

## Education

### The University of Cambridge

October 2022 - present

*PhD in Engineering, Bioengineering*

Cambridge, UK

### Trinity College Dublin

September 2018 - May 2022

*Baccalaureus in Arte Ingeniaria (B.A.I), Biomedical Engineering*

Dublin, IE

- First Class Honours

- Thesis: 'Metabiomaterial: Multi-layered 3D immunomodulating patch'

## Publications

### Journal Articles

- J.F. Murphy *et al.*, *Stem Cell Research and Therapy*. doi:10.1186/s13287-019-1486-4 (2019)

- J. Mayourian *et al.*, *Circulation Research*. doi:10.1161/CIRCRESAHA.118.312420 (2018)

- J.F. Murphy *et al.*, *SSRN Electronic Journal [preprint]*. doi:10.2139/ssrn.4046466 (2022)

### Book Chapters

- I. C. Turnbull *et al.*, *Methods in Molecular Biology*. doi:10.1007/978-1-4939-8597-5\_11 (2018)

### Conference Abstracts

- J.F. Murphy *et al.*, *Biomedical Engineering Society Annual Meeting*. (2019)

- S.I. Salazar *et al.*, *New York Academy of Sciences*. (2019)

- J.F. Murphy *et al.*, *American Heart Association Scientific Sessions*. (2018)

- I.C. Turnbull *et al.*, *International Society for Stem Cell Research*. (2018)

- J.F. Murphy *et al.*, *New York City Science and Engineering Fair*. (2018)

## Research Experience

### Monaghan Lab, Trinity Centre for Bioengineering

September 2018 - May 2022

Research Assistant

Dublin, IE

- Characterised a novel biomaterial's mechanical and physiochemical properties through tensile testing, ELISA assays, FTIR analysis, mass spectroscopy, flow cytometry, and contact angle assessment.

- Provided expertise to PhD students on 3D design and printing, induced-pluripotent stem cell culture and differentiation, and engineered cardiac tissue fabrication techniques.

- Key exchange point of international collaboration between the Costa Lab (NYC) and the Monaghan Lab (Dublin). Focused on adapting an engineered cardiac tissue bioreactor for use with a novel pacing system.

- Performed histological staining and analysis of tissue explants with polarized light microscopy to characterize fibrotic encapsulation around next-generation silicone implants.

- Carried out in-depth image analysis using threshold segmentation and region-of-interest normalization.

- Developed a setup to determine propagation of electric pulses across biomaterial bridge between fresh muscle tissues *ex vivo*.

### Turnbull Lab, Icahn School of Medicine at Mount Sinai

June 2021 - September 2021

Research Assistant

New York City, USA

- Developed Rianú, a web application capable of tracking and analyzing multiple cardiac tissues simultaneously.

- Modified the existing tissue recording setup to record multiple tissues in a single frame.

### Costa Lab, Icahn School of Medicine at Mount Sinai

March 2017 - September 2020

Research Assistant

New York City, USA

- Maintained induced-pluripotent stem cells (iPSCs), mesenchymal stem cells, and cardiac stem cells in culture.

- Differentiated iPSCs into cardiomyocytes and fabricated 3D human engineered cardiac tissues. Used engineered tissue as a testing platform for various drug- and cell-based therapies for cardiac regeneration.

- Used existing LabVIEW and MATLAB software to collect and analyze data on cardiac function.

- Designed and printed 3D accessories to help with the data collection process.

### Dean Lab, Columbia University

June 2017 - December 2017

Lab Intern

New York City, USA

- Exfoliated graphite to get monolayers of graphene and used a bright field microscope to record locations.

- Created a graphene device insulated by boron nitride and used atomic force microscopy to identify imperfections.

## Teaching Experience

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### Voluntary Tuition Program, Trinity College Dublin

September 2018 - May 2019

Maths Tutor

Dublin, IE

- Met with a primary school student each week to aid them in their understanding of maths.

### Center for Excellence in Youth Education at Mount Sinai

September 2016 – June 2018

Research Scholar

New York City, USA

- Guided middle school students through laboratory dissections of the heart, eye, and kidney.
- Provided guidance and advice on the New York City high school application process.

## Open Source Projects

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**Rianú:** Multi-tissue tracking software for increased throughput of engineered cardiac tissue screening

<https://rianu.mrph.dev>

- Identified a bottleneck in existing engineered cardiac tissue analysis software.
- Created a web application capable of tracking and analyzing multiple engineered cardiac tissues simultaneously.
- Validated this software against existing software and provided detailed documentation for its use.
- Actively maintain this software and will release it open-source under the BSD 3-Clause License upon publication.

**doi3bib:** A website that converts DOI's into L<sup>A</sup>T<sub>E</sub>X compatible bibtex entries

<https://doi3bib.com>

- A simple serverless web app that returns latex compatible bibtex entries when supplied with a DOI or PMID.
- Obtains bibtex entries for doi.org or crossref.org and parses them to make sure they are compatible with L<sup>A</sup>T<sub>E</sub>X.

## Further Information

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### Awards

- W.D Armstrong Studentship, School of Technology, University of Cambridge (2022 - 2026)
- Honorary Robert Gardiner Memorial Scholarship, University of Cambridge (2022)
- Book Prize, Department of Engineering, Trinity College Dublin (2019, 2020, 2021)
- New York City Science and Engineering Fair (NYCSEF) Finalist, Second Award (2018)
- Frank W. and Jane J. Stahl Memorial Award for Technical Excellence, NYCSEF (2018)
- Naval Science Award, Office of Naval Research, NYCSEF (2018)

### Memberships

- Engineers Ireland, Student Membership (2018 - 2022)

### Citizenships

- Republic of Ireland
- United States of America

### Sports

- Cambridge University Blues Men's Ice Hockey Team, Defenceman (2022 - present)

### Skills

- Programming: C++, Docker, Python including OpenCV, JS, Web design, MATLAB
- CAD: Solidworks, Autodesk Fusion 360, Revit and Inventor, OpenSCAD
- Microscopy: Tissue staining, sectioning, and mounting, Confocal, Polarized Light
- Data Analysis: ImageJ/FIJI, Graphpad Prism, R, Excel
- Office: L<sup>A</sup>T<sub>E</sub>X, EndNote 20, Microsoft Word