



# IEEE ComSoc Tactile Internet Technical Committee

GC 2022 Virtual Meeting

Falko Dressler <[dressler@ccs-labs.org](mailto:dressler@ccs-labs.org)>

Stefano Giordano <[stefano.giordano@unipi.it](mailto:stefano.giordano@unipi.it)>

Nikolaos Pappas <[nikolaos.pappas@liu.se](mailto:nikolaos.pappas@liu.se)>

# Agenda

- Welcome & Introduction
- Approval of the agenda
- Highlights of the GC 2021 meeting
- Approval of the meeting minutes
- Background about TI TC
- Report on activities
- Report on standards activities
- Project presentations
- Planning activities for 2022/2023
- Any other business

# Participation in the TI TC Online Meeting

- Please, fill out the following form to indicate your participation at the meeting (link will be provided in the chat box)

<https://forms.gle/hSUAPYKT373LspDe8>

- This is extremely important to track your participation in our meetings

# How to Join the TI TC?

- We hold two meetings every year:
  - At ICC and Globecom
  - <https://ti.committees.comsoc.org/>
- Become a member by joining our mailing list:
  - <https://ti.committees.comsoc.org/mailling-list/>
- You are an active member if you have attended two or more of the prior five regularly scheduled TC meetings
- You are a voting member if you are an active member or have substantially contributed to the TI Technical Committee activities

# Highlights of the ICC 2022 Meeting

- Meeting was online and chaired by Falko Dressler
- Discussed items:
  - Discussion on new activities
  - Report on conference and publication activities
  - Planned activities
  - Newsletter
- Motion to approve the meeting minutes:

<https://ti.committees.comsoc.org/meetings/>

# Brief History of the TI TC

- Started as a technical sub-committee in June 2015 with
  - Meryem Simsek, Latif Ladid, and Mischa Dohler as officers
- Summer 2018 evaluated to a TC with
  - Meryem Simsek, Falko Dressler, Oliver Holland as officers
- Elections 2022, new officers
  - Falko Dressler, Stefano Giordano, Nikolaos Pappas
  - Meryem Simsek as past chair
- Initiated an IEEE standardization working group on the Tactile Internet, IEEE P1918.1
- Organized various workshops, tutorials, special sections, tracks in flagship conferences as well as various special issues in IEEE journals
- Highly active and engaged members with very interactive meetings including guest speakers

# Tactile Internet Definition

- Standardized definition:

*"A network or network of networks for remotely accessing, perceiving, manipulating or controlling real or virtual objects or processes in perceived real time by humans or machines."*

# Tactile Internet TC Charter

- The objectives of the TI technical committee are to facilitate the worldwide harmonization of **research, standardization** and **best practices** for deployment user scenarios of the global **TI ecosystem**, to design the built-in security and privacy and to explore ways the tactile technology can be realized in different segments such as in engineering, automobile, transport and logistics, health service, and public. The TI technical committee will target the understanding of the tactile **requirements**, defining **system specifications** to meet these requirements, and developing **breakthrough technology** to the identified challenges of the tactile internet.

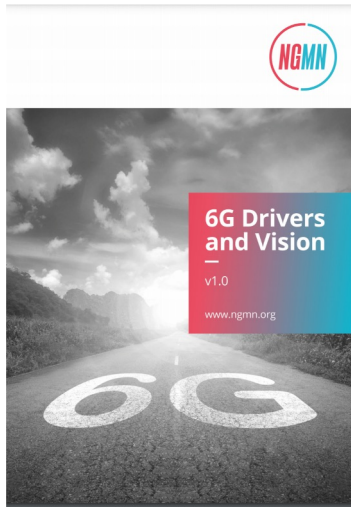


# TI is Gaining Momentum with 6G, XR/MR and the Metaverse



RINGS

Merging digital/physical/virtual worlds



[https://www.ngmn.org/wp-content/uploads/NGMN-6G-Drivers-and-Vision-V1.0\\_final.pdf](https://www.ngmn.org/wp-content/uploads/NGMN-6G-Drivers-and-Vision-V1.0_final.pdf)

**DFG** Deutsche  
Forschungsgemeinschaft

Priority Programme “Resilience in Connected Worlds – Mastering Failures, Overload, Attacks, and the Unexpected (Resilient Worlds)” (SPP 2378)

Many keynotes from major  
drivers and companies

Mixed reality

Holograms

Internet of Senses

Immersive  
Experiences

HCI

...

**IEEE**  
Advancing Technology  
for Humanity

# Report on Activities

# General Overview of TC Activities

- Conferences
  - Sponsorship of symposia – nominations for symposium co-chairs
  - Endorsement of conferences
  - Sponsorship of workshops, special sessions, tutorials
- Nominations
  - Distinguished lectures
  - IEEE Senior/Fellow membership status
- Awards
  - Annually two awards: service award and technical contribution award
- Student competition
- Standardization activities
- Webinars
- Publications, e.g. Special issues, books
- Newsletter
- Collaborations with other TC/societies

# General Overview of TC Activities

- GC 2023 symposium chair positions
  - Communication and Information System Security
    - Safa Otoum, Zayed University, UAE
  - SAC Machine Learning for Communications
    - Jihong Park, Deakin University, Australia
- Call for GC 2024 symposium chair positions (right after our meeting)
  - Please, reach out to the TC officers to be nominates

# General Overview of TC Activities

- Nominations for distinguished lectures
- Endorsement for IEEE Fellowship
- Awards
  - TI TC Service award and TI TC Technical Contributions award
  - Nominations for awardees to be sent to the awards sub-committee
- Student competition
  - Safa Otoum, Zayed University, UAE

# Report on Awards

- TI TC 2021 Service awardee: Oliver Holland, Advanced Wireless Technology Group, Ltd, UK
  - Dr. Oliver Holland's outstanding contributions and continuous service to the TI TC as well as IEEE P1918.1 standardization WG leading to the visibility and success of the Tactile Internet.
- TI TC 2021 Technical contribution awardee: Zaher Dawy, American University of Beirut, Lebanon
  - Prof. Zaher Dawy's excellent contributions to the design of the Tactile Internet architecture, and his fundamental contributions to Tactile Internet research.

# Report on Awards

- As a part of the TI activities, *Service Award* and *Technical Contribution Award* are established
- Current awards subcommittee:
  - Stefano Giordano, Universita di Pisa (chair)
  - Oliver Holland
  - Zaher Dawy
  - Sharief Oteafy

# Tactile Internet TC Newsletter

- Newsletter
  - Guodong Zhao ([Guodong.Zhao@glasgow.ac.uk](mailto:Guodong.Zhao@glasgow.ac.uk)) appointed as lead editor
  - Call for contributions is ongoing
  - Opportunity to:
    - disseminate your achievements within the TI community
    - Engage with the TI community
    - Share your upcoming events, openings etc. Within a global team
  - Please, submit your content!
  - First newsletter published
  - Second newsletter ready
  - <https://ti.committees.comsoc.org/newsletter/>



# Tutorials and Workshop Activities

- Tutorials:

- [Computing in Communication Networks – From Theory to Applications](#) - IEEE ComSoc Training Course [online]
- [Computing in Communication Networks: The Road Ahead](#) - Tutorial at VTC2021-Fall [online]
- [Goal-Oriented Communication for Networked Intelligent Systems](#) – Tutorial at IEEE SPAWC 2021
- IEEE SPS - EURASIP summer school on “Defining 6G: Theory, Applications, and Enabling Technologies”, Goal-oriented and semantic communications, Aug. 2022
- IEEE/CIC ICC 2022: Age of Information Optimizations in Wireless Networks: Theories, Applications, and Beyond
- IEEE ICC 2022: Age of Information in Wireless Networks: Fundamentals and Applications
- Spring School 2022: Emerging and future communication networks: technologies, architectures, and tools: Semantics Communications for Future Wireless Communications
- IEEE SPS - EURASIP summer school on “Defining 6G: Theory, Applications, and Enabling Technologies”, Linköping, Sweden, August 29-September 1, 2022

# Tutorials and Workshop Activities

- Workshops:
  - 6G-life: Digital transformation and sovereignty of future communication networks; Virtual Workshop on B5G and 6G, Yonsei University, Sydney
  - CeTI: Tactile Internet with Human-In-The-Loop – Workshop on Robotics in Industry 4.0; Université Paris Saclay, France [online]
  - Globecom 2023 Workshop planned on Tactile Internet for Telepresence and Immersive Experiences
  - Workshop on Beyond URLLC Workshop: Research Trends and Open Challenges in Real-Time IoT toward 6G (BUW-6G) at the IEEE ICC 2023 (upcoming)
  - IEEE Future Networks World Forum 2022 Workshop on Incorporating Physical Layer Security in 6G Security Protocols.

# Publication Activities

- Special issues:
  - IEEE Internet of Things Journal “Age of Information and Data Semantics for Sensing, Communication and Control Co-Design in IoT”, Published Oct. 2021.
  - Frontiers in Communications and Networks, Special Issue on “Age of Information”
  - IEEE Communications Standards Magazine „Autonomous Networks: Opportunities, Challenges, and Applications”
  - IEEE Network „Zero Touch Networks: Opportunities, Challenges, and Potential Applications”
  - **Planned:** IEEE Network „Tactile Internet”

# Projects Worldwide

- Projects and other activities:

- Worldwide new TI centers/research groups are opening, e.g., Canada, Germany, UK, Abu-Dhabi, Lebanon, and the USA
- CeTI Summer School, Smart Textiles & Wearables, Sept 2021 – Planned for Sept 2022 as well!
- “Semantics-Empowered Communication for Networked Intelligent Systems”, Swedish Research Council (VR) , (2022-2025)
- “Information Handling in Industrial IoT”, ELLIIT, (2021-2025)
- ADAMO (Adaptive Fluid dynamics for Motorbikes)
- 5G-enabled Remote Robotics Control
- Resilience in Connected Worlds

# Engagement/Collaboration with other TC/Societies

- Engagement with other TCs, e.g., IoT, Ad Hoc & Sensor Networks, Information Infrastructure & Networking, Network Intelligence (ETI)
  - Online meetings on a new joint SIG on “IoT and the Tactile Internet” with the IoT-AHSN TC
- Engagement with IEEE ComSoc SCV chapter
  - Joint webinars and other activities
- Engagement with IEEE Computer Society SCV chapter
  - Joint webinars (e.g., NFIC – next frontiers in computing) and other activities
- Collaboration with IEEE Robotics and Automation Society Telerobotics TC
  - Standardization
  - Joint Special Issues, e.g., IEEE Transactions on Human-Machine Systems
  - Joint Workshops and/or webinars
  - Joint SIG?
- Discussion with other TCs from other IEEE societies ongoing
- Organization of online webinars in collaboration with the IEEE ComSoc SCV and IEEE Computer Society SCV chapters

# SIG Activities

- SIG: IoT in the Tactile Internet
  - Together with the IoT, Ad Hoc & Sensor Networks TC a cross-TC SIG has been formed on ""
  - The SIG activities will be coordinated by Dr. Sharief Oteafy ([soteafy@depaul.edu](mailto:soteafy@depaul.edu)) from DePaul University and Dr. Nikolaos Pappas ([nikolaos.pappas@liu.se](mailto:nikolaos.pappas@liu.se)) from Linköping University
  - An online kick-off meeting on June 23<sup>rd</sup>, 2021 with an invited talk on "Cyber-Physical-Social Systems (CPSS) in the 6G Era: From Tactile Internet to Internet of No Things" by Martin Maier
  - Please, reach out to Sharief Oteafy and/or Nikolaos Pappas in case of interest
- Other SIGs currently under discussion
  - Please, reach out to us in case you are interested to lead a SIG activity

# Webinar Series

- Started a webinar series with experts from diverse backgrounds
  - Stay tuned for updates!
- 6G and Onward to Next G: Virtual Immortality, Eternal Life, and Other Metaverse Pastimes
  - December 14, 2022, 18:00-19:00 (CEST)
  - Prof. Martin Maier
- Networked Cyber-Physical Systems for automotive applications
  - October 19, 2022, 18:00-19:00 (CEST)
  - Prof. Stefano Giordano
- From Network Softwarization to In-Network Computing
  - September 28, 2022, 18:00-19:00 (CEST)
  - Dr. Giang T. Nguyen

# Report on other Activities since ICC'22

- The website has been updated
  - A new tab on ,Best readings` has been added
  - List of various articles has been added
  - Hint to contact the officers for listing a related article
  - Meetings including slides and minutes are uploaded
  - Awards tab has been updated with the new awardees



# Report on Standards Activities

- IEEE:

- Both groups meeting monthly to discuss updates; additional ad-hoc meetings are schedule upon need
- IEEE P1918.1 working group on the Tactile Internet continues activities. Close to finalizing the draft standard, as is the last item needed before completion towards balloting. There have been recent significant contributions to the use cases and architecture within IEEE P1918.1.
- IEEE P1918.1.1 Haptic Codecs group has completed definition of its zero-delay and delay-bounded kinaesthetic codecs.

# ComSoC TC Restructuring

## TC Restructure (update & draft)

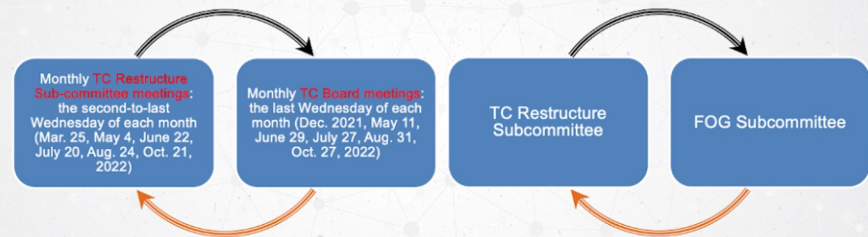
### Why Should We Restructure the TCs?

-  Lack of industry participation
-  Lack of diversity in YP & Students members
-  Lack of coordination to form SIGs
-  Lack of support for local chapters globally
-  Lack of support for standard development
-  Lack of educational services to members
-  Lack of guidelines in creating TC awards
-  Significant overlapping areas among some TCs

### What we've done in 2022?

#### Iterative Procedure

- Iterative procedure to involve TCs/ICs in the process:



**All meeting docs and slides are available at:**  
<https://tc.boards.comsoc.org/meeting-documents/>

**Your feedback is very important to us!**

Please send your comments to  
Shiwen Mao, TC Board Director, E-mail: [smao@ieee.org](mailto:smao@ieee.org)  
Wei Zhang, VP TEA, E-mail: [weizhang@ieee.org](mailto:weizhang@ieee.org)

# Planning Activities for 2022

- Increase #membership and participation
- Increase #tutorials, special issues, distinguished lecturers
- Involve our members from various regions
- Open calls for participation to the TI TC activities will be continued
- Additional special interest groups to be launched
- Engagement with other TCs and societies
- Additional (inter-disciplinary) webinars will be organized
- Social media engagement

# Summary of Call for Action/Inputs

- Input for newsletter. Please, reach out to [Guodong.Zhao@glasgow.ac.uk](mailto:Guodong.Zhao@glasgow.ac.uk)
- Updates on activities, e.g., publications, webinars, workshops, tutorials, SIs, SSs, ...
- Engagement with your local chapters
- Call for invited talks for the webinar series!

# Other Business

- Total number of subscribers to the mailing list  
~210□
- Website administration
- Publicity activities, e.g., social media
- Suggestions for improvements?
- Further ideas?