# Oral Qualifying Exam Proposal

Connor H. McCurley
Electrical and Computer Engineering
University of Florida, Gainesville
FL 32611, USA*

August, 2019

## Research Questions

**Goal: Manifold Learning for Multi-sensor, Multi-resolution Fusion with Imprecise Data**

1. **Manifold learning from imprecise data**
   - Multiple instance learning for manifold construction
   - Extend supervised manifold learning methods to MIL framework
   - "Best" way to construct the manifold (AE, SOM, classical methods, graph-based)
   - Outlier/ adversarial robustness
2. **Multi-sensor fusion using manifolds**
   - Can we intelligently combine manifolds for sensor fusion? (Extend RQ1 for multiple sensors)
   - Incorporation of context-dependent information
   - Fusion using manifolds (Combination of manifolds, joint-manifold construction)
   - General fusion approaches (HME, Choquet integral, HMM, alignment of data, fusion of raw data)
   - Dissimilarity metrics (Measure similarity of manifolds/ How to determine placement of sample in test)

## Datasets

- DSIAC (Visible + MWIR)
- Plant data (Chris Topp, single-source, Can use for maifold methods)
- Hyperspectral + LIDAR
- Landmine (Not public release)
- Simulated

*Put something here