# VIRGINIA TECH DEPARTMENT OF STATISTICS COLLOQUIUM

*Data Analytics Can Enhance Intelligence of Engineering Systems*

## OCTOBER 6 | 3.30 PM

IN PERSON SEMINAR: SEITZ 313

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**Abstract**: Data analytics can provide the opportunity to capture tremendous new productivity gains, reveal the implicit product and process know-how, improve quality control, and facilitate a digital transformation in manufacturing. In this talk, two research examples of data analytics for engineering systems will be presented. Firstly, we show the relationships between deep neural networks, Gaussian process, and differential equations, and use their connections to develop new physics-informed data analytics methods for tackling the high computational cost in high-fidelity simulation, digital twin, and virtual assembly. Secondly, we propose a Wasserstein-based out-of-distribution detection (WOOD) method for identifying the abnormal samples in the data, which has the potential to enhance the classifiers' robustness to irrelevant inputs, and improve the system resilience and security under attacks. The statistical learning bound of the WOOD is investigated to guarantee that the achieved loss value approximates the global optimum.

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