Dr. Michelangelo Villano

Term: 2025-2026

Michelangelo Villano (Senior Member, IEEE) received the B.Sc. and M.Sc. degrees (Hons.) in telecommunication engineering from the Sapienza University of Rome, Rome, Italy, in 2006 and 2008, respectively, and the Ph.D. degree (Hons.) in electrical engineering and information technology from the Karlsruhe Institute of Technology, Karlsruhe, Germany, in 2016.

From 2008 to 2009, he was a Young Graduate Trainee with the European Space Research and Technology Center, European Space Agency, Noordwijk, The Netherlands, where he developed processing algorithms for ice sounding radar. Since 2009, he has been with the German Aerospace Center (DLR), Microwaves and Radar Institute, Weßling, Germany, where he developed, among others, the staggered synthetic aperture radar (SAR) acquisition mode that allows imaging a wide swath with high resolution through continuous variation of the pulse repetition interval. Since 2019, he has been the Head of the NewSpace SAR Research Group, where he leads the development of cost-effective and multi-static SAR concepts for frequent and enhanced Earth monitoring. In 2017, he was a Visiting Research Scientist with the Communications, Tracking, and Radar Division, NASA Jet Propulsion Laboratory, Pasadena, CA, USA, where he adapted the staggered SAR mode to the NASA-ISRO SAR (NISAR) mission, for which staggered SAR is currently being considered as the baseline acquisition mode. Since 2019, he has also been a Lecturer with Ulm University, Ulm, Germany. He has authored or coauthored over 30 peer-review journal papers, a book chapter, and over 80 articles in international conference proceedings. He holds 11 patents in the field of SAR.

Dr. Villano was a recipient of the First Place Student Paper Award at the European Conference on Synthetic Aperture Radar (EUSAR), Berlin, Germany, in 2014, the IEEE Geoscience and Remote Sensing Society Letters Prize Paper Award in 2015 and 2017, the Student Paper Award at the Asia–Pacific Conference on Synthetic Aperture Radar, Marina Bay Sands, Singapore, in 2015, the DLR Science Award in 2016 and 2023, the Award as Young Scientist of the Foundation Werner von Siemens Ring in 2017, the ITG Dissertation Award in 2017, and the Best Paper Award at the German Microwave Conference 2019. In 2022, he was awarded a Starting Grant by the European Research Council (ERC). He is co-chair of the Working Group on “Active Microwave: Radar and SAR” of the IEEE Geoscience and Remote Sensing Society’s Technical Committee on Instrumentation and Future Technologies. He serves as an Associate Editor for the IEEE Transactions of Geoscience and Remote Sensing. He served as a Technical Program Chair for the EUSAR 2024.

Topic 1: Spaceborne Synthetic Aperture Radar (SAR) Concepts Based on Small Antennas

Abstract: The antenna aperture size has a major impact on the performance of synthetic aperture radar (SAR) systems. This lecture reviews some relevant design aspects, which relate resolution, coverage, noise level and ambiguities, and explores the opportunities for using small antennas both on single satellites and in clusters of small satellites. Trade-offs related to the length-to-height ratio and the selection of the orbit height are addressed. Ambiguous and waveform-encoded SAR modes for dedicated applications are introduced and discussed. Recently developed processing techniques for the generation of highly accurate digital elevation models from sets of noisy and ambiguous SAR images are presented along with experimental demonstrations.