Graduate Opportunities in Safe Transportation and Resilient Systems

GAANN- GOSTARS Fellowship Project

Adviser: Adriana Trias-Blanco, Ph.D.

Title: Bridge Modal Characterization Through the Use of Remote Sensors.

Description: Current approaches for the modal characterization of bridges is done by the implementation of accelerometers, which are contact sensors capable of measuring the acceleration of the structure at each point of contact. The information gathered from the accelerometers, provides sufficient data to allow the recognition of the different mode shapes of the structure. This approach is used to calibrate the finite element model of the bride which is further used for structural evaluations. One important limitation of the use of accelerometers is the need for the sensor to be in contact with the evaluated structure, which involves the use of special machinery to provide proper reach to the inspectors, resulting on prolonged sessions for data collection and the possibility of traffic disruption. Given the current decaying stage of our transportation infrastructure and the necessity for the DOTs to fast-track data collection processes that will improve asset management and accelerate infrastructure rehabilitation, this project aims to ease the need of cumbersome data collection processes by deploying remote sensors that can detect the structure's vibration and other structural characteristics through the use of simplified methods, while maintaining the quality of the data.

Impact on GOSTAR: Infrastructure rehabilitation is an important topic due to the broadness of its impact, and currently is one the most discussed bills in congress. Candidates involved in this project will be exposed to significant applied research, which will provide them with the tools needed to tackle the responsibilities of either industry or academia upon graduation. The results of this project will be presented to national and international organizations as ASCE's Structures Congress, Transportation Research Board (TRB), International Association of Bridge and Structural Engineering (IABSE).

Impact on GAANN: This research will tackle one critical area of national need, infrastructure rehabilitation. The goal of this research involves the implementation of new technologies and new processes to improve infrastructure inspection and further impact asset management and decision-making, which will ultimately extend the service life of our transportation infrastructure.

Tentative Plan									
Semester	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Task	Literature review	Develop standard requirements for data collection & Initiation of data collection		Completion of data collection phase (new and conventional technologies). Initiation of automation of data processing methods			Data processing, analysis, conclusions, and recommendations		
Outcome	Develop potential guidelines for data collection for the proposed new technologies			Develop detailed technology comparison based on data accuracy			Develop algorithm for the automation of vibration data gathered via LiDAR		
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.		
Graduation								**Summer 2025**	