carolina at Chapel Hill, USA) and Jaoea Mostafa (University of North Carolina at Chapel Hill, USA)	
Poster: Design of Mixed Reality Dangerous Situations for Autistic Children: Road Safety	. 205
Poster: AsyncFedKD: Asynchronous Federated Learning with Knowledge Distillation	. 207
Poster: Probing the EHR for Standardized Nursing Data	. 209
Poster: Affordable Automatic Air Quality Monitoring System for At-Risk Homes  Bryce Bible (University of Tennessee, USA), Bruce Tonn (Three3, USA),  Kristina Kintziger (University of Nebraska Medical Center), Kelsey  Ellis (University of Tennessee, USA), Jennifer First (University of  Tennessee, USA), Laura Humphrey (Three3, USA), Erin Rose (Three3,  USA), and Xiaopeng Zhao (University of Tennessee, USA)	. 211
Poster: Enabling Data Interoperability for Decentralized, Smart and Connected Health Applications	. 214
Oshani Seneviratne (Rensselaer Polytechnic Institute, USA)	, 214
Author Index	217