

Attachment 1 – DAGSI Research Topic

1. **Research Title:** Geopositioning algorithms for hypersonic platforms
2. **Individual Sponsor:**

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3. **Academic Area/Field and Education Level**
Computer Science/Autonomous Vehicle Geopositioning, Hypersonic Flights (BS level)

4. **Objectives:**

The primary objective is to lead to the development of geo-positioning algorithms for platforms with hypersonic speeds in GPS denied/degraded environments. The sensing scenario of interest is a passive electro optical sensor flying at hypersonic speeds. Exploring ideas such as the replacement of a typical photogrammetric pipeline (e.g., detecting and matching landmarks) with an alternative algorithm (e.g., a tracking algorithm) would be of interest. Additionally, utilizing a fast algorithm such as a shallow neural network (e.g., to estimate optical flow with a single forward pass) would also be of interest. A secondary goal of collecting new aerial datasets from drones would also be of interest.

5. **Description:**

Possible characteristics of a new hypersonic geo-positioning algorithm might include: region tracking, using preconfigured features, measuring the optical flow of landmarks, estimating optical flow vectors, and outputting the displacement measurement in pixels counts. Additionally, estimation for tracking must be done quickly so using algorithms based upon shallow networks may be advantageous. Using widely available public benchmark datasets such as the KITTI dataset would also be advantageous. Additionally making use of low-cost relevant hardware is also of interest (e.g. small payload appropriate for a drone).

6. **Research Classification/Restrictions:**

The researchers working on the project will be US citizens.

7. **Eligible Research Institutions:** Indicate to what organizations this topic should be provided
The Ohio State University.