Jack F. Murphy

jfm65@cam.ac.uk | website: https://jack.engineering

Education

The University of Cambridge — **Expected 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-layed 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

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

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 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 LaTeX.

Further Information

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: LaTeX, EndNote 20, Microsoft Word