



Graduate Opportunities
in Safe Transportation
and Resilient Systems



GAANN- GOSTARS Fellowship Project

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Title: Reliability-Based Resilience Indicator for Transportation System Subjected to the Seismic Event

Description: The highway transportation systems compound roads, pavements, bridges, culverts, tunnels, rail, aviation, ferries, and other assets are highly vulnerable in case of the occurrence of the natural disruption. In fact, the resilience-based assessment is a probability/reliability-based framework that can be defined as structural/infrastructural ability to experience less damage and recover more quickly from disruption events. The main objective of this project is to develop a new resilience-based transportation framework (RTF) using the risk hazard analysis and reliability-intensity surface. The new proposed resilience metric can be utilized to update the target reliability index of the bridges for the purpose of code calibration using the LRFD philosophy.

Impact on GAANN: The study attempts to present a sophisticated framework to estimate the transportation network vulnerability faces with natural disasters. The project is expected to quantify the current structural reliability and infrastructural resilience conditions associated with the seismic probability of occurrence. Indeed, the risk probability of the natural disaster resulting from earthquakes events help us to determine a sophisticated resilience metric. Accordingly, the outcomes help to propose a reliable safety measure for providing an economical-preventative risk-aversion-decision-framework for national transportation infrastructure.

Impact on GOSTAR: The focus of the GAANN project prepares a graduate student to understand the concepts of the natural hazards' identification using the stochastics analysis. S/he will learn how to assess the vulnerability of the infrastructural system. In fact, the graduated students may join the national labs, USDOT, research center, or academic position to keep contributing to the safety and reliance concern of the nation. S/he will be educated to work on various structural safety topics including structural design and assessment and natural hazard and risk analysis.

Tentative Plan									
Semester	1	2	3	4	5	6	7	8	9
Task	Literature Review	Reliability Study		Developing PSHA Developing Aging Model Developing Damage index Using Probabilistic Resilience				Damage vs. resilience Resilience vs. traffic flow	
Outcome	Learning the basic concept of structural reliability and resilience			Propose a new aging model Propose a new Damage index Propose a new Probabilistic resilience				Correlation of damage index and resilience Correlation of resilience metric and traffic flow	
Deliverable	Publish in a refereed conference proceedings and journal			Publish in a refereed conference proceedings and journal				Publish in a refereed conference proceedings and journal. Potential patent Application.	
Graduation									Summer 2025