DEVELOPMENT OF ELECTRICAL IMPEDANCE TOMOGRAPHY DATA ACQUISITION SYSTEM AND DEEP LEARNING BASED RECONSTRUCTION ALGORITHMS FOR SPATIAL DAMAGE DETECTION

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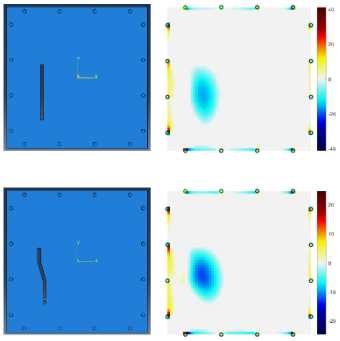
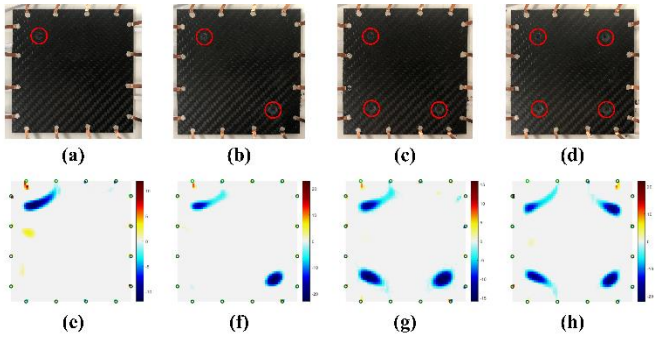
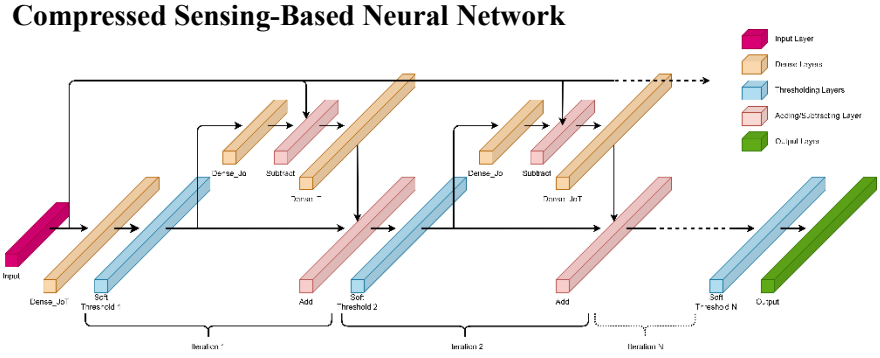
ABAQUS Simulations for EIT



Spatial Damage Detection w/ Carbon Fiber



Compressed Sensing-Based Neural Network



Custom EIT DAQ System

Electrical impedance tomography (EIT) is a non-destructive, non-invasive, and non-radioactive imaging technique used for reconstructing the internal conductivity distribution of a sensing domain. Performing EIT often requires large, stationary benchtop equipment that can be expensive and impractical. Other researchers have attempted to make portable EIT systems, but they all rely on external computation for image reconstruction/data analysis. We have developed a low-cost, portable, and wireless EIT data acquisition (DAQ) system that is capable of independently performing image reconstructions on-board. Our system can also support a wide range of sensing materials such as electrically conductive UHMWPE, TPU, and carbon fiber reinforced polymers. Since EIT reconstruction algorithms can be extremely computationally intensive, we have also developed an alternative deep-learning algorithm that leverages the compressed-sensing (CS) technique to strategically train a neural network.

A Thesis Defense in Mechanical Engineering

California Polytechnic State University, San Luis Obispo

Monday, March 11, 2024, at 1:00PM

Building 13-117, or Zoom: https://calpoly.zoom.us/j/5051110827

Meeting ID: 505 111 0827