

1. **Research Title:** Intelligent Power Systems for Next Generation Aircraft
2. **Individual Sponsor:**

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

Electrical Engineering, Computer Engineering, Materials Engineering, and Physics (MS or PhD level)

4. **Objectives:** Develop control methods and optimize strategies to improve power quality and system stability of distributed power systems. Create real time simulation models to emulate the behavior of electrical and mechanical system onboard an aircraft. Enhance DC Arc detection, localization, and isolation techniques. Improve power electronics and associated control techniques for 270 Vdc / ± 270 Vdc systems. Investigate the long-term reliability of silicon carbide (SiC) and gallium nitride (GaN) power transistors. Mitigate the effects of electromagnetic interference (EMI) generated by switched-mode power supply systems.
5. **Description:** DC aviation Electrical Power Systems (EPS) provide many advantages, particularly in the area of weight savings and increased efficiency. Advances in power electronics, energy storage, and communication and control theory create new opportunities in the design of intelligent power systems (IPS) for mission critical purposes. IPS can increase system efficiency, improve safety, and enhance the management, stability and quality of the onboard EPS.

Current research focuses on the development of IPS for aviation applications. Research interests are: generator/energy storage design and control strategies; stability analysis, control strategies, and optimization techniques for distributed power systems; mechanical/electrical modeling and simulation; Hardware in the Loop (HIL) strategies including Control HIL and Power HIL; DC arc fault detection, localization, and isolation; power electronics hardware and associated control techniques; characterization, and reliability analysis of wide bandgap semiconductors; conducted and radiated electromagnetic interference (EMI).

6. **Research Classification/Restrictions:** Open to U.S. citizens only. Some aspects of this research may include ITAR restrictions.
7. **Eligible Research Institutions:**

DAGSI (All DAGSI Universities).