

# Anomaly Detection for Streaming Advanced Manufacturing data

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## ABSTRACT

This talk presents some current research on statistical anomaly detection in streaming manufacturing data as part of I-Form, the SFI Research Centre for Advanced Manufacturing. Research goals include (i) decision support for machine operators, (ii) defect detection in build parts and (iii) predicting machine health. With the advent of modern dynamometers, IoT sensors, microscopy, and ethernet-connected machine tools, we are now in a position to leverage new artificial intelligence techniques to quantify the performance and behaviour of the manufacturing process.

I will also present a novel recursive extreme studentised deviate algorithm (R-ESD) to detect anomalies in streaming time series data via statistical learning. We adapt the generalised ESD test (Rosner, 1983) to streaming time series data by using time series decomposition and a sliding window approach. This is made computationally feasible by recursive updates of the ESD test statistic (Grubbs, 1950). Our method is statistically principled and it outperforms the **AnomalyDetection** software package, recently released by Twitter Inc. (Twitter) and used by multiple teams at Twitter as their state of the art on a daily basis (Vallis, Hochenbaum and Kejariwal, 2014).