

## Research Interest

Random Vibrations Modeling and Control, Ultrasonics, Uncertainty Quantification, Intelligent Structures, System Identification, Probabilistic Structural Health Monitoring (SHM), Probabilistic Mechanics, Stochastic Signals and Systems, Wave Propagation, Lithium-ion Battery Modeling, Fracture Mechanics, Surface and Inter-facial Phenomena, Nano Mechanics, Bio-Composites

## Academic Responsibilities

ME 451: Automatic Controls: This is a senior-level control system engineering course. The focus of the course is to teach students how to design and implement a feedback control system.

## Professional Experience

### Post-doctoral Research

Jun 2022- July 2024

Stanford University, Stanford, USA

Developed novel algorithms to determine the real-time health state and degradation of the lithium-ion battery. The algorithm uses real-time state estimation techniques such as the Kalman filter and particle filter. Built-in piezoelectric transducer induced ultrasonic signals were used as measurement signals and incorporated into the algorithm for future state prediction.

Developed different signal processing tools to efficiently process the ultrasonic signals both in frequency and time-frequency domain for characterising battery degradation

### PhD Research

Aug 2017 - May 2022

Rensselaer Polytechnic Institute, Troy, NY, USA

Developed time-varying time series models for analyzing non-stationary, stochastic and random signals. These models are very general and can be applied to many different applications such as random vibration signal analysis, seismic signal analysis, electrocardiogram signal analysis and so on

Developed **structural damage diagnosis** algorithms using ultrasonic wave propagation and random vibrations signals. The basic idea is to extract meaningful features inherent in the signals and use those features and asymptotic statistical properties of the estimated parameters to formulate the anomaly detection algorithms. The same algorithm can be used in many different applications.

### MS Research

Aug 2015 - Jul 2017

North Dakota State University, Fargo, ND, USA

Performed **fractographic analysis** and applied principles of **fracture mechanics** on ax fibers which has 100 micrometer diameter (**In situ SEM and tensile testing, FESEM imaging**) to investigate the failure mechanism of ax fibers. Applied statistical failure analysis techniques and quantified the variation of failure strengths. Also performed polymer

