1. **Research Title:** Multipath Detection and Estimation
2. **Individual Sponsor:** Charles Berdanier, AFRL/RYMP, 2241 Avionics Circle, WPAFB, OH 45433-7333
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3. **Academic Area/Field and Education Level**:

Electrical Engineering/ Digital Signal Processing and Optimization (MS or PhD level)

4. **Objectives**:

Develop computationally efficient estimates of multiple multipath signals present in receiver bandwidths. Starting with existing linear models of multipath with theoretical justification, extend these models from linear to non-linear. Consider scenarios for pulsed, multicarrier and OFDM signals.

5. **Description**:

If we consider a system of signals present at a receiver, the signals are bounded by the receiver bandwidth and contain the signal of interest, interfering signals and noise. The signal of interest may consist of a direct signal from transmitter to receiver (the "direct path") and one or more indirect signals (the "multipath"). It is in our interest to isolate the direct path and multipath from the noise and interferers. While the direct path signal may not be present due to blocking features, the multipath will be observable. This research will explore methods to exploit multipath to improve signal detection and estimation performance for diverse RF Sensing applications. These applications include source localization, radar, communications, and biomedical sensing. In particular, multipath consists of more than one signal with varying amplitude and time delay relative to the direct path. These multipath signals sum together to constructively or destructively affect the performance of the direct path. The ability to detect and estimate several components of the multipath signal is therefore important for overall system performance.

6. **Research Classification/Restrictions**: Unclassified
7. **Eligible Research Institutions**: DAGSI-SOCHE members