UNIVERSITY OF WORCESTER
Worcester Polytechnic Institute

Projects Showcase
[A celebration of all senior students' research, design, and creative theses]
APRIL 19, 2024

WPI
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LET’S CONNECT
Undergraduate Research Projects Showcase

A celebration of research, design, and creative theses—a requirement of every graduating senior through the Major Qualifying Project (MQP)—takes place each spring on campus. Classes are cancelled during the showcase so the entire community can appreciate the breadth and depth of undergraduate research activities—and their potential to change the world. Student teams representing all academic departments present their work to their faculty advisors, external sponsors, and the community-at-large, and the public is invited. One of three significant academic projects all WPI students complete, the MQP is the culmination of a project-based educational experience that prepares students for their journey after graduation.

The project experience provides students with the skills to lead team efforts, to communicate professionally, to meet deadlines and exceed expectations, to deal with ambiguity and unexpected difficulties, and to consider not just the technical, but the ethical and social dimensions of their work. The projects must be thoroughly documented in written reports, and virtually all teams make oral presentations of their results. These are the presentations you will see today.

Often MQPs lead to publications in peer-reviewed journals, presentations at regional and national conferences, and patents. Some become the foundations for entrepreneurial ventures. Others become useful innovations and products for their corporate sponsors. But no matter what becomes of an MQP, the chances are it has already served as an effective capstone to a WPI education and a profound steppingstone to a successful and rewarding career and life.

Presentations by Department

4 Aerospace Engineering
5 Bioinformatics and Computational Biology
6 Biology and Biotechnology
8 Biomedical Engineering
10 Business
12 Chemical Engineering
15 Chemistry and Biochemistry
17 Civil, Environmental, and Architectural Engineering
19 Computer Science
24 Data Science
27 Electrical and Computer Engineering
29 Humanities and Arts
30 Interactive Media & Game Development
31 Mathematical Sciences
32 Mechanical Engineering
36 Physics
37 Professional Writing
38 Robotics Engineering
41 Social Science and Policy Studies
Aerospace Engineering  

Department  

Location: HL 218  

8:30am  
Design and Testing of an Amphibious AUV  
Ryan Chesnake, Graham Driscoll-Carignan,  
Spencer Granlund, Matthew McMahon, Evan  
Russell, Benjamin Twombly  
Advisor: Prof. Demetriou  

8:50am  
RC Aircraft Design for AIAA Design, Build, Fly  
(DBF) Competition  
Elias Monzayet, Bridget Muturi, Carson Murphy,  
Troy Santopadre, Wesley Schulz, Richard Shaw,  
Jack Robertson, Regina Valencia  
Advisor: Prof. Yuan  

9:10am  
Novel Mobility Solutions for Extreme Lunar  
Terrain  
Benjamin Cobb, Alexa Dahlquist, Michael Gouveia,  
Finnian Hamblett, Roman Henry, Joseph  
Kuchenmeister, Cristina Perez  
Advisor: Prof. Karanjgaokar  

9:30am  
Aerodynamic and Structural Analysis of the  
Kaman K-16B  
Andrew Carlton, Shannon Daly, Elizabeth Healy,  
Naoki Heginbotham, Cyril Ogbebor, Viren Punjabi,  
Douglas Shirakura, Akhilesh Yarlagadda  
Advisor: Prof. Blandino  

BREAK 10 minutes  

10:00am  
Design, Analysis and Testing of Ionic Wind  
Propulsion System for an Electric Aircraft  
Cailin Borovicka, Colleen Henderson, Cole  
Lederman, Ariel Velasquez  
Advisor: Prof. Taillefer  

10:20am  
Design and Testing of a Tethered Underwater  
Wing  
Laurence Clancy, Michael Daton, Holly Perry, John  
Radzanowski, Charles Ritchie, Erika Varady,  
Zachary Winston  
Advisor: Prof. Olinger  

10:40am  
Design and Analysis of a High-Powered Model  
Rocket  
Nathan Brumble, Robert Doyle, Abigail Duval,  
Melissa Kelly, Cameron McAfee, Claire Matthews,  
Bryan Silva  
Advisor: Prof. Taillefer  

11:00am  
Design of Thermally Efficient Cryogenic Tanks  
for Spacecraft  
Quentin Collins, Roman Gowie, Alice Kelly, Rayden  
Morley, Sean Nuzio, Nathaniel Polus, Janelly  
Torres  
Advisor: Prof. Jayachandran  

BREAK 10 minutes  

11:30am  
Design of a CubeSat for Identifying, Tracking  
and Mitigating Space Debris - Part 1  
Jackson Neu, Ellie Sherman, Domonic St. Pierre  
Advisor: Prof. Taillefer  

11:46am  
Design of a CubeSat for Identifying, Tracking  
and Mitigating Space Debris – Part 2  
Liam Piper, Ethan Prigge  
Advisor: Prof. Demetriou  

12:10 am  
Coupled Sensor Configuration and Planning  
with UAVs  
Alexandra Ballentine, Joseph Calomo, Jarrett  
Gulden, Peter Korfuzi, Jake Letourneau, Thomas  
Lamar, Marina Nelson  
Advisor: Prof. Cowlagi  

12:30 pm  
Design and Analysis of a Small Sat as a  
Communication Relay for Venus Atmospheric  
Probes  
William C. Baxter, Gregoire Brougher, Jacob Ewen,  
Isaac Garry, George Love, Adam Osgood  
Advisor: Prof. Lu
Bioinformatics & Computational Biology

POSTER SESSION, 9:30 am to 12:30 pm
Rubin Campus Center, Odeum

Deep Learning Analysis on Neuroimaging Data to Distinguish Anxiety and Depression Diagnoses in Adolescents
Olivia Deckers, Pitipat Kongsomjit
Advisor: Benjamin Nephew

Machine Learning Analysis of Neuroimaging (MRI) Data to Distinguish Patients with Focal Cortical Dysplasia Type II
Jonathan Golden, Vivek Kandasamy
Advisor: Benjamin Nephew

Transcriptomic Analysis of Pseudomonas putida in Varied Growth Conditions
Gabriella Guzman Jerry
Advisor: Natalie Farny

Transcriptomics of Myosin XI Conditional-loss-of-function in Moss
Carter Nakagawa
Advisor: Luis Vidali
Biology & Biotechnology

POSTER SESSION, 9:30am to 12:30pm
Rubin Campus Center, Odeum

Applications of Aptamers for Toxicological Remediation of PFOA
William Miller, Hayley Wigren
Advisor: Natalie Farny

Artemisia annua Tea Drug Interactions: New Method Development
Ryan Polansky, Russel Kam
Advisors: Pamela Weathers, Suzanne Scarlatta

Artemisinin’s Effect on Iron Metabolism in Breast Cancer Cells
Daisy Connors, Clare Nargi
Advisors: Jill Rulfs, Michael Buckholt

Assessing Nucleic Acid Aptamers for the Amelioration of Copper Toxicity
Stephanie E. Reis
Advisors: Natalie G. Farny, Jagan Srinivasan

Chillin’ Out: The Role that CBD Plays in Parkinson’s Disease Treatment
Jan Anthony, Katherine Corbin, Rachel Grandmaison, Mikayla Raffin
Advisors: Mike Buckholt, Jill Rulfs, Jagan Srinivasan

Comparison of Pre-Operative Site Sterilization Techniques in Equine Medicine
Holly Galvin
Advisors: Michael Buckholt, Jill Rulfs
Sponsor: Michael Myhre Equine Clinic

Conservation and Function of the N terminal Insert of Kek1
Josephine Patten
Advisor: Joseph Duffy

Discovery of a Novel Mutation in Rifampicin Resistant E. coli
Kyra Robinson
Advisor: Louis Roberts

Effects of Cortical Dynein on Chromosome Movement and Alignment
Nora Shanks
Advisor: Amity Manning

EGFR: Functional & Evolutionary Analyses of Domain V
Alexandra Poulhazan
Advisor: Joseph Duffy

Examining the Effects of Phytoestrogens on Ovarian Cancer Cells
Sarah Aspinwall, Vanessa Cenkollari, Hannah Gilmore, Komlavi Touglo
Advisors: Jill Rulfs, Michael Buckholt

Functional Analyses of the Kek5 Intracellular SLIM, CO1, in Drosophila and Disease Implications in Humans
Kelly Heffernan
Advisor: Joseph Duffy

Impacts of Loons Syringes on Vocalization
Maryam Al Hakeem, Caitlin Guilfoyle
Advisors: Michael Buckholt, Jill Rulfs, John Mager(ONU)

Implementation of Telehealth Techniques to Improve Emergency Department Best Practices in Suicide Prevention
Taylor Jane McGinty
Advisor: Jill Rulfs

Inducible mCardinal Genetic Circuit in Pseudomonas putida for Soil Contaminant Remediation
Lauren Abraham
Advisor: Natalie Farny

Metal Dyshomeostasis in Alzheimer’s Disease: An Observation of the Role of ZIP12 in Zinc Uptake in Neuronal Cells
Madison Brown, Lily Lancellotti, Allison Walker, Morgan Whitney
Advisors: Robert Dempski, Lou Roberts
Mindfulness could change your brain... for the better!
Sakshi Joglekar
Advisor: Ben Nephew

Modulation of Cellular Stress Response by the RB Tumor Suppressor Protein
Grace McCarthy, Jacqelyn Nicoletti
Advisor: Amity Manning

Neural Mechanisms of Social Threat Processing Can Optimize Emotion Regulation Training to Improve Mental Health
Eva Petschek
Advisors: Richard Lopez, Benjamin Nephew

North American Moth Populations & the Effects of Changing Climate
Zoë Swartley, Michelle Kirtich
Advisor: Marja Bakermans

NUDIX Hydrolase Expression and Impact on mRNA Structure
Olivia Garrity, Kaleigh Caserta
Advisor: Louis Roberts

Operation Tick Hunt: Developing an Experimental Framework to Monitor Lyme Disease in Central Massachusetts
Dylan Mackisey, Connor McKaig, Ciara Moroney
Advisors: Michael Buckholt, Chris Collins

Optimizing Immunopuriﬁcation of Exocyst Complex in Plants
Ren Vitellaro
Advisors: Luis Vidali, Edward Chocano Coralla, Mary Munson(UMass)
Sponsor: UMass

Psychosocial and Biochemical Correlates of Nicotine Administration via Vaping Behaviors
Mira Kirschner
Advisors: Angela Incollingo Rodriguez, Jagan Srinivasan

Puriﬁcation and Characterization ClOg1 from Moss
Zachary Gogna
Advisors: Luis Vidali, Louis Roberts

Screening for ErbB Family Inhibitors to Identify Potential Cancer Therapeutics
Samuel Levitan
Advisor: Joseph Duffy

Stress-dependent Cilia Remodeling in C. elegans
Katelyn Quinn-Cyr
Advisors: Inna Nechipurenko, Jim Doyle

Suv420H2 Localization during Mitosis is Sensitive to Phosphorylation
Stephanie Lee
Advisor: Amity Manning

The Effect of Gut Microbiome Modifications on Chemosensory Deﬁciencies in C. elegans Models of Alzheimer’s Disease
Grace Solod
Advisor: Jagan Srinivasan

The Role of the Map Kinase Pathway in C. elegans Immune Response Against C. albicans
Alexis Wood
Advisor: Reeta Rao

The Roles of RNA Degradation Proteins in Mycobacteria
Madelaine Freitas, Alana Lue Chee Lip
Advisor: Scarlett Shell
Biomedical Engineering

Salisbury Labs Kinnicut Hall
Room 115

9:05am
Encapsulation of Lithium in a Nanocarrier for Use During Pregnancy and Lactation
Cameron Carlin, Kayla Condon, Sarah Ossing, Violet Smiarowski
Advisors: Diana Alatalo, Christina Bailey-Hytholt

9:25am
Peak Stress Reduction in Below Knee Amputations
Riley Bent, Will Leland, Gabriella Rios, Priyanka Sunil
Advisor: Karen Troy

9:45am
Flow System to Study the Role of Vascular Endothelial Glycocalyx in Transendothelial Migration of Cancer Cells in-vitro
Helga Becka, Kerry Bushway, Samantha Cocchiaro, Jacob Elliott
Advisor: Solomon Mensah

10:15am
Design of a 3D Engineered Wound Healing Model of Ehlers-Danlos Syndrome
Madison Donahue, Maya Evohr, Morgan Foltz, Abigail Holmes, Spencer Whitford
Advisor: George Pins

10:35am
Automation of an Accurate, Auditory-Based Blood Pressure Monitor
Amirthavarshini Babu, Isabelle Benson-Clarke, Benjamin Breslov, Juliana Prisco, Benjamin Whee
Advisor: Dirk Albrecht, Pradeep Radhakrishnan

10:55am
A Baby Bottle Device to Capture Intraoral Images of the Maxillary Palate
Kenza Bezzat, Jacob McDonald, Nicolas Loycano, Samantha Turner
Advisors: Diana Alatalo, Haichong Zhang

Salisbury Labs Room 104

9:05am
Ultrasound Guided Needle Insertion Device
Dhruv Chheda, Mikkel Hersum, Jena Taubert
Advisor: Haichong Zhang

9:25am
StomaSense: An Innovative Solution to Preventing Leaks in Ostomy Bags
Nick Coviello, Martin Fortou, Sophia Mularoni, Theresa Rosato
Advisors: Dirk Albrecht, Solomon Mensah

9:45am
Design of a Perfusable Vascularized Leaf Scaffold Housing Device
Codey Battista, Nishan Grandhi, Aidan Kaufman, Ariel Shirzadi
Advisor: George Pins

10:15am
Microfluidic Chip for Modeling Peritoneal Dialysis Ultrafiltration Failure
Sydney Breen, Roman Bolshakov, Isabella Mastriani, Antone Mello
Advisor: Catherine Whittington

10:35am
The KLAA: A Rescue Device for Diaphoretic EKG Acquisition
Lauren Averka, Kellie Bushe, Abigail Gallagher, Abbigail Poland
Advisor: Brenton Faber

10:55am
The Design of a Microfluidic Device for Measuring the Mechanical Properties of Lactating Mammary Cells
Brenna Hadad, Stephanie Low
Advisors: Kristen Billiar, Diana Alatalo
Salisbury Labs Room 105

9:05am
A Neuromorphic Model of the Peripheral Auditory System Implemented in MATLAB
Austin Aguirre, Jack Brazer, Hunter Lassard, Aidan Pereira
Advisor: Adam Lammert

9:25am
Cerebrospinal Fluid Pressure Gradient Model of the Central Nervous System
Louis Desy, Alexis Graziano, Samantha Robison, Isabella Sheeran
Advisor: Raymond Page

9:45am
Enhancing Medication Accessibility: Designing a Child Resistant Pill Bottle Cap for Diverse Users
Emma Bass, Joseph Connor Beane, Jennifer Mills, Nicholas Uy
Advisor: Zoe Reidinger

10:15am
Esophageal Variceal Hemorrhage Rescue Device: Var-Ex Tube
Lillian Dupuis, Guinevere Ferreira, Molly Mahoney, Sarah Percifull
Advisors: Solomon Mensah, Brenton Faber

10:35am
Developing an Optimal Procedure to Evaluate the Effects of Substrate Stiffness and Temperature on Lactating Mammary Epithelial Cells
Leithsa Dimanche, Jazmyn Ewing, Caroline Major, Taina Quinones
Advisor: Diana Alatalo

11:00am
Expanding the Functional Capabilities of the Tongue Prosthesis
Li DeWitt, Deborah Diniz, Avery Macomber, Mylla Santana
Advisors: Dirk Albrecht, Pradeep Radhakrishnana

Salisbury Labs Room 305

9:05am
Developing an in vitro Model to Modulate Molecular Transport in Uterine Myometrial Hypoxia
Eleanor Finberg, Tiffany Foote, Livia Hernon, Anna Kelly, Emily Strojny
Advisor: Catherine Whittington

9:25am
Identifying Magnitudes of Accelerative and Rotational Forces that Impact the Head when Mountain Bike Riding
Christopher Libby, Samuel Ott, Benjamin Pinto Baqueriza
Advisors: Songbai Ji, Benjamin Nephew

9:45am
High Strain Uniaxial Cell Stretching Device
Gabriel Cason, Stuart Elmhurst, Alyssa Morgan, Livia Skende, Angus Zuwallack
Advisor: Kristen Billiar

10:15am
Neuroprosthetic sEMG Device for Video Game Control
Francis Coghlan, Drew Silvernail
Advisors: Taimoor Afzal, Adam Lammert

10:35am
Leap into Learning: A Biomechanics Tool for Interactive Education in Jumping Mechanics
Tuvy Do, Amy Ngo, Chris Nguyen, Daniela Galvan Sanchez, Cara Yorina
Advisor: Karen Troy
The Business School
POSTER SESSION, 9:30am to 12:00pm
Unity Hall 420

Analyzing NFL Managerial Performance Using Sports Data
Evan Bettencourt (BU, MA)
Advisors: Kenny Ching, Randy Paffenroth (MA)

App X Application Proof of Concept
William Doyle (CS), Amitai Erfanian (CS), Katelyn Tropeano (BU)
Advisors: Robert Sarnie, Wilson Wong (CS)

Automatic Flying Disk Inventory
Matthew Adam (IE, ME), Benjamin Antupit (RBE), Claire Higginson (RBE)
Advisors: Greg Lewin (RBE), Walter Towner
Sponsor: Maple Hill Disc Golf

Botanical Conservatory for Aldus C. Higgins House Estate
Morgan Collins (AE), Megan Haley (MGE)
Advisors: Jim Ryan, David Samson, (HUA), Steven Van Dessel (CEAE)

Building the Stride Score App for Informed Education and Career Decisions
Pooja Kawatkar (CS), Dang Nguyen (MIS), Ksenia Romanova (CS)
Advisors: Jim Ryan, Rob Sarnie, Wilson Wong (CS)
Sponsor: Stride Funding

Creating a Minimum Viable Product for Worcester Red Sox’s Enterprise Mobile Application
Mohamed Barry (CS), Miguel Duran (IE), David Rosenstein (CS)
Advisors: Marcel Blais (MA), Sara Saberi, Rob Sarnie, Wilson Wong (CS)
Sponsor: Worcester Red Sox

Creating a Project Engagement Portal for WPI Students
Brian Fox (MIS), Caroline McLaughlin (MIS, PW)
Advisors: Kevin Lewis (PW), Jim Ryan

Design and Prototype of a 5-DoF Robotic Surgical Instrument
Cameron Crane (BME, RBE), Calvin Page (ME, RBE), Nick Johannessen (ME, RBE), Josh Kleiman (IE, ME)
Advisors: Sharon Johnson, Sajid Nisar (Kyoto University), Adam Powell (ME), Yihao Zheng (ME)
Sponsor: Kyoto University of Advanced Science

Development of a Working Prototype and Field Test of Pillar, a Solution to the Medication Non-Adherence Problem
Michael Akstin (CS), Walter Giardina (BU), Tara Desrochers (ECE), Serena Mower (CS), Andrew Sosa (CS), Grace Stevens (ECE)
Advisors: Stephen Bitar (ECE), Michael Engling (CS), Edward Gonsalves, Walter Towner
Sponsor: Raymond Ranellone, Walter Towner

Equitable Employment Solutions: Enhancing Skills Matching for Marginalized Groups
Sasha Daraskevich (DS), Ben Erwin (IE), Mikaela Milch, (CS, DS), Nolan Willoughby (IE)
Advisors: Daniel Reichman, (CS), Andrew Trapp, Marcela Vasconcellos (DS)
Sponsor: Intrare

Evaluating the Effects of Suicide Risk Screening on Emergency Department Workflow
Katee Harrington (IE), Kirsten Harrod (IE), Elijah Kennedy (IE)
Advisor: Sharon Johnson
Sponsor: Edwin Boudreaux

FCAT - Testing Public APIs for Next Generation Platform
Aidan MacNevin (CS), Drew Plunkett (MGE), Rusen Sabaz (CS)
Advisors: Mehuel Bhatia (ME), Rob Sarnie, Wilson Wong (CS)
Sponsor: Fidelity Center for Applied Technology

Fidelity: Customer Data Exploration and Analysis with a Geo-Spatial Focus
Janette Jerusal (DS), Jack Lafond (DS), Sandra Phan (MIS, DS)
Advisors: Marcel Blais (MA), Jim Ryan, Robert Sarnie
Sponsor: Fidelity

Improvement to Site Selection and Due Diligence Process for Affordable Housing Projects in Worcester
Philip Bui (CS), Hasan Gandor (CS), Jack Hoover (CE), Tyler Jordan (IE)
Advisors: Matthew Ahrens (CS), Suzanne LePage (CEAE), Sara Saberi, Robert Sarnie
Sponsor: Worcester IS FAB Lab

Improving Machine Utilization at Sjogren Industries
Conor McGonigle (IE), Henry Sniezek (IE), Christian Varela (IE)
Advisor: Renata Konrad
Sponsor: Sjogren Industries, Inc.
Integrating Generative AI into User Centered Design Approach
Veronica Deer (MIS)
Advisor: Bengisu Tulu

Integration of Environmental Social Governance (ESG) into Turner Construction Company’s Supply Chain
Nicholas Battaglino (CE), Eugena Choi (EVE, EVS), Hannah George (BU, EVS), Jailyn Medeiros (AREN), Adam Tedesco (CE), Dreivone Townsend (AREN)
Advisors: Laila Abu-Lail (CE), John Lindholm, Jessica Rosewitz (CEAE), Elisabeth Stoddard (IGS)
Sponsor: Turner Construction Company

Looking Forward in the Chinese Real Estate Market
Shuailin Wang (BU)
Advisor: Walter Towner

Optimization of Tool Wear Versus Tool Change at Affordable Interior Systems
Phillip Cass (IE, ME), Ryan Martin (MGE)
Advisors: Christopher Brown (ME), Walter Towner
Sponsor: Affordable Interior Solutions

Optimizing Croi Platform: An Evaluation and Enhancement of the Croi Platform in High School Environments
Nicolas Gronda (MGE)
Advisors: Sandhya Balasubramanian, Rosanna Garcia
Sponsor: Croi, Inc.

Organizational Resiliency and Small and Medium Enterprises in New Zealand
Joel Brunzell (BU)
Advisors: Michael Elmes, Ingrid Shockey (EVS)

Post-Disaster Aid Distribution
Max Anderson (DS), Brock Dubey (DS), Kaycie Lam (MA), Madelyn Marcotte (DS), Justin Vo (DS, MIS)
Advisors: Andrew Trapp, Bengisu Tulu, Özge Aygül (DS)

Process Automation & Data Matching
Chase Goings (MIS), Griffin Curley (MA), Mirandi McCormick (CS)
Advisors: Marcel Blais (MA), Rob Sarnie, Wilson Wong (CS)
Sponsor: Micronotes

Rich Embedded Finance Solutions for Colleges and Students
Andrei Bornstein (CS), Nikola Grozdani (CS), Zach Newberg (BU)
Advisors: Rob Sarnie, Wilson Wong (CS)
Sponsor: Citizens Bank

Saint-Gobain Abrasives: Optimizing the Production Process in Bond Plant 7
Ryan Biberon (MGE), Andrew Lufkin (MGE), Stephen MacDonald (MGE), Giancarlo Orlandi (MGE)
Advisor: Walter Towner
Sponsor: Saint-Gobain Abrasives

Selection Criteria for Deployment of Collaborative Robots
Nikolaos Diakides (MGE), Jose Tamariz (IE, RBE), Francisco Yanes Gorbea (IE), Fangle Zhao (IE)
Advisor: Walter Towner

Tool Change Process Improvement at AIS
Kaitlyn Byrum (IE), Benjamin Chaves (IE), Haley Gilbert (IE), Raman Kaushik (IE), Matthew Wofford (MGE)
Advisor: Walter Towner
Sponsor: Affordable Interior Systems

UMass MIH Program: Preparing for Growth with Data Analysis
Shannon Reno (IE), Sarah Spencer (IE), Maryka Tousignant (IE), Adrianna Yuen (IE)
Advisor: Sharon Johnson
Sponsor: University of Massachusetts Memorial Hospital

Using Social Network Analysis to Understand Spontaneous Volunteerism after a Disaster
Leonardo Coelho (IE)
Advisor: Renata Konrad

Visualizing Policy Compliance for Enhanced Cloud Governance
Ryan Saklad (BU), Will Huang (CS), Ryan Kornitsky (CS)
Advisors: Rob Sarnie, Wilson Wong (CS)
Sponsor: State Street

Wearable Biometric Monitoring for Collegiate Soccer Athletes
Evan Brady (BME), James Carmody (ME), Krish Patel (ECE), Jennifer Russo (MGE)
Advisors: Taimoor Afzal (BME), Mehul Bhatia (ME), Bashima Islam (ECE), Walter Towner
The Separation of Microplastics by Froth Flotation  
Kayla Carpenter, Lauren Eppinger, Paige Mesick  
Advisor: Laila Abu-Lail

Examining the Influence of Lipid Nanoparticle Composition on Their Thermodynamic Properties Using Differential Scanning Calorimetry and pKa Analysis  
Abigail Deichert, Julia Dowd, Caitlyn Swart  
Advisor(s): Christina Bailey-Hytholt, Ronald Grimm, Chemistry and Biochemistry

Encapsulation of Lithium in a Nanocarrier for Use During Pregnancy and Lactation  
Cameron Carlin, Kayla Condon, Sarah Ossing, Violet Smiarowski  
Advisor(s): Christina Bailey-Hytholt, Diana Alatalo, Biomedical Engineering

Formulating Liposomes for Increased Antimicrobial Activity Towards *Staphylococcus Epidermidis*  
Mae Felkner, Emily Pimentel, Kate Stoncius, Hannah Wolfgang  
Advisor(s): Christina Bailey-Hytholt, Elizabeth Stewart

Assessment of Lipid Nanoparticle Structure  
Warren Callen, Steven Robinson  
Advisor: Christina Bailey-Hytholt

Effects of Glucose Oxidase (Gox) on Synthetic Honey  
Gabriel Garbes, Jonathan Martin  
Advisor: Susan Roberts

Automated Shearing Devide for the Control of Aggregation in *Taxus Chinensis* Suspension Cultures  
Jada Smith, Deah Zajmi  
Advisor: Susan Roberts

Effect of Magnetism on Astaxanthin Production in *Xanthophyllumyces Dendrothous*  
Eric Kasischke  
Advisor: Eric Young

ABS Plastic Cannot be Recycled Infinitely  
Zachary Maynard  
Advisor(s) David DiBiasio, Nancy Burnham, Biomedical Engineering  
Professor Stefan Hengsberger and Professor Hans-Ulrich Sigenthaler of Haute école d’ingénierie et d’architecture de Fribourg.
Molybdenum-Based Double Transition Metal MXenes: A DFT Analysis of Properties
Benjamin Traverso
Advisor: Aaron Deskins

Catalytic Hydrothermal Liquefaction of Wastes
Candy Zhang
Advisor: Michael Timko, Aidin Panahi

Unlocking Bamboo’s Biofuel Potential: A Delignification and Crystallinity Study Using Deep Eutectic Solvent Pretreatment
Kathleen Buek, Tyler Gambon, Zachary Manfredi
Advisor: Michael Timko

Waste to Energy: Understanding the Effects of Radical Initiators, Hydrothermal Liquefaction Pathways
Joelis Velez Diaz
Advisor: Michael Timko, with Alex Maag, Geoffrey Tompsett

Stranded Gas Valorization
Ethan Fox
Advisor(s): Nikolaos Kazantzis, Michael Timko

Renewable Hydrochar Adsorbent
Lili Hellerman, Andrew Troup
Advisor: Michael Timko

Co-Hydrothermal Liquefaction of Food Waste and Lignin
Skyler Kauffman
Advisor(s): Michael Timko, Alex Maag

Catalytic Upgrading of the Hydrothermal Liquefaction Aqueous Phase Using Zeolites
Alex Mosley, Oamfah Suwannapong, Jia Yazon
Advisor: Michael Timko

Visible Light Functionalization and Degradation of Plastics
Lucas Bazydola
Advisor(s): Michael Timko, Patricia Musacchio, Chemistry and Biochemistry

Mechanical Strength of Bamboo Fiber Biocomposites Within a Biorefinery Concept
Clayton Hanlon, Chase Herberich, Jacob Kayser, Terrence McFarland
Advisor(s): Michael Timko, Nima Rahbar, Civil, Environmental and Architectural Engineering

Recycling Used Canola Oil into 3D Printing Resin
Thomas Dell’Aera, Jessica Feeney, Richard Franzen, Daniel Shea, Emily Sollecito
Alex Maag, Mehul Bhatia, Mechanical and Materials Engineering

Production and Uses of Hydrochar from Fermented Fruit Waste
Emily Brindisi, Samantha Dubord, Evelyn Kellum, Leah Harnisch-Weidauer
Advisor: Stephen Kmiotek

Reactive Packed Bed Safety: Experimental Evaluation of TiCi4 Passivation for Metal Hydrides
Alexander Greally, Gavin Maloney, Jonathan Santos, Adrianna Tagayun
Advisor(s): Stephen Kmiotek, Andrew Teixeira

Evaluating PFAS Treatment Processes
Max Elwell, Madeline Goggin, Patrick McKenna, Nathan Raymond
Advisor(s): Stephen Kmiotek, John Bergendahl, Civil, Environmental and Architectural Engineering

*** Not Presenting in Chemical Engineering***

Analyzin PFAS Concentrations Along the Blackstone River Wathershed (presenting in EVE)
Noelle Noons, Alec Parish
Advisor: Stephen Kmiotek, John Bergendahl, Civil, Environmental and Architectural Engineering

Design and Analysis of an Automated Wine Bottle Opener (presenting in BME and ME)
Frank Almeida (BME), Cameron DiMeglio, Patrick King, Luke Rogers (ME)
Advisors: David DiBiasio, Kristen Billiar (Biomedical Engineering), Mustapha Fofana (Mechanical Engineering)

**** Not Presenting***

Dust Explosion of Niacin in the Animal Feed Industry (not presenting)
Joshua Roberts
Advisor: Stephen Kmiotek

Defining the Characteristics of Optical Sensors Dissolved Organic Matter Monitoring (not presenting)
Rachel Cabral
Advisor: Stephen Kmiotek

Study of the Hydrodynamics of Wastewater Treatment Plant Reactors (not presenting)
Maya Vartabedian
Advisor: Stephen Kmiotek

Analysis of Plasma Etching in Semiconductors (not presenting)
Nicholas Culkin
Advisor: Stephen Kmiotek
Chemistry and Biochemistry

POSTER SESSION, 9:30 to 11:30 am
Campus Center, Odeum A & B

Examination of the visual effects of NaCl exposure on the neurites of NGF differentiated PC12 cells
Charlotte Adams
Advisor: Suzanne Scarlata

Synthesis and SAR Studies of Coronavirus Main Protease Inhibitors
Patrick Bailey
Advisor: José Argüello and Akbar Ali (UMass)

Methods for Imaging Salmonella Biofilms
Meghan Barry
Advisor: Christopher Lambert

Metal Dyshomeostasis in Alzheimer's Disease: An Observation of the Role of ZIP12 in Zinc Uptake in Neuronal Cells
Madison Brown, Lily Lancellotti, Allison Walker and Morgan Whitney
Advisor: Robert Dempski and Lou Roberts (BBT)

Medium Chain Fatty Acids Cause Toxicity in C. elegans
Juliet Bolduc
Advisor: Carissa Olsen

Novel Synthesis of Biologically Relevant Heterocycles
Lilian Carleu
Advisor: Anita Mattson

Biochemical Studies of CDK16
Kallie Case
Advisor: Suzanne Scarlata

Characterization of Two Novel Apoptin Homologs via Structural and Localization Predictions and in vitro Confirmation
Megan Caten and Eva Plankey
Advisor: Destin Heilman

What impacts do artificial sweeteners have on clean drinking water? Remediation of Artificial Sweeteners in Drinking Water with Zeolites
Elizabeth Dahlberg
Advisor: Drew Brodeur

Searching for Cu Importers in Salmonella Typhimurium
Jocelyn Diaz
Advisor: José Argüello

Investigation of PCV1 VP3 Through Structural Prediction and Analysis of Protein Dynamics
Kylie Doehring and Nicholas Sorel
Advisor: Destin Heilman

Exploring the Impacts of Diet and Stress on Membranes in C. elegans
Diana DiTullio and Liliana MacDonald
Advisor: Carissa Olsen

Flavylium-Inspired Catalysts for Chromene Functionalization
Olivia Guimaraes and Jacob Vosburg
Advisor: Anita Mattson

Monitoring biological interfaces for Salmonella resistance in a fluidic channel
Lindsay Hoey
Advisor: Christopher Lambert

Artemisia annua tea drug interactions: new method development
Russell Kam and Ryan Polansky
Advisor: Suzanne Scarlata and Pamela Weathers (BBT)

Exploring Cellular Dynamics: Monitoring PLCδ1 Expression and Visualizing Subcellular Localization in PC12 Cells
Rafaela Kanli
Advisor: Suzanne Scarlata

Utilizing Sensitzers for Zinc Photocages
Sophie Loree
Advisor: Shawn Burdette
Amide Coupling Creates Hydrophilic Polymers for UiO-66 Attachment
David MacLeod
Advisor: Ronald Grimm

Investigation of porous metal-organic frameworks as solid supports for separation of organic molecules
Quinn McCue
Advisor: John MacDonald

Fabrication of Phosphatidylserine-Containing Asymmetric Giant Unilamellar Vesicles by Hemifusion
Jake McDonough
Advisor: Arne Gericke

Investigating the Effects of Salt Stress on the Morphology of PC12 Cells
Bailey Norris
Advisor: Suzanne Scarlata

Diazolation of 3-bromotetrahydrofuran Via Photoredox Catalysis
Matthew Resmini
Advisor: Patricia Musacchio

Conversion of Carboxylic Acids to Ketones Utilizing Nitrile Sources
Oliver Zaba
Advisor: Patricia Musacchio
Civil, Environmental, & Architectural Engineering
POSTER SESSION, 12:30pm to 3:00pm
Kaven Hall

1. Building Responsibly: Sustainability Within the Supply Chain
Nicholas Battaglino, Eugena Choi, Hannah George, Jailyn Mederios, Adam Tedesco, Dreivone Townsend
Advisors: Jessica Rosewitz, Laila Abu-Lail, Laureen Elgert, Soroush Farzin, John Lindholm, Lisa Stoddard

2. An Analysis of Water Scarcity in California and Recommendations for Management in Coalinga
Duncan D’Olimpio, Meilie Fromhein, Kayleigh George, Chloe Harrison, Richard Healey
Advisor: Jeanine Dudle

3. Evaluating the Initial Service Line Inventory and Replacement Plan Processes
Donald Crowley, Louis Lavenda, Ryan Malaquias, Joseph Peregrim
Advisor: Jeanine Dudle

4. The Lantern Student Hub: A Space for Better Mental Health
Jesse Ames, Anna Bauerle, Ethan Lockhart, Christina Tran
Advisors: Saroush Farzin, Leonard Albano, Crystal Brown

5. Developing a Space Improving Behavioral Patterns and Productivity
William Fallon, Jonathan Nguyen, Ethan Thompson
Advisors: Saroush Farzin, Ali Yousef

6. Design of Duxbury Boardwalk
Elidja Diakite, Ryan Tonry
Advisors: Suzanne LePage, Leonard Albano

7. Interchange Redesign: Modernizing Infrastructure in Sterling, Massachusetts
Samantha Calamari, Braeden Fruchtman, Abigail Pulling, Brandon Taranto
Advisor: Suzanne LePage

8. Advising the CTDOT on Accessibility Compliance, Safety, and Stormwater Management in Bridgeport, CT
Kendall Begin, Bridget Gillis, Margaret Paratore
Advisor: Suzanne LePage

Samuel Dickens, Joseph McNeill, Natanel Pinkhasov, Aunika Yasui
Advisors: Soroush Farzin, Carrick Eggleston, Nima Rahbar

10. East Haddam Downtown Roadway Redevelopment
Nicholas Manz, Jack Perriello, Aaron Swann
Advisor: Suzanne LePage

11. Botanical Conservatory for Aldus C. Higgins House Estate
Morgan Collins, Megan Haley
Advisors: Steven Van Dessel, Jim Ryan, David Samson

12. On-Campus Student Parking Garage & Recreation Center
Mario Barberio, Alexi Echevarria, Michael McLoughlin, Giovanni Ramirez
Advisor: Leonard Albano

13. Optimizing Storage Tank Design for Efficient Potable Water Supply
Bryce Curtin, Christian Davis, Robert Gyurcsan, Marcella Larrabee
Advisor: Jeanine Dudle

Franklin Ford, Seton King
Advisors: Steven Van Dessel, Tahar El-Korchi
15. Corridor Study of Route CT-156 in East Lyme, Connecticut
Luna Daury, Michaela Dos Santos, Lauren Hess
Advisors: Suzanne LePage, Robert Kreuger

16. Developing a New Baseball Facility for WPI
DJ Brooks, Jacob DelMonte, Frankie Polito
Advisors: Leonard Albano, Mehul Bhatia

17. Simultaneous Degradation of Ammonia and PFAS in Landfill Leachate
Isabella Clowes, Bhargavi Ramesh, Liam Thomson
Advisors: John Bergendahl, Stephen Kmiotek

18. Analyzing PFAS in the Blackstone River Watershed
Noelle Noons, Alec Parish
Advisors: John Bergendahl, Stephen Kmiotek

19. PFAS Extraction via Divalent Catonic Interactions
Max Elwell, Madeline Goggin, Patrick McKenna, Nathan Raymond
Advisors: John Bergendahl, Stephen Kmiotek

20. Re-Imagining the Gordon Library
Joseph Hurley, Kyle Shriberg, Emmanuel Vargas
Advisors: Steven Van Dessel, Tahar El-Korchi

21. Restoration of the Mill Creek Salt Marsh in Chelsea MA
Joseph Horowitz, Adam Lepore, Rebekah Mendoza, Kaleigh Walsh
Advisors: Paul Mathisen, Crystal Brown

22. Analysis and Design of a New Community Recreation Center in Worcester
Jocelyn Bourgoin, John Mohareb, Ravyn Rapley, Vivian Vacharakupt
Advisor: Jessica Rosewitz

23. Mangrove Boardwalk Project
Advisor: Aaron Sakulich

24. Auxetic Steel-Concrete Structures
Ibrahim Hussam Smaili Krkoukli
Advisor: Nima Rahbar

25. Potable Water Reuse in Massachusetts
Carley Burns
Advisor: John Bergendahl

26. What Makes a Home?
Vivienne Evans
Advisor: Nancy Ma

27. Waste Pavilion
Dakota Lehner, Esrom Negash, Megan Tupaj
Advisors: Soroush Farzin, Leonard Albano, Nima Rahbar, Bridgitt Servatius, Herman Servatius

28. Reimagining of WPI Gordon Library - Retaining Wall Design
Elizebeth Fiscus
Advisors: Steven Van Dessel, Tahar El-Korchi

29. Biocemented Soil Stabilization with Enzyme Induced Carbonate Precipitation through Carbonic Anhydrase
Edward Jacoby
Advisor: Nima Rahbar

30. Designing a Community Space in Buxton, Guyana
Nathalie Larrea
Advisor: John Bergendahl
Computer Science

POSTER SESSIONS

Innovation Studio, Second Floor

Session A: 10:00am to 12:00pm

EcoTarium Explorer: Increasing Accessibility at the Worcester EcoTarium
Joseph Fox, Owen Mcginley, Dylan Olmsted, Dylan Phillips, Brandon Vuong
Advisor: Rodica Neamtu
Sponsor: Worcester EcoTarium

DraftKings Fantasy Sports Data Analytics
Abigail Albuquerque, Vagmi Bhagavathula, Kristin Lavoie, Owen Radcliffe, Eric Schuman
Advisors: Donald Brown (ECE), Randy Paffenroth (Math)
Sponsor: DraftKings

Machine Learning, Image Processing, and Transfer Learning for Handwritten Text Recognition
Matthew Haley, Liam Hall, Christopher Langevin, Cameron Norton, Harsh Patel, Elliot Trilling
Advisors: Oren Mangoubi (MA), Randy Paffenroth (MA)
Sponsor: DraftKings

Mining Graph Patterns in Software Development from Code Repositories
Ethan Falcao, Nur Fateemah, Alexander MacDonald, Jakob Simmons
Advisors: Fabricio Murai, Frank Zou (Math)

Z3-Wellness: Evaluating and Improving a Sleep Wellness Application for College-Age Students
Sultan Adedeji, Camilo Escobar, Seungho Lee, Lucas Sicard, Jack Hanlon, Benjamin Bagley, Matthew Lacadie, Parker Van Ham, Mackenzie Pryor (DS), Justine Moy (DS)
Advisor: Carolina Ruiz

AutoOD 2.0: Elevating User Experience and Multi-User Functionality
Talia Andrews, Ishayu Das, Tristan Sharich, James Yi
Advisor: Elke Rundensteiner

Interactive Experience Design

John Carrotta, Justin Santiago-Wonoski, Sriram Sundararajan, Madelyn Veccia
Advisors: Melissa Kagen, Erin Solovey

FinTech Project B23 - Stride Funding - Building Stride Score App for Informed Education and Career Decisions
Pooja Kawatkar, Dang Nguyen, Ksenia Romanova
Advisors: Jim Ryan, Robert Sarnie, Wilson Wong
Sponsor: Stride Funding

App X Application Proof of Concept
William Doyle, Amitai Erfanian, Katelyn Tropeano
Advisors: Sarnie Robert, Wong William
Sponsor: Seni Hazan

Rich Embedded Finance Solutions for Colleges and Students
Andrei Bornstein, Nikola Grozdani, Zach Newberg
Advisors: Robert Sarnie, Wilson Wong
Sponsor: Citizens Bank
Project Center: Fintech Project Center

Various Design Projects in the ASSISTments Foundation
Neha Kuchipudi
Advisor: Neil Heffernan
Sponsor: ASSISTments
Enhancing Skills Matching for Marginalized Groups
Sasha Daraskevich, Ben Erwin, Mikaela Milch, Nolan Willoughby
Advisors: Daniel Reichman, Andrew Trapp (BUS, DS), Marcela Vasconcellos (DS)
Sponsor: Intrare

Clean Sweep
Austin Hyatt, Nelson Pires
Advisors: Farley Chery (IMGD), Rodney DuPlessis (IMGD), Gillian Smith, Karen Stewart (IMGD)

Implementing a New Beecology Project Web App Interface
William Dufault, Mattheus Faria, Steven Frisch, Colin Fyock
Advisors: Carolina Ruiz, Liz Ryder (BB)

Clean Sweep
Austin Hyatt, Nelson Pires
Advisors: Farley Chery (IMGD), Rodney DuPlessis (IMGD), Gillian Smith, Karen Stewart (IMGD)

Implementing a New Beecology Project Web App Interface
William Dufault, Mattheus Faria, Steven Frisch, Colin Fyock
Advisors: Carolina Ruiz, Liz Ryder (BB)

FCAT - Testing Public APIs for Next Generation Platform
Aidan MacNevin, Drew Plunkett, Emre Sabaz
Advisors: Mehul Bhatia (ME), Michael O’Connor, Robert Sarnie (BS), Wilson Wong
Sponsor: Fidelity Center for Applied Technology
Project Center: FinTech Project Center

Designing for Productivity, Exploring the Cognitive Impact of Architectural Design
William Fallon, Jonathan Nguyen, Ethan Thompson
Advisors: Soroush Farzin, Ali Yousefi

Creating a Comprehensive Pipeline for Exploring Cultural Variance in Data Visualization
Joselin Barbosa, Katie Bowles, Vivian Reno
Advisors: Lane Harrison, Noelle Rakotondravony

Performance of HPC Systems
Karl Brzoska
Advisor: Shubbhi Taneja

How the Human Brain Makes Sense of Natural Scenes
Shivali Mani, Alison McNicholas, Jose Morales
Advisor: Ziming Zhang

Leveraging Product Analytics to Streamline Application Flows and Triple User Retention for Perr, a File-sharing Application
Justin Luce, Michael McInerney, Aidan Syrgak
Advisor: Chun-Kit Ngan
Sponsor: Overthrow Inc.

Designing an Interactive Interface for FACET: Personalized Explanations in XAI
Randy Huang, Belisha Genin, Jacob Reiss, Katharine Dion, Alexander Pietrick
Advisor: Elke Rundensteiner

Aiding in the Migration of the E-Trials Platform
Kristine Guan, Sharon Wu
Advisor: Neil Heffernan
Sponsor: The ASSISTments Foundation

Predicting Students’ Mental Health Using Fitbit Data
Allison Escott, Kyle Lusignan, Noah Pins, Olivia Raisbeck
Advisors: Shichao Liu, Oren Mangoubi, Elke Rundensteiner

An Examination of Share Buyback Program Execution
Robert Chiocchio
Advisors: Marcel Blais (MS), Randy Paffenroth, Stephan Sturm (MS)
Sponsor: Bern University of Applied Sciences
Project Center: Switzerland

FACET: Finding Actionable Explanations for Unwanted AI Predictions
Katharine Dion, Belisha Genin, Randy Huang, Alexander Pietrick, Jacob Reiss
Advisors: Dr. Elke Rundensteiner, Peter VanNostrand, Dennis Hofmann

Jitter Compensation for Cloud-based Game Streaming
Nicholas Heineman, Yu-Chi Liang, Aaron Nguyen, William Ryan
Advisor: Mark Claypool

Operation Breadcrumbs
Tate Donnelly, Nicholas Frangie, Jack McEvoy
Advisors: Adryen Gonzalez (IMGD), Ben Schneider (IMGD), Gillian Smith

Enhancing the Robustness of Deep Neural Networks
Alasdair Campbell, Jared Lasselle
Advisor: Yanhua Li

7Factor 2023-2024: AWS Analysis
Cameron Goodrich, Joey Rozman, Nathaniel Sadler, Oliver Shulman, Dov Ushman
Advisor: Joshua Cuneo
Sponsor: 7Factor

Customizing Large Language Models for Automated Academic Advising at Universities
Ronit Banerjee, Kate Butziger, Fabrizio Filizzola, Matt Kiszia
Advisor: Xiangnan Kong

Robot Escape Room
Iain McEwen, Conner McKeivitt, Kaelin Panneton
Advisors: Berk Calli (RBE), Melissa Kagen (IMGD), Gillian Smith

Failed To Send
Evans Owusu, Carolyn Meyer
Advisors: Karen Stewart (IMGD), Gillian Smith

Predictors of Medically Significant Chronic Pain Response to Mindfulness-Based Treatment
Adeline Evans, Adina Palayoor
Advisors: Carolina Ruiz, Benjamin Nephew (BCB/BBT)

Session B: 1:00pm to 3:00pm

Isolation-Centric Operating Systems for the Enterprise
Annalisa Allan, Jacob Chlebowski, Quentin Hall, Zaq Humphrey, Charles Kneissl-Williams, Cole Ouellette, Mira Plante, Caleb Scopetski, Aidan Wech, Connor West, Edison Zhang
Advisors: Jun Dai, Craig Shue, Sherry Sun

Fine-Tuning Open-Source Large Language Models for Generating Math Explanations
Paul Godinez, Eli Hoffberg, Neena Xiang
Advisor: Neil Heffernan
Project Center: ASSISTments

Database Technology Comparisons and Exploration
Axel Luca, Ethan Pollack, Harrison Taylor
Advisors: Rodica Neamtu, Wilson Wong

Developing Reusable Robotic Code Library for Improving Quality of Controllers
Jair Meza, Austin Rebello, Brianna Sahagian
Advisor: George Heineman

Efficient Delivery of Geospatial Data for Web Visualization
Deepi Gosukonda, Nadav Konstantine, Nicholas Markou, Patrick Salisbury
Advisor: Lane Harrison
Sponsor: Tetra Tech

7Factor Staffing Tool #2
Matthew Adragna, Jackson Lundberg, Jordan Wecler
Advisor: Joshua Cuneo
Sponsor: 7Factor Software, LLC

Data Analytics/Visualization for Analyzing the Draft and Evaluation of Players in Professional Sports
Jacob Adamsky, Jinjia Ou, Engjell Ramadani
Advisor: Craig Wills

7Factor Staffing Tool One
Nicholas Borrello, Sean McNamara
Advisor: Joshua Cuneo
Sponsor: 7Factor

Improving QUIC Slow Start Behavior in Satellite Networks with SEARCH
Amber Cronin
Advisors: Mark Claypool, Alexander Wyglinski (ECE)
Sponsor: Viasat

Building a Platform for Data Visualization Learning
Joe Dobbelaar, Luke Foley, Ryker Germain, Matthew McAlarney
Advisor: Lane Harrison
ChordCraft: AI Chord Generator VST  
Sameer Desai, Thomas Kneeland, Darren Kwee, Ilana Whittaker  
Advisors: Scott Barton (HUA), Charles Roberts

ReVisit Study  
Alvin Chen, Luke Gardone  
Advisor: Harrison Lane

Mobile App for E-Waste Processors  
Cortina Barbieri, Abigail Boafo, Abby Hoschouer, Madeline Mueting, Alyssa Ogi  
Advisors: Robert Krueger, Harrison Lane, Mahamadou Sagna

Creating a Survey Tool for Users of American Sign Language  
Julia Albrecht, Juliana Porto, Jenna Tripoli  
Advisor: Erin Solovey  
Sponsor: National Science Foundation, ASL Education Center

Exploring Use Cases and Evaluating Tools for Web3 Technology  
Jacob Byrnes, Michael Gatti, Jack Lynch, Kody Robinson, Eric Zhou  
Advisor: Craig Wills

Zero-th Annual Martin Gardner Exploration Project: 2048  
Ethan Catania, Tucker Raymond  
Advisor: Michael Engling

Software Engineering Healthcare Application Framework  
Joseph Cardarelli, Bryce Lukens, Ari Schechter, Mike Wilkinson, Ian Wright  
Advisor: Wilson Wong

Developing a Brain-Computer Interface to Enhance Storytelling in Games with the Identification of Cognitive States  
James Cao, Andrew Nguyen, Jagger Polvino  
Advisors: Max Chen (IMGD), Gillian Smith, Erin Solovey

Authentication Mechanisms  
Charles Anderson, Ian Grzembski, Caitlyn Puiia, Daniel Onyema  
Advisor: Craig Wills

Implementing Butterfly Data Visualization Tools for the Beecology Project  
Joanna Hu, Bernhard Nordemann, Megan Sin, Aria Yan  
Advisors: Carolina Ruiz, Elizabeth Ryder (BCB)

Voice Control of the HOPE Hand Exoskeleton for Individuals with Motor Impairments and Speech Aphasia  
Connor Gaudette, Matthew McGourty, Allison Rozear, Keenan Segenchuk  
Advisors: Christopher Nycz (RBE), Erin Solovey, Yunus Telliel, Haichong Zhang (BME/RBE)

Latency and Jitter Compensation for Cloud-based Game Streaming  
Marek Garbaczonek, Jonathan Hsu, Mark Renzi  
Advisor: Mark Claypool

RavenGuard MQP  
Alex Marrinan  
Advisor: Michael Engling

GoatConnect  
Owen Lebane, John Mezzo, Isabella Pabon, Harry Rubin  
Advisor: Rodica Neamtu

Mohamed Barry, Miguel Duran, David Rosenstein  
Advisors: Marcel Blais (MA), Joshua Cuneo, Sara Saberi (WBS), Robert Sarnie (WBS), Wilson Wong  
Sponsor: Worcester Red Sox  
Project Center: FinTech Project Center

Automated Design Tool for Arduino Circuits  
Gabriel Buziba, Yangyang Jin, Andres Neqron, Casey Wohlers  
Advisors: David Brown, Pradeep Radhakrishnan (ME)

PMKS+: An Application for Generating and Analyzing Planar Linkages  
Nicole Burgess, Robert Eskridge, Tyler Evans  
Advisors: David Brown, Pradeep Radhakrishnan
SCApeGoat: Side-Channel Analysis Library
Samuel Karkache, Trey Marcantonio
Advisors: Fatemeh Ganji (ECE), Patrick Schaumont

The Statistics of Subsequences
Chase Miller, Andrew Salls, Duncan Soiffer
Advisors: George Heineman, Daniel Reichman, Gabor Sarkozy

Radar and AI-based Soil Moisture Prediction for Efficient Farm Irrigation
Allen Cheung, Ruba Khan
Advisors: Oren Mangoubi, Seyed Zekavat (DS)

Automated Wearable ECG Data Editing with DNN
Vincenza Burdulis, Jacob Nguyen, Daniel Sardak
Advisor: Bashima Islam (ECE)

Dynamical Systems Approaches for Deep Learning
Neil Kale
Advisor: Randy Paffenroth

Assisting Learning Through Student Mastery Metrics
Noah Goodman, Justin Weintraub
Advisor: Neil Heffernan

Enriching Visually-Impaired Visitors Experiences at the Worcester Art Museum
Timothy Connors, Theo Coppola, Randolph Dyer
Advisor: Rodica Neamtu
Sponsor: Worcester Art Museum

soloPlane: Modular Electronic Mallet Instrument
William Merry, Robert Oleynick, Nathaniel Reppucci
Advisors: Scott Barton (CS, RBE), Patrick Schaumont (ECE)

Social Robot for Interactive Play
Joseph Baliestiero (RBE), Jayson Caissie, Kaley Du, Megan Jacques (RBE), Chloe Plasse, K. "V" Valery (RBE)
Advisors: Rose Bohrer, Jane Li (RBE)
Data Science

POSTER SESSION
Unity Hall 500

Group A  12:00pm to 1:30pm

#A
Building a Platform for Data Visualization Learning
Joseph Dobbelaar (CS), Luke Foley (CS), Ryker Germain (DS), Matthew McAlarney (CS)
Advisors: Lane Harrison

#A
Deep Learning Analysis of Neuroimaging (MRI) Data
Olivia Deckers (BCB), Jonathan Golden (CS), Vivek Kandasamy (BCB), Pitipat Kongsomjit (DS)
Advisors: Dmitry Korkin, Benjamin Nephew, Angela Incollingo Rodriguez (co-advisor)

#A
FinTech Project B23 - Enhancing Investment Management - Data Science
Dante Amicarella (DS), Sarah LaRusso (Math/CS), Maya Liao (DS), Nathan Shemesh (CS)
Advisors: Marcel Blais, Rob Sarnie, Wilson Wong

#A
Leveraging Product Analytics to Streamline Application Flows and Triple User Retention for Perr, a File-sharing Application
Justin Luce (CS), Michael McNerney (CS), Aidan Syrgak Uulu (DS)
Advisors: Chun-Kit Ngan

#A
Machine Learning for Predicting Effectiveness of Mindfulness for Chronic Pain Reduction
Adeline Evans (CS), Adina Palayoor (CS/DS)
Advisors: Carolina Ruiz

#A
Post-Disaster Aid Distribution
Maxime Anderson (DS), Brock Dubey (DS), Kaycie Lam (Math), Madelyn Marcotte (DS), Justin Vo (DS/MIS)
Advisors: Andrew Trapp, Bengisu Tutu

#A
RAPIDS: Rapid AI Platform for Innovating Data Science
Jai Patel (CS), Caleb Talley (CS), Natasha Ussrey (CS/DS)
Advisors: George Heineman, Xiaozhong Liu

#A
Sustainability Insights: Navigating Environmental Challenges through Data Exploration
Charlotte Carter (DS), Brandon Luong (CS), Sydney Peno (DS)
Advisors: Torumoy Ghoshal

#A
Supervised Machine Generated Text Detection Using LLM Encoders in Various Data Resource Scenarios
Marc Capobianco (CS/DS), Duong Luong (DS), Charles Phelan (DS), Matthew Reynolds (DS), Krish Shah-Nathwani (DS)
Advisors: Kyumin Lee

#A
Z3-Wellness: Evaluating and Improving a Sleep Wellness Application for College-Age Students
Sultan Adedeji (CS), Benjamin Bagley (CS), Camilo Escobar (CS), Jack Hanlon (CS), Matthew Lacadio (CS), Seungho Lee (CS), Justine Moy (DS), Mackenzie Pryor (DS), Lucas Sicard (CS), Parker Van Ham (CS)
Advisors: Carolina Ruiz
Group B  2:00pm to 4:00pm

#B
A Data-driven Analytical Approach for Improving Endurance Runners’ Performance
Mason Perham (DS), Ethan Rudometkin (DS)
Advisors: Chun-Kit Ngan

#B
A Data-driven Framework for Competitive Machining Industry: Database, Analysis, and Dashboard
Kendall Haddigan (DS), Daniel Thu (DS)
Advisors: Fatemeh Emdad, Chun-Kit Ngan

#B
Addressing Imbalanced Data in Machine Learning: Methods and Challenges
Bishoy Soliman Hanna (DS)
Advisors: Ziming Zhang

#B
Customizing Large Language Models for Automated Academic Advising at Universities
Ronit Banerjee (CS/DS), Kathryn Butziger (CS), Jose Fabrizio Filizzola Ortiz (CS), Matthew Kisza (CS)
Advisors: Xiangnan Kong

#B
Design of AI-enabled Chatbot
Federico Perez (DS), Colin Mettler (CS), Xiao Xiao (CS), Guillermo Morel Mendez (CS), Rolando Salamea-Lopez (ECE), QiHan He (ECE), Hrishikesh Nair (ECE), Quincy Payne (ME)
Advisors: Lin Cheng, Bo Tang

#B
DraftKings Fantasy Sports Data Analytics
Abigail Albuquerque (DS), Vagmi Bhagavathula (CS/DS), Kristin Lavoie (DS), Owen Radcliffe (CS), Eric Schuman (DS)
Advisors: Donald Brown, Randy Paffenroth

#B
Drone-Based Intelligent Soil Sub-Surface Characterization
Nicholas Latsis (DS), Ethan Reed (DS), Joshua Thurber (DS)
Advisors: Doug Petkie, Seyed Zekavat

#B
EcoTarium Explorer: Increasing Accessibility at the Worcester EcoTarium
Joseph Fox (DS), Owen McGinley (CS), Dylan Olmstead (DS), Dylan Phillips (CS), Brandon Vuong (CS)
Advisors: Rodica Neamtu

#B
Extending Course Planner for Broader Academic Coverage
Jennifer Kimball (DS), Matthew Suyer (DS)
Advisors: Andrew Trapp

#B
FACET System: Finding Actionable Explanations for Unwanted AI Predictions
Katherine Dion (DS), Belisha Geninn (CS/RBE), Randy Huang (CS), Alexander Pietrick (CS/DS), Jacob Reiss (CS)
Advisors: Elke Rundensteiner

#B
FinTech Project B23 - Fidelity - Customer Data Exploration and Analysis with a Geo-Spatial Focus
Janette Jerusal (DS), Jack Lafond (DS), Sandra Phan (DS/MIS)
Advisors: Marcel Blais, Jim Ryan, Rob Sarnie

#B
How the Human Brain Makes Sense of Natural Scenes
Shivali Mani (DS), Alison McNicholas (CS), Jose Morales (CS)
Advisors: Ziming Zhang

#B
Implementing a New Beecology Project Web App Interface
Will Dufault (CS), Mattheus Faria (DS), Stevie Frisch (CS), Colin Fyock (CS)
Advisors: Carolina Ruiz, Elizabeth Ryder

#B
Implementing Butterfly Data Visualization Tools for the Beecology Project
Joanna Hu (CS), Bernard Nordermann (CS), Megan Sin (DS), Aria Yan (DS)
Advisors: Carolina Ruiz, Elizabeth Ryder
# Improving Job Matching through Skill Elicitation
Sasha Daraskevich (DS), Ben Erwin (IE), Mikaela Milch (CS/DS), Nolan Willoughby (IE)
Advisors: Daniel Reichman, Andrew Trapp

# Creating a Comprehensive Pipeline for Exploring Cultural Variance in Data Visualization
Joselin Barbosa (CS), Katie Bowles (DS), Vivian Reno (CS)
Advisors: Lane Harrison

# Machine Learning, Image Processing, and Natural Language Processing for Handwritten Text Recognition
Matt Haley (DS), Liam Hall (CS), Christopher Langevin (DS), Cameron Norton (Math), Harsh Patel (CS), Elliot Trilling (CS/Math)
Advisors: Oren Mangoubi, Gregory Noetscher, Randy Paffenroth

# Mining Graph Patterns in Software Development from Code Repositories
Nur Fateemah (CS/DS), Alexander MacDonald (CS), Jakob Simmons (CS), Ethan Vaz Falcao (DS/Math)
Advisors: Fabricio Murai, Frank Zou

# Predicting Students' Mental Health Using Fitbit Data
Allison Escott (DS), Olivia Raisbeck (CS/DS), Kyle Lusignan (Math), Noah Pins (Math)
Advisors: Shichao Liu, Oren Mangoubi, Elke Rundensteiner
Automated Wearable ECG Editing With DNN
Vincenza Burdulis, Jacob Nguyen, Daniel Sardak (CS/DS)
Advisor: Bashima Islam

Design of AI-Enabled Chatbot
Qihan He, Rolando Salamea-Lopez, Colin Mettler (CS), Guillermo Morel Mendez (CS), Hrishikesh Nair, Quincy Payne (ME), Federico Perez (DS), Xiao Xiao (CS)
Advisors: Lin Cheng (MME), Bo Tang

Developing DC/DC Converter Topology for Fuel Cell Charging of 280-400V Hybrid-Battery Bus
Ryan Cote, Edison Doko, Efthymios Marios Loukedes, Kathlyn Sirowich, Meng Wang
Advisor: Gregory Noetscher
Sponsor: Honeywell International, Inc.

Development of ECE 331X
Alessandra Fabela
Advisor: Alexander Wyglinski

FPGA Accelerated SAT Solver
Sam David (ECE/CS), Joshua Eben, Andrew Gray, Patrick Hunter (ECE/CS), Matthew Lund, Coco Mao (Xinyun Mao)
Advisor: Koksal Mus

FSAE Electric Car
Hussain Bhatti, Harris Brancazio (ME), Henrique Checucci Bahia dos Santos (ME), John Demedeiros, Emma Dimming (RBE), Connor Dowgilewicz (ME), Zoe Goodman, Carson Graham (CS), William Gunn (ME), Sam Kierstead (ME), Evelyn Maude (RBE), Arnav Sacheti (CS/ECE)
Advisors: William Michelson (RBE), David Planchard (MME), Andre Rosendo (RBE)

Hybrid GaN-SIC Power Switches for Future E-Mobility Applications
Wassim Faker
Advisor: Stephen Bitar

Industrial Control System
Christopher Danti, Casey Frommer
Advisor: Gregory Noetscher
Sponsor: Babcock Power Services

Integrated Solutions Towards Wireless Transcutaneous Oxygen Monitor
Ali Atta (ECE/BME), Olivia Kendzulak, Ryan McSweeney, Naisargi Mehta (ECE/BME)
Advisor: Ulkuhan Guler

Luminescence-Based Sensing for Transcutaneous CO2 and SpO2 Assessment
Evan Apinis, Kleo Golemi, Kosti Pano
Advisor: Ulkuhan Guler

Modular Gaming Table
Kaiwen Chen (ME), Jimmy Clemente (ME), Joshua DeVoy (ME), Nikolaos Konstantinou, Emma Nollman (ME), Chloe Trotta-Smith (ME)
Advisors: Medhi Mortazavi (MME), Donald Brown

Music for Muscular Dystrophy
Luke Harrington, Joshua Hollyer, Dexuan Tang
Advisor: Stephen Bitar

Open-Source Design of a Cryptographic ASIC
Trevor Drane
Advisor: Patrick Schaumont
Opportunistic Communication with Zero and Low Power Radios
Aisling Corcoran, Alberto Flores, Tai Le, Allan Villatoro, Elisabeth Whittemore
Advisor: Bashima Islam

Scanning Array for EMI Detection
Sarah Chen, Michael Iberger
Advisor: Gregory Noetscher

SCApeGoat: Side-Channel Analysis Library
Samuel Karkache (ECE/CS), Trey Marcantonio
Advisors: Fatemeh Ganji, Patrick Schaumont

Shunt Resistor Based Circuit Breaker Design for Ground Fault and Arc Fault Detection
Pari Nguyen, Olivia Peterson, Dominic Ridolfi, Elinor Ross, Mason Roth
Advisors: Reinhold Ludwig, Edvina Uzunovic
Sponsor: Schneider Electric

soloPlane: Modular Electronic Mallet Instrument
William Merry (RBE), Robert Oleynick (ECE/CS), Nathaniel Reppucci
Advisors: Scott Barton (HUA), Patrick Schaumont

Speech Driven 3D Modeling
Ryan Antes, Jacob Hand
Advisor: Ziming Zhang (ECE/CS)

T-Scope: Side-Channel Leakage Assessment with a Hardware-Accelerated Online TVLA Test
Andrew Malnicof, Hao Wang
Advisor: Patrick Schaumont

Wireless Wearable Electromyogram (EMG) Shoulder System
Julia Antocci, Thomas Flanagan, Max Kanefsky, Timothy Walsh
Advisor: Edward Clancy

Variable Planar Inductor
Abigail Brachtl, Maria Cox, Brendan O’Mullan, Brooke Schoen
Advisor: Gregory Noetscher
Humanities and Arts

PRESENTATIONS, 12:00pm to 1:30pm
Higgins House

12:00 noon
Welcome
Kathryn Moncrief, HUA Department Head

12:10 pm
Adapting Housing Policy for Post-COVID Affordable Housing: Lessons from Australia and New South Wales
Jack Hoover
Advisor: John Galante
Project Sponsor: City of Worcester and Worcester IS FAB Lab

12:30 pm
Terminology in Action: The Impact of Linguistic Choices on Gender Equality and Inclusion
Lauren Eppinger
Advisor: Rebecca Moody

12:50 pm
Becoming Artificial Intelligence
Caroline Major
Advisors: Sarah Lucie and Kathryn Moncrief

1:10 pm
Artificial Intelligence is not the End of the World: Performing as an A.I. Student
Jack Yebbba
Advisors: Sarah Lucie and Kathryn Moncrief

1:30 pm
Architectural Influence on Scenic Design: A Case Study of New Brutalism
Adrienne Saucier
Advisor: Sarah Lucie
Interactive Media and Game Development

Fuller Labs Upper Perreault Hall

10:00am
Inari
Alessandro Brianti, Zhechuan (Joshua) Hu, Connor Peavey, Joseph Volpato, Xingge Yang
Advisor: Matthew Ahrens, Ralph Sutter

10:15am
3D Miniatures
Lauren Waddick
Advisor: Joshua Rosenstock, Ralph Sutter

10:30am
Epsilon Squad Adventures: A Concept Artbook
Jeff Chen, Alistair Gilmour
Advisor: Adryen J. Gonzalez, Ed Gutierrez

10:45am
Spiral Development
Jason Asidi
Advisor: Walt Yarbrough

11:00am
Break

11:15am
Failed to Send: An Internet Aesthetic Visual Novel
Carolyn Meyer, Evans Owusu
Advisor: Gillian Smith, Karen Stewart

11:30am
Ravenguard
Griffin Bowers, Alex Marrinan, Michael Weideman, Charles West
Advisor: Michael Engling, Walt Yarbrough

11:45am
Latency and Jitter Compensation for Cloud-Based Game Streaming
Marek Garbaczonek, Jonathan Hsu, Mark Renzi
Advisor: Mark Claypool

12:00pm
Lunch Break

1:30pm
Raveling Dreams
Ethan Chau, Aidan von Conta, Luca Wol
Advisor: Rose Bohrer, Farley Chery

1:45pm
DROPTABLE
Zesheng Chen, Bright Lin
Advisor: Charlie Roberts

2:00pm
Exploring Adaptive Time Delay in First Person Shooter Games
Benjamin Gelinas, Andrew Hariyanto, Trevor Ng, Sophia Silkaitis
Advisor: Mark Claypool

2:15pm
Break

2:30pm
Operation Breadcrumbs
Tate Donnelly, Nicholas Frangie, Jade McEvoy, Schuyler Rae Pritchard, Abigail Rauch, Kerri Thornton
Advisor: Adryen J. Gonzalez, Ben Schneider, Gillian Smith

2:45pm
Clean Sweep
Zachary Adams, Renee Cullman, Conor Dolan, Austin Hyatt, Jessica Liano, Nelson Pires
Advisor: Farley Chery, Rodney DuPlessis, Gillian Smith, Karen Stewart

3:00pm
Not An MQP
Ed Carrotta, Justin Santiago-Wonoski, Sriram Sundararajan, Madelyn Veccia
Advisor: Melissa Kagen, Erin Solovey
POSTER SESSION, 8:45am to 9:30am

Interactions of Per-Occurrence and Aggregate Deductibles
Abigail Barksdale, Allison McMorrow
Advisor: Jon Abraham, Barry Posterro

Heat Loss Effects of Thermal Inactivation of Pathogens in Aerosols through Electromagnetic Heating
Kai Chhoeuk
Advisor: Burt Tilley

The association scheme of the dihedral group and its designs
Benjamin Brodeur
Advisor: William J. Martin

Analyzing NFL Managerial Performance Using Sports Data
Evan Betencourt
Advisor: Kenny Ching, Randy Paffenroth

BREAK, 9:30am to 9:45am

PRESENTATIONS, 9:45am to 12:15pm

9:45am
Machine Learning, Image Processing, and Transfer Learning for Handwritten Text Recognition
Matthew Haley, Liam Hall, Christopher Langevin, Cameron Norton, Harsh Patel, Elliot Trilling
Advisor: Oren Mangoubi, Randy Paffenroth

10:00am
Stochastic Modeling of Neuron Dynamics
Natalie Tierney
Advisor: Andrea Arnold

10:15am
Pricing Sequence Risk
Jack Cascone, Matthew Letourneau, Zachary Pitts
Advisor: Jon Abraham, Barry Posterro

10:30am
The Statistics of Subsequences
Chase Miller, Andrew Salls, Duncan Soiffer
Advisor: George Heineman, Daniel Reichman, Gabor Sarkozy

10:45am
3D Image Reconstruction of a Fossil Using Neutron Tomography
Augustine Benjamin, Scarlett Clarke
Advisor: David C. Medich, Vadim V. Yakovlev

BREAK, 11:00am to 11:15am

11:15am
Waste Pavillion
Megan Tupaj
Advisor: Brigitte Servatus, Herman Servatus

11:30am
Delsarte $J'$-designs in the dihedral groups
Sycamore Herlihy
Advisor: William J. Martin

11:45am
Machine Learning for System Identification and Parameter Estimation
Caitlin Ho
Advisor: Andrea Arnold

12:00pm
Dynamical Systems Approaches for Deep Learning
Neil Kale
Advisor: Randy Paffenroth
Mechanical and Materials Engineering Department

POSTER SESSION, 8:30am to 12:00pm
Alden Hall

Design and Kinematic Evaluation of a 5-DoF Surgical Instrument
Josh Kleiman, Cameron Crane, Calvin Page, Nicholas Johannessen
Advisor: Adam Powell, Yihao Zheng, Sharon Johnson

NASA Lunabotics
Zeb Carty, Kelli Huang, Ian Machnerney, James Nguyen, Terence Tan, Sean Thal, Giovanni Giacalone, Brendan Byrne
Advisors: Ken Stafford, Carlo Pincioli

Wearable Biometric Monitoring for Collegiate Soccer Athletes
Evan Brady, James Carmody, Krish Patel, Jennifer Russo
Advisors: Mehul Bhatia, Bashima Islam, Taimoor Afzal, Walter Towner

Design and Fabrication of an Operational RCV Internal Combustion Engine
Michael Zembruski, Molly Vincent, James Ralph, Devin Patel, Jack Parker, Jiwon Shon
Advisor: Selcuk Guceri

Augmented Reality for Ultrasound Imaging
Jack Charpentier, Brian DeFlaminio, Kayva Mani, Jordan Pina
Advisors: Yihao Zheng, Ziming Zhang

Wings of Gompei
Michael Magalhaes, Aaron Vaz, Marc Rich, Daniel Barmakian, Matthew Gadjiala, Adelan Latli, Lauren Faulkner
Advisor: Alireza Ebadi

WPI Assists MS: A New TECHnique
Jonathan Adams, Evan Wertz, Joseph Puia, Douglas Cain
Advisor: Alireza Ebadi

Autonomous Intervention Medical Tools
Bailey Koestner
Advisor: Lee Moradi

Design and Evaluation of a Propulsion Aid Device for Folding Wheelchairs
Amanda Borden, Megan Jacene, Stephanie Steriti
Advisors: Sarah Jane Wodin-Schwartz, Elisabeth Stoddard

Engineering Enclosures for Space: Architecture for The Next Frontier
Samuel Dickens, Joseph McNeill, Natanel Pinkhasov, Aunika Yasui
Advisors: Soroush Farzin, Nima Rahbar, Carrick Eggleston

Introduction to Acoustics Course Development
Samuel Lambert, Lauren Meinhold, Jacob Bendick, James Obermaier
Advisors: Joseph Stabile

Automated Design Tool for Arduino Circuits
Gabriel Buziba, Yangyang Jin, Andres Negron, Casey Wohlers
Advisor: David C. Brown, Pradeep Radhakrishnan

The Design and Prototyping of a Low-Cost & Efficient Ocean Cleanup Robot
Gabriel Espinosa, Danny Ngo, Sebastian Valle, Alexander Wadsworth
Advisors: Selcuk Guceri, Vincent Aloi

Design of an Airborne Particle Concentrator
Lucien Wallace
Advisors: Sarah Jane Wodin-Schwartz, Elisabeth Stoddard, Holly Ault

PMKS+: An Application for Generating and Analyzing Planar Linkages
Nicole Burgess, Robert Eskridge, Tyler Evans
Advisors: David C. Brown, Pradeep Radhakrishnan

Wankel MQP
Michael Bragg, Giovanni Vecchiarino, Andrew Wirtz, Jack O’Neill, Nikki Lam, Peter FernHolz
Advisor: Selcuk Guceri
Designing and Testing a Safe and Adjustable Bicycle for a Child with Achondroplasia
Avinash Bissoondial, Eliza Dion, Katharine Miller, Kelsey Reno, Sequoia Truong
Advisors: Sarah Jane Wodin-Schwartz, Zoe Reidinger

Expanding the Functional Capabilities of the Tongue Prosthesis
Li DeWitt, Avery Macomber, Mylla Santana, Deborah Diniz
Advisors: Pradeep Radhakrishnan, Dirk Albrecht

Open Source Desktop CNC Mill
Alex Brown, Gabriel Brown, Brian English, Abigail Hodges, Luke Hoy, Jacob Schools
Advisor: Pradeep Radhakrishnan

Reversible Solid Oxide Cell Performance Optimization
Aritro Deb Sarker, Elliot Dunham, Shannen Preble
Advisor: Yu Zhong

Breakfast Sandwich Robot
Trevor Faber, Ethan Moynihan, Mathew Balquin, Samson Hodges
Advisors: Pradeep Radhakrishnan, Fiona Levey, Bo Tang

Lightweight and Efficient Manifold Design for Hydrogen Fuel Cell Powered Unmanned Aerial Vehicles (UAVs)
Sophia Islam, Avery Purtell, Liam Hemmerling, Michael Bonito, Jack Cassidy
Advisor: Ahmet Sabuncu

Design and Construction of a Tilting Platform in a Wind Tunnel for Wildfire Testing
Dillon McDermott, Samuel Griffiths, Sophia Lindsay, Eric Montiverdi
Advisor: Albert Simeoni

Energy Harvesting for the Army
Joel Eckstrom, Flint Eller, Keeston Holohan, Yashas Honnavalli, Ethan Shaw
Advisors: Pratap Rao, Gregory Noetscher

Wearable Near-Infrared Spectroscopy Device for Acute Orthopedic Trauma
Krishram Kothimbakam, Timothy Lee, Alex Moreira, Gautham Rajeshkumar
Advisor: Yihao Zheng

Development of a Modular Upper-Body Strength Enhancement Powered Exoskeleton Device
Ilyssa Delizo, Nathanial Dixon, Matthew Frey, Mionna Green, Christopher Johnson
Advisors: Mehul Bhatia, Andre Rosendo, Stephen Bitar

A Robotic Platform For Neurointervention
Alexander Masiero, Maria Aranda Ramirez, Luka Christianson, Edward Flanagan, Tyler Brown
Advisors: Yihao Zheng, Ziming Zhang

Wāwāmalu Water Tank and Irrigation System Design
Zackary DiCelico, Jack Yebba
Advisors: Selcuk Guceri, Lauren Mathews

Palm Print
Cameron Shelley, Matthew Folenta, Justin DeBeauchamp, Tereza Hrubia, Isaac Lau, John Mansour
Advisor: Joseph Stabile

Parametric UUV Design Tool
Joshua Barney, Belkys Felix Nova, Emma Gilroy, Keelan Smith
Advisor: Ahmet Sabuncu

Detecting and Correcting Bends in Medical-Grade Endoscopes using Computer Vision and Cold-Rolling Processes
Abigail Clemence, Nikita Igoshin, Chenhao Li, Praniva Pradhan, Jessica Rhodes, George Shelton
Advisor: Pradeep Radhakrishnan

Modular Gaming Table
Kaiwen Chen, Jimmy Clemente, Joshua DeVoy, Nikolaos Konstantinou, Emma Nollman, Chloe Trotta-Smith
Advisors: Medhi Mortazavi, Donald Brown

Automated Flying Disc Inventory
Matthew Adam, Tristan Andrew, Benjamin Antupit, David Costa, Claire Higginson, Daniel Ouellette, Jonathan Whooley
Advisors: Greg Lewin, Walter Towner
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Formula Electric Racecar
Arnav Sacheti, Carson Graham, Connor Dowgielewicz, Emma Dimmig, Evelyn Maude, Harris Brancazio, Henrique Checcucci, Hussain Bhatti, John Demedeiros, Samuel Kierstead, William Gunn, Zoe Goodman
Advisor: William Michalson

Hydroelectric Power for Off-the-grid Farms
Juancarlo Mantica
Advisor: Ahmet Sabuncu

PLA Recycler
Samuel Appiah Kubi, Evan Arenburg, Nathan Dorman
Advisors: Mehul Bhatia, Andre Rosendo

SailBot 2023-24
Erin Murphey, Theodore Winters, Anthony Virone, Matthew Gomes
Advisors: William Michalson, Kenneth Stafford

Design & Assembly of a 3D Printed Humanoid for At-Home Assistive Care
Merel Sutherland, Anna McCusker, William Michels, Shivank Gupta
Advisors: Pradeep Radhakrishnan, Derren Rosbach, Dirk Albrecht

Design of a High-Impulse Mechanical Apparatus for Dynamic Testing of Novel Energy-Absorbing Composites
Andrew Amkreutz, Alessia Kodhimaj, Cory Abraham, Konstantin Nikolaychuk
Advisors: Diana Lados, Anthony Spangenberger

Magnesium Production and Recycling for Clean Energy
Artem Iurkovskyi, Cooper Langner
Advisor: Adam Powell

Design and Fabrication of a Gas Turbine Engine
Terrence Benedict, Hunter Carey, Jacob Sledge, Isaac Kreiger
Advisor: Selcuk Guceri

Reinventing Shoe Soles Using Axiomatic Design to Reduce Lower Leg Injuries
Sean B. Foody
Advisor: Christopher A. Brown

Design and Optimization of Novel Impact-Resistant Composites for Energy-Efficient Transportation Applications
Matthew Boisvert, Kiana-Karla Layam, Mark Ruddat, Joseph Saladino
Advisors: Diana Lados, Anthony Spangenberger

Multi-orientation Autonomous 3D Welding with an Industrial Robot Manipulator
Cameron Earle, Jack Tervay
Advisors: Andre Rosendo, Jianyu Liang

Kinematics Design and Analysis for Recovery Evaluation of Spinal Cord Injury (KARESCI 2)
Apollinaris Rowe, Landen Kovens
Advisors: Michael Engling, Yuxiang Liu

Design, Realization, and Application of a Positioner for High Resolution Optical Metrology in Aerostructures
Paige Campagna, Ryan Powers
Advisor: Cosme Furlong-Vazquez

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Paige Campagna, Ryan Powers
Advisor: Cosme Furlong-Vazquez
Physics Department

Olin Hall 107

9:30am
Terahertz Time Domain Spectroscopy for Characterizing Properties of Carbon Nanotube Yarns
Natalie Frey
Advisor: Kateryna Friedman, Lyubov Titova

9:45am
Laboratory Gas Phase Molecular Spectroscopy
Valerie Bennett
Advisor: Douglas Petkie

10:00am
Simulation and Characterization of Silicon Nitride Photonic Integrated Circuits
Maximillian Hubbard, Charlie Tribble
Advisor: Douglas Petkie
Co-Advisors: James Eakin (LEAP), Eoghan Gallagher (LEAP)
Sponsors: Spark Photonics, Small Business Innovation Research Program

10:15am
Investigating Fetch-Limited Wave Growth in The Coastal Alaskan Arctic
Michelle Sangillo
Advisor: Nancy Burnham

10:30am  Break

11:00am
Developing an X-ray Fluorescence System for use in Developing Countries and Determining its Minimum Detectable Limits of Lead and Uranium
Kylar Coleman-Foley
Advisor: David Medich
Co-Advisor: Peter Hansen (IGSD)

11:15am
Explorations in Modified Gravity and Dark Matter Energy
Alexandra Spezzano
Advisor: Germano Iannacchione

11:30am
3D Image Reconstruction of a Fossil Using Neutron Tomography
Isaac Benjamin, Scarlett Clarke (MA)
Advisor: David Medich, Vadim Yakovlev (MA)
Sponsor: Paul Scherrer Institute

11:45am
Electromagnetic Simulations for the He6-CRES RF System
Luciano Malavasi
Advisor: David Medich
**Professional Writing**

**POSTER SESSION, 11:00am to 12:00pm**

**Higgins House**

**Environmental Rhetoric and Social Media**
Jia Yazon
Advisors: Sarah Riddick (PW) and Michael T. Timko (ChE)

**Game Wikis for Clean Sweep and Raveling Dreams IMGD MQPs**
Ethan Chau
Advisors: Sarah Riddick (PW); Rose Bohrer (CS); Farley Chery (IMGD)

**Partnering With The United States Department of Treasury To Implement an American Rescue Plan Act Grant At Free Medical Programs**
Lauren Averka, Kellie Bushe, Kylie Doehring, Kelly Hefferman
Advisors: Brenton Faber (PW & BME), Destin Hellman (Biochemistry) and Joseph Duffy (Biology & Biotechnology)

**Clinical Studies of Malignant Tumors, Tissue Growth, and Cysts in Gynecological Research**
Tiffany Foote
Advisors: Brenton Faber (PW & BME); Catherine Whittington (BME)

**The Rhetorical Construction of the 'Chemical Imbalance Theory,' and the Potential for Gut-Centric Alternatives**
Alexis Wood
Advisors: Shana Lessing (PW) Reeta Prusty Rao (BBT)

**Behind the Biomedical Engineer: A WPI BME Podcast**
Alyssa Morgan
Advisors: Brenton Faber (PW) and Kristen Billiar (BME)

**Creating a Marketing Plan for the WPI Project Engagement Portal**
Caroline McLaughlin
Advisors: Kevin Lewis (PW) and Jim Ryan (MIS)
Robotics Engineering

AM Session

Unity Hall 243

8:30 am
Opening Remarks

8:45 – 9:00 am
Voice Control of a Hand Exoskeleton for Traumatic Brain Injury Patients with Motor Impairments and Aphasic Speech
Team Members: Connor Gaudette; Matt McGourty; Keenan Segenchuk; Allison Rozear
Advisors: Tess Meier; Christopher Nycz; Yunus Dogan Telliel; Erin Solovey; Haichong Zhang

9:00 – 9:15 am
FASTR – Flexible Articulating Surgical Transoral Robot
Team Members: Chase Beausoleil; Mark Gagliardi; Samay Govani; Cole Parks
Advisors: Stephen Bitar; Loris Fichera; Yuxiang Liu; Haichong Zhang; Yihao Zheng

9:15 – 9:30 am
Robotics Intracardiac Catheter Steering System
Team Members: Megan DeSanty; Isabelle Lachaux; Elizabeth Minor; Rebecca Young
Advisors: Loris Fichera; Shang Gao; Zhenglun Wei; Haichong Zhang; Yihao Zheng

9:30 – 9:45 am
Automated Control of External Ventricular Drain for Neuro-ICU
Team Members: Matthew Duncan; Yujie Guo; Haotian Liu; Haoran Zhang
Advisor: Christopher Nycz

9:45 – 10:00 am
Augmented Reality Human-Robot Interface for Assisting Robotic Manipulation
Team Members: Tyler Giroux; Justin Kyi; Dimitri Saliba; Alexander Sun; Bryon Tom
Advisors: Jane Li; Koksal Mus

10:00 – 10:15 am
SOPHT: Soft Prosthetic Hand
Team Members: Christina Aube; Jeff Davis; James Doucette
Advisors: Mahdi Agheli; Markus Nemitz; Haichong Zhang

10:15 – 10:30 am
Soft Assistive Robotics for Helping Daily Tasks
Team Members: Luis Aldarondo; Antonios Sevastos; Ethan Weisse; Hannah Zink
Advisors: Berk Calli; Loris Fichera; Cagdas Onal

10:30 – 10:45 am
Progressive Molding of Soft Robots for Ocean Conservation
Team Members: Sara Frunzi; Dilce Oliveira; Owen Rouse
Advisors: Cem Aygul; Markus Nemitz

Unity Hall 400

8:45 am
Opening Remarks

9:00 – 9:15 am
Development of Cube Swarm for Search and Rescue Applications
Team Members: William Albert; Phillip Brush; Benjamin Dodge; Timothy Klein; Andrew McCammon; Jason Rockmael; Dang Tran
Advisors: Greg Lewin; Shubhbi Taneja; Reinhold Ludwig
### PM Session

**Unity Hall 400**

#### 1:00 – 1:15 pm

**NASA Lunabotics**

- **Team Members:** Brendan Byrne; Zeb Carty;
- Giovanni Giacalone; Kelli Huang; Ian Machnerney;
- James Nguyen; Terence Tan; Sean Thal
- **Advisors:** Carlo Pincioli; Ken Stafford

#### 1:15 – 1:30 pm

**Trashbot: Autonomous Trach Collecting Robot**

- **Team Members:** Liliana Loughlin; Cristobal Rincon Rogers; Matthew Sweeney; Yuhan Wu
- **Advisors:** Fabricio Murali; Neil Rosenberg; Andre Rosendo,

#### 1:30 – 1:45 pm

**SailBot**

- **Team Members:** Mathew Gomes; Erin Murphey;
- Anthony Vrone; Theodore Winter
- **Advisors:** William Michelson; Kenneth Stafford

#### 1:45 – 2:00 pm

**BiQu: Bimodal Quadruped Robot**

- **Team Members:** Ethan Chandler; Akshay Jaitly; Yifu Yuan; Puen Xu; Leihong Wang; Tao Zou
- **Advisors:** Mahdi Agheli; Jing Xiao

#### 2:00 – 2:15 pm

**Design and Assembly of a 3D Printed Humanoid Robot for At-Home Assistive Care**

- **Team Members:** Shivank Gupta; Anna McCusker;
- Wil Michels; Merel Sutherland
- **Advisors:** Dirk Albrecht; Pradeep Radhakrishnan;
- Deren Rosbach

#### 2:15 – 2:30 pm

**Waste Sorting Robot for Recycling**

- **Team Members:** Valerie Childers; Brett Cohen;
- Dylan Hunt; Nicholas Moy; Isaac Noble; Gabriel Ward; Lily Wolf
- **Advisors:** Berk Calli; Sarah Jane Wodin-Schwarz
2:30 – 2:45 pm
Advancing Humanoid Robots: Demonstration of Standing and Assisted Walking Alongside a New Simulation Framework
*Team Members: Stephen Fanning; Jatin Kohli; Dylan Nguyen; Scott Pena; Jack Rothenberg; Ana Roure*
*Advisors: Dirk Albrecht; Pradeep Radhakrishnan*

2:45 – 3:00 pm
Eve - Agricultural Harvesting Robotic System
*Team Members: Soumaya El Mansouri; Lexi Krzywicki; Timothy Rinaldi*
*Advisors: Berk Calli; Yarkin Doroz; Sarah Wodin-Schwartz*

**POSTER ONLY**
Automated Flying Disc Inventory
*Team Members: Benjamin Antupit; Jonathan Whooky; Daniel Ouellette; David Costa; Tristan Andrew; Matthew Adam; Claire Higginson*
*Advisors: Greg Lewin; Walter Towne*

**POSTER ONLY**
The Design and Prototyping of a Low-Cost & Efficient Ocean Cleanup Robot
*Team Members: Gabriel Espinosa; Danny Ngo; Sebastian Valle; Alexander Wadsworth*
*Advisors: Vincent Aoi; Selcuk Guceri*

**POSTER ONLY**
HURON: Full-size Humanoid Robot (Lower Body)
*Team Members: Thai Duc Doan; Sahen Jueja; Nhi Nguyen; Carlos Giralt Ortiz*
*Advisors: Berk Calli; Mahdi Agheli; Markus Nemitz; Nitin Sanket*

3:00 pm
Closing Remarks
Social Science & Policy Studies

POSTER SESSION

9:30am to 1:00pm
Salisbury Labs 411

Psychological & Cognitive Sciences

Psychophysiological Effects of Social Feedback During Social Media Use
Lorena Silva Nunes
Advisor: Richard Lopez

Stress-Dependent Cilia Remodeling in C. elegans
Katelyn Quinn-Cyr
Advisors: Jim Doyle, Inna Nechipurenko

Neural Mechanisms of Social Threat Processing Can Optimize Emotion Regulation Training to Improve Mental Health
Eva Petschek
Advisors: Richard Lopez, Benjamin Nephew

Psychosocial and Biochemical Correlates of Nicotine Administration via Vaping Behaviors
Mira Kirschner
Advisors: Angela Incollingo Rodriquez, Jagan Srinivasan

Building an Inclusive Park for Holden: Understanding Community Needs, Priorities, and Expectations
Samantha Curtis
Advisor: Erin Ottmar

Academic Cheating at the University Level
Samuel Borge, Assumption University
Advisor: Karen Lionello-DeNolf, Assumption University

Learning Lecture Content Through AI-Driven Spaced Retrieval
Olivia Shan, Assumption University
Advisor: Leamarie Gordon, Assumption University

The Role of Active Student Responding in Post-Secondary Education Settings
Ryan Singley, Assumption University
Advisor: Nicole Pantano, Assumption University

Technology, Policy & Sustainability

Evaluating the Feasibility of Repeat Photography as a Service to Monitor the Effects of Climate Change
Mateo Blumenthal
Advisors: Elisabeth Stoddard, Dominic Golding

Design and Evaluation of a Propulsion Aid Device for Folding Wheelchairs
Amanda Borden, Megan Jacene, Stephanie Steriti
Advisors: Elisabeth Stoddard, Sarah Jane Wodin-Schwartz

Designing a Resilience Hub for Vulnerable Populations in Las Carolinas, Puerto Rico
Tara Checko
Advisors: Elisabeth Stoddard, John-Michael Davis

Exploring Value Systems: Māori Perspectives in Scholarly Literature on Mice-Invertebrate Interactions in Aotearoa New Zealand
Laura Romania
Advisors: Elisabeth Stoddard, Leslie Dodson, Ingrid Shockey

Design of an Airborne Particle Concentrator
Lucien Wallace
Advisors: Elisabeth Stoddard, Holly Ault, Sarah Jane Wodin-Schwartz
Integration of Environmental Social Governance (ESG) into Turner Construction Company's Supply Chain
Eugena Choi, Hannah George, Nicholas Battaglino, Jailyn Medeiros, Adam Tedesco, Dreivone Townsend
Advisors: Elisabeth Stoddard, Laureen Elgert, Laila Abu-Lail, Soroush Farzin, John Lindholm, Jessica Rosewitz

Restoration of the Mill Creek Salt Marsh in Chelsea, Massachusetts
Adam Lepore, Rebekah Mendoza, Joseph Horowitz, Kaleigh Walsh
Advisors: Crystal Brown, Paul Mathisen

Evaluating the Desire for Humanoid Robots in Assisted Living Facilities
Merel Sutherland
Advisors: Derren Rosbach, Pradeep Radhakrishnan

Disparities in Mortgage Denials Based on Race and Debt-to-Income Ratio in Massachusetts and Worcester County
Alexandria Sheehan
Advisors: Alexander Smith, Gbetonmasse Somasse

Mobile App for E-Waste Processors
Cortina Barbieri, Abigail Boafo, Abby Hoschouer, Madeline Mueting, Alyssa Ogi
Advisors: Robert Krueger, Mahamadou Sagna, Lane Harrison

Corridor Study for CT-156 in East Lyme, Connecticut
Lauren Hess, Luna Daury, Michaela Dos Santos
Advisors: Robert Krueger, Suzanne LePage

Financial Resources from the Inflation Reduction Act (IRA) for Boston-Area Concrete Manufacturers to Integrate Environmental, Social, Governance (ESG) Through Turner Construction
Ellie Burress
Advisors: Elisabeth Stoddard, Laureen Elgert, John Lindholm, Jessica Rosewitz

BranchBot: Autonomous Quadcopter for Branch Attachment
Keelan Boyle, Zane Altheimer, Cooper Dean, Andrew Kerekon
Advisors: Robert Krueger, Dmitry Korkin, Oren Mangoubi, Andre Rosendo

Climate Change May Affect the Seasonality of Native Silk Moths
Zoë Swartley, Michelle Kirtich
Advisor: Marja Bakermans
The projects program at WPI is the university’s signature approach to undergraduate education, combining theoretical study with practical problem solving. It brings together the brilliant minds and talents of our student teams and faculty advisors with a wide variety of corporate, government, and nonprofit organizations. Collaboratively, it addresses real business needs, synergizing to create meaningful results.

Project work is one of the most distinctive aspects of a WPI education and has been at the core of WPI’s undergraduate curriculum for more than 50 years. It provides students the opportunity to gain professional skills, a talent for teamwork, and the confidence to dive right in. Together with our corporate partners, we are making progress, one project at a time.

WPI welcomes sponsorship for our Major Qualifying Projects. If you are interested in discussing company engagement strategies, including projects such as these, please contact Lisa Drexhage, Associate Director, Corporate Relations, University Advancement, at cro@wpi.edu.

General guidelines for project sponsorship:

• The best types of projects support or enhance current activities.
• A project cannot be “mission critical” or on the “critical path.”
• Most MQPs consist of a team of students (2–4) and a faculty advisor, although in some cases—depending upon the scope of the project and the disciplines of the student team—there may be additional advisors.

For more information about sponsoring a project, visit wpi.edu/+engage.

To contact a specific academic department, please refer to the list below.
(Note: All numbers begin with 508-831-).

Aerospace Engineering – 5221
Bioinformatics and Computational Biology - 5357
Biology and Biotechnology - 5543
Biomedical Engineering - 5447
Business - 5218
Chemical Engineering - 5250
Chemistry and Biochemistry - 5371
Civil, Environmental, and Architectural Engineering - 5294
Computer Science - 5357
Data Science - 4883
Electrical and Computer Engineering - 5231
Humanities and Arts - 5246
Integrative & Global Studies - 5547
Mathematical Sciences - 5241
Mechanical Engineering - 5236
Physics - 5258
Professional Writing - 5198
Robotics Engineering - 6665
Social Science and Policy Studies - 5296
STEM Education Center - 5512
ABOUT WPI

WPI is a premiere STEM-focused university and a recognized pioneer and global leader in project-based learning. Founded in 1865 on the principle that students learn most effectively by applying the theory learned in the classroom to the practice of solving real-world problems, WPI’s continued mission is to transform lives, turn knowledge into action to confront global challenges, and revolutionize STEM through distinctive and inclusive education, projects, and research. WPI’s project-based curriculum engages undergraduates in solving important scientific, technological, and societal problems throughout their education and at more than 50 project centers around the world. Today WPI offers more than 70 bachelor’s, master’s, and doctoral degree programs across 18 academic departments in science, engineering, technology, business, the social sciences, and the humanities and arts. Its faculty and students pursue groundbreaking research to meet ongoing challenges in health and biotechnology; robotics and the internet of things; advanced materials and manufacturing; cyber, data, and security systems; learning science; and more.