2027 IWSHM Special Session Request Form

Special Session Title**: "Next-Generation Computer Vision for Structural Health Monitoring"**

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Keywords: Computer vision, image and video analysis, deep learning, vision transformers, vision-based measurements, 3D sensing and reconstruction, autonomous inspection, structural health monitoring

Scope of Session

Advances in computer vision and imaging technologies are enabling a new generation of noncontact, automated, and scalable structural inspection and monitoring systems. Emerging developments in vision-based measurements, deep learning, 3D sensing, and autonomous robotic platforms are expanding the capabilities of visual methods for detecting and quantifying structural damage, measuring structural response, and characterizing structural geometry. This special session focuses on recent theoretical, computational, and experimental innovations in computer vision-based SHM, spanning visual data acquisition, processing, interpretation, and quantitative measurement. Topics of interest include, but are not limited to, image- and video-based damage detection, localization, and quantification; vision-based displacement, deformation, and vibration measurements; deep learning and vision transformers; visual foundation models; image registration and change detection; 3D reconstruction and geometric characterization; RGB-D, LiDAR, and multimodal visual sensing; active perception; and autonomous inspection using unmanned aerial and ground vehicles. The session particularly welcomes contributions that advance the accuracy, robustness, and practical applicability of vision-based inspection and measurement techniques. Research addressing challenging imaging conditions, sensor calibration, measurement uncertainty, real-time processing, and field deployment is encouraged, along with demonstrations of innovative visual sensing systems, robotic inspection platforms, and experimental applications across civil, mechanical, and aerospace structures.