The Department of Civil and Environmental Engineering at the University of Houston presents...

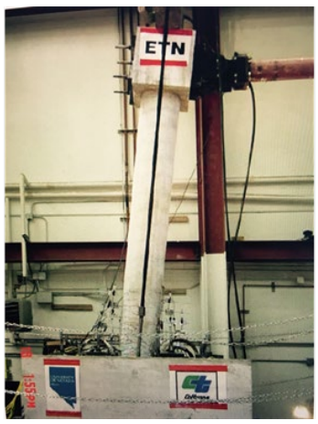
CIVE 6111 Graduate Seminar

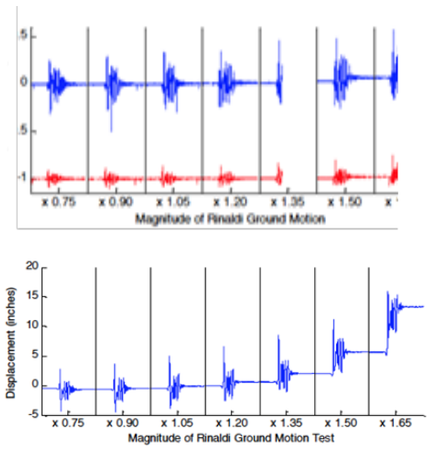
DAMAGE DETECTION – A KEY TO ROBUST STRUCTURAL HEALTH MONITORING

Anne S. Kiremidjian
The C.L. Peck, Class of 1906 Professor in the School of Engineering
Stanford University

Friday, November 19, 2021 - 2:45pm-3:45pm
Classroom Business Building (CBB) - Room 124
Zoom Link: https://uh-edu-cougarnet.zoom.us/j/92476830560

Abstract
Structural health monitoring systems requires a careful design of hardware, software and algorithms to perform their function. Their primary goal is to diagnose damage as it occurs before there is a catastrophic failure or loss of functionality of the structure, and to predict its residual life and strength in order to make appropriate repair decisions. Key to the robust structural damage diagnosis is ability of the system to predict the occurrence, location, type and degree of damage. In this presentation, several damage detection algorithms will be presented. These include the displacement algorithm for large deformation estimates, its enhanced version that uses a gyroscope and the wavelet-based algorithms. The presentation will conclude with a discussion on the main challenges to a widespread implementation of structural health monitoring systems and how they can be overcome.





Bio
Anne Kiremidjian is a professor of civil and environmental engineering at Stanford University. Her research focuses on earthquake hazard and loss modeling and structural health monitoring for extreme events. Within the area of earthquake hazard and risk modeling, she has developed methods for time-dependent earthquake occurrences, regional hazard mapping, regional loss assessment, and lifelines risk analysis of water, transportation, and power systems. Within the area of structural health modeling, her research includes the development of wireless sensors and sensing networks for structural performance evaluation, and novel damage detection and localization algorithms utilizing data from the sensor network using advanced data analytics, statistical and machine learning methods. For her research with her students, Dr. Kiremidjian has been recognized with numerous awards including the *Extraordinary Achievement Award in Loss Estimation* from Applied Technology Council and the *C. Martin Duke Award* for Excellence in Lifeline Earthquake Engineering Research by the American Society of Civil Engineers (ASCE). In 2014 she was elected *Distinguished Member of the American Society of Civil Engineers*, then in 2017 she received the *Lifetime Achievement Award at the International Workshop on Structural Health Monitoring*. In 2018 she was awarded *the John Fritz Medal* from the American Association of Engineering Societies, one of the highest awards given to an engineer in the United States. In 2020, she was elected as Honorary Member of the Earthquake Engineering Research Institute and was named with the C.L. Peck, Class of 1906 Chaired Professorship in the School of Engineering at Stanford. In 2021 she was elected to the National Academy of Engineering.

During her career, Dr. Kiremidjian has held numerous service positions that have enabled her to greatly influence the field of earthquake risk reduction. As co-Director and Director of the John A. Blume Earthquake Engineering Center at Stanford University, she organized workshops on earthquake lifeline and regional risk assessment, testified to the California Congress in support of the formation of the Pacific Earthquake Engineering Research Center (PEER) in 1995, testified to US Congress on behalf of EERI in support of the re-appropriation of the National Earthquake Hazard Reduction Act (1997), and testified to the US Senate Committee on Commerce, Science and Transportation on behalf of the American Society of Civil Engineers (2009). Dr. Kiremidjian has published more than 350 journals papers, book chapters, technical reports, and refereed conference proceeding papers, and holds patents on wireless structural health monitoring.