Attachment 1 – DAGSI Research Topic Template

1. **Research Title:** Nanomaterials for Brain Function Activation
2. **Individual Sponsor:**

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

   Chemistry, engineering, biology (BS, MS or PhD level)

4. **Objectives:** Synthesis of nanomaterials for remote activation of neurons with magnetic fields.

5. **Description:** Cognitive overload, fatigue and stress affect Airman and Guardians (A/G) in the different environments they operate. These stressors activate different mechanisms that affect brain function and result in compromised performance. Technologies that can sense brain activity and respond to the effects of these stressors would provide an effective means to prevent performance decay and maintain alert/readiness. This topic is focused on the use of nanomaterials made of soft components (nucleic acids, peptides, etc.) or metals (gold, iron oxide, etc.) or the combination of both to be interfaced with neurons and control their function. Specific challenges to be addressed are: methods to safely deliver the nanomaterials to the brain, control over spatial resolution of the stimulation and the use of non-invasive methods to activate the nanoparticles. The end goal of this topic is to provide a non-invasive means to activate/deactivate or enhance brain function as needed in a closed-loop system.

6. **Research Classification/Restrictions:** Unclassified

7. **Eligible Research Institutions:** The Ohio State U., Wight State U., U. of Cincinnati, U. of Dayton, Ohio U., Miami U.

NOTE: Topics submitted to DAGSI must be approved for public release. The material was assigned a clearance of CLEARED on 23 Sep 2024, AFRL-2024-5223.