

DAGSI Research Topic (Renew)

1. **Research Title:** Elastomeric Architectures for Enhanced Survivability of Electronic Systems
2. **Individual Sponsor:** List the AFRL research topic sponsor's contact information

Dr. Abigail Juhl, AFRL/RXAS
AFRL/RXA, 2179 12th Street
Wright-Patterson AFB, OH 45433
Abigail.juhl.1@us.af.mil

3. **Academic Area/Field and Education Level**

Mechanical Engineering, Electrical Engineering, Physics, Materials Science, or related field (MS or PhD)

4. **Objectives:** Develop design rules and novel geometric architectures for lightweight electronics packaging that have extreme, localized damping for shock and broadband energy attenuation to improve electronics sustainability and resilience when subjected to harsh mechanical environments.
5. **Description:** Electronic devices continue to be the backbone of the intelligence, surveillance, reconnaissance (ISR) and communications missions of the USAF and consequently experience a diverse range of static, vibrational and impact loads when in service. Recent advances in flexible hybrid electronics (FHE) have broadened the design space of electronics packaging through the introduction of soft, elastomeric materials and additive manufacturing techniques that enable compliant and complex form factors. 3D printed elastomeric architectures have been demonstrated to possess novel, reversible energy storage and vibrational damping behaviors, however the design rules, analysis techniques and experimental validation methods needed to tune these behaviors for specific FHE applications is lacking. The project will focus on the identification of building block architectures with inherent mechanical instabilities and/or nonlinear mechanical behaviors that enhance the attenuation the broad frequency stimulus of impact loading or that selectively reduce the sensitivity of the device to a target vibrational frequency. System-level packaging strategies that enable spatially graded energy storage/dissipation across the electronic device or provide specific frequency damping at multiple locations within the device are also desired.
6. **Research Classification/Restrictions:** Unclassified and unrestricted. Eligible for Public release.

7. **Eligible Research Institutions:** Indicate to what organizations this topic should be provided



DAGSI (Wright State University, AFIT, Ohio State University, University of Dayton, Miami University, Ohio University, University of Cincinnati) NOTE: Topics submitted to DAGSI must be approved for public release. Need PA Approval #



AFIT (only)



USAF A (only)

If you are submitting a topic for the USAFA, indicate if you are also interested in sponsoring a USAF Cadet in summer 2015 (Average cost for USAF Cadet for 33 days is \$5000)



Yes



No