The 7th IEEE World Forum on the Internet of Things – WFIoT2021

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Hosted by The University of Louisiana at Lafayette
Held in conjunction with the IoT Community Slam

IEEE World Forum on Internet of Things

University of Louisiana Lafayette

IEEE Internet of Things

Internet of Things Community

Call for Technical Papers

The IEEE World Forum on the Internet of Things (WFIoT2021) seeks submissions and proposals for original technical papers that address the Internet of Things (IoT), its theoretical and technological building blocks, the applications that drive the growth and evolution of IoT, operational considerations, experimentation, experiences from deployments, and the impacts of IoT on consumers, the public sector, and industrial verticals. The theme for the World Forum is "The Impact of Artificial Intelligence on IoT". In recognition of the rapid growth of IoT across the world and adoption across almost all verticals we encourage the submission of multi-disciplinary content. Papers should address, but are not limited to, the high-level topics below and the more detailed list found further in this document and on the WFIoT2021 website and can be downloaded as a PDF document:

- Applications, Processes, and Services
- Artificial Intelligence, Machine Learning, and Analytics
- Basic and Enabling Technologies
- Communication, Connectivity, and Networking
- Computing – from Edge to Cloud
- Cybersecurity, Security, and Privacy
- Infrastructure, Devices, and Components
- Information Processing from Multimedia and Heterogenous Sources
- Results from Experiments, Demonstrations and Trials, and Deployment Experiences
- Social and Societal Impacts
- Systems Engineering, Integration Methods, and Operation Technologies
- Theoretical foundations, design methods, and architectural considerations

In addition, the World Forum is also seeking proposals for: (1) Special Sessions consisting of peer reviewed papers focused on research topics of importance to IoT; (2) Workshops consisting of peer reviewed papers, discussions, and summary results about advanced topics relevant to IoT. The summary results will be edited and published as part of the WFIoT2021 Proceedings; and (3) Industry Panels aimed at research topics important to industrial IoT issues. Each, Special Session, Workshop, and Industry Panel, once selected will issue an individual call for papers.

Track 1.0: IoT Applications, Processes, and Services

Application, Processes, and Services in Various Verticals and Markets

• Aerospace and Defense • Agriculture, Forestry, and Management of Natural Resources	• Entertainment • Environmental Applications and Monitoring	• Logistics • Manufacturing and Industry • Mining

• Automotive (Connected and autonomous Vehicles) • Building Construction, Management, and Operation • Consumer Electronics • Covid-19 and IoT • Education • Energy and Power (Generation, Transmission, Distribution, and Metering)	• Facility Construction and Operation • Food Preparation, Distribution, Delivery, and Consumption • Healthcare, Public Health, Practice of Medicine, and Medical Research • Hospitality and Tourism • Information Technology Services	• Oil and Gas (Exploration and Production, Transportation, and Refining and Retail) • Research and Research Facilities • Retailing and Merchandising • Smart Cities • Sports and Games • Transportation and Multimodal Transportation • Utilities Management and Operation

Track 2.0: Artificial Intelligence, Machine Learning, and Analytics

• AI Based Control Systems • AI Platforms and Frameworks • Artificial Intelligence Algorithms for IoT • Big Data Analytics for IoT • Classification and Clustering Algorithms for High Dimensional Data • Data Analytics for IoT	• Deep Learning • Distributed ML/AI Systems • Eliminating Bias in ML/AI • Knowledge Based Systems • Machine Learning Algorithms for IoT • Machine Learning for Specific IoT Applications • Machine Vision	• Metrics and KPIs for ML/AI Performance • Natural Language Processing • Neural Networks • Neuromorphic ML/AI • Security for ML/AI • Specialized Hardware Accelerators for ML/AI • Testing and Verification of ML/AI Systems • Testing of ML/AI models

Track 3.0: Basic and Enabling Technologies

Storage, Management, and Data Acquisition for IoT

• Cloud Based Storage • Collaborative Shared File Systems	• Data Provenance and Curation • Data Search	• Memory Systems • Metadata

• Data Aggregation • Data Bases • Data Buffering Methods • Data Caching • Data Cleanup and Filtering • Data Coding • Data Compression • Data Encryption	• Data Standards and Protocols • Device Storage, Storage Migration • Distributed Storage • File Systems, Archival Storage • Fog Data Banks • High Performance File Systems	• Near Line Storage • Storage for Real Time Processing • Storage for Streaming Data • Structured and Unstructured Data Techniques

Sensors and Actuators

• Accelerometers • Acoustic Sensors • Augmented Human Capabilities • Bionic Systems • Chemical and Biological Sensors • Complex and Compound Sensors • Cooperative Sensor Systems • Crowd sensing • Discrete Actuators • Discrete Sensors • Distributed Sensors • Electro-magnetic Sensors	• Feature detection • Fiber based sensors • Fluidic sensors • Human Centric Sensing • Hyper-spectral Sensors • Information Sensing • Mechanical Actuators • Miniaturized Actuators • Mobile sensor platforms • Networked Sensors • MEMS actuators • MEMS based sensors • Physical Sensors • Portable sensor gateways and devices	• Radar and Lidar systems • Robotics • Satellite based sensors • Satellite sensor arrays • Sensor Architectures • Self-Calibration & Testing Techniques • Sensor Co-registration • Sensor Integration • Sensor Processing • Sensor Swarms • Video sensors • Vision systems • Wearable’s and Body Sensor Networks

Interfaces (Humans in the loop)

• Augmented Reality • Biologically Inspired Actuators • Brain Controlled • Contextual • Cooperative and Multifactor systems	• Gestural • Graphic Interfaces • Haptics • Holographic • Olfactory • Speech and sound	• Tactile • Textual • Thermal • Video • Virtual Reality • Visual Interfaces

Software for IoT

• Analytic Frameworks • Analysis, testing, and debugging software • Application specific software • Automated software generation • Development Environments • Device Drivers • Distributed software systems • Domain Specific Software • Homomorphic computing software • Hypervisors	• Emulation software • Graphics and Rendering software • Libraries • Logging • Model Based Software • Modelling software • Multi-use IoT Platforms • Operating Systems • Orchestration • Platforms and Frameworks • Realtime control systems • Reporting and Display Systems	• Resource Optimization Software • Simulation software • • Requirements tracing tools • Software development kits (SDKs) • Software Languages • Software Platforms and Frameworks • Software for quantum computing • Traceability tools • Virtualization Software • Visualization

Power and Energy for IoT

• Batteries • Charging Methods • Fuel Cells • Green Power • High reliability power supplies and power components	• Power conditioning • Power control systems • Power monitoring • Power regulation • Power scavenging • Power storage	• Rectennas • Solar Power • Thermal power sources • Transmitted Power • Ultra-low power technologies

Design Methods

• Collaborative design frameworks • Electronic design frameworks and tools • Design Automation • Design Management • Design Optimization • Design Space Exploration • Design Testing • Requirement capture and traceability • Tradeoff Systems	• Design Verification • Functional and intrinsic attribute design • Lifecycle analysis • Mechanical design frameworks and tools • Modeling and Simulation Tools • Operational technologies and processes • Synthesis	• Techniques for IoT Device and Systems Design • Test design • Tolerancing • Tools for integrated mechanical, electronic, and software design • User interface design • Usability analysis • Workflow management • Versioning

Track 4.0: Communication, Connectivity, and Networking

• 5G, 4G, and 3G Networks • 6LoWPAN, RPL, 6TiSCH • Access methods and protocols • Ad-hoc and Manet Networks • Body and Wearable Networks • Broadcasting Systems for IoT • Coding methods and protocols • Dense communication environments • Heterogeneous Networks	• High Bandwidth Networks • Internet protocols (IPv6, Ipv4, ….) • Low Latency Networks • Low Power LAN and WAN Networks • Mesh Networks • MIMO and Beam Forming Arrays • Millimeter Wave Technologies • Named IoT Networking • Mixed licensed, unlicensed, and shared spectrum systems	• Narrow Band Networks • Network Virtualization Functions • Network Management • Open Systems • Radio Technologies • Real Time Communications • Routing and Control Protocols • Rural communications • Secure Communications • Spectrum allocation • Spectrum Efficiency • Spectrum Sharing D2D and M2M Communications

Track 5.0: Computing – from Edge to Cloud

• Advanced Computing Concepts • Artificial Intelligence and Machine Learning Chips and Chip Architectures • Autonomic Computing • Cloud Computing • Cooperative Computing • Communications Intensive Computing • Computing Accelerators and Offload Engines	• Computing Platforms and Frameworks • Distributed Computing • Edge Computing • Embedded Computing • Fog Computing • Graphic Processing Units (GPUs) • Homomorphic Computing • IoT Computing Architectures • Limited Capability Computing • Low Power Computing	• Memory Intensive Computing • Mobile Computing • Multi-core Computing • Neuromorphic Computing • Novel Chips • Platform Based Computing • Quantum Computing • Real Time Computing • Tensor Processing Units (TPUs)

Track 6.0: Cybersecurity, Security, and Privacy

• Admission, Identification,	• Fakes and Deep Fakes • Forensics	• Planning and recovery • Policy based security frameworks

Authentication, and Authorization methods • Anomaly Detection • Big data and information integrity in IoT • Block Chains • Bot Attacks • Cross-layer attacks in IoT • Cryptographic Methods • Cybersecurity • Denial of Service	• IoT Privacy and Security • Key management • Homomorphic techniques • Intrusion detection in IoT • Malicious Code Detection • Multi-factor security methods • Physical Unclonable Functions (PUFs) • Physical/MAC/Network Attacks in Internet of Things	• Privacy based channel access in IoT • Privacy Metrics Security for ML/AI systems • Security Frameworks • Security standards in IoT • Security for Wireless Networks • Vulnerabilities and attack Vectors • Zero Trust Systems

Track 7.0: Infrastructure, Devices, and Components

Communications, Computing, and Storage

• ASICs • Cellular Mobile Network Systems (3G, 4G, 5G, WAN, LAN,…) • Cell Towers • Customer Premise Equipment • Dockers • Edge, Fog, and Cloud Facilities and Data Centers • Fixed Communication Infrastructure (Cable, Copper, Fiber, Wireless, and Free Space Optical)	• FPGA Computing • Gateways and aggregation points • Hyperscale and HPC Facilities • Kubernetes • Local Area and Distribution Networks • mmWave Access Facilities • Quantum Communications • Narrow Band • Power and Energy • Realtime Communications	• Satellite based communications systems and arrays (LEO, MEO, and GEO) • Shared sensor systems (Lidars, Radars, and Video) • Systems on a chip (SOCs) • Timing Infrastructure • UAV based sensor and communications platforms • User terminals • Wide Area Networks • Wideband Communications

Track 8.0: Information Processing from Multimedia and Heterogenous Sources

• AI/ML Based Techniques for handling Multimedia • Animation • Audio Processing • Compression Methods (Lossy and Lossless) • CODECs (Coder and Decoder algorithms for multi-media IoT content and data) • Expert Systems	• Fast and complexity-awareness algorithms for real-time multimedia computing in IoT • Hyperspectral Data Processing • Image processing • Low complexity audio/video encoding for IoT • Multimedia Data Representation	• Multimedia Hardware and Devices for IoT • Real-time compression and storing scheme for IoT • Retrieval • Service and system architectures of multimedia based IoT content • Transcoding • Watermarking • Workflow

Track 9.0: Results from Experiments, Demonstrations and Trials, and Deployment Experiences

• Analysis to identify gaps in current technologies and requirements for deployment • Closing the Gap between Research and Implementation • Collaborative opportunities in IoT • Competitions and Challenge Projects in IoT • Experiences from Prototypes, Demos, and Field Trials	• IoT deployment in Government organizations and major ISPs • IoT and Future Internet architectures • IoT deployment in Vertical Markets and specific end-uses • IoT Interconnections addressing analysis of QoE, QoS, Scalability, Performance and other intrinsic attributes	• Multi-Objective IoT System Modeling and Analysis of: Performance, Energy, Reliability, Robustness • Organization and management of IoT Projects • Real use case deployment scenarios and results • Standardization and Regulation • Testbeds for IoT • Technology Transfer

Track 10.0: Social and Societal Impacts

• Allocation of Responsibility and Obligation in IoT Services and Offerings • Benefits of IoT from Environmental and	• Ethical aspects of IoT application and service design • Future Implications of widespread IoT deployment	• Metrics, Measurements, and Evaluation of IoT Sustainability and ROI • New Services enabled by IoT

Ecological Applications • Business Models for IoT • Consequences of Automation for Human Employment Patterns • Dependence of Critical Systems on IoT • Economic Impacts of IoT	• Human Role in IoT • Implications of IoT on privacy • Impacts of New Human-Device Interactions in IoT • IoT and changing requirements for Education • IoT for Do-It-Yourself and Maker Communities • IoT and Human Safety	• Risks of IoT Deployment • Social Models and Networks • Societal Aspects of IoT • Urban Dynamics and Crowdsourcing Services • Value Chain Analysis and Value Chain Evolution

Track 11.0: Systems Engineering, Integration Methods, and Operation Technologies

• Analysis Tools and Methods • Application Templates • Computer Aided Engineering • Decomposition Methods and Tools • Dependency tracing and analysis • Development Planning • Development Processes • Digital Twins • Ecosystem Formation	• Estimation Techniques • IoT Project/Program Management • Integration Planning • Interface Capture • Lifecycle Analysis • Maintenance, Repair, and Overhaul • Model based Methods • Module and Component Specifications • Program Organization • Requirements capture	• Requirements verification • Risk Analysis for IoT • System Simulation and Emulation • System Synthesis • Testing and Validation • Verification Methods • Work breakdown structures and tools • Work Process Optimization

Track 12.0: Theoretical foundations, design methods, and architectural considerations

• Automation • Autonomy • Basics of Knowledge based systems for IoT • Digitization	• Mathematical Models of IoT Systems and Systems Behaviors • Ontologies and Data Dictionaries	• Scaling Analysis • Semantics • Software Defined Functionality • Simulation and Emulation

• Domain Specific Science and Engineering • Foundations of the Internet and other Connectivity Networks • IoT Architectures • IoT as a Control Systems	• Operational Technologies • Optimization Methods • Performance Evaluation Tools • Reference Designs • Robotics	• Standardization • Systems Science and Systems Engineering • Virtualization Techniques • Web based tools for publishing, discovery, and retrieval