Nicholas Scaperdas

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Education

Northeastern University — Boston, MA
Bachelor of Science in Bioengineering, Minor in Computer Science — *Sep. 2020 – May 2024*
Concentration in Biomedical Devices and Bioimaging — *GPA: 3.9*

Awards

Summa Cum Laude from Northeastern University
Northeastern University College of Engineering Dean's List (All Semesters)
Northeastern University Honors Program
Tau Beta Pi Engineering Honors Society

Research Experience

Temporary Research Assistant — Feb. 2025 – Present
Mass Spectrometry Facility at Rutgers University — *Piscataway, NJ*

- Utilized Q-Exactive HF and Eclipse mass spectrometers for experiments across Rutgers' research community
- Executed experiments including comparing drug retention between dried blood spot and plasma samples from rodents, identifying phosphorylated amino acids in cells injected with a developed compound, etc.
- Prepared and ran up to 100 samples per day for bottom-up analysis using techniques such as in-gel or on-bead digestion methods and liquid chromatography
- Presented, analyzed, and organized mass spectrometry data using software such as Xcalibur, UniDec, DIA-NN

Bio-Inspired Materials Researcher — Jan. 2023 – June 2023
The George J. Kostas Research Institute for Homeland Security — *Burlington, MA*

- Formulated biocompatible hydrogels using different combinations of acrylamide, acrylic acid, and sodium alginate, designed to swell and contract due to pH changes driven by E-coli metabolism
- Designed, coded, and integrated a "perfusion chamber" device which uses gravity-based flow to automate buffer exchange and modify pH levels at specific time intervals using an Arduino microcontroller
- Utilized 3D SLA resin printer to create new molds and holders for use in hydrogel polymerization and for containing hydrogel pucks within my "perfusion chamber" design
- Characterized gel size and color change over multiple weeks using custom scripts within ImageJ
- Using this "perfusion chamber" design, implemented an experiment which cycled gels in buffers of neutral and acidic pH, the results of which were presented in a publication in *Matter*

Work Experience

Upstream Process Development Co-op — Jan. 2022 – June 2022
Solid Biosciences — *Boston, MA*

- Maintained multiple mammalian cell lines with HEK-293 or Vero-27 type cells while conducting experiments to optimize virus production and adherent cell attachment to suspended microcarriers
- Prepared and managed bioreactor environments bioreactor environments for production of modified Herpes Simplex Virus (HSV) and Adeno Associated Virus (AAV) for development of a viral-vector based gene therapy process targeted to treat Duchenne Muscular Dystrophy
- Managed bioreactor conditions using bioprocess automation software to control cell metabolism and growth
- Used compound microscope to image and track cell growth and attachment to microcarriers
- Analyzed month-long experimental data gathered from an Electronic Lab Notebook system or from DeltaV bioreactor software using Microsoft Excel to track metabolites, cell viability, and HSV/AAV production

Publications

Kuang, Jenevieve, Shanna Bonanno, Wei-Ting Chang, Duncan Q. Bower, Violet M. Pratt, Jillian Zerkowski, Nicholas Scaperdas et al. "Microbially driven reversible size-and color-changing materials." Matter 7, no. 5 (2024): 1848-1866.

Presentations

Northeastern Bioengineering Capstone, An Air Quality Monitor to Measure Indoor Air Pollutants for Knox County, ME Residents. Fall 2023.

Projects

FufuPot Countertop Mixer | *KiCad, VSCode, C++, Git* Jan. 2024 – April 2024

Generate Product Development Hardware Build Studio *Boston, MA*

- Lead electrical design of water dispensing and heating systems for a stand mixer designed to automate the labor-intensive fufu making process
- Integrated water pump into electrical system to dispense precise amounts of water at different intervals in the mixing process
- Implemented induction heating coil for simultaneous cooking and mixing
- Coded firmware for device including display, water dispensing, heating, and mixing elements

Indoor Air Quality Monitor Capstone | *SOLIDWORKS, KiCad, Arduino, C++* July 2023 – Dec. 2023

Northeastern University Bioengineering Capstone Project *Knox County, ME*

- Constructed indoor air quality monitor over a six-month period for research purposes in Knox County, Maine to measure a wider range of air pollutants than commercially available devices
- Determined set of 10 pollutant sensors after an evaluation process, developing a schematic containing the integration and wiring necessary to use all sensors for continuous monitoring over a year long period
- Produced airflow simulations using SOLIDWORKS to design an optimal device casing
- Presented results to citizens of Knox County at a Town Hall and to a series of judges at a poster presentation

ABAQUS FEA Object Redesign | *SOLIDWORKS, Abaqus FEA* Dec. 2023

Mechanical Engineering Computation and Design *Boston, MA*

- Tasked redesigning a daily life object and using SOLIDWORKS CAD software to redesign the object
- Produced two CAD redesigns of my bedframe with additional supports shown to reduce deformation due to a static load of 1000 lbs using Abaqus FEA

Tatum Robotics Bracelet and Doorbell | *EasyEDA, C++, Git* Jan. 2023 - May 2023

Generate Product Development Hardware Build Studio *Boston, MA*

- Contributed to electrical design of bracelet and doorbell communicating via Bluetooth for use by the Deaf-Blind Community as part of a interdisciplinary engineering design team featured in *Northeastern News*
- Developed custom circuit board for both components, including part specification, schematic design, PCB routing, and assembly through soldering by hand or via soldering paste

Skills

Competencies: Mammalian Cell Culture, Mass Spectrometry, Aseptic Handling, 3D Printing, PCB Design/Assembly

Applications: Xcalibur, SOLIDWORKS, ImageJ, KiCad, Abaqus FEA, DeltaV, AutoCAD, Arduino, Microsoft Excel

Programming Languages: C/C++, MATLAB, Java, Python, Racket

Community Service

Roslindale Branch of the Boston Public Library Roslindale, MA

- Founded new volunteering program to connect Northeastern University students with local children in the Boston area to teach them STEM lessons in unique fun ways

Boston Children's Museum CreatedBy Festival South Boston, MA

- Contributed to tabling event alongside various Boston companies to inspire local children to pursue STEM and to promote local Northeastern STEMout activities

Jamaica Plain Branch of the Boston Public Library Jamaica Plain, MA

- Mentored students over zoom and in person, assisting them with learning STEM concepts through fun and engaging activities, including coding, chemistry, and engineering applications
- Continued program for multiple years, including managing and redesigning new and existing activities as well as promoting the program to local families following a post-COVID slump in attendance