

5G Tactile Internet: An Application for Industrial Automation

Theme The Internet, which was created to provide resilient and interoperable communication across the globe, evolved to transport a vast amount of content with which to enrich our real-life experience. Pervasive ultra-broadband, programmable networks, and cost reduction of IT systems are paving the way to new services and commoditization of telecommunications infrastructure while lowering entrance barriers for new players and giving rise to new value chains. Today, it provides a depth of information and social sophistication that rivals the real world. The Tactile Internet, the next evolutionary step, will enable remote, real-time physical interaction with real and virtual objects, creating a two-way interactive experience in which boundaries between the real world and virtual world will blur. Examples include Tactile Internet of Things, Industry 4.0, Cloud Robotics, and Artificial Intelligence. 5G will both exploit and accelerate this transformation. Differentiated from 4G, benefits offered by 5G is much more than the increased maximum throughput. It aims to involve and benefit from many current technical advances including Industrial Internet of Things (IIoT). With the technological advancements in IIoT of today, stage is being set for the emergence of the Tactile Internet in which ultra-reliable and ultra-responsive network connectivity will enable it to deliver real-time control and physical tactile experiences remotely. As per ITU, the Tactile Internet will add a new dimension to human-machine interaction by delivering a low latency enough to build real-time interactive systems. Further, the Tactile Internet has been described as a communication infrastructure combining low latency, very short transit time, high availability and high reliability with a high level of security. Associated with cloud computing proximity through e.g. mobile edge-clouds and combined with the virtual or augmented reality for sensory and haptic controls, the Tactile Internet addresses areas with reaction times in the order of a millisecond.

Because the Tactile Internet will be servicing really critical aspects of society, it will need to be ultra-reliable, with a second of outage per year, support very low latencies, and have sufficient capacity to allow large numbers of devices to communicate with each other simultaneously and autonomously. It will be able to interconnect with the traditional wired Internet, the mobile Internet and the IIoT thereby forming an Internet of entirely new dimensions and capabilities. State-of-the-art fourth generation (4G) mobile communications systems do not largely fulfil the technical requirements for the Tactile Internet. Therefore, fifth generation (5G) mobile communications systems are expected to underpin the Tactile Internet at the wireless edge.

To this end, this special issue cordially invites researchers to share latest research insights and present key and emerging results on the Tactile Internet for industrial automation, including industrial protocols, wireless techniques, new hardware designs, and novel data processing.

Topics: Topics of Interest include (but not limited to):

- PHY/MAC challenges for Tactile Internet
- Novel latency mechanism for Tactile Internet
- Edge-computing and edge-intelligence
- Network function virtualization
- Multi-service network slicing
- Cloud and Fog technologies
- Network functional decomposition
- Low-latency and high-availability protocol design
- Tactile Internet use-cases and scenarios
- Energy efficient Tactile communication
- Wireless robotics and control systems
- Industrial communication systems
- Prototypes, test-beds, and demos
- Silicon systems and hardware revolutions
- Tactile Internet standardization
- Error-resilient data compression
- Big-data and machine learning

Papers discussing application areas and the resulting new developments at the 5G Tactile Internet IIoT mobile technologies are especially welcome. All contributions must focus on the use of 5G Tactile Internet for Industrial automation.

Manuscript Preparation and Submission

Follow the guidelines in “Information for Authors” in the IEEE- IES website: <http://www.ieee-ies.org/pubs/transactions-on-industrial-informatics> . Please submit your manuscript in electronic form through Manuscript Central web site: <https://mc.manuscriptcentral.com/tii> . On the submitting page #1 in popup menu of manuscript type, select: SS on **5G Tactile Internet: An Application for Industrial Automation**.



CALL FOR PAPERS



for Special Section on

Submissions to this Special Section must represent original material that has been neither submitted to, nor published in, any other journal. Regular manuscript length is 8 pages.

Note: The recommended papers for the section are subject to final approval by the Editor-in-Chief. Some papers may be published outside the special section, at the EIC discretion.

Timetable:

- **Manuscript Submission:** September 30, 2018 **(Extended to November 30, 2018)**
- **First Revisions/Reject Notification:** November 30, 2018
- **Notification of Acceptance:** January 31, 2019
- **Final Manuscript Due:** February 28, 2019
- **Publication:** May 2019

Guest Editors:

Shahid Mumtaz, Instituto de Telecomunicações, Portugal, smumtaz@av.it.pt

Anwer Al-Dulaimi, EXFO, Canada, anwer.al-dulaimi@exfo.com

Ai Bo, Beijing Jiaotong University, Beijing, China, boai@bjtu.edu.cn

Kim-Fung Tsang, City University of Hong Kong, ee330015@cityu.edu.hk