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# Data Calibration of the Actual versus the Theoretical Micro Electro Mechanical Systems (MEMS) Based Accelerometer Reading through Remote Monitoring of Padre Jacinto Zamora Flyover

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**Abstract :** This paper shows the application of Structural Health Monitoring, SHM into bridges. Bridges are structures built to provide passage over a physical obstruction such as rivers, chasms or roads. The Philippines has a total of 8,166 national bridges as published on the 2015 atlas of the Department of Public Works and Highways (DPWH) and only 2,924 or 35.81% of these bridges are in good condition. As a result, PHP 30.464 billion of the 2016 budget of DPWH is allocated on roads and/or bridges maintenance alone. Intensive spending is owed to the present practice of outdated manual inspection and assessment, and poor structural health monitoring of Philippine infrastructures. As the School of Civil, Environmental, & Geological Engineering of Mapua Institute of Technology (MIT) continuous its well driven passion in research based projects, a partnership with the Department of Science and Technology (DOST) and the DPWH launched the application of Structural Health Monitoring, (SHM) in Padre Jacinto Zamora Flyover. The flyover is located along Nagtahan Boulevard in Sta. Mesa, Manila that connects Brgy. 411 and Brgy. 635. It gives service to vehicles going from Lacson Avenue to Mabini Bridge passing over Legarda Flyover. The flyover is chosen among the many located bridges in Metro Manila as the focus of the pilot testing due to its site accessibility, and complete structural built plans and specifications necessary for SHM as provided by the Bureau of Design, BOD department of DPWH. This paper focuses on providing a method to calibrate theoretical readings from STAAD Vi8 Pro and sync the data to actual MEMS accelerometer readings. It is observed that while the design standards used in constructing the flyover was reflected on the model, actual readings of MEMS accelerometer display a large difference compared to the theoretical data ran and taken from STAAD Vi8 Pro. In achieving a true seismic response of the modeled bridge or hence syncing the theoretical data to the actual sensor reading also called as the independent variable of this paper, analysis using single degree of freedom (SDOF) of the flyover under free vibration without damping using STAAD Vi8 Pro is done. The earthquake excitation and bridge responses are subjected to earthquake ground motion in the form of ground acceleration or Peak Ground Acceleration, PGA. Translational acceleration load is used to simulate the ground motion of the time history analysis acceleration record in STAAD Vi8 Pro.

**Keywords :** accelerometer, analysis using single degree of freedom, micro electro mechanical system, peak ground acceleration, structural health monitoring
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