

Bio:

Marek Jasinski, (S'00-M'05-SM'12). MSc, PhD degrees from the Faculty of Electrical Engineering at Warsaw University of Technology (WUT 2000, awarded by IEEE PS, and Association of Polish Electrical Engineers; 2005 awarded by ABB respectively). Habilitation (D.Sc. in 2018). Professor position at WUT since 2019. His research focuses on the control of renewable energy sources and drives. He was with the Aalborg University, VESTAS Power Program as a consultant (2009). He had an internship at RWTH-Aachen University - E.ON Energy Research Centre Power Generation and Storage Systems in Germany (2013/2014). In 2020, he visited A&M Texas University at Qatar, Smart Grid Centre as a Temporary Associate Research Scientist. Since 2021 he is a Head of Industrial Electronics Division at WUT. His research is focused on the control of Energy processing by means of Power Electronics Intelligent Converters (EPEIC) under distorted voltage and higher grid impedance as well as on optimizing the topology, control, and reliability of EPEIC. Chair of the IEEE IES Student and Young Professional Activity Committee (received IEEE YP Hall of Fame Award 2019). Chair of the IES - Power Electronics Joint Chapter IEEE PS (2008 – 2012). IES and PS AdCom Member (since 2008). He is an Associate Editor in IEEE Industrial Electronics Magazine (since 2016), IEEE Journal of Emerging and Selected Topics in Industrial Electronics (since 2019), and IEEE IES Industrial Electronics Technology News (since 2020). He has received several WUT Rector's Awards and other recognitions for his outstanding research results including the first prize for scientific and technical achievements of the Prime Minister (Poland) in 2017. He supervised more than 25 students and most of them work in field of power electronics.

## **Implementation of Power Electronics Converters in Smart Energy Processing**

Abstract:

A personal information-processing device such as a Personal Computer surprises nobody. All its varieties, such as smartphones are commonly used. Automation and robotics are at the initial stage of its heyday. Such advanced technology is also beginning to enter other basic areas of life, such as agriculture, education, medicine, including rehabilitation, and hopefully in case of physical rehabilitation of people in a post-traumatic coma. Modern technologies such as the IoT, the Internet of Energy, Industry 4.0, Smart Grids including AC and DC microgrids or artificial intelligence, etc. are dynamically developing. However, a technological gap can be noticed here, especially in the third world or underdeveloped countries where electrical infrastructure is weak or does not exist at all. Namely, there is not an inexpensive personal device for transforming and storing energy, capable of driving an electric machine, which is the driving force behind the development of our civilization. Such a device should be adapted to many tasks, from basic ones, i.e. obtaining and storing energy from renewable sources, and transforming it into a useful form through compatibility with the concept of the Internet to artificial intelligence and human-machine system. The development of a series of personal Intelligent Power Electronic Converters with a drive and energy storage will make it possible to use it in many places and areas of life. Thanks to a power electronics, it will be possible to provide electricity to the neediest in third world countries, as well as to use it in exoskeletons or physical rehabilitation of people in a post-traumatic coma. Power

Electronics Converters with energy storages can be compared to the digestive system of our body. Thanks to it, we will obtain, process and store an energy, and if necessary, thanks to advanced data collection, sensing, and control methods, we will drive an electric machine that can, depending on the needs, pump water from a deep well during a drought in Africa or control the exoskeleton arm supporting a movement of the limb during rehabilitation.