Jack F. Murphy

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Education

Trinity College Dublin, The University of Dublin **Expected 2018 - 2022**
B.A.I in Biomedical Engineering Dublin, Ireland

- First Class Honours (>70%) every year to date

The High School for Math, Science, and Engineering **September 2014 - June 2018**
New York Regents Diploma, Advanced Designation with Honors New York City, USA

- Community Service and Mastery in Mathematics Distinctions

Publications

Journal Articles

- J.F. Murphy *et al., Manuscript submitted for publication.* (2021)
- 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)

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 - present**
Research Assistant Dublin, Ireland

- Provide 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 and the Monaghan Lab. 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.

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 dissection of the heart, eye, and kidney.
- Finalist in the New York City Science and Engineering Fair with research carried out in the Costa Lab.

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.

Projects

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

- Identified a bottleneck in existing engineered cardiac tissue analysis software.
- Created a web application capable of tracking and analyzing multiple engineered cardiac tissue simultaneously.
- Validated this software against existing software in the field and provided detailed documentation for its use.

Web Design

- Developed my personal portfolio website that automatically updates citation counts by paper DOI.
- Created websites for various projects, other students, a student society, a band, and for software documentation.

Further Information

Awards

- 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 - present)

Citizenships

- United States of America
- Republic of Ireland

Skills

- Programming: C++, Docker, Python including OpenCV, Web design including Hugo and Bootstrap
- 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

References

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Michael G. Monaghan
Ussher Assistant Professor, Biomedical Engineering
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Irene C. Turnbull
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