

# Meadhbh O'Neill

PHD · STATISTICAL DATA SCIENCE

Confirm Centre, University of Limerick, Ireland

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## Profile

Highly motivated individual studying statistical data science within the Confirm Smart Manufacturing Centre and the Mathematics Application Consortium for Science and Industry (MACSI) in the University of Limerick. My research involves creating state-of-the-art methodology using modern statistical techniques for optimizing manufacturing processes. My work includes the development of novel variable selection methods, which can be used to gain meaningful insights into the key drivers of a process. I have had a leading role in several high-impact interdisciplinary projects, where I have strengthened my communication, teamwork and problem-solving skills while working closely with industry experts.

## Education

### University of Limerick

Limerick, Ireland

PHD IN STATISTICAL DATA SCIENCE (EXPECTED MAY 2023)

2018 - 2023

BSC IN FINANCIAL MATHEMATICS (1.1 — FIRST CLASS HONOURS DEGREE)

2014 - 2018

## Industry Projects

### Multinational Pharmaceutical Company COMPLETED

May 2021 - April 2022

- Implement statistical models to extract meaningful information from large-scale high-throughput data measured via state-of-the-art metrology throughout the manufacturing process.
- Development of new, robust and flexible statistical models for multivariate sensor data using functional data analysis.
- Establishment of novel models for temporal derivatives (i.e., velocity and acceleration) with uncertainty estimates.
- Construction of innovative prediction models, which capture between- and within-production line uncertainty.

### Multinational Medical Device Company COMPLETED

Dec. 2020 - March 2021

- Investigate potential insights from manufacturing execution system (MES) data.
- Statistical analysis of performance metrics including workload, scrap and idle time.
- Construction of control limits to assess variability in different workstations, shifts, days of the week.
- Development of an interactive dashboard providing a clear view of overall daily performance.

### Multinational Electronics Company COMPLETED

June - Aug. 2019

- Gain a deeper understanding of the behaviour of a device through its voltage response curve.
- Creation of a clustering algorithm to identify different shapes of voltage curves statistically.
- Mapping of the curves to a physical failure mechanism using a mathematical model.
- Obtain new insights into device failure modes and device-level variability.
- Creation of an interactive dashboard that provides visual exploration of the failure location and automated clustering.

## Skills

**Statistical Modelling** Multivariate regression analysis, predictive models, clustering, decision trees

**Programming** R (tidyverse, tidymodels, mlr3, XGBoost, Shiny, knitr, data.table), SPSS

**Essential** Technical report writing, clear delivery of presentations, critical thinking, curiosity

## Publications

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### Robust Distributional Regression with Automatic Variable Selection

2022

ARXIV:2212.07317 [STAT.ME]

O'NEILL, M. AND BURKE, K.

### smoothic: Variable Selection Using a Smooth Information Criterion

2022

CRAN R PACKAGE VERSION 1.0.0

O'NEILL, M. AND BURKE, K.

### Variable Selection Using a Smooth Information Criterion for Distributional Regression Models

2021

STATISTICS AND COMPUTING (ACCEPTED FOR PUBLICATION)

O'NEILL, M. AND BURKE, K.

### Process Visualization of Manufacturing Execution System (MES) Data

2021

2021 IEEE SMARTWORLD, PP. 659-665. DOI: 10.1109/SWC50871.2021.00098

O'NEILL, M., MORGAN, J., AND BURKE, K.

### Differentiable Penalized Regression

2019

THE 39<sup>TH</sup> CONFERENCE ON APPLIED STATISTICS IN IRELAND (CASI)

O'NEILL, M. AND BURKE, K.

## Presentations

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### The 15<sup>th</sup> International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics)

King's College, London

ROBUST DISTRIBUTIONAL REGRESSION MODELS WITH AUTOMATIC VARIABLE SELECTION

December 2022

O'NEILL, M. AND BURKE, K. (CONFERENCE PRESENTATION)

### The 36<sup>th</sup> International Workshop on Statistical Modelling (IWSM)

University of Trieste, Italy

AUTOMATIC VARIABLE SELECTION IN DISTRIBUTIONAL REGRESSION MODELS

July 2022

O'NEILL, M. AND BURKE, K. (CONFERENCE PRESENTATION)

### The 42<sup>nd</sup> Conference on Applied Statistics in Ireland (CASI)

University College Cork, Ireland

ROBUST DISTRIBUTIONAL REGRESSION WITH AUTOMATIC VARIABLE SELECTION

May 2022

O'NEILL, M. AND BURKE, K. (CONFERENCE PRESENTATION)

### The 4<sup>th</sup> International Conference on Econometrics and Statistics (EcoSta)

HKUST, Hong Kong

SMOOTH BIC VARIABLE SELECTION PROCEDURE FOR HETEROSCEDASTIC DATA

June 2021

O'NEILL, M., GLEESON, J.P., AND BURKE, K. (CONFERENCE PRESENTATION)

### Invited Seminar at The Division of Mathematics for Vehicle Engineering

Fraunhofer ITWM, Germany

INDUSTRIAL FEATURE SELECTION USING A SMOOTH INFORMATION CRITERION

June 2021

O'NEILL, M., GLEESON, J.P., AND BURKE, K. (SEMINAR)

## Accomplishments

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### Global Young Scientists Summit (GYSS) SELECTION

January 2022

Based on my achievements to date and my contribution to several industrial projects, I was nominated and chosen to attend the 10<sup>th</sup> anniversary edition of the GYSS after a highly competitive selection process. The theme of GYSS 2022 was "Advancing Science, Creating Technologies for a Better World". It was an exciting opportunity to interact and be mentored by Nobel laureates and eminent scientists, while also exchanging ideas with other young researchers.

## References

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#### Dr. Kevin Burke

Lecturer in Statistics

Department of Mathematics & Statistics, UL

#### Prof. Norma Bargary

Professor of Data Science & Statistical Learning

Department of Mathematics & Statistics, UL