

1. **Research Title:** Experimental Turbine Aerodynamics and Heat Transfer

2. **Individual Sponsor:**

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3. **Academic Area/Field and Education Level:** Mechanical and Aerospace Engineering (MS and/or PhD level)

4. **Objectives:** The objective of this DAGSI project is to conduct research related to unsteady fluid dynamics, turbine cooling and advancing flow control methods by leveraging machine learning systems to achieve tangible engineering goals associated with complex flow interactions in turbines with thickened trail edges to inform design efforts and develop future aircraft systems. Research can be focused on better fundamental understanding of relevant experimental flows through the use of data assimilation, transient IR or modal analysis techniques to distill complex experimental data and understand its dynamical behavior.

5. **Description:** Turbines in a gas turbine engine are often among the first components designed and released to production due to their complexity and long lead times. Based on recent technology developments, ensuring turbine designs offer stable efficiency while remaining at a viable cost to the warfighter requires much finer understanding of sensitivities that influence both the performance and cost of turbines.

Current research is focused on understanding the trade space surrounding turbine design geometric complexity and aerodynamic performance through detailed experimental flow field measurements of flow control techniques applied within dynamic flow environments. Detailed experimental measurements can be made using the [Air Force Research Laboratory Aerospace Transonic Turbine Cascade or Elevated Temperature Active Cooling Research facilities](#). The facilities are equipped with multiple advanced diagnostic tools; thermography, high speed imaging techniques, a suite of steady and unsteady instrumentation and blade rapid prototyping are available.

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

7. **Eligible Research Institutions:** ABET accredited universities within the US