

2nd World Conference on **AEROSPACE ENGINEERING**

August 18-19, 2022| Webinar

Attitude control of a small spacecraft using Reconfigurable Embedded Magnetorquers

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The nanosatellite market is rapidly growing for scientific and commercial applications. The main reason is the availability of low-cost commercial off-the-shelf components and already-developed subsystems in the market. This evolution also enabled many universities and small and medium-sized enterprises (SMEs) to develop their own satellites. The problem with small satellites is the available space and weight constraints for housing a large number of required subsystems, such as power, attitude determination and control, telecommunication, and payload. The ultimate solution is to make all subsystems smaller and lighter. Attitude control system orientate the satellite in space to rotate solar panels towards Sun and antennas towards ground station. Normally permanent magnets, reaction wheels, and magnetic rods are used for this purpose, but their price, weight, and size make them incompatible with small satellites. In this conference, we are going to discuss innovative embedded attitude actuators called embedded magnetorquers, which are inserted in the internal layers of the power management PCB (printed circuit board) of small satellites. The resultant system is very light, reconfigurable and occupies no extra space on the spacecraft.

Biography

Anwar Ali received his M.S. degree in Electronic Engineering and Ph.D. degree in Electronic and Communication Engineering from Politecnico di Torino, Italy in 2010 and 2014, respectively. During PhD, he worked on AraMiS (Italian acronym stands for modular architecture of small satellites) project which was a joint venture between Politecnico di Torino, MIT (Boston, USA), Spin Electronics and NeOhm. Since March 2019, he is working as Associate Professor at the School of Information Science and Technology, Zhejiang Sci-Tech University, Hangzhou, China. He has published more than 40 research papers in renowned journals and conferences around the globe and has completed 5 research projects as Principle Investigator (PI). He has also completed 2 projects as co-PI and has worked in many projects as group member. His research interests include power electronics, analog and mixed signal circuits, RF/microwave front end & antenna design, small satellites (power management, attitude determination & control systems), thermal modeling & thermal analysis of aerospace systems and EMI & EMC issues in electronic systems.