FY23/24 DAGSI Research Topic

1. **Research Title:** Target Detection and Classification for Modality-Agnostic 3D Modelling
2. **Individual Sponsor:**

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

    Electrical Engineering (MS or PhD level)
    Computer Engineering (MS or PhD level)
    Computer Science (MS or PhD level)
    Applied Mathematics (MS or PhD level)

4. **Objectives:** Develop theoretical techniques to perform detection and classification for general 3D reconstructions/models, independent of sensing modality.
5. **Description:** Detection and Classification algorithms, particularly in 2D, heavily leverage the imaging physics from each sensing modality as operating conditions when evaluating their metrics. Point sets (or point clouds) are typically considered a viable 3D representation of objects, which are typically compiled by scanning or other comparable reconstruction techniques. However, these are all subject to the particular sensing modality of each technique, which can vary wildly (e.g., LIDAR, EO, and RF all have unique considerations). Current implementations, such as Pointnet and Pointnet++, are able to perform feature learning on point sets, but all fail at capturing local structure and generalizing to complex scenes. This project aims to enhance the state-of-the-art by introducing the ability to capture local structures, conduct feature learning based on these 3D local structures, and then compare the improved performance to current approaches.
6. **Research Classification/Restrictions:** Unclassified
7. **Eligible Research Institutions:** All research universities in the state of Ohio

PA Approval #: