

# A Report on IEEE WiMob 2022 Conference

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The Wireless Mobility (WiMob) 2022 conference, held in Thessaloniki, Greece, mainly included following topics: Artificial intelligence and machine learning for e-health services including sensor-based e-health applications, e-health data processing, and e-health data sharing, LORA and deep learning, artificial intelligence for wireless network optimization and signal processing, 5G networks, artificial intelligence and mobility networks, artificial intelligence and vehicular networks, and the wireless network security.

## 0.1. Artificial Intelligence and Machine Learning for E-health Services

A great number of papers were dedicated to e-health application in WiMob 2022. E-health-related papers mainly exploited machine learning and artificial intelligence tools to model the collected data from different health and activity monitoring sensors, e.g., watch, shoe, ear plug, and smartphone sensors. The trained models could remarkably enhance the human-related e-health applications. Some papers deployed the augmentation reality (AR) and virtual reality (VR) concepts as well in order to further enhance the safety providing service's performance.

Some paper titles of this section: 1. VitalPod: A Low Power In-Ear Vital Parameter Monitoring System, 2. A Cost-effective Infrared Thermographic System for Diabetic Foot Screening, 3. Cardiac monitoring novel low-power sensor measuring upper thoracic electrostatic charge variation, 4. Evaluating Parameters of the TUG Test Based on Data from IMU and UWB Sensors, 5. Plastic Optical Fiber Sensor-based Smart Mattress For Sleeping Posture Remote Monitoring, 6. Recognition Models for Distribution and Out-of-Distribution of Human Activities, 7. LSTM Step Prediction and Ontology-Based Recommendation Generation in Activity eCoaching, 8. Augmented and Virtual Reality Based Exegames in GAME2AWE for Elderly Fall Prevention 9. Integrating AR and IoT Services into mHealth Applications for Promoting Wellbeing.

## 0.2. LORA and Deep Learning

Lora-related works mainly investigated in developing neural network models for LoRaWAN IoT sensors in order to enhance the communication performance and energy efficiency of LoRaWAN networks.

Some paper titles of this section: 1. Deep Learning-based receiver for Uplink in LoRa Networks with Sigfox Interference, 2. Decentralized Evaluation of Trust in Ad Hoc Networks using Neural Networks, 3. Experimental throughput models for LoRa networks with capture effect, 4. Generic Model to Quantify Energy Consumption for Different LoRaWAN Channel Access Methods, 5. ADR-Lite: A Low-Complexity Adaptive Data Rate Scheme for LoRa Network, 6. LoRaWAN optimization using optimized Auto-Regressive algorithm, Support Vector Machine and Temporal Fusion Transformer for QoS ensuring, 7. LoRaOpp: A Protocol for Opportunistic Networking and Computing in LoRa Networks, 8. Dynamic Adaptation of LoRaWAN Traffic for Real-time Emergency Operations.

## 0.3. Artificial Intelligence for Wireless Network Optimization and Signal Processing

Wireless Network-related works mainly investigated on the shift of management paradigms to Softwarization and Artificial Intelligence, e.g., programmable networks, software defined networks (SDNs), and reconfigurable intelligence for Wireless Communications. The papers exploited machine learning opportunities to provide better quality of service and wireless network management.

Some paper titles of this section: 1. Reconfigurable Intelligent and Holographic Surfaces for Wireless Communications (keynote), 2. HTTP Adaptive Streaming System Maximizing Overall Video Quality over SDN-enabled Wi-Fi APs, 3. Towards a Fully Programmable Internet of Things, 4. Segment Prefetching at the Edge for Adaptive Video Streaming, 5. Spatio-Temporal Data Reduction Technique in WWSN for Smart Agriculture, 6. Decentralized P2P Federated Learning on Ad-hoc Like Networks with Non-IID Dataset.

Moreover, some papers presented the impressive results of applying machine learning and neural network models for wireless network signal processing.

Some signal processing relative paper titles: 1. Multi-Carrier (OFDM) Cooperative Transmission in MANETs with Multiple Carrier Frequency Offsets 2. Smart Full-Exploitation of Beamforming Fusion assisted Spectrum Sensing for Cognitive Radio 3. Over-the-Air Computing under Adaptive Channel State Estimation.

## 0.4. 5G Networks

5-th generation network-related works concentrated more specifically on the future networks (5G and beyond) capabilities and requirements with respect to the generic wireless network section. The papers inspected challenges and solutions of 5G cellular network optimization, 5G RAN architecture design for integrated services, design of non-terrestrial networks, on-demand service management, software defined networks service enhancement, edge optimization, immersive holographic communication, and energy-efficient network design using artificial intelligence tools, advanced network simulators, emulators, and testbeds.

Some paper titles of this section: 1. Reliable and Available Wireless: The IPv6 contribution towards end-to-end determinism over 5G and beyond (keynote), 2. Real time testbeds for 5G NSA and SA mobile architectures to provide VoLTE and VoNR services over IP Multimedia Core Network Subsystem, 3. Assessment of 5G RAN Features for Integrated Services Provisioning in Smart Cities, 4. Multi-Connectivity for User Throughput Enhancement in 5G Non-Terrestrial Networks, 5. Hierarchical Federated Learning for the Next Generation IoT, 6. optimize the network management applications, e.g., mobile network data clustering, decentralized ML-based network management, heterogeneous transfer learning in dynamic networks, and optimizing Edge-Cloud cooperation for transmission latency and bandwidth congestion optimization, 7. Energy Saving Router Rotation Protocol for DECT-2020 NR, 8. On the Fair Energy Sharing in Networks with Wireless Charging-capable Devices.

## 0.5. Artificial Intelligence and Mobility Networks

Mobility network-related works mainly discussed innovative ideas to address mobility management over modern wireless networks, e.g., mobile users' (humans, vehicles, unmanned aerial vehicles (UAV), and drones) positioning, trajectory prediction, and quality of experience (QoE) prediction, through using advanced centralized or decentralized machine learning and deep learning paradigms.

Some paper titles of this section: 1. Deep Learning-Based QoE Prediction for Streaming Services in Mobile Networks, 2. Best Practices for Model Calibration in Smartphone-based Indoor Positioning Systems, 3. Real-Time Deep Learning based Road Deterioration Detection for Smart Cities, 4. Drone-Assisted Lane Change Maneuver using Reinforcement Learning with Dynamic Reward Function, 5. On the Second Order Statistics of Cooperative UAV Communications underlying Interference Limited Composite Fading Conditions, 6. Air-to-Ground Channel Characterization for Unmanned Aerial Vehicles Based on Field Measurements

We note that our presented paper under the title of Intra-Cluster Reinforced Social Transformer for Trajectory Prediction (INTRAFORCE) was presented also in this section. INTRAFORCE is a novel pedestrian and vehicle trajectory predictor that uses reinforcement learning to design a high-performance Social-Transformer, an attention-based neural network, architecture based on the intra-cluster user mobility features.

## 0.6. Artificial Intelligence and Vehicular Networks

Vehicular network-related presentations introduced optimization techniques for network traffic management, enhancing the quality of service and reliability, decreasing the latency, and enhancing the network security (malware detection) over vehicular ad hoc networks (VANET) and vehicle to everything (V2X) networks through using machine learning paradigms.

Some paper titles of this section: 1. AI-based prediction for Ultra Reliable Low Latency service performance in industrial environments, 2. On Handling of Certificate Digest in V2X Communication, 3. Prioritization for Latency Reduction in 5G MEC-Based VRU Protection Systems, 3. On-the-Road Comparison of LTE-V2X Cooperative Awareness Message Distribution between Regular and Vulnerable Road Users, 4. A Comparative Study of Artificial Intelligence Algorithms for Network Traffic Prediction in VANET, 5. Cellular-V2X for Vulnerable Road User Protection in Cooperative ITS, 6. A Surrogate-Based Technique for Android Malware Detectors' Explainability, 7. Data leakage prevention model for vehicular networks.

## 0.7. Network Security

Security-related papers mainly applied block chain, neural network explainability, and proactive malware detection methods. Moreover, some federated learning papers were as well presented, which potentially could increase the network privacy and security.

Some paper titles of this section: 1. Holo-Block Chain: A Hybrid Approach for Secured IoT Healthcare Ecosystem, 2. Fuzzy approach for load balancing in Blockchain-based Software Defined Vehicular Networks, 3. An Efficient Data Integrity Verification Scheme For Distributed Fog Computing Architecture, 4. Secrecy Performance of Small-Cell Networks over Nakagami Fading in the Presence of Unreliable Backhaul and Imperfect CSI, 5. AODV-Miner: Consensus-Based Routing Using Node Reputation. 6. A Surrogate-Based Technique for Android Malware Detectors' Explainability, 7. Hierarchical Federated Learning for the Next Generation IoT.