RX15-17

1. **Research Title:** Autonomous Research Systems Planning and Control
2. **Individual Sponsor:** List the AFRL research topic sponsor's contact information

   Dr. Benji Maruyama, AFRL/RXAS
   2941 Hobson Way
   WPAFB, OH 45433-7333
   Benji.Maruyama@us.af.mil

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

   Computer Science/Engineering, Robotics, Operations Research, Applied Mathematics and related fields (BA/BS, MS or Ph.D. level)

4. **Objectives:** To develop new methods to plan and execute experiments for autonomous research systems. To implement artificial intelligence/machine learning approaches to materials research problems such as synthesis of carbon nanotubes, image segmentation and 3D microstructural tomography. To develop means of extracting or aiding in the extraction of underlying chemical and physical phenomena from large sets of experiments. To develop strategies for mutual interaction between Autonomous Research Systems and human researchers that improve productivity.
5. **Description:** The proposed project includes basic research to understand and develop autonomous research systems, broadly defined as systems which plan, execute, and evaluate experiments in continuous closed loop fashion equivalent to autonomous robots. We are developing the ability to rapidly and autonomously perform experiments which converge on targeted outcomes and aid in the development of the fundamental underlying physical and chemical phenomena involved in the materials systems. Broad collaborations between materials researchers to implement autonomous research systems are critical to our success.
6. **Research Classification/Restrictions:** This research is mostly at the basic level but may include ITAR restrictions.
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 #**

   88 ABW-2014-3747