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# ETI on Internet of Sounds Kickoff Meeting

15:00 – 16:00 CET | Zoom Teleconference | 3<sup>rd</sup> May 2023





# Agenda

- ▶ Welcome (Luca Turchet)
- ▶ Approval of the agenda (All)
- ▶ Introduction: IEEE ComSoc & ETI on IoS (Luca Turchet)
- ▶ Short presentation of the steering committee members (All)
- ▶ Brief reflection on geographical diversity of Board and IoS community (Luca Turchet)
- ▶ 4<sup>th</sup> International Symposium on the Internet of Sounds (Stefano Giordano)
- ▶ Updates on current activities (Luca Turchet)
- ▶ Updates on future IS<sup>2</sup> 2024 (Nils Peters)
- ▶ Open discussion / Any other business (All)



# Introduction: IEEE ComSoc & ETI on IoS

- ▶ The **IEEE Communications Society (ComSoc)** is a community comprised of a diverse group of academic and industry professionals with a common interest in advancing all communications technologies. Activities includes:
  - produce publications
  - organize conferences
  - foster educational programs
  - promote local activities
  - development and implementation of standards
  - **work on technical committees**
- ▶ The IEEE ComSoc is organized in
  - 27 Technical Committees (for consolidated areas of technology)
  - 8 Emerging Technical Sub-Committees (for new areas of technology)

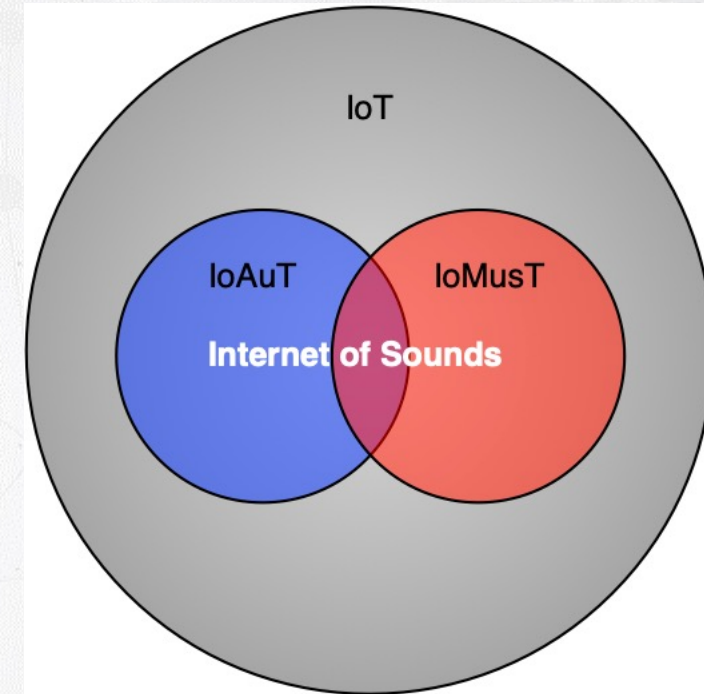
↑  
**ETI on IoS**

ETIs are expected to become TCs  
when the area is consolidated



# ETI on Internet of Sounds

- ▶ In March 2023 the IEEE ComSoc launched the ETI on IoS based on a proposal of the **Internet of Sounds Research Network**
- ▶ ETI's aim: to foster research and innovation surrounding the design, development and evaluation of **sound-based communications**
- ▶ This ETI proposes to investigate the emerging field of the IoS, which stems from the convergence of Sound and Music Computing and the Internet of Things
- ▶ The ambition of this ETI is not only to bridge existing research areas and communities and foster cross-domain collaborations, but also to ensure that IoS-related **challenges** are tackled within a **shared, pluralistic and system-level perspective**
- ▶ Academic, industrial and artistic research are considered (along with basic and applied research), in line with the **interdisciplinary** background of the partners





# Main areas of interest

## ▶ Sound Things

- Smart devices with improved audio capabilities
- Embedded Audio (HW, SW, operating systems)
- Distributed systems for the IoS
- Sensors and actuators for the IoS

## ▶ Networking

- Wireless acoustic sensor networks
- Machine learning over wireless networks for Internet of Sounds applications
- Cloud and edge computing for IoS applications
- Design and development of ultra-reliable low-latency networks
- Protocols and exchange formats for the IoS
- 5G/6G architectures

## ▶ Applications and services

- Networked music performance systems
- Detection and classification of sounds in acoustic sensor networks
- Sound-based anomaly detection and sound-based predictive maintenance in networked settings
- Web Audio applications
- Spatial Audio for the IoS
- Networked Musical XR
- Packet loss concealment methods
- Digital Signal Processing as a Service
- Industrial applications of the IoS



# Main areas of interest

## ▶ Datasets and storage

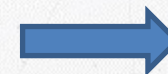
- Open audio databases for Deep Learning and Data Mining
- Cloud-based services for musical and audio applications
- Challenges in the management and delivery of large audio databases
- Visualization, access and indexing of audio databases

## ▶ Artistic aspects of the IoS

- Music performance studies leveraging Internet of Musical Things technologies
- Music pedagogy studies leveraging Internet of Musical Things technologies
- Participatory live music performances

## ▶ Responsible and Ethical Research and Innovation for the IoS

- Accessibility and inclusiveness within the Internet of Sounds
- Sustainability and ethical aspects of the Internet of Sounds
- Regulatory aspects of the Internet of Sounds
- Business and innovation aspects of the Internet of Sounds
- Personal data-related challenges in the Internet of Sounds



**The IoS is a highly interdisciplinary field of research**



# Website



## ABOUT COMSOC

Home / About ComSoc / Committees / Emerging Technologies Initiatives / Internet of Sounds Emerging Technologies Initiative

### Internet of Sounds Emerging Technologies Initiative

The aim of this emerging technology initiative (ETI) is to foster research and innovation surrounding the design, development and evaluation of sound-based communications. Current sound-based practices and systems developed in both academia and industry point to convergent research trends that bring together the field of Sound and Music Computing with that of the Internet of Things. This ETI proposes to investigate the emerging field of the *Internet of Sounds (IoS)*, which stems from such disciplines. The IoS relates to the network of Sound Things, i.e., devices capable of sensing, acquiring, processing, actuating, and exchanging data serving the purpose of communicating sound-related information. The proposal for this ETI stemmed from the emerging IoS community, which gathers around the *Internet of Sounds Research Network* (<https://www.internetofsounds.net/>) and annually organizes the *International Symposium on the Internet of Sounds*. The ambition of this ETI is not only to bridge existing research areas and communities and foster cross-domain collaborations, but also to ensure that IoS-related challenges are tackled within a shared, pluralist and system-level perspective. Both academic research and industrial research are considered (along with basic and applied research), in line with the interdisciplinary background of the partners.

- ▶ We have a dedicated page hosted on the IEEE ComSoc website:  
<https://www.comsoc.org/about/committees/emerging-technologies-initiatives/internet-of-sounds>
- ▶ Soon another page will be created on the IEEE website with more information
- ▶ We will still keep the website of the Internet of Sounds Research Network  
<https://internetofsounds.net/>
- ▶ We will still keep the current mailing list despite IEEE has offered to provide one
- ▶ Slides and minutes will be published on the ETI website and made publically available



# Board of the ETI on IoS

## Technical Committee Board Scope

- ▶ The Board is responsible for the oversight and promotion of the activities of the Internet of Sounds research community, including the promotion of technical content and the support of technical activities

## Objectives

- ▶ Ensure that the ETI is covering topics that are timely and of interest to the community as well as to IEEE ComSoc
- ▶ Encourage ETI members to conduct technical activities on timely topics
- ▶ Encourage the participation of ETI members to the ETI activities, e.g., IS2 conference, organization of special issues, etc.
- ▶ Ensure that the ETI members are operating according to the community's code of conduct
- ▶ Resolve any issues that could emerge amongst ETI members



# Board members

**Chair** | Luca Turchet

**Vice-Chair** | Carlo Fischione

**Secretary** | Nils Peters

**Industry Liaison Officer** | Sacha Krstulovic

**Workshops, Tutorials, & Symposia Officers** | Jan Østergaard, Marcelo M. Wanderley

**Special Issues and Publications Officers** | Maximo Cobos, Woon-Seng Gan

**Standardization Officers** | Jan Dürre, Stefano Giordano

**Seminar and Invited Talk Officers** | George Fazekas, Tuomas Virtanen

**Diversity Officer** | Cristina Rottondi

**Policy Officer** | Elisabetta Lazzaro





# Diversity in the board & community

IoS RN

About Partners Roadmap Resources Conference Statements News Contacts

## Internet of Sounds Research Network

Join

Mailing-list

100+ Partners

200+ Subscribers

20+ Countries

- ▶ Diversity in terms of **industry** (15), **academia** (79), **artistic institutions** (5), **other institutions/consortia** (3)
- ▶ Geographical diversity of the ETI board (Europe, Asia, North America)
- ▶ It partially reflects the geographical diversity of the IoS community (some countries are more represented than others)
- ▶ To date, in the the IoS RN various countries are not yet represented (e.g., Japan, Argentina) and some are poorly represented (e.g., China) ...yet there are IoS practitioners there



# 4<sup>th</sup> International Symposium on the Internet of Sounds



UNIVERSITÀ  
DI PISA



## Call for papers and demos

After the success of the first three editions, we are pleased to invite the community to submit to the 4th International Symposium on the Internet of Sounds (IS<sup>2</sup> 2023). The Internet of Sounds is an emerging research field positioned at the intersection of the Internet of Things and Sound and Music Computing domains. The symposium will be hosted at the congress center "Ex Monastero delle Benedettine" in the city of Pisa, Italy.



# Updates on current activities

- ▶ IEEE Communication Magazine invited us to launch a special issue on the Internet of Sounds topic
  - Guest Editors: Woon-Seng Gan, Maximo Cobos, Hossein Shokri Ghadikolaei, Luca Turchet
  - Deadline: 29<sup>th</sup> February 2024
- ▶ Application to the *2023 ComSoc TC Innovation Support* to organize a workshop on the topic Immersive Networked Audio
  - Budget: \$5,000
  - To cover the costs for the workshop
  - To support experienced and (especially) early career researchers by waiving the fee
  - If funded the workshop will take place during IS2 2023 in Pisa
- ▶ Planning to launch a series of online seminars on IoS topics



# Updates on IS<sup>2</sup> 2024

- ▶ Maybe in Erlangen at Fraunhofer IIS?

INTERNATIONAL AUDIO LABORATORIES ERLANGEN

**AUDIO**  
**LABS**



# Open discussion

- ▶ Do you have any proposal?
- ▶ Do you have any news or update to share? E.g.,
  - Funded projects on IoS related areas
  - Master's/PhD courses offered
  - Keynotes or tutorials at conferences
  - Tutorials at conferences
  - Prototypes, open-source software, open datasets
- ▶ Standardization efforts?
- ▶ Any other business