

2024 IEEE/ACM Ninth International Conference on Internet-of-Things Design and Implementation (IoTDI) **IoTDI 2024**

Table of Contents

Theory and Systems

Beyond Thresholds: A General Approach to Sensor Selection for Practical Deep Learning-Based HAR	1
<i>Geffen Cooper (The University of Texas at Austin) and Radu Marculescu (The University of Texas at Austin)</i>	
ImmunoPlane: Middleware for Providing Adaptivity to Distributed Internet-of-Things Applications	13
<i>Kumseok Jung (The University of British Columbia, Canada), Gargi Mitra (The University of British Columbia, Canada), Sathish Gopalakrishnan (The University of British Columbia, Canada), and Karthik Pattabiraman (The University of British Columbia, Canada)</i>	
Wireless Multicast Rate Control Adaptive to Application Goodput and Loss Requirements	25
<i>Mohammed Elbadry (Stony Brook University, USA), Fan Ye (Stony Brook University, USA), and Peter Milder (Stony Brook University, USA)</i>	

Application I

LIZARD: Pervasive Sensing for Autonomous Plastic Litter Monitoring	37
<i>Farooq Dar (University of Tartu, Estonia), Mayowa Olapade (University of Tartu, Estonia), Abdul-Rasheed Ottun (University of Tartu, Estonia), Zhigang Yin (University of Tartu, Estonia), Mohan Liyanage (University of Tartu, Estonia), Agustin Zuniga (University of Helsinki, Finland), Monica Passanantti (University of Turin, Italy; University of Helsinki, Finland), Sasu Tarkoma (University of Helsinki, Finland), Petteri Nurmi (University of Helsinki, Finland), and Huber Flores (University of Tartu, Estonia)</i>	

SEAGULL: Low-Cost Pervasive Sensing for Monitoring and Analysing Underwater Plastics	49
<i>Huber Flores (University of Tartu, Estonia), Agustin Zuniga (University of Helsinki, Finland), Marko Radeta (Wave Labs, MARE/ARNET/ARDITI, University of Madeira, Portugal; University of Belgrade, Serbia), Zhigang Yin (University of Tartu, Estonia), Mohan Liyanage (University of Tartu, Estonia), Naser Hossein Motlagh (University of Helsinki, Finland), Ngoc Thi Nguyen (University of Helsinki, Finland), Sasu Tarkoma (University of Helsinki, Finland), Moustafa Youssef (The American University in Cairo, Egypt), and Petteri Nurmi (University of Helsinki, Finland)</i>	
Cooperative Infrastructure Perception	61
<i>Fawad Ahmad (Rochester Institute of Technology, USA), Christina Shin (University of Southern California, USA), Weiwu Pang (University of Southern California, USA), Branden Leong (University of Southern California, USA), Pradipta Ghosh (Meta, USA), and Ramesh Govindan (University of Southern California, USA)</i>	

Application II

Exploiting mmWave and Deep-Learning Models to Estimate People Count in Urban Scenarios	73
<i>Girish Vaidya (Delft University of Technology, Netherlands; Amsterdam Institute for Advanced Metropolitan Solutions, Netherlands) and Marco Zuniga (Delft University of Technology, Netherlands)</i>	
Real-Time Multimodal Cognitive Assistant for Emergency Medical Services	85
<i>Keshara Weerasinghe (University of Virginia, USA), Saahith Janapati (University of Virginia, USA), Xueren Ge (University of Virginia, USA), Sion Kim (University of Virginia, USA), Sneha Iyer (University of Virginia, USA), John A. Stankovic (University of Virginia, USA), and Homa Alemzadeh (University of Virginia, USA)</i>	
i-CardiAx: Wearable IoT Driven System for Early Sepsis Detection Through Long Term Vital Sign Monitoring	97
<i>Kanika Dheman (ETH Zürich, Switzerland), Marco Giordano (ETH Zürich, Switzerland), Cyriac Thomas (ETH Zürich, Switzerland), Philipp Schilk (ETH Zürich, Switzerland), and Michele Magno (ETH Zürich, Switzerland)</i>	

IoT and AI/ML

NaviSlim: Adaptive Context-Aware Navigation and Sensing via Dynamic Slimmable Networks ...	110
<i>Timothy K Johnsen (University of California, Irvine, USA) and Marco Levorato (University of California, Irvine, USA)</i>	
CHESFL: Clustering Hierarchical Embeddings for Semi-Supervised Federated Learning	122
<i>Allen-Jasmin Farcas (The University of Texas at Austin, USA), Myungjin Lee (Cisco Research, USA), Ali Payani (Cisco Research, USA), Hugo Latapie (Cisco Research, USA), Ramana Rao Kompella (Cisco Research, USA), and Radu Marculescu (The University of Texas at Austin, USA)</i>	

Orientation Estimation Piloted by Deep Reinforcement Learning	134
<i>Miaomiao Liu (University of California, Merced, USA), Sikai Yang (University of California, Merced, USA), Arya Rathee (University of California, Merced, USA), and Wan Du (University of California, Merced, USA)</i>	

Security

Handling Jamming Attacks in a LoRa Network	146
<i>Ashikul Haque (Wayne State University) and Abusayeed Saifullah (Wayne State University)</i>	
Blades: A Unified Benchmark Suite for Byzantine Attacks and Defenses in Federated Learning	158
<i>Shenghui Li (Uppsala University, Sweden), Edith C.H. Ngai (The University of Hong Kong, China), Fanghua Ye (University College London, UK), Li Ju (Uppsala University, Sweden), Tianru Zhang (Uppsala University, Sweden), and Thimo Voigt (Uppsala University, Sweden; Research Institutes of Sweden, Sweden)</i>	
Towards Quantum Resilient IoT: A Backward-Compatible Approach to Secure BLE Key Exchange Against Quantum Threats	170
<i>Tao Liu (Queensland University of Technology, Australia), Gowri Ramachandran (Queensland University of Technology, Australia), and Raja Jurdak (Queensland University of Technology, Australia)</i>	

Pose & Gesture Recognition

SUPER: Seated Upper Body Pose Estimation using mmWave Radars	181
<i>Bo Zhang (McMaster University, Canada), Zimeng Zhou (McMaster University, Canada), Boyu Jiang (McMaster University, Canada), and Rong Zheng (McMaster University, Canada)</i>	
TinyssimoRadar: In-Ear Hand Gesture Recognition with Ultra-Low Power mmWave Radars	192
<i>Andrea Ronco (ETH Zürich), Philipp Schilk (ETH Zürich), and Michele Magno (ETH Zürich)</i>	
ASLRing: American Sign Language Recognition with Meta-Learning on Wearables	203
<i>Hao Zhou (Pennsylvania State University), Taiting Lu (Pennsylvania State University), Kenneth DeHaan (Gallaudet University), and Mahanth Gowda (Pennsylvania State University)</i>	

Posters/Demos

Poster Abstract: Towards a Predictive Model for Improved Placement of Solar-Powered Urban Sensing Nodes	215
<i>Alex Cabral (Harvard University), Jim Waldo (Harvard University), and Amy V. Mueller (Northeastern University)</i>	
Demo Abstract: PriviFy: Designing Tangible Interfaces for IoT Privacy Configuration	217
<i>Bayan Al Muhandar (Cardiff University, UK), Omer Rana (Cardiff University, UK), and Charith Perera (Cardiff University, UK)</i>	

Intermittent Edge Computing for Green Agricultural Automation	219
<i>Hui-Xin Shih (Academia Sinica & National Taiwan University, Taiwan), Yu-An Lin (Academia Sinica & National Taiwan University, Taiwan), Hsu-Huai Tsai (Academia Sinica & National Taiwan University, Taiwan), Yuan Lin-Huang (Academia Sinica & National Taiwan University, Taiwan), and Chih-Yu Wang (Research Center for Information Technology Innovation, Academia Sinica, Taiwan)</i>	
Demo Abstract: Online Training and Inference for On-Device Monocular Depth Estimation	221
<i>Allen-Jasmin Farcas (The University of Texas at Austin, USA), Geffen Cooper (The University of Texas at Austin, USA), Hyun Joon Song (The University of Texas at Austin, USA), Afnan Mir (The University of Texas at Austin, USA), Vincent Liew (The University of Texas at Austin, USA), Chloe Tang (The University of Texas at Austin, USA), Prithvi Senthilkumar (The University of Texas at Austin, USA), Tiani Chen-Troester (The University of Texas at Austin, USA), and Radu Marculescu (The University of Texas at Austin, USA)</i>	
Demo Abstract: A Prototype for Machine Learning with Batteryless Sensors	223
<i>Geffen Cooper (The University of Texas at Austin), Tianda Huang (The University of Texas at Austin), and Radu Marculescu (The University of Texas at Austin)</i>	
EdgeCam: A Distributed Camera Operating System for Inference Scheduling and Continuous Learning	225
<i>Yuqi Dong (Nanjing University of Science and Technology, China) and Guanyu Gao (Nanjing University of Science and Technology, China)</i>	
Demo Abstract: ImmunoPlane - Middleware for Providing Adaptivity to Distributed Internet-of-Things Applications	227
<i>Kumseok Jung (The University of British Columbia, Canada), Gargi Mitra (The University of British Columbia, Canada), Sathish Gopalakrishnan (The University of British Columbia, Canada), and Karthik Pattabiraman (The University of British Columbia, Canada)</i>	
Demo Abstract: Blades: A Unified Benchmark Suite for Byzantine-Resilient in Federated Learning	229
<i>Shenghui Li (Uppsala University, Sweden), Edith C.H. Ngai (The University of Hong Kong, China), Fanghua Ye (University College London, UK), Li Ju (Uppsala University, Sweden), Tianru Zhang (Uppsala University, Sweden), and Thiemo Voigt (Uppsala University, Sweden; Research Institutes of Sweden, Sweden)</i>	
Demo Abstract: PRINCE: Device Energy Estimation with a Single Photo	231
<i>Farooq Dar (University of Tartu, Estonia), Mohan Liyanage (University of Tartu, Estonia), Mayowa Olapade (University of Tartu, Estonia), Zhigang Yin (University of Tartu, Estonia), Abdul-Rasheed Ottun (University of Tartu, Estonia), Adeyinka Akintola (University of Tartu, Estonia), Francisco Airtón Silva (University of Tartu, Estonia), and Huber Flores (University of Tartu, Estonia)</i>	
Author Index	233