

## **The 5th International Workshop on Wireless Communications and Networking in Extreme Environments (WCNEE 2021)**

**Friday, 16 July, 2021 • 15:00 – 19:00 CEST • Online**

Wireless communications and networking in extreme environments such as underwater, underground, rural areas, intra-body, in flight and in space have been attracting growing interest from both academia and industry in an effort to conquer the last frontier for wireless technologies. In recent years, underwater wireless networks have attracted significant attention for military and commercial applications including oceanographic data collection, disaster prevention, tactical surveillance, offshore exploration, and pollution monitoring. Unmanned aerial systems that are autonomously networked can assist humans in extreme or difficult-to-reach environments as well as provide cost-effective wireless connectivity for devices without infrastructure coverage. Underground wireless networks could enable applications such as precision agriculture, pipeline fault diagnosis, mine disaster rescue, concealed border patrol, and crude oil exploration, among others. Wireless networked systems of intra-body sensors and actuators could play a key role on real-time monitoring and medical treatment of chronic diseases such as diabetes, as well as enable automated drug administration and targeted drug delivery. Satellite (mega-) constellations could improve communications and ongoing monitoring of Earth phenomena ranging from weather and climate to disaster management. Rural areas remain underserved by increasingly core societal applications.

Despite the obvious differences, underwater, aerial, underground, intra-body, rural and space wireless networks share common core research challenges that arise from the harsh nature of the propagation medium (fading, absorption, scattering, multipath) and the inaccessible nature of the environment. As a result, conventional communication and networking techniques do not “scale up” in extreme communication environments mainly due to the excessive propagation losses of traditional wireless technologies and the financial limitations of operating far from “grids”. The goal of the WCNEE workshop, now in its 5th edition, is to bring together academic researchers and industrial players to share their research findings and technical contributions, from the physical all the way to the application layer in realizing underwater, aerial, underground, intra-body, rural and space wireless communication networks with a focus on bridging the gaps between theory, algorithms, prototypes, testbeds, demonstration and production networks. WCNEE will also facilitate discussions about modeling and characterizing propagation and wireless network performance in such diverse environments based on real-world data measurements.

### **Steering Committee:**

Stella N. Batalama (Florida Atlantic University, USA)  
Tommaso Melodia (Northeastern University, USA)  
Dimitris A. Pados (Florida Atlantic University, USA)  
Emrecan Demirors (Northeastern University, USA)  
Panos P. Markopoulos (Rochester Institute of Technology, USA)

### **Workshop Organizers:**

George Sklivanitis (Florida Atlantic University, USA)  
Zhangyu Guan (SUNY at Buffalo, USA)

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**15:00 – 15:05**

**Opening Session**

**Chairs: George Sklivanitis, Zhangyu Guan**

**15:05 – 16:05**

**Keynote Session**

TBA

**16:05 – 16:30**

**Coffee Break**

**16:30 – 17:45**

**Session 1**

***Chirp Spread Spectrum Modulation for Intrabody Nanoscale Communication and Sensing***

Honey Pandey, Josep M. Jornet (Northeastern University, USA)

***Machine Learning Based Sound Speed Prediction for Underwater Networking Applications***

Ambrin Begam Riaz Ahmed, Mohamed Younis, Miguel Hernandez De Leon (University of Maryland, Baltimore County, USA)

***Localizing Autonomous Underwater Vehicles: Experimental Evaluation of a Long Baseline Method***

Irene Tallini (University of Rome, La Sapienza, Italy & Northeastern University, USA), Luca Iezzi, Petrika Gjanci, Chiara Petrioli (University of Rome, La Sapienza, Italy), Stefano Basagni (Northeastern University, USA)

**17:45 – 19:00**

**Session 2**

***Towards Ambiently Powered Inference on Wireless Sensor Networks: Asynchrony is the Key!***

Vasileios Papageorgiou, Athanasios Nichoritis, Panagiotis Vasilakopoulos, Georgios Vougioukas, Aggelos Bletsas (Technical University of Crete, Greece)

***Network-Aware AutoML Framework for Software-defined Sensor Networks***

Emre Horsanali, Yagmur Yigit, Gokhan Secinti (Istanbul Technical University, Turkey), Aytac Karameseoglu (BTS Group, Turkey), Berk Canberk (Istanbul Technical University, Turkey)

***Sequential Task Allocation with Connectivity Constraints in Wireless Robotic Networks***

Hongzhi Guo, Albert Aninagyei Ofori (Norfolk State University, USA)