Learning from the sky: robot-aided mapping, radio access and localization

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Abstract

The use of flying robots (drones) carrying radio transceiver equipment is the new promising frontier in our quest towards ever more flexible, adaptable, and spectrally efficient wireless networks. Beyond obvious challenges within regulatory, control, and battery life, the deployment of autonomous flying radio access network (Fly-RANs) also comes with a number of exciting new research problems at the core of which lies the issue of autonomous real-time placement of the drones in a way that can guarantee user and network performance. We show recent results for this problem in scenarios as diverse as IoT monitoring, mobile broadband access, and ad hoc connectivity. In this talk we also show how radio-aided autonomous robots can also be used for mapping and user localization purposes. Our approaches lie at the cross-roads between machine learning, signal processing and optimization. Early-stage practical realizations are demonstrated.

Bio

David Gesbert (IEEE Fellow) is Professor and Head of the Communication Systems Department, EURECOM. Prior to EURECOM, he was with the University of Oslo and before this he was a founding engineer of Iospan Wireless Inc, a Stanford spin off pioneering MIMO-OFDM (now Intel). D. Gesbert has published about 300 papers and 25 patents, some of them winning the 2015 IEEE Best Tutorial Paper Award (Communications Society), 2012 SPS Signal Processing Magazine Best Paper Award, 2004 IEEE Best Tutorial Paper Award (Communications Society), 2005 Young Author Best Paper Award for Signal Proc. Society journals, and paper awards at conferences 2011 IEEE SPAWC, 2004 ACM MSWiM. He has been a Technical Program Co-chair for ICC2017. He was named a Thomson-Reuters Highly Cited Researchers in Computer Science. In 2015, he received the ERC Advanced grant "PERFUME" on the topic of smart device Communications in future wireless networks. He is a Board member for the OpenAirInterface (OAI) Software Alliance. Since early 2019, he heads the Huawei-funded Chair on Advanced Wireless Systems Towards 6G Networks. In 2020, he was awarded funding by the French Interdisciplinary Institute on Artificial Intelligence for a Chair in AI for the future IoT.