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************* CALL FOR PAPERS **************

SPECIAL SESSION ON

Ubiquitous and Pervasive Computing for Intelligent Demand Forecasting in Energy Distribution, Smart Retail, and Urban Transit

SESSION ORGANIZERS:

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EDITORIAL BOARD: (Optional)

[Name, University or Organization, Country, e-mail]

SESSION DESCRIPTION:

The exponential advancement of embedded systems, sensor networks, and machine learning has redefined how real-time demand is captured, predicted, and optimized across essential public and private infrastructures. This special session aims to bring together interdisciplinary researchers and practitioners to explore the role of ubiquitous and pervasive computing in enabling intelligent

demand forecasting within energy distribution systems, smart retail ecosystems, and urban transportation networks.

In today's interconnected environments, vast streams of data are generated by IoT devices, edge sensors, mobile agents, and geospatial infrastructure. These sources provide a rich basis for forecasting energy consumption patterns, predicting retail product demand, and estimating commuter loads in transit systems. However, transforming this data into actionable insights in real-time requires the convergence of ubiquitous sensing, scalable machine learning algorithms, and resilient computational frameworks.

This session welcomes original research, practical case studies, and emerging solutions that address the challenges and opportunities in using pervasive computing and machine learning for real-time demand intelligence across sectors. Topics of interest include (but are not limited to):
Real-time demand prediction in urban energy grids using pervasive sensor data

- Intelligent shelf replenishment and inventory forecasting in smart retail stores

- Passenger flow estimation and routing optimization in urban transit systems

- Context-aware demand forecasting using mobile and geolocation data

- Lightweight machine learning models for embedded demand forecasting

- Federated and privacy-preserving learning in demand-sensitive environments

- Edge-cloud collaborative intelligence for dynamic demand response

- Time-series modeling and deep learning for temporal demand shifts

- Sensor fusion and ubiquitous analytics in public infrastructure

- Socio-economic factors in demand modeling using ubiquitous data sources

RECOMMENDED TOPICS:

Topics to be discussed in this special session include (but are not limited to) the following:
We invite original (un-published) research contributions based on the above-mentioned themes, including the following topics but not limited to:

1.Ubiquitous Intelligence for Energy Demand Forecasting

- Real-time energy consumption prediction using smart meters and pervasive sensors
- Edge-device-enabled demand response systems for smart grids
- Forecasting peak load patterns with mobile and geospatial sensor data
- IoT and AI integration for optimizing residential and industrial energy demand
- Demand-side management using ambient and behavioral data analytics

2. Intelligent Demand Sensing in Smart Retail

- RFID and vision-based shelf demand tracking using pervasive devices
- Predictive inventory and restocking strategies with edge learning models
- Multi-modal consumer behavior forecasting using ubiquitous data streams
- Context-aware recommendation systems for adaptive pricing and promotions
- Demand fluctuation modeling during events using in-store sensor fusion

3. Urban Mobility and Transit Demand Forecasting

- Real-time passenger flow prediction using mobile, GPS, and IoT telemetry
- Dynamic routing and scheduling in public transport using demand sensing
- Spatiotemporal modeling for traffic and commuter demand using ML
- Federated learning on vehicular edge devices for privacy-preserving analytics
- AI-enabled transport demand management during peak and emergency events

4. Distributed and Federated Learning for Demand Forecasting

- Federated AI architectures for decentralized demand forecasting in cities
- Secure model aggregation across smart grids, transit systems, and retail nodes
- Privacy-preserving demand prediction using homomorphic and differential privacy
- Transfer learning across sectors (e.g., from energy to retail) using shared features
- Model compression and optimization for edge inference under resource constraints

5. Sensor Fusion and Pervasive Data Integration

- Cross-domain sensor fusion for unified demand prediction pipelines
- Temporal and spatial data harmonization for smart infrastructure monitoring
- Edge-cloud orchestration for real-time demand intelligence across distributed networks
- Adaptive learning using noisy or missing data from pervasive sources
- Use of 5G/6G and LoRaWAN for real-time demand data transmission

6. Sustainable and Resilient Demand Forecasting Frameworks

- Low-energy ML architectures for real-time demand estimation on embedded platforms
- Green AI strategies for demand analytics in energy-efficient smart systems
- Explainable AI for trust and transparency in demand-driven infrastructure
- Autonomous feedback systems for demand-aware control in industrial ecosystems
- Scalable deployment frameworks for demand forecasting in urban environments

SUBMISSION PROCEDURE:

Researchers and practitioners are invited to submit papers for this particular theme session on **[session - Ubiquitous and Pervasive Computing for Intelligent Demand Forecasting in Energy Distribution, Smart Retail, and Urban Transit]** *on or before* **[5th July 2025]**. All submissions must be original and may not be under review by another publication. INTERESTED AUTHORS SHOULD CONSULT THE CONFERENCE'S GUIDELINES FOR MANUSCRIPT SUBMISSIONS at https://www.icain-conf.com/downloads. All submitted papers will be reviewed on a double-blind, peer-review basis.

NOTE: While submitting a paper in this special session, please specify [**Ubiquitous and Pervasive Computing for Intelligent Demand Forecasting in Energy Distribution, Smart Retail, and Urban Transit**] at the top (above paper title) of the first page of your paper.

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