

Attachment 1 – Research Topic Template

RHIS-3

1. **Research Title:** Development of a Test Platform for Electrochemical Sensor

2. **Individual Sponsor:**

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

Electrical Engineering and Computer Science/Sensor Signal Development and Platform Miniaturization

BS Level

Previous work with gas sensors and Labview software is strongly desirable. Previous work with visualization, machine learning algorithms and software design is strongly desirable.

4. **Objectives:** The objectives of this research include 1) assisting in modifications of a fully functioning altitude chamber for evaluating various gaseous compound sensors 2)interfacing the chamber with a variety of peripheral electronic systems 3) calibrating these sensors to their specified target 4) testing these sensors in altitudes ranging from 1000 to 60000 feet and 5) assembling and aiding in the miniaturization of the best sensors and their corresponding integrated circuits into a flyable form factor for monitoring breathing air quality.

5. **Description:** Multiple systems exist that provide feedback on the status of aircraft systems to pilots and ground crews. Few systems on the other hand monitor the health of the operator and what they may be exposed to. A suite of commercial off the shelf (COTS) sensors exists to detect and quantify compounds of toxicological relevance. There is potential to incorporate these COTS sensors into a form factor that would readily plug into the aircrew breathing air supply. Unfortunately little to no research has focused on the effects of altitude on these sensors. Their viability as aircraft air quality monitors is unknown. By assembling an in house altitude chamber we can acquire these affordable, optimized COTS products and test them in Air Force relevant environments. This allows us to trouble shoot many altitude associated problems before flight testing and certification commences. We can thus address these issues in a controlled laboratory environment in close proximity to the appropriate equipment required to modify them. Overall objective sought is the fabrication of laboratory demonstration prototype orthogonal/multi-modal sensors for determination of air quality in military aircraft.

6. **Research Classification/Restrictions:** Current investigators assigned to project carry a Confidential or higher security clearance. Applicants will be subjected to a full background check to obtain these clearance levels.

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

AFRL FY14 Research Topic Template -DAGSI -AFIT - USAFA

DAGSI must be approved for public release. PA Approval # 88ABW-2014-2960, 711
HPW/XPO 17 June 2014

AFIT (only)

USAFA (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