



## *The 16th International Conference on Intelligent Robotics and Applications (ICIRA 2023)*

*July 5-7, 2023 in Hangzhou, China*

### **ICIRA 2023 Special Session Proposal**

#### **Title of the Proposal: Dielectric elastomer actuators for soft robotics**

#### **Technical Outline of the Session and Topics:**

##### Outline of the Session:

Due to their large deformation, high-energy density, and fast response speed, dielectric elastomer actuators are a family of artificial muscles that have shown emerging applications in the field of soft robotics. In the past two decades, dielectric elastomer actuators with different configurations (planar, conical, staked, minimum energy structure, etc.) have been proposed to generate different actuations, such as elongation, contraction, bending and twisting; enabling the design of novel soft robots, including climbing robots, flying robots, deep-sea robots and wearable robots. However, dielectric elastomer actuators are suffering from significant nonlinearities. Firstly, the actuation of dielectric elastomer actuators comes from the nonlinear electromechanical response that not only relies on the square of the voltage, but also depends on own hyperelastic deformation. Moreover, the inherent viscoelasticity leads to both creep and hysteresis. Creep is one kind of slow-time effect and only dominates the dynamic response during the firstly few cycles and then becomes ignorable. The hysteresis is an asymmetric, multi-valued and rate-dependent nonlinearity that exists during the whole response. As a consequence, the design, dynamic modeling and precise control of dielectric elastomer actuators are huge open challenge. This session aims to highlight recent progress in design, modeling and control of dielectric elastomer actuators and inspire relevant research interests.

##### Topics of the Session:

- *Topic 1: Dielectric elastomer actuator*
- *Topic 2: Dynamic modeling*
- *Topic 3: High-precision tracking control*
- *Topic 4: Optimization design*

#### **Contact details of the Session Organizers**

- *Organizer 1: Assoc. Prof. Jiang Zou, Shanghai Jiao Tong University;*
- *Organizer 2: Assoc. Prof. Feifei Chen, Shanghai Jiao Tong University;*
- *Organizer 3: Assoc. Prof. Chongjing Cao, University of Chinese Academy of Science;*

- *Organizer 4: Assoc. Prof. Wenbo Li, Tongji University;*
- *Organizer 5: Asst. Prof. Wenjie Sun, Xi'an University of Technology*