

Education

<b>The University of Cambridge</b> <i>PhD in Engineering, Bioengineering</i>	<b>October 2022 - present</b> Cambridge, UK
<b>Trinity College Dublin</b> <i>Baccalaureus in Arte Ingeniaria (B.A.I), Biomedical Engineering</i>	<b>September 2018 - May 2022</b> Dublin, IE
<ul style="list-style-type: none"><li>- First Class Honours</li><li>- Thesis: 'Metabiomaterial: Multi-layered 3D immunomodulating patch'</li></ul>	

Publications

<b>Journal Articles</b>	
<ul style="list-style-type: none"><li>- J.F.Murphy <i>et al.</i> <i>Bio-Design and Manufacturing.</i> (2024)</li><li>- Y.Pan <i>et al.</i> <i>Cell Reports Physical Science.</i> doi:10.1016/j.xcrp.2024.101930 (2024)</li><li>- J.F.Murphy <i>et al.</i> <i>Computer Methods and Programs in Biomedicine Update</i> 10.1016/j.cmpbup.2023.100107 (2023)</li><li>- J.F. Murphy <i>et al.</i>, <i>Stem Cell Research and Therapy.</i> doi:10.1186/s13287-019-1486-4 (2019)</li><li>- J. Mayourian <i>et al.</i>, <i>Circulation Research.</i> doi:10.1161/CIRCRESAHA.118.312420 (2018)</li></ul>	
<b>Book Chapters</b>	
<ul style="list-style-type: none"><li>- I. C. Turnbull <i>et al.</i>, <i>Methods in Molecular Biology.</i> doi:10.1007/978-1-4939-8597-5_11 (2018)</li></ul>	
<b>Conference Abstracts</b>	
<ul style="list-style-type: none"><li>- J.F. Murphy <i>et al.</i> <i>BioMedEng24.</i> (2024)</li><li>- J.F.Murphy <i>et al.</i> <i>TERMIS World Congress 2024</i></li><li>- J.F. Murphy <i>et al.</i>, <i>Biomedical Engineering Society Annual Meeting.</i> (2019)</li><li>- S.I. Salazar <i>et al.</i>, <i>New York Academy of Sciences.</i> (2019)</li><li>- J.F. Murphy <i>et al.</i>, <i>American Heart Association Scientific Sessions.</i> (2018)</li><li>- I.C. Turnbull <i>et al.</i>, <i>International Society for Stem Cell Research.</i> (2018)</li><li>- J.F. Murphy <i>et al.</i>, <i>New York City Science and Engineering Fair.</i> (2018)</li></ul>	

Research Experience

<b>Monaghan Lab, Trinity Centre for Bioengineering</b> Research Assistant	<b>September 2018 - May 2022</b> Dublin, IE
<ul style="list-style-type: none"><li>- Characterised a novel biomaterial's mechanical and physiochemical properties through tensile testing, ELISA assays, FTIR analysis, mass spectroscopy, flow cytometry, and contact angle assessment.</li><li>- Provided expertise to PhD students on 3D design and printing, induced-pluripotent stem cell culture and differentiation, and engineered cardiac tissue fabrication techniques.</li><li>- 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.</li><li>- Performed histological staining and analysis of tissue explants with polarized light microscopy to characterize fibrotic encapsulation around next-generation silicone implants.</li><li>- Carried out in-depth image analysis using threshold segmentation and region-of-interest normalization.</li><li>- Developed a setup to determine propagation of electric pulses across biomaterial bridge between fresh muscle tissues ex vivo.</li></ul>	
<b>Turnbull Lab, Icahn School of Medicine at Mount Sinai</b> Research Assistant	<b>June 2021 - September 2021</b> New York City, USA
<ul style="list-style-type: none"><li>- Developed Rianú, a web application capable of tracking and analyzing multiple cardiac tissues simultaneously.</li><li>- Modified the existing tissue recording setup to record multiple tissues in a single frame.</li></ul>	
<b>Costa Lab, Icahn School of Medicine at Mount Sinai</b> Research Assistant	<b>March 2017 - September 2020</b> New York City, USA
<ul style="list-style-type: none"><li>- Maintained induced-pluripotent stem cells (iPSCs), mesenchymal stem cells, and cardiac stem cells in culture.</li><li>- 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.</li><li>- Used existing LabVIEW and MATLAB software to collect and analyze data on cardiac function.</li><li>- Designed and printed 3D accessories to help with the data collection process.</li></ul>	

## 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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Department of Engineering, University of Cambridge

October 2023 - January 2024

M1P Demonstrator

Cambridge, UK

Department of Engineering, University of Cambridge

October 2022 - December 2022

CAD Demonstrator

Cambridge, UK

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  $\text{\LaTeX}$  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  $\text{\LaTeX}$ .

## Further Information

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### Awards

- Sports Personality of the Year, University of Cambridge (2024)
- 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)

### Positions

- Assistant Captain, Cambridge University Blues Men's Ice Hockey Team (2024 - present)
- Club Secretary, Cambridge University Ice Hockey Club (2024 - present)

### 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:  $\text{\LaTeX}$ , EndNote 20, Microsoft Word