Research Interest

Random Vibrations Modeling and Control, Ultrasonics, Uncertainty Quantifcation, Intelligent Structures, System Identifcation, 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 flter and particle flter. Built-in piezoelectric transducer induced ultrasonic signals were used as measurement signals and incorporated into the algorithm for future state prediction.
- Developed diferent signal processing tools to e f ciently process the ultrasonic signals both in frequency and time-frequency domain for characterising battery degradation

PhD Research Aug 2017 - May 2022

RensselaerPolytechnic 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 diferent 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 diferent applications.

MS Research Aug 2015 - Jul 2017

North Dakota State University, Fargo, ND, USA

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