Proposed GMU-Polito Collaboration Project

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Technical Problem:

Video data can provide dense 2D displacement measurements, but these measurements are noisy (uncertain) and sensitive to algorithmic hyperparameters. Sensor installations (ie. strain gauges) have lower noise, but require dense installations to sufficiently quantify displacements.

Research Question:

How can we combine image (video) based displacement measurements with traditional sensor installations to better quantify strain and displacement fields?

Proposed Technical Approach:

- Evaluate two forms of data fusion to combine these sensor measurements
  - Gaussian process interpolants: kriging, Bayesian filtering
  - Machine learning: shallow and deep neural networks
- Two rounds of experiments
  - Simple structures with well constrained 1D load-displacement relationships
  - More complex structures with 2D load-displacement relationships

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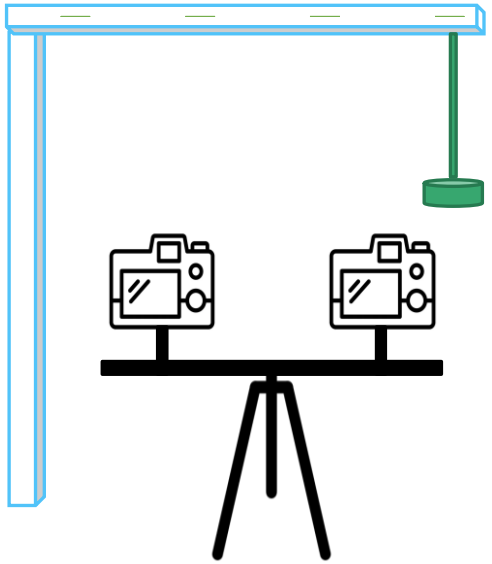
Experimental Plan

At GMU (2 to 4 week research visit):

- Simple structures
  - Cantilever beam
  - Simple beam
  - Static & dynamic testing
- Data will be used for algorithm prototyping



AESDO Lab (2-4 week visit):

- Full-scale static loading test
- Induce 2D/3D strain fields
- Adapt initial algorithms to handle multi-dimensional strain and displacement fields

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