# Structural Condition Monitoring
# Using Deep Gaussian Process Regression

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The progressive deterioration of civil infrastructure signals an urgent need for advanced maintenance methodologies (Lee et al., 2023). Traditional inspections are often constrained by their reliability and timeliness, prompting the need for a paradigm shift in safety evaluation (Lee et al., 2022). This study introduces a framework utilizing deep gaussian process regression for real-time structural condition monitoring. Unlike an ordinary gaussian process regression that relies on user-defined kernel settings, deep gaussian process regression liberates the process from the constraints of prior knowledge about data characteristics (Jakkala, 2021). The algorithm we propose adapts to inherent data features, enabling effective monitoring even when explicit data properties are unknown. It addresses data shifts due to environmental influences, such as temperature changes, thus ensuring a resilient safety strategy against such externalities. A salient aspect of our method is its capability to assess data normalcy in the time-domain dimension, promoting an instinctive grasp and immediate action – vital in urgent health monitoring scenarios. The intuitive nature of our approach streamlines the identification of anomalous patterns, equipping decision-makers with insights that are actionable without the need for intricate data manipulation or in-depth expertise. The presentation will showcase applications within civil infrastructure, illustrating the versatile and robust nature of this advanced monitoring technique.

## Acknowledgements

## References

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