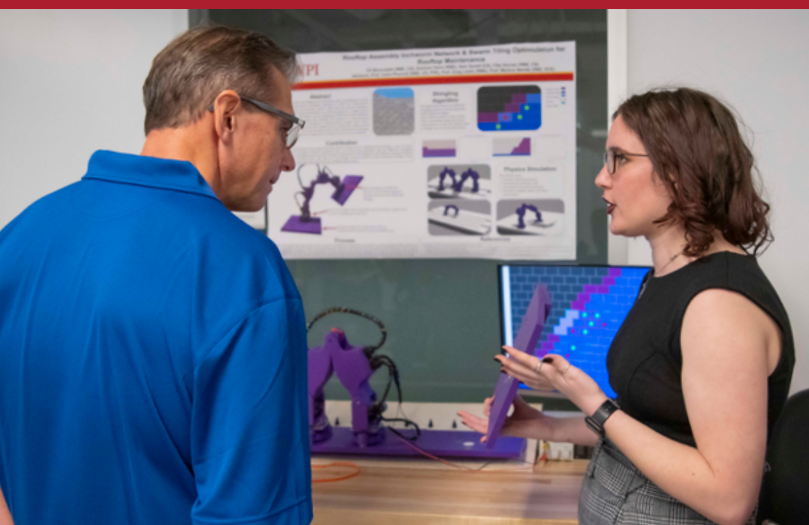# UNDERGRADUTE RESEARCH

Projects Showcase*

[A celebration of all senior students' research, design, and creative theses]

APRIL 21, 2023

* formerly Project Presentation Day

Worcester Polytechnic Institute

Project sponsors include...

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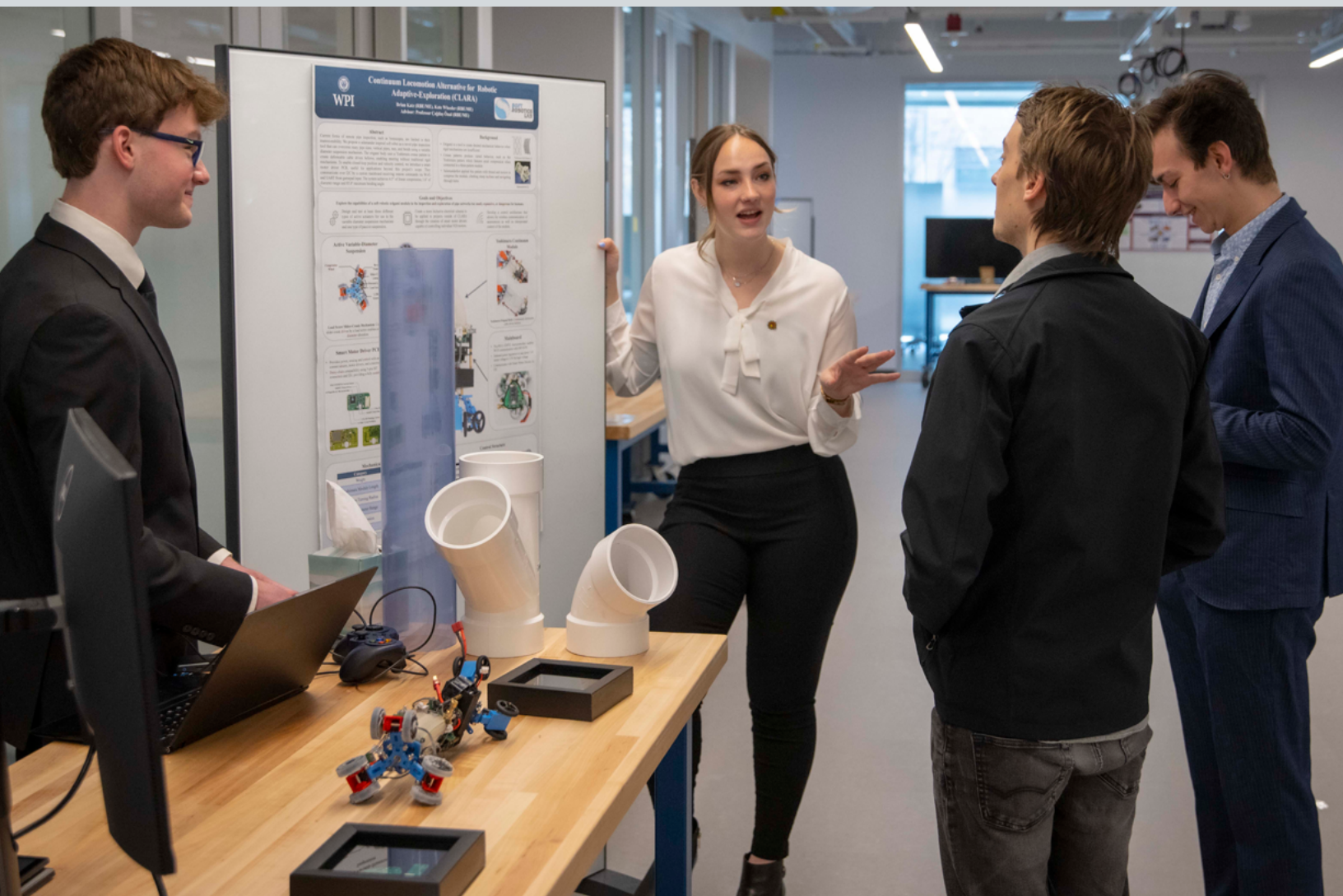
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Interested in partnering with WPI?

LET'S CONNECT

Undergraduate Research Projects Showcase

formerly Project Presentation Day

> The purpose of the change in the event name is to better reflect to the outside world, and to reinforce to our own community, that research, design, and creative scholarship are integral to our project-based approach to STEM-focused education," said Arne Gericke, interim dean of undergraduate studies.

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

Aerospace Engineering Department

Location: HL 218

8:30am
Structural Design Analysis of the Burnelli CBY-3 Loadmaster and DC-3
Aaron Boyer, Amaya Massari, Jacob Moore, Nicholas Paszczuk, Emily Raynowska, Gabrielle Tims
Advisor: Prof. Blandino

8:50am
Computational Fluid Dynamic (CFD) Analysis of the Burnelli CBY-3 Loadmaster
Nicholas Orlovsky, Maria Wojciechowski
Advisor: Prof. Blandino

9:10am
Design of Micro Rover for Lunar Polar Exploration
David Acuna, Zachary Angell, William Fisher, Corbin Grubb, Watts Herideen-Woodruff, Lily Kinne, Marcela Mayor, Travis McGregor, Caleb Powell
Advisor: Prof. Karanjgaokar

9:30am
Design and Testing of an Amphibious AUV
Michael Beskid, Ryan Brunelle, Calista Carrignan, Robert Devlin, Toshak Patel, Kofi Sarfo
Advisor: Prof. Demetriou
Co-Advisor: Prof. Loris Fichera (RBE)

10:00am
Micro-Aircraft Design for 2023 AIAA DBF Competition
Julian Robles, Noah Mester, Sean McMahon, David Reynolds, Anwar Hughes-Crawford, Alex Psenicka
Advisor: Prof. Yuan

10:20am
Design of an RC Aircraft for the 2023 AIAA Design, Build, Fly (DBF) Competition
Noah Cook, Nicholas Fiorenza, Dylan Gerisch, Tyler Guertin, Drake Hamblin, Newton Le, Nickolas Pellegrini, Joseph Salvato
Advisor: Prof. Olinger

10:40am
Design and Analysis of a High-Powered Model Rocket
Tiana Am, Emily Abbe, Bryce Bragdon, Paul Coccomo, Garrett Devlin, Logan Frandsen, Sarah Hildreth, Megan Malito, Jacob Roller, Kevin Schultz, Mason Thyng, Hunter Wagner
Advisor: Prof. Taillefer

11:00am
Mitigating Boil-Off in Cryogenic Spacecraft Propellant Tanks
Jacob Borowsky, Jack Charbonneau, John Dougherty, Alexander Lagle, Nicholas Masse, Jacob Mitchell, Deep Patel, Rory Veguilla
Advisor: Prof. Jayachandran

11:20am
CubeSat Development for Identification of Space Debris
Dinmukhammed Abdimash, Benjamin Brady, Dev Gujarathi, Matthew Liliedahl, Connor Moriarty, Kaitlyn Smith, Ryan Weeks, Benjamin Workinger
Advisor: Prof. Demetriou, Prof. Gatsonis, Prof. Taillefer

Bioinformatics & Computational Biology

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

Using Protein Interaction Modeling to Understand Exocyst Assembly and Tethering Dynamics in Exocytosis
Chloe Byrne
Advisor: Luis Vidali

Simulating Intestinal Microbiotic Interactions with Agent Based Modeling
David Datta
Advisor: Liz Ryder, Reeta Rao

Defining the Role of RIC-8 in Neuronal Heat Shock Response
Adam LaBombard
Advisors: Inna Nechipurenko, Liz Ryder

Analysis of Metrowest Student Mental Health Data
Wesley Lo
Advisors: Ben Nephew, Dmitry Korkin

Investigating the Epigenetic Basis for Disease Tolerance Using scRNAseq Analysis of Influenza-Infected Mouse Lung Cells
Emmaline Raven
Advisor: Jeremy Luban (UMMS), Liz Ryder

Expanding the Beecology Project's Data Analysis Capabilities for Butterfly Observations
Sophia Strano
Advisor: Carolina Ruiz, Liz Ryder

Biology & Biotechnology

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

Estrogenic Effects of OTC Promensil on Breast Cancer Cells
Gabrielle Paquette, Hannah Smith
Advisors: Mike Buckholt, Jill Rulfs

Determining How Infected Macrophages Evade Natural Killer Cell Antibody Dependent Cellular Cytotoxicity
Michelle Pan
Advisors: Kiera Clayton, Reeta Rao

Exploring the effects of CBD on C. elegans with 6-OHDA induced Parkinson's Disease to determine potential therapeutic implications
Claire Behning, Amanda Holbrook
Advisors: Mike Buckholt, Jill Rulfs, Suzanne Scarlata

Effects of codon content and context on transcript stability and translation efficiency in *M. smegmatis*
Olivia Atkins
Advisor: Scarlet Shell

The Role of The Map Kinase Pathway in *C. elegans* Immune Response Against *C. albicans*
Susanna Oppong
Advisor: Reeta Rao

Bat activity is related to habitat type and structure in managed barrens in New England
Natalie Kay, Amelia Sadlon
Advisor: Marja Bakermans

Suv420 Localization During Mitosis is Regulated by Phosphorylation
Hannah Shell
Advisor: Amity Manning

Exploring Exogenous Cannabinoids as a Potential Therapeutic for the Reduction of Oxidative Stress in C. Elegans Model Systems
Alexia Barcus, Hannah Kachadoorian
Advisor: Mike Buckholt, Jill Rulfs, Jagan Srinivasan

Investigating the Common Loon Syrnix
Kaylee Gladu
Advisors: Mike Buckholt, Jill Rulfs, Jay Mager (Ohio Northern), Mark Pokras (Tufts Vet School)

Examining the Effects of Phytoestrogens on Prostate Cancer Cells
Ally Breen, Lia Kelly
Advisors: Mike Buckholt, Jill Rulfs

Effects of 2,3-dihydroxybenzoate on Growth and Antibiotic Resistance in *E. coli*
Dana Littlefield, Tammie Zhu
Advisor: Mike Buckholt

Evaluating environmental interference in outdoor automated radio telemetry systems
Vinh Tran
Advisor: Marja Bakermans

Little Balls of Stress: Understanding the Activation Pathway of Resveratrol-Induced Stress Granules
Katherine Stratton
Advisor: Natalie Farny

Characterizing the Kekkon Family as Adhesion Molecules
Hannah Allen
Advisor: Joe Duffy

Structural Analysis of Kek1's Interaction with the EGFR
Alex Boucher Jr
Advisor: Joe Duffy

Stressed Out! Role of GPER1 in BPA-Induced Stress Granule Formation
Hope Hutchinson
Advisor: Natalie Farny

fNIRS study on Tacit Knowledge in Manufacturing
Alex Breiling
Advisors: Benjamin Nephew, Yihao Zheng

Fast Food Waste

Alex Guerra, Wirt Jones

Advisors: Mehul Bhatia, Reeta Rao

Biomedical Engineering

Salisbury Labs Kinnicutt Hall Room 115

9:05am
3D Bioprinting of an Aortic Valve with Cell-Laden Hydrogels
Gillian Ebeling, Priyanka Joshi, Chloe Naasz, Khushi Soni
Advisor: Sakthikumar Ambady

9:25am
Automatic Feeding Device for Premature Infants in Low-to-Middle Income Countries
Alexis Compton, Melissa Hauman, Samantha Havel, Kelsey Leach
Advisors: Dirk Albrecht, Solomon Mensah

9:45am
Developing a Behavioral Assay for Tinnitus Characterization
Myah Caplan, Jacob Mills
Advisor: Adam Lammert

10:10am
Design of a UCL Regeneration System
Carter Bach, Abigail Bartynski, Jonathan Coco, Julia Sherwin
Advisors: George Pins, Dr. David Magit (BIDMC)

10:30am
System for Reporting Malfunctioning Biomedical Devices in Accra, Ghana
Ana Grandgeorge, Elisabeth Lynn
Advisors: Solomon Mensah, Robert Krueger

10:50am
Validating and Manufacturing a Bio-realistic Surgical Phantom for Laparoscopic and Robotic Surgical Training
Caitlin Bonavita, Binh Diec, Alex Hill, Andrew Sifferlen
Advisors: George Pins, Dr. Thomas Cataldo (BIDMC)

Salisbury Labs Room 104

9:05am
User Study and Optimization of Wearable Transcutaneous Oxygen Sensor
Sydney Hobson, Abigail Leonardi, Ciara Murphy, Vanisha Rohera
Advisor: Ulkuhan Guler

9:25am
Improving Pulse Oximeters to Measure Blood Oxygen Saturation Accurately for All Skin Types
Khaled Jarad, Ian Lafountain, Kaylie Lunderville, Emily Pacheco, Marcel Paolillo, Casey Peris
Advisors: Taimoor Afzal, Funmi Ayobami

9:45am
Designing an In Vitro Model of Uterine Myometrium to Study Intramural Uterine Fibroids
Zara Alkaff, Elizabeth Hicks, Micah Wilde
Advisors: Catherine Whittington, Marsha Rolle

10:10am
Artificial Tongue Actuation Device
Tatyana Barthold, Hope Soucy, Luese Ufuah, Marc Voorhees, Declan Williams
Advisors: Dirk Albrecht, Pradeep Radhakrishnan

10:30am
Metric to Characterize Baseball Pitcher Fatigue
Kyle Johns, Charlotte Kokernak, Crystal Murray, Amy Ngan
Advisor: Karen Troy

Salisbury Labs Room 105

9:05am
Development of a Needle Insertion System for Ultrasound-Guided PCNL
Alexander King, Abhinav Palisetti, Cabot Priestner, Haohao Yi
Advisors: Haichong Zhang, Yihao Zheng

9:25am

Modeling the Endothelial Glycocalyx Post Pneumonectomy in a 3D Fluidic Chip
Eric Johnson, Mia Long, John Martel, Megan Ouellette, Sudish Vengat
Advisor: Solomon Mensah

9:45am

Haptic Feedback Controller for Robotic Neurointervention
Troy Mullenberg, Shiyue Wang, Ethan Wilke
Advisors: Haichong Zhang, Yihao Zheng, Ziming Zhang

10:10am

Microfluidic Chip Design for Studying Ultrafiltration Failure in the Fibrotic Peritoneum
Cleo Caldwell, Alison Drapeau, Araceli Baeza Gonzalez, Gabriel Rivera
Advisors: Catherine Whittington, Diana Alatalo

10:30am

Microfluidic Bioreactor to Simulate Fluid Flow in a Tissue-Engineered Heart Valve
Casey Chabra, Rachel Drasser, Emma Smith, Alexandra Taylor
Advisor: Kristen Billiar

9:45am

Developing a Standard Procedure for Comparing the Effects of *Artemisia annua,* Artemisinin, and Artesunate on Fibroblasts
Sarah Francis, Molly McGinn, Bella Vignola
Advisors: Raymond Page, Pamela Weathers

10:10am

Detecting and Alerting Risk of ACL Injury in Female Horizontal Jumps Due to Changes in Athletic Performance
Sarah Boynton, Cayla Jumpp, Dreya Martin, Michaela Mattson, Emma Shulenburg
Advisors: Funmi Ayobami, Zoe Reidinger

10:30am

Injectable Glycosaminoglycan-Based Hydrogel Drug Delivery System
Christina Avakian, Emelia Carleton, Akhil Chilamkurthi, Andrew Voronin
Advisor: Jeannine Coburn

Salisbury Labs Room 305

9:05am

Neuroblastoma Tumor on a Chip: Groundwork for a Fluidics Model of the Hypoxic Tumor Microenvironment
Priscilla Anand, Gabrielle Healey, Santiago Rivero, Madison Sanborn, Tiffany Saunders
Advisor: Jeannine Coburn

9:25am

Automation of an Accurate, Auditory-Based Blood Pressure Monitor
Riley Baranowski, John Clewley, Abigail Maynard, Aaron Searth, Vy Tran
Advisors: Dirk Albrecht, Pradeep Radhakrishnan

Business

POSTER SESSION, 9:30am to Noon
Unity Hall 420

A Marketing Plan for an Alternative Method of Workplace Safety in the U.S Construction, Transportation, and Mining Industries Based on Real-time Impairment Detection
Franco Bazzini, Gevorg Khukeyan
Advisor: Edward Gonsalves
Sponsor: Sobereye

Analysis of Agricultural Development Opportunities in Buxton, Guyana
Abdoul Barry, Ralph Lambert, Michael Modine, Benjamin Sseruwagi
Advisors: Walter Towner, Harold Walker (CEEV)
Sponsor: Kristophe Zephyrin

Analysis of Stigma Towards the Mental Health Discussion via Social Media
Mark Buono, Rachelle Gonzales, Jada Hinds-Williams, Josephine Kim
Advisors: Adrienne Hall-Phillips, Nima Kordzadeh, Jeanine Skorinko (SSPS)

Analyzing Housing Market Trends with Data and External Factors
Alex Bolduc, Reagan Brunelle, Aleksander Proko, Yueting Zhu
Advisors: Robert Sarnie, Michael Elmes, Marcel Blais (MA), Wilson Wong (CS)
Sponsor: Angelo Gordon

Chaos Engineering for Cloud Resiliency
Nestor Lopez, Renee Sawka, Olivia Scola
Advisors: Robert Sarnie, Wilson Wong (CS)
Sponsor: State Street Financial

Continuing Development of a Cloud – Based Enterprise Resource Planning System for Gompei's Goat Cheese
Gabrielle Acquista, Victoria Buyck, Benjamin Sakac, Sohrob Yaghouti
Advisors: James Ryan, Michael Engling (CS)
Sponsor: Gompei's Goat Cheese

Design of WPI Townhouses
Christopher Cavallaro, Aidan Murphy, Thijs Seppenwolde, Nicholas Willey, Noah Willey
Advisors: James Ryan, Nima Rahbar (CEAE), Jessica Rosewitz (CEAE)
Sponsor: Worcester Polytechnic Institute

Developing Marketing Recommendations for the LEAP at WPI/QCC
Gabrielle Puchovsky, Lilly Proulx
Advisors: Walter Towner, James Eakin (LEAP)
Sponsor: Worcester Polytechnic Institute

Development of Predictive and Prescriptive Analytical Models Using Customer, Revenue, and Usage Data
William Bazakas-Chamberlain, Abigael Kihu, Michael O'Connor, Shiyu Wu
Advisors: Robert Sarnie, Marcel Blais (MA), Wilson Wong (CS)
Sponsor: SaasWorks

Efficiency Analysis of Partner Organizations: Poverty Stoplight
Kayla Brown, Rebecca Noris, Catherine Salvaggio, Hayden Smith
Advisors: Andrew Trapp, Ryan Madan (PW), Daniel Reichman (CS)
Sponsor: Poverty Stoplight

Evaluating Economic Feasibility and Design of Modular Production Systems in the Steel Industry
Elise Deshusses, Aaliyah Royer, Kenneth Savage, Advait Surana
Advisor: Sara Saberi
Sponsor: Gen-H

Evaluating Quality, Environmental Impact, and Economic Sustainability In Support of Benchmarking Efforts At Twelve Guns Brewing
Domenic DiCenso, Danta Coccagnia, Mary Suckow
Advisors: Edward Gonsalves, Walter Towner, Aaron Sakulich (CEAE)
Sponsor: Twelve Guns Brewing

Fidelity: AI Based Anomaly Detection
Aruzhan Koshkarova, Nathan Kumar, Mitchell Sirois, Austin Zhou
Advisors: Robert Sarnie, Marcel Blais (MA), Wilson Wong (CS)
Sponsor: Fidelity Investments

Improving the Shipping & Receiving Process at Sjogren Industries Inc.
Isabella Landivar, Rayna Sharma
Advisor: Renata Konrad
Sponsor: Sjogren Industries Incorporated

Management Engineering Analysis of WPI Lunabotics Engineering Team
Jaden Meng, Corey Logan
Advisors: Walter Towner, Kenneth Stafford (RBE)
Sponsor: Worcester Polytechnic Institute

Manufacturing Process Standardization at Affordable Interior Systems
Brianna Ankstitus, Martin Carrau, Malyssa Deranian,
Heather McGlauflin, Cherylle Eliza Sabilla
Advisor: Walter Towner
Sponsor: Affordable Interior Systems

Process Improvement at Saint-Gobain
Nicole Logrecco, Holly Mason,
Irune Sesma Matamoros, Gabriel Tamayo Uribe
Advisor: Sharon Johnson
Sponsor: Saint-Gobain Abrasives

Process Improvement at Sjogren Industries
Gabriel Comenzo, Michael Souza
Advisor: Sharon Johnson
Sponsor: Sjogren Industries

Redesigning the Worcester Red Sox's Enterprise Mobile Application
Qui Nguyen, Kara O'Neil, Bridget Redgate
Advisors: Robert Sarnie, Sara Saberi, Wilson Wong (CS)
Sponsor: Worcester Red Sox

Sustaining Agriculture through Social Networks in Central Massachusetts
Jeffrey Compere, Abraham Koffman
Advisors: Michael Elmes, Laureen Elgert (SSPS)

The Role of The Quorum Café on the WPI Campus
Calisto Betti, Kell Carlisle, Livia Thomollari
Advisors: Purvi Shah, Sharon Johnson,
Oleg Pavlov (SSPS)
Sponsor: The Quorum Café

Third Party Aggregator Development for FDX API Integration at Citizens Bank
Chelsea Chang, Kevin Inger, Jonathan Metcalf,
Jack Sullivan
Advisors: Robert Sarnie, Wilson Wong (CS)
Sponsor: Citizens Bank

Utilizing Waste to Provide an Economically Viable Alternative to Roofing in Accra, Ghana
Jackson Baker, Michael Morin
Advisors: Debora Jackson, Walter Towner,
Mustapha Fofana (ME), Robert Krueger (SSPS)
Sponsor: Academic City University

Worcester IS Fab Lab MQP Blockchain and Machine Learning Report
Joshua DeBare, Mabel Konadu, Kelsey Moody,
Cameron Morreale, Qingbei Shang
Advisors: Robert Sarnie, Marcel Blais (MA),
Wilson Wong (CS)
Sponsor: FAB Lab for Social Good

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Chemical Engineering

Poster Session
8:00 AM – 12:00 PM
Salisbury Labs 402

Encapsulation and Characterization of Bacteriophage Loaded in Liposomes
Julia Afthim, Dylan Rapoport, Wasef Raza
Advisor: Christina Bailey-Hytholt

Assessing Gene Expression in Trophoblast Cells after Delivery of Nucleic Acid Loaded Nanoparticles
Michela Benazzi, Matthew Shea
Advisor: Christina Bailey-Hytholt

Fouling in a Diffusiophoretic Water Separations System
Albert Foun, Sam Qu, Maheer Quasem
Advisior: Andrew Teixeira

Pharmaceutical Catalysis: Continuous Flow Enantiopurification Reactor Design
Griffin Carloni, Zachary Carney, Robert Dec
Advisor: Andrew Teixeira

Photocatalytic Degradation of Tetracycline using Batch and Flow *Reactors*
Michelle Barboza, Brent Ditzler
Advisor: Andrew Teixeira

Metallic Alloy Design for Additive Manufacturing
Patrick Devine, Grace Fitzpatrick-Schmitt
Advisor: Danielle Cote (ME)

High Energy Density Magnesium-Air Battery for Shipping, Rail & Aviation Electrification & Grid Storage
Kurt Lindenthal, Edward Miller, Tyler Riggs, Jacqueline Simon Villacis
Advisor: Adam Powell (ME)

Development of Module for Fire Dynamics
Alana Miska
Advisor: James Urban (FPE)

Fire & Fracture Resistant Smartphone Case for First Responders
Noah Kantor, Jacob Morin
Advisor(s): Ali Rangwala (FPE), James Urban(FPE)

Development of a C-H Acylation Reaction in Batch & Flow
Rachel Swanson
Advisor: Patricia Musacchio (CBC)

Valorization of Stranded Natural Gas
Elitumaini Swai
Advisor(s): Nikolaos Kazantzis, Michael Timko

Techno-Economic Analysis of Ammonia Production in the Presence of Uncertainty
William Garvey, Paul Jasmin
Nikolaos Kazantzis

Lab Development of Electrical Resistance Heating for Soil Remediation
Rainier Vaughn
Advisor(s): David DiBiasio, Kristen Boudreau

Poster session
8:00AM – 12:00 PM
Salisbury Labs 406

Modeling Interactions Between Carbon Dioxide & Biomolecules

Nathan Demers

Advisor: Aaron Deskins

Modeling Carbon Nitride Materials

Naomasa Tanaka

Advisor: Aaron Deskins

Surface Passivation of Hydride Fuel Cell for Process Safety

Abigail Calistra, Nathan Crock, Kristen Soden, Morgan Watson

Advisor: Stephen Kmiotek

Beverage Industry Optimization Project I

Katelyn Bergeron, Edward Carrillo, Emily Donovan, Jessica Goode, Henry Liro, Lucas Wilson-Wuestefeld

Advisor: Stephen Kmiotek

Analysis of Pesticide Content in Cannabis Extract

Abigail Cummings. Adam Lee, Brandon Nieto, Reya Singh

Advisor: Stephen Kmiotek

CO2 Removal by Moss

Derek Baker

Advisor: Stephen Kmiotek

High Energy Passive Solar Systems

Sarah Abatiello, Emma Driscoll, Effelia Loscouski, Sydney Smith, Jade Veth

Advisor(s); Stephen Kmiotek, Selcuk Guceri (ME)

Degradation of Per- and Poly – fluoroalkyl Substances via Advanced Oxidation Processes

Alexis Clark, Katherine Lacriox, Shayla Nguyen

Advisor(s): Stephen Kmiotek, John Bergandahl (CE)

Residential PFAS Sources

Christopher Harvill, Katherine Lacroix

Advisor: John Bergandahl (CE)

Characterization of a Well-Type HPGe Detector Using Standard

John Alonzo

Not Presenting

An Exploration of Tea Tannis Impact on Mouthfeel in Wine
Cameron Cronin, Toni Vigliotti
Advisor(s): Elizabeth Stewart, Eric Young

Chemistry and Biochemistry

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

Discovery and Characterization of Novel Anelloviridae Protein Activities and Their Potential Cancer-Selective Toxicity
Aaron Wheeler, Chloe Byrne, Jessica Takami, and Shane Dancer
Advisor: Destin Heilman

Silanes Form Strong Bonds to UiO-66 Metal-Organic Framework Surfaces
Abigail Berube
Advisor: Ronald Grimm

Investigating the Role of Exosomes in the Development of Neuromuscular Junctions
Adam McKnight
Advisor: Suzanne Scarlata

Exploring the effects of CBD on C. elegans with 6-OHDA induced Parkinson's Disease to determine potential therapeutic implications Amanda Holbrook and Claire Behning
Advisor: Suzanne Scarlata, Jill Rulfs, and Michael Buckholt

Investigating the Role of Plasmalogens in C. elegans
Anna Hickman, and Sofi Murray
Advisor: Carissa Olsen

Overexpression of ATF1 in Brewer's Yeast for an Increase in Production of Select Esters
Brandon Rein and Olivia Wallace
Advisor: Destin Heilman

Phosphatidylinositol-4-Phosphate Domain Properties in Asymmetric Giant Unilamellar Vesicles
Catherine Reynolds
Advisor: Arne Gericke

Investigating an in vivo murine model of microglial senescence
Christina Tsillas
Advisor: Robert Dempski

Establishing a Zebrafish Model for Venous Malformations
Eleni Bellas
Advisor: Destin Heilman

Nicotinamide N-Methyltransferase Inhibition
Eliza Mastergeorge
Advisor: Anita Mattson and Paul Thompson (Umass)

Sustaining Silicon's Charge-Carrier Lifetimes through Nb2Ox5 and Organic Silane Passivation
Emma Pellerin
Advisor: Ronald Grimm

Morphological Effects of Stretch on Actin Cytoskeleton in Cocultured Neuronal and Smooth Muscle Cells
Gismael Lopez
Advisor: Suzanne Scarlata

The Role of PLCβ1 in the Relocalization of EGR-1
Grace Hadley
Advisor: Suzanne Scarlata

Drug-Herb Interactions between Artemisia annua Tea, Caffeine, and Acetaminophen
Hannah Duncan and Sophia Togneri
Advisor: Suzanne Scarlata and Pamela Weathers

The Synthesis and Properties of a Zinc Photocage Containing Aminoquinoline
Isaac Frederique
Advisor: Shawn Burdette

Bioconjugation of Aliphatic Amino Acids
Ishani Bedre
Advisor: Patricia Musacchio

Synthesis of Zinc Photocaged Thioester Molecules for Biological Applications
Jason White
Advisor: Shawn Burdette

Copper homeostasis in Salmonella enterica: cloning, expression, and purification of CopA transporter and CueO cuproprotein
Jeffrey Marsh
Advisor: Jose Arguello

Determining the Relationship between DNA Double Strand Breaks and Apoptosis: Implications for Cancer Therapy
Jillian Earley
Advisor: Jose Arguello and Sharon Carter (Umass Medical)

Cellular Stress and Thioredoxin
John Gabelmann
Advisor: Jose Arguello and Natalie Farny

Coarse-grain lattice technique for studying protein-ligand binding
Jon Aronoff
Advisor: George Kaminski and Jennifer Mortensen

Development of Method to Determine EDTA Concentration
Katherine Jones
Advisor: Christopher Lambert

Interactions of Human VPS45 with Partner SNARE Proteins
Kimberly Huaman
Advisor: Arne Gericke and Mary Munson

Investigation into Ionic and Photoredox Reactions of Sulfoxonium Ylides
Kyra Tripp
Advisor: Anita Mattson

Trafficking of the Dopamine Transporter
Lali Berelashvili
Advisor: Suzanna Scarlata, Jeanine Skorinko, and Haley Melikian (UMass)

Analyzing Cannabinoid Content in Hemp Plants
Lauren Balukonis
Advisor: Anita Mattson

Exploring the Role of GolT and GolB Proteins in Copper Homeostasis in Salmonella: Generation of E. coli Clones for Protein Expression
Leo Zhu
Advisor: Jose Arguello

Bamboo for Mining Reclamation and Renewable Energy
Marissa Desir and Yiyi Wu
Advisor: Anita Mattson and Robert Krueger

Differentiating SH-SY5Y Cells into Mature Human Neurons
Natalia Wierzbicki
Advisor: Robert Dempski

Development of a C-H Acylation Reaction in Batch and in Flow
Rachel Swanson
Advisor: Patricia Musacchio and Andrew Teixeria

Surface Functionalization of 1DL Materials
Rebecca Ramthun
Advisor: Ron Grimm

Phosphatidylinositol Phase Behavior in the Presence of Bivalent Cations
Safiya Ali
Advisor: Arne Gericke

Hypo-Osmotic Stress Impact on Cell Circadian Rhythms
Tovah Lockwood
Advisor: Suzanne Scarlata

Civil Environmental Architectural Engineering

POSTER SESSION, 12:30pm to 3:00pm
Kaven Hall

Solutions for an Unpaved Road
Clara Dublin, Shannon Logan
Advisor: A. Sakulich

Beach Accessibility and Conservation
Nadiya Chalak, Catie Coumounduros, Madison Garrity, Colette Webster
Advisor: S. Lepage

Framingham Stormwater
Adele Brochu, Evan Rios, Kali Sander, Caitlin Strzegowski
Advisor: S. Lepage, P. Mathisen

Improving Traffic Safety During Arrival and Dismissal at the Quinsigamond School
Rachel Flanagan, Morgan Ruoss
Advisor: S. Lepage

Route 122-Airport Rotary Intersection Redesign in Worcester
Mitchell Decelles, Theron Howe, Azat Mukhametkulov, Ritesh Prasannakumar
Advisor: S. Lepage

Mental Health in a New WPI Residence Hall
Christopher Cavallaro, Aidan Murphy, Thijs Seppenwolde, Nicholas Willey, Noah Willey
Advisor: J. Rosewitz, N. Rahbar, J. Ryan

Designing Affordable Housing in Ghana
Hannah Frieden, Kyle Mann, Eda Raycraft, James Scalise, Margot Schassler
Advisor: S. Van Dessel, N. Rahbar, P. Kruger

Tomorrow's Hurricane Resilient Hub; Designing Modular Shipping Containers for the Mountainous Region of Puerto Rico
Holly Hazelton, Makayla Delo, Emily Deptula, Aradhana Bissoondial
Advisor: S. Van Dessel, T. El-Korchi, N. Ma

Porous Concrete for Microflush Toilet Technologies
Justin Aguilar, Michael Peck, David Omura, John Lowther
Advisor: A. Sakulich, R. Kruger

Design a Tiny House on Wheels for Wildfire and Indoor Air Quality Research and Teaching
Hannah Rodenbush, Hannah Frank, Nathalie Martin-Nucatola
Advisor: S. Liu, S. Van Dessel, N. Rahbar

Thermal Performance of Nanoparticle Reinforced Enzymatic Construction Materials
Georgy Zhukov, Anne McNamara
Advisor: S. Van Dessel, N. Rahbar

Tatnuck Brook Bridge Design
Patrick Nieman, Elizabeth Valentine
Advisor: L. Albano

Performing Arts Center Design for WPI
Adam Bartlett, Mark Delia, Emily Jorden, Fatimah Wattar
Advisor: L. Albano

Design of Terminal E at Logan Airport
Kristin Stilin, Melanie Castillo, Mike Maffeo, Jacob Gassenheimer
Advisor: T. El-Korchi

Revised Affordable Housing for the Modern Family
Danforth Kennerson, Lucas Kamal, Talia Mamayek, Max Wojtas
Advisor: S. Farzin, C. Brown, L. Albano

Design a Net-Zero and a Resilient Building for Heatwaves
Stefanie Beaudry, Vanessa Bussiere, Sarah Johnson, Athina Theofilou
Advisor: S. Liu

Water Contamination from Fire Events
Emily Mullin, Dayna Tang, Luke Marcoux
Advisor: J. Bergendahl, A. Rangwala, Jagan

Regulating Human Emotional States in Build Environment
Gianna Viele, Phebe Cunningham, Sebastian

Villacorta, Hailey Anderson, Nicholas Whalen,
Payton Dean
Advisor: S. Farzin, A. Yousefi, L. Albano

PFAS Phase Friction
Shannon Henderson, Richard Widman, Ryan
Trongone
Advisor: J. Bergendahl, S. Kmiotek

**Sudbury Renewable Renovations & Structures
Project**
Keira Coulard-Smith, Sophia Callandrello, Derek
Childs, Danielle Gonzalez, Lana Vilcinskas
Advisor: P. Mathisen, C. Eggleston, S. Van Dessel

**Feasibility Study for Sustainable Development
in the US**
Adam Shi, Adam Dincher, Karris Krueger
Advisor: S. Farzin, S. Van Dessel

Re-Evaluated WPI Campus Access
Morgan Hughes
Advisor: N. Rahbar

Computer Science

POSTER SESSIONS
Innovation Studio, Second Floor

10:00am-12:00pm
PATHly Visualizer: Exploring Anycast Stability in IPv4 and IPv6
Jack Campanale, Jasper Meggitt, Yash Patel, Cindy Trac
Advisor: Mark Claypool
Sponsor: Fastly
Project Center: Silicon Valley Project Center

10:00am-12:00pm
Developing a 3D Food Printer
Ashley Burke, Nupur Shukla
Advisors: Rodica Neamtu, Danielle Cote (ME)

10:00am-12:00pm
Z^3 Wellness: An Enhanced Sleep Health Application for Better Sleep and Mental Wellness
Eri Kim, Patrick Mejia
Advisor: Carolina Ruiz

10:00am-12:00pm
Warden: Multi-Layered Control Flow Integrity in Web Applications
Keith DeSantis, Samuel Parks, Kush Shah
Advisor: Craig Shue

10:00am-12:00pm
Neurotype Cafe Visual Novel
Lena Dias, Harmoni Larrabee, Mitch Tanguay
Advisors: Rose Bohrer, Ben Schneider

10:00am-12:00pm
Data-Driven Computational Approaches in Pain Medicine
Aidan Burns, Lauren Flanagan, Smera Gora
Advisors: Lisa Ann Conboy (Harvard Medical), Benjamin Nephew (Biology & Biotechnology), Carolina Ruiz

10:00am-12:00pm
Efficiency Analysis of Partner Organizations: Poverty Stoplight
Kayla Brown, Rebecca Noris, Catherine Salvaggio, Hayden Smith
Advisors: Ryan Madan (PW), Daniel Reichman, Andrew C. Trapp (IE/DS)
Sponsor: Poverty Stoplight

10:00am-12:00pm
A Visual-Based Educational Support Platform for Teaching and Learning Neural Network-Based NLP Analytics
Jack Gomes, Daniel Johnson, Garrett McMerriman, John Prominski, Henry Yoder
Advisor: Chun-kit Ngan (DS)

10:00am-12:00pm
Understanding and Optimizing Mistake Messages in Mathematics
Shannen Lin, Siddhartha Pradhan, Chayanne Sandoval-Williams
Advisors: Neil Heffernan, Stacy Shaw (SSPS)

10:00am-12:00pm
Advancing Diffusion Models for Human Activity Recognition
Sirut Buasai, Jason Dykstra, Dillon McCarthy, Cindy Trac
Advisor: Elke Rundensteiner (DS)

10:00am-12:00pm
Exploring the Effects of Latency Compensation Techniques on Player Performance and Experience in FPS Games
Ivan Klevanski, Alexander Mitchell, Yihong Xu, Sitsanok Young
Advisor: Mark Claypool
Sponsor: NVIDIA

10:00am-12:00pm
Fidelity: AI Based Anomaly Detection
Aruzhan Koshkarova, Nathan Kumar, Mitchell Sirois, Austin Zhou
Advisors: Marcel Y. Blais (MA), Robert Sarnie (BUS), Wilson Wong
Sponsor: Fidelity

10:00am-12:00pm
Patients Views of Cancer Immunotherapy on Social Media and Online Forums
Sidney Goldinger, Florkenthia Jolibois, Sierra Mangini, Mago Sheehy, Tiffany Wee Sit
Advisor: Ngan Chun-kit (DS)

10:00am-12:00pm
Mobile Device Software-Defined Networking
Matthew Hlushko, Ivan Martinovic, Jacob Salerno
Advisor: Craig Shue

10:00am-12:00pm
Developing a Wildlife Crime Media Aggregator
Julie Andrade, Michael Geary, Bao Huynh
Advisors: Kyumin Lee, Renata Konrad (MG), Oren Mangoubi (MA)
Sponsor: Meredith Gore, Patricia Raxter

10:00am-12:00pm
Feature Recognition of Aerial Images Using Machine Learning
Ryan Firenze, Margaret Munroe, Sebastian Pineda, Amos Roche, Arman Saduakas
Advisors: Oren Mangoubi (MA),
Gregory Noetscher (ECE)
Sponsor: DEVCOM Soldier Center

10:00am-12:00pm
Sailbot
Samuel Alden, Douglas Moore, Cameron Pelletier, Owen Pfannenstiehl, Joshua Unger
Advisors: William Michalson (RBE), Kenneth Stafford (RBE)

10:00am-12:00pm
NASA Lunabotics Competition 2022-23
Alex Brattstrom , Carter Bullock , Roopsa Ghosh, Patrick Hagearty , Helen Le, Joshua Moy
Advisors: Kenneth Stafford(RBE), Joshua Cuneo(CS),
Sponsor: NASA

10:00am-12:00pm
Fair Ranking Under Uncertainty
Marie Tessier, Sai Varun Vadlamudi, Brinda Venkataraman
Advisors: Jon Abraham (MAC), Elke Rudensteiner

10:00am-12:00pm
USDA Foodborne Illness Outbreak Detection and Visualization
Katy Hartmann, Timothy Kwan, Jasmine Laber, Anne Lapsley, Liam Rathke
Advisor: Elke Rundensteiner

10:00am-12:00pm
Coalition Formation and Scheduling for Heterogeneous Robot Swarms with Ant Colony Optimization
William Babincsak
Advisor: Carlo Pinciroli

10:00am-12:00pm
Applying Explainable AI to Taxi Driver Classification
William Burke, Ian Coolidge, JinRyoul Kim
Advisor: Yanhua Li

10:00am-12:00pm
Evolving Neural Networks
Gregory Conrad, Gabriel Deml, Aidan Horn
Advisor: Joseph Beck

10:00am-12:00pm
FinTech Project B22 - Woo Sox - Improving Polar Park's Total Fan Experience via the Woo Sox Mobile App.
Qui Nguyen, Kara O'Neil, Bridget Redgate
Advisors: Sara Saberi (Business), Robert Sarnie (Business), Wilson Wong
Sponsor: Worcester Red Sox
Project Center: FinTech Project Center

10:00am-12:00pm
Worcester IS Fab Lab MQP Blockchain and Machine Learning
Joshua DeBare, Mabel Konadu, Kelsey Moody, Cameron Morreale
Advisors: Marcel Blais (MA), Rob Sarnie (BUS), Wilson Wong
Sponsor: Embue, Cyvl, Worcester IS FAB Lab

10:00am-12:00pm
Audio Journal Android App
Anna Cherkinsky, Vansh Patel, Reily Siegel
Advisors: Lane Harrison, Rodica Neamtu
Sponsor: Audio Journal

10:00am-12:00pm
ScreamaeraX: Modeling Laryngeal Surgical Robots Using Differential Dynamic Logic
Natalie McClain
Advisors: Rose Bohrer, Loris Fichera (RBE)

10:00am-12:00pm
The Way
HChen, JColley, FShen, JSmith
Advisors: MAhrens, Walt Yarbrough(IMGD)

10:00am-12:00pm
Third Party Aggregator Development for FDX API Integration at Citizens Bank
Chelsea Chang, Kevin Inger, Jonathan Metcalf, Jack Sullivan
Advisors: Robert Sarnie (BUS), Wilson Wong
Sponsor: Citizens Bank
Project Center: Wall Street FinTech

1:00pm-3:00pm
Developing Quality of Life Features for the E-TRIALS Platform
Emily Gorelik
Advisor: Neil Heffernan

1:00pm-3:00pm
Goatconnect - developing a student-athlete network application
Loren DiLoreto, Jacob Feiss, Harrison Kyriacou
Advisor: Rodica Neamtu
Sponsor: Chris Robertson (Head Football Coach)

1:00pm-3:00pm
Chaos Engineering for Cloud Resiliency
Nestor Lopez, Renee Sawka, Olivia Scola
Advisors: Robert Sarnie (BUS), Wilson Wong
Sponsor: State Street
Project Center: Wall Street/FinTech Project Center

1:00pm-3:00pm
GPU-Accelerated Simulations for Artistic Performance
Evelyn Tran
Advisor: Charles Roberts

1:00pm-3:00pm
Exposing the Imposter's Hunger for Power: Hardware Keylogger Attack Detection
Brianna Roskind
Advisors: Patrick Schaumont (ECE), Robert Walls

1:00pm-3:00pm
Simulator for Teacher-Student Classroom Interactions
Mary Braen, Gabriel Camacho, Emily Lin, Ryan Luu, Aidan Mulcahey, Jonathan Palmieri
Advisor: Jacob Whitehill(CS)

1:00pm-3:00pm
Generating Solitaire Games
Patrick Eaton, Benjamin Gilchrist, Alex Martinho, Kyle McFatter, Jason Odell
Advisor: George Heineman

1:00pm-3:00pm
Robot Escape Room
Olivia Bell (IMGD/CS), Liang Lu (RBE/CS), Zachary Sarrett
Advisors: Berk Calli (RBE), Melissa Kagen (IMGD), Gillian Smith

1:00pm-3:00pm
Small-Size Soccer Robots
Spencer Belleville, Conner Christensen, Ashley Espeland, Logan Rinaldi, Nathan Rogers, Benjamin Schwantes, Evan Vadeboncoeur, Yifei Zhao
Advisors: Stephen Bitar (ECE), Joshua Cuneo, Alireza Ebadi (ME), Siavash Farzan

1:00pm-3:00pm
Sewn Into Memory: Reliving Memories Through An AR Quilt
Amanda Jones, Megan Letendre, Elise Nerden
Advisors: Gillian Smith, Erin Solovey

1:00pm-3:00pm
Remote-Controlled Mixed Reality Driving Experience
Greg Klimov, Samuel Kwok, Cole Manning, Mason Powell, Sam Rowe, Adam Yang
Advisor: Tian Guo
Sponsor: NSF

1:00pm-3:00pm
SocialSight: Analyzing Social Media
Carlie Flanagan, Kiara Munz
Advisor: George Heineman

1:00pm-3:00pm
Distribution-Driven Augmentation of Real-World Datasets for Improved Cancer Diagnostics With Machine Learning
Stephen Price
Advisors: Rodica Neamtu, Winston Soboyejo (ME)

1:00pm-3:00pm
BCI
David Danielian
Advisors: Ally Howell (BCB), Erin Solovey

1:00pm-3:00pm
Learning Debiased Representations for Long-Tailed Visual Recognition
Prudence Lam
Advisor: Ziming Zhang (ECE)

1:00pm-3:00pm
Creating the Pwnable Claw Machine
Arthur Ames, Charlotte Clark, Evelyn Dube, Declan Murphy
Advisors: Robert Walls, Loris Fichera (RBE)

1:00pm-3:00pm
Piniverse: General Content Creation Framework
Gabriel Buonomano, Shiming De, Alexander Kwan, Yongcheng Liu, Yihong Xu
Advisors: Tian Guo, Gillian Smith

1:00pm-3:00pm
Analyzing DASH Video Streaming over Geostationary Satellite Networks
Daniel Quackenbush, Kristi Prifti, Zijian Guan
Advisor: Mark Claypool
Sponsor: Viasat

1:00pm-3:00pm
7Factor 2022-2023: Staffing Tool
Keval Ashara, Othniel Bondah, Nicholas Li
Advisor: Joshua Cuneo
Sponsor: 7Factor Software, LLC

1:00pm-3:00pm
Built Environment MQP
Hailey Anderson, Phebe Cunningham, Payton Dean,
Gianna Viele, Sebastian Villacorta , Nicholas Whalen
Advisor: Leonard Albano (AE) Soroush Farzin (AE)
Ali Yousefi

1:00pm-3:00pm
Electric Triumph Spitfire MKIV (1972)
Blaise Pingree, Bradley Sprunger, Grace Magnotta,
Pat Flanigan, Sean McMillan, Shane Donahue,
Wynn Roberts
Advisors: Craig Putnam (RBE), Donald Brown
(ECE), Joshua Cuneo, Nicholas Bertozzi (RBE),

1:00pm-3:00pm
**Incremental Earley Parsing of Incomplete Inputs
for Structured Editing**
Finn Wander
Advisor: Gary Pollice

1:00pm-3:00pm
**Expanding Beecology Project's Data Analysis
Capabilities for Butterfly Observations**
Sophia Strano
Advisors: Carolina Ruiz, Elizabeth Ryder (BCB)

1:00pm-3:00pm
**Audio Journal: empowering visually impaired
people to access exhibits at the Worcester Museum
of Art**
Zane Carey, Vrandol Perez, Daniel Rabinovitz,
Marko Vila, Michael Zeolla
Advisors: Lane Harrison, Rodica Neamtu
Sponsor: Worcester Art Museum

1:00pm-3:00pm
**Bismuth: A Programming Language for _
Distributed, Concurrent & Mobile Systems**
Alex Friedman
Advisors: Rose Bohrer, Yunus Telliel (PW)

1:00pm-3:00pm
**Development of Predictive and Prescriptive
Analytical Models Using Customer, Revenue, and
Usage Data**
WBazakas-Chamberlain, AKihu, MO'Connor, SWu
Advisors: Robert Sarnie, Wilson Wong
Sponsor: SaaSWorks
Project Center: FinTech

1:00pm-3:00pm
Modular Package for Autonomous Driving
Rohan Anand, Martin Bleakley, Allison Colon,
Ian Khung, Ishan Rathi
Advisor: Pradeep Radhakrishnan (ME)

1:00pm-3:00pm
Imperius
Matthew Hendrickson, Benjamin Martin
Advisors: Joseph Beck, Ben Schneider (IMGD)

1:00pm-3:00pm
**Implementation of a Cloud-Based Enterprise
Resource Planning System for Gompei's Goat
Cheese**
Gabrielle Acquista, Victoria Buyck, Benjamin Sakac,
Sohrob Yaghouti
Advisors: Michael Engling, Jim Ryan (Business)
Sponsor: Gompei's Goat Cheese

1:00pm-3:00pm
Library Technology
Brandon Scanlon, Oliver Yasuna
Advisor: George Heineman

1:00pm-3:00pm
Jitter and Latency in Cloud Game Streaming
Ryan Darcey, Botao Han, Sean O'Connor,
Wenjie Zhang
Advisor: Mark Claypool

1:00pm-3:00pm
The Way
HChen, JColley, FShen, JSmith
Advisors: MAhrens, Walt Yarbrough(IMGD)

1:00pm-3:00pm
**Assessing Path-Planning Algorithms for
Collaborative Multi-Robot Exploration with
Memory Constraints**
Nicholas Grumski, Abigail Hyde
Advisor: Carlo Pinciroli (RBE)

1:00pm-3:00pm
**Creating a Multi-Robot, Multi-Human, Multi-
Platform System**
Samantha Braun, Alyssa Magaha
Advisors: Jane Li, Carlo Pinciroli

1:00pm-3:00pm
Marching Band Simulator
Braden Arnold, Sydney Gardner, David Mahany,
Jacob Matthews
Advisors: Joshua Rosenstock (HUA), Gillian Smith

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1:00pm-3:00pm
Detecting Clouds and Forecasting Power of a PV System
Erin Carter, Emma Pruitt, Olivia Rockrohr,
Megan Hanlon
Advisors: Tian Guo, Gregory Noetscher (ECE),
Ziming Zhang (ECE)

1:00pm-3:00pm
Convert a Windows-based software (BoGL) to a Web-based system
Margaret Earnest, Jakob Misbach, Anthony Vuolo III
Advisors: David Brown, Pradeep Radhakrishnan

Data Science

POSTER SESSION, 1:00pm to 3:00pm
Location: Unity Hall 500

Advancing Diffusion Models for Human Activity Recognition
Cindy Trac
Dillon McCarthy
Sirut Buasai
Jason Dykstra
Advisor: Elke Rundensteiner

Understanding player movement in the NFL, from Scouting Combine to games
Matthew Dzwil
Mia Hopman
Katie Housekeeper
Advisors: Yanhua Li and Kenny Ching

USDA Foodborne Illness Outbreak Detection and Visualizations
Katy Hartmann
Timothy Kwan
Jasmine Laber
Anne Lapsley
Liam Rathke
Advisors: Elke Rundensteiner and Oren Mangoubi

Data-Driven Computational Approaches in Pain Medicine
Lauren Flanagan
Smera Gora
Aidan Burns
Advisors: Carolina Ruiz, Benjamin Nephew, and Lisa Conboy

Developing a Wildlife Crime Media Aggregator
Julie Andrade
Michael Geary
Bao Huynh
Advisors: Kyumin Lee, Renata Konrad, and Oren Mangoubi

Efficiency Analysis of Partner Organizations: Poverty Stoplight
Hayden Smith
Rebecca Noris
Catherine Salvaggio
Kayla Brown
Advisors: Andrew Trapp, Daniel Reichman, and Ryan Madan

Interpretability of Deep Neural Networks for Pre-Symptomatic Pathogen Exposure Detection
Maceo Richards
Advisors: Xiaozhong Liu and George Heineman

Clinical Trial Prediction
Calvin Rambacher
Advisors: Xiaozhong Liu and Fabricio Murai

Analysis of Stigma Towards the Mental Health Discussion on Social Media
Mark Buono
Rachelle Gonzales
Jada Hinds-Williams
Josephine Kim
Advisors: Adrienne Hall-Phillips, Nima Kordzadeh, and Jeanine Skorinko

Fidelity: AI Based Anomaly Detection
Aruzhan Koshkarova
Nathan Kumar
Mitchell Sirois
Austin Zhou
Advisors: Marcel Y. Blais, Robert Sarnie, and Wilson Wong
Sponsor: Fidelity LLC

Development of Predictive and Prescriptive Analytical Models Using Customer Revenue and Usage Data
William Bazakas-Chamberlain
Abigael Kihu
Michael O'Connor
Shiyu Wu
Advisors: Marcel Y. Blais, Robert Sarnie, and Wilson Wong
Sponsor: SaaSWorks

Worcester IS FAB Lab MQP on Blockchain and Machine Learning
Qingbei Shang
Joshua Debare
Kelsey Moody
Mabel Konadu
Cameron Morreale
Advisors: Marcel Y. Blais, Robert Sarnie, and Wilson Wong
Sponsor: Worcester IS FAB Lab

Analyzing Housing Market Trends with Data and External Factors
Alex Bolduc
Reagan Brunelle
Aleksander Proko
Yueting Zhu
Advisor: Marcel Y. Blais, Robert Sarnie, Wilson Wong, and Michael Elmes
Sponsors: New York City-based Alternative Investment Firm

Risk Indifference Pricing of American Put Options: Deep Learning for Reflected Backwards Stochastic Differential Equations
Fredrick "Forrest" Miller
Advisor: Stephan Sturm

Answering Unique Questions Pertaining to the COVID-19 Pandemic
Steven Tran
Tia Mehta
Dylan Shanes
Advisor: Torumoy Ghoshal

Machine Learning with User-Friendly Data Generation for Computer Vision-Based Navigation
Amos Roche
Ryan Firenze
Margaret Munroe
Sebastian Pineda
Arman Saduakas
Advisor: Oren Mangoubi

A Visual-Based Educational Support Platform for Teaching and Learning Neural Network-Based NLP Analytics
Garrett McMerriman
Daniel Johnson
Jack Gomes
Henry Yoder
John Prominski
Advisor: Chun-Kit Ngan

A BERTopic Platform for Perceiving Patients' Views of Cancer Immunotherapy on Social Media and Online Forums
Mago Sheehy
Sierra Mangini
Florkenthia Jolibois
Tiffany Wee Sit
Sidney Goldinger
Advisor: Chun-Kit Ngan

Multi-Class Classification of Bets and Parlays for DraftKings Sportsbook
Grace Casey
Ryan Dieselman
Jack Fredo
Jackson Lombardi
Cameron Tomko
Advisor: Rick Brown

Understanding and Optimizing Mistake Messages in Mathematics
Siddhartha Pradhan
Chayanne Sandoval-Williams
Shannen Lin
Advisor: Neil Heffernan and Stacy Shaw

Electrical and Computer Engineering

POSTER SESSION, 9:00am to Noon Atwater Kent Labs, Hallway Floor 1

Electric Jet ski
Matthew Fredo, Patrick Hyland, Antonio Torres, Isaac Tufts, Samuel Boudreau (ME), James Hammel (ME), Mathieu Michaud (ME), Blake Pedersen (ME), Zachery Therrien (ME)
Advisors: Mehul A. Bhatia (ME), Stephen J. Bitar

Playing Pong for Stroke Rehabilitation Therapy Using a Real-Time Wireless Wearable Electromyogram Sensing System
Dilan Altiparmak, Alexandria Miera, Alicia Salvalzo
Advisor: Ted Clancy

Open Source 5G Networks, Spoofing Attacks and Proof-of-Concept Multi-Node Continuous Spectrum Analysis
Kena Dudac, John Matthews, Matthew Zoner, Eric Heinemann (CS), Conor McDonough (CS), John Petrarca (CS)
Advisors: Alexander Wyglinski, Robert Walls (CS)

User Study and Optimization of Wearable Transcutaneous Oxygen Sensor
Abigail Leonardi, Vanshika Rohera, Sydney Hobson (BME), Ciara Murphy (BME)
Advisor: Ulkuhan Guler

Open Source IC Design for Post Quantum Cryptography
Alexander Demirs, Bruce Huynh, Matthew Wong
Advisors: Patrick Schaumont, Herman Servatius (MA)

High Altitude Balloon for Measuring Environmental Pollution – HAB 4.0
Connor Borsari, Nicholas Chantre, Jonathan Lopez, Drew Solomon
Advisor: Gregory Noetscher

POSTER SESSION, 9:00am to Noon Atwater Kent Labs, Hallway Floor 2

Formula Electric SAE for 2022-2023
Daniel Ali (ME), Jared Bushnell (ME), Sophie Chretien (ME), Edward Clifford (CS), Javier Espinal, Eric Gustafson (ME), Ori Katz, Emily Kelley (RBE), Henry Livingston, Pranjal Mann (ME), James Mitchell (RBE), Macy McEnaney (ME), Peter Murray (ME), Matthew Reynolds (CS), Michael Rideout, Alan Robertson, Thomas Walsh (ME), Sam Sands (ME), Alexander Wessel, Noah Wolf
Advisors: William Michalson (RBE), David Planchard (ME)

Detecting Clouds and Forecasting Power of a PV System
Megan Hanlon, Emma Pruitt, Olivia Rockrohr, Erin Carter (CS),
Advisors: Gregory Noetscher, Tian Guo (CS)

Ropeless Lobster System: Resurfacing Oceanic Locator
Caylee Butler (ME), Slater Campbell, Trevor Parks (ME), Charlie Snow (CS)
Advisor: William Michalson (RBE)

Photon Emission and Laser-Assisted Side-Channel Analysis of Hardware Implementations
Evan Wu
Advisor: Shahin Tajik

Electrical and Computer Engineering

POSTER SESSION, 9:00am to Noon
Atwater Kent Labs, Pumpkin Lounge, Floor 1

Virtual Conference with Augmented Technology
Weizhe Wang
Advisor: Xinming Huang

WPI Center for Well-Being Electrical System Design
Thuyen Nguyen
Advisor: Stephen J. Bitar

Automate Model Data into a Physics-Based Analytic Software
Maya Ellis
Advisor: Shamsnaz V. Bhada
Sponsor: MITRE

Small-Size Soccer Robots
Benjamin Schwantes
Advisor: Stephen J. Bitar

Audio-Based Object Recognition
Zhuolin Liu, Michael Rothstein
Advisor: Bashima Islam

Vulnerability Analysis of Security ICs Against Laser Fault Inject
Kyle Mitard
Advisor: Shahin Tajik

Real-Time Temperature Controlled Microalgae Incubator Testbed
Max To, Katerina Angjeli
Advisor: Stephen J. Bitar

Open Source FPGA Implementation of Number Theoretic Transform for CRYSTALS-Dilithium
Brandon Voci
Advisor: Patrick Schaumont,
Herman Servatius (MA)

Humanities and Arts

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

12:20pm
Integrating Herbal Medicine into Modern Healthcare Systems: A Case Study on *Artemisia annua* in China, the US, and Kenya
Sophia Togneri, Major in Intl/Global Studies
Advisor: John Galante

12:40pm
Semiconductors in Taiwan
Abigail Leonardi, Minor in Chinese
Advisor: Jennifer Rudolph

12:50pm
Inosculation
Shannon Henderson, Minor in Creative Writing
Advisor: Kate McInryre

1:00pm
An Analysis of Regency Era Romance in Sense and Sensibiliry
Alex Jozitis, Minor in Drama/Theater
Advisor: Laura Eckelman

1:10pm
Gender in Dance: How Salsa and Mambo Reflect Heteronormativiry
Jay Yen, Minor in Spanish
Advisor: Aarti Madan

1:20pm
The Bureaucracy of the N1 Rocket
Garrett Devlin, Minor in History
Advisor: Joe Cullon

Interactive Media and Game Development

FL Upper Perreault Hall

10:00am
Imperius
Matthew Hendrickson, Kurtis Kiai,
Benjamin Martin, Aaron Waldman
Advisors: Joe Beck (CS), Ben Schneider (IMGD)

10:15am
The Way
Oliver Chen, Joe Colley, Shen Fang, Jaden Smith-Borne
Advisors: Matt Ahrens (CS), Walt Yarbrough (IMGD)

10:30am
Exploring the Crossroads: Augmented Reality and Tabletop Roleplaying Games
Warren Andress, Shawn Finnigan, Alex Jozitis
Advisors: Melissa Kagen (IMGD), Kevin Lewis (HUA)

10:45am
Jitter and Latency in Cloud Game Streaming
Ryan Darcey, Botao Han, Sean O'Connor, Wenjie Zhang
Advisor: Mark Claypool (IMGD/CS)

11:00am
Break

11:15am
Marching Band Simulator
Braden Arnold, Sydney Gardner, David Mahany, Jacob Matthews
Advisors: Josh Rosenstock (IMGD/HUA), Gillian Smith (IMGD/CS)

11:30am
Piniverse: General Content Creation Framework
Gabriel Buonomano, Shiming De, Alexander Kwan, Yongcheng Liu
Advisors: Tian Guo (CS), Gillian Smith (IMGD/CS)

11:45am
Robot Escape Room
Olivia Bell, Nathan Clune, Lillie DeHaemer, Liang Lu, Grace O'Reilly, Zachary Sarrett
Advisors: Berk Calli (RBE), Melissa Kagen (IMGD), Gillian Smith (IMGD/CS)

12:00pm
Lunch Break
Stay for more presentations in the afternoon, starting at 1:30!

1:30pm
Gnome Hollow
Diego Arce, Kirsten Roethel, Alan Roush, Garrett Sheehan
Advisors: Gillian Smith (IMGD/CS), Ralph Sutter (IMGD)

1:45pm
Exploring the Effects of Latency Compensation Techniques on Player Performance and Experience in FPS Games
Ivan Klevanski, Alexander Mitchell, Yihong Xu, Sitsanok Young
Advisor: Mark Claypool

2:00pm
Retro Video Game Project
Zihang Chen, Alexandra McFann
Advisor: Adryen Gonzalez (IMGD/HUA)

2:15pm
Django Unplugged
Nadiyah Garris, Geoff Garsson, Yaseen Nagib, Victoria Rindeiko, Hanwen Xu
Advisor: Farley Chery (IMGD)

2:30pm
Break

2:45pm
Last Chance: Graphic Novel
Daniel Pacheco-Cruz
Advisors: Adryen Gonzalez (IMGD/HUA), Ed Gutierrez (IMGD/HUA)

3:00pm

Jazz History Database Virtual Museum

Thi Quynh Ha Nguyen, Niko Pelletier

Advisors: Charlie Roberts (IMGD/CS), Ralph Sutter (IMGD)

3:15pm

Neurotype Café

Lena Dias, Harmoni Larrabee, Mitch Tanguay

Advisor: Rose Bohrer (CS/IMGD), Ben Schneider (IMGD)

3:30pm

Purradise City

Kateri Bajer, Zack Koval, Erin Marczewski, Percy Rynkowski

Advisor: Rose Bohrer (CS/IMGD), Adryen Gonzalez (IMGD/HUA), Ben Schneider (IMGD)

MATHEMATICAL SCIENCES

Unity Hall 520

8:30am- Refreshments

9:00am
Project Title: An Application for Generating Bond Graphs on the Web.
Students: Margaret Earnest (CS), Jakob Misbach (CS, math minor), Anthony Vuolo III (MA/CS)
Advisors: Brigitte Servatius, David C. Brown, Pradeep Radhakrishnan

9:15am
Project Title: Risk Indifference Pricing of American Put Options.
Students: Frederick "Forrest" Miller
Advisors: Stephan Sturm

9:30am
Project Title: Multiscale Muscle Modeling
Students: Liz Cole
Advisors: Sam Walcott

9:45am
Project Title: Extracting and Visualizing Wildlife Trafficking Events from Online News Articles
Students: Julie Andrade, Michael Geary, Bao Huynh
Advisors: Oren Mangoubi, Renata Konrad, Kyumin Lee

10:00am
Project Title: Tiling of Prime and Composite Kirchhoff Graphs.
Students: Jessica Wang
Advisors: Joseph D. Fehribach

10:15am Break

10:30am
Project Title: Methods for Learning What Works in Educational Technology
Students: Anshika Jain, Brendan King
Advisors: Adam Sales

10:45am
Project Title: Open-Source FPGA Implementation of Number Theoretic Transform for CRYSTALS-Dilithium.
Students: Brandon Voci
Advisors: Herman Servatius, Patrick Schaumont (Electrical and Computer Engineering)

11:00am
Project Title: Non-Linear Dimension Reduction of Crypto-Currency Data.
Students: Lyra Layne, Cole Peterson, Ben Rajotte, Taenler Tavares
Advisors: Stephan Sturm, Fangfang Wang

11:15am
Project Title: Fidelity: AI Based Anomaly Detection
Student Names: Aruzhan Koshkarova, Nathan Kumar, Mitchell Sirois, Austin Zhou
Advisor(s): Marcel Blais, Robert Sarnie, Wilson Wong
Sponsor: Fidelity

11:30am
Project Title: Make Business Data Actionable
Students: William Bazakas-Chamberlain, Michael O'Connor. Abigail Kihu, Shiyu Wu
Advisors: Marcel Blais, Robert Sarnie, Wilson Wong

11:45am
Project Title: Feasibility of PIPS Device for Applications in Neutron Radiation Measurement
Students: Nicole Dombrowski
Advisors: Marcel Blais, David Medich

12:00pm
Project Title: An M-Estimator for the Survivor Average Treatment Effect
Student: Lora Dufresne
Advisors: Adam Sales, Alexander Smith

12:15pm
Project Title: Machine Learning with User-Friendly Data Generation for Computer Vision-based Navigation
Students: Ryan Firenze, Margaret Munroe, Sebastian Pineda, Amos Roche, Arman Saduakas
Advisors: Oren Mangoubi

12:30pm
Project Title: Bamboo for Mining Reclamation and Renewable Energy
Students: Yiyi Wu
Advisors: Sarah Olson, Robert Krueger (SSPS, Director of Ghana Project Center), Berk Calli (RBE).
Sponsor: Ghana Project Center

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Mechanical and Materials Engineering (MME) Department Projects

Time: 8.30am – 12pm (Alden Hall)

1. Design and Prototyping of a Wankel Engine
Students: Patrick Leach, William Hopkins, Ryan Gillett, Yutai Han
Advisor: Selcuk Guceri

2. Design, Simulate, Build, and Test an RC Airplane
Students: Kalle Asaro, Delaney Cox, Heather Oxford, Everett Wonson
Advisor: Alireza Ebadi
Sponsors: BAE Systems, Aimtek, Oxford Consulting

3. Smart Mechanical Backstop
Students: Emily Doucette, Marissa Lamprey, Joseph Salvon, Adam Marsh, Jeffrey Brennan
Advisor: Christopher Brown

4. Locker with Accessible High Shelf
Students: Annika Keck, Colin Canniff
Advisor: Eben Cobb

5. Reconstruction of a High-Rise Fire Using Experimental and Computational Techniques
Students: Abigail Benoit, Grace Cummings, Matthew Guarneri, Peter Guertin
Advisor: Milosh Puchovsky (FPE)

6. An Improved Actuation System for an Artificial Tongue Prosthesis
 Students: Luese Ufuah, Tatyana Barthold, Hope Soucy, Marc Voorhees, Declan Williams
Advisors: Pradeep Radhakrishnan, Dirk Albrecht (BME)
Sponsor: Women's Impact Network

7. Modular Package for Autonomous Driving (mPAD)
Students: Rohan Anand, Martin Bleakley, Allison Colon-Heyliger, Ian Khung, Ishan Rathi
Advisors: Pradeep Radhakrishnan, Kaveh Pahlavan (ECE, CS)

8. High Energy Density Magnesium-Air Battery for Shipping, Rail and Aviation Electrification and Grid Storage
Students: Kurt Lindentha, Tyler Riggs, Edward Miller, Jaqueline Simon-Villacis
Advisor: Adam Clayton Powell

9. Mechanism Design for Avoiding Ice Deformation in Fixed Docks
Students: Tim Loosigian, James Barrera, Cole Rabe
Advisor: Alireza Ebadi

10. Smart Net
Students: Michael Sposato, Noah Skinner, Joseph Durocher, Aidan Lynn, Noah Litzinger
Advisor: Alireza Ebadi

11. Small Jet Engine Test Fixture, Design and Fabrication
Students: Amanda Forgione, Bradley Markiewicz, Alexander Almazan, Matthew Lovoi, William Stottlemyer
Advisor: Selcuk Guceri

12. Electric Jet Ski
Students: James Hammel, Zachery Therrien, Blake Pedersen, Mathieu Michaud, Samuel Boudreau, Isaac Tufts, Antonio Torres, Patrick Hyland, and Mathew Fredo
Advisors: Mehul Bhatia, Steven Bitar (ECE)

13. Robot Ecosystem for Monitoring Climate Change
Students: Kalina Bonofiglio, Lauryn Whiteside, Maya Angeles, Matthew Haahr, Brandon, Simpson, Josh Palmer
Advisor: Markus Nemitz

14. BoGL Web: An Application for Generating Bond Graphs on the Web
Students: Margaret Earnest, Jakob Misbach, Anthony Vuolo
Advisors: David C. Brown (CS), Pradeep Radhakrishnan, Brigitte Servatius (MA)

15. Fast Food Waste
Students: Alexander Guerra, Wirt Addison Jones IV
Advisors: Mehul Bhatia, Reeta Rao

16. Realistic Shoulder Model with Soft Tissue Attachments
Students: Kelly Miller, Fiona McEvilly, Marilyn Senger
Advisor: Fiona Levey

17. Development of 3D Printed Humanoid Robots, Koalby and Ava, as Lab Assistants
Students: Aashish Singh Alag, Zeñia Alarcon, Emily Austin, Tessa Lytle, James Van Milligen
Advisors: Pradeep Radhakrishnan, Kaveh Pahlavan (ECE)

18. Getting 3D Printed Humanoid Robots, Koalby and Ava, to Stand and Walk!
Students: Joshua Fernandez, Erin Lee, Tessa Lytle, Finbarr O'Sullivan, Casey Snow
Advisors: Pradeep Radhakrishnan, Kaveh Pahlavan (ECE)

19. Developing a 3D Food Printer
Students: Nupur Shukla, Ashley Burke, Julia Toplyn
Advisors: Danielle Cote, Rodica Neamtu (CS)

20. Low Profile Home Speaker
Students: Abigail McLean, Aidan Nunes, Brandon Cote, Joseph Martin
Advisor: Joseph Stabile

21. Utilizing Waste to Provide an Economically Viable Alternative to Roofing in Ghana
Students: Michael Morin, Jackson Baker
Advisors: Robert Krueger (SSPS), Debora Jackson (BUS), Walter Towner (BUS), Mustapha Fofana

22. Design, model and manufacture an internal combustion engine
Student: Qianchen Zeng
Advisor: Alireza Ebadi

23. Elevator Rope Sway Monitoring
Students: Jack Johnson, Sage Ortega-Shue, Martin Wadzinski, David Bilis, Jay Yen, Kyle Lopez, Tyler Sanderville
Advisors: Pradeep Radhakrishnan, Cosme Furlong
Sponsor: OTIS Elevator Company

24. Army Exoskeleton
Students: Roe Hendrick, Alexander Strickland, Luke Reid, Francesco Valagussa, Liudmila Serebrennikova, Nicholas Biliouris
Advisors: Mehul Bhatia,Songbai Ji (BME), Haichong Zhang (RBE/CS)

25. Design of an Air Blower System for Fuel Cells
Students: Sarah Homsy, Evan MacGregor, Grace Blackadar, Jane Spear
Advisor: Ahmet Subuncu
Sponsor: Honeywell International, Inc.

26. A Transfection Device for Mammalian Cells
Students: Walter Conway, Anthony Bozza, Shelby Tweedie, Luis Sandoval
Advisors: Sakthikumar Ambady (BME), Ahmet Can Sabuncu, Aswin Gnanaskandan

27. Boot Insole-Based Triboelectric Power Generation in Military Applications
Students: Robert Hyers, Andrew Ferrecchia, Kyle MacPherson, Katherine Morissette
Advisors: Pratap Rao, Gregory Noetscher (ECE)
Sponsor: U.S. Army Combat Capabilities Development Command Soldier Center

28. Solar Agribots
Students: Taylor Frederick, Ashley Pavlov, Noelle Crump, Philgen Simpson, Jay Piyajarawong, Travis Thompson, Lin Guan, Tianshu Wang, Vasil Bozdo
Advisors: Mehul Bhatia, Nicholas Bertozzi (RBE), Joseph Bec (CS), Markus Nemitz (ECE)

29. Development of Formative Stress Models and Projects
Student: Emily Coughlin
Advisors: John Sullivan, Sarah Jane Wodin-Schwartz

30. Saving Bicycles
Students: Hannah Boucher, Michaela Kelly, Molly MacAllister, Kian Tuma
Advisor: Fiona Levey

31. Design of Adjustable Rehabilitative-Assisted Mechanism for Rodents Suffering from Spinal Cord Injury
Students: Yanbo Dai, Xianhan Jia, Zhengrong Tang, Haojun Yan
Advisors: Yuxiang Liu, Xiangnan Kong (CS)

32. Smart Wearable Football Helmet
Students: Amanda Smith, Regan Krizan, Julie Lee, Mitchell DeVillers, Adam Olson
Advisors: Mehul Bhatia, Songbai Ji (BME)

33. Design, Optimization and Testing of an Electric Formula SAE Vehicle
Students: Thomas Walsh, Alex Wessel, Alan Robertson, Jared Bushnell, Sam Sands, Ori Katz, James Mitchell, Edward Clifford, Daniel Ali, Michael Rideout, Javier Espinal, Peter Murray, Macey McEnaney, Emily Kelley, Pranjal Mann, Matthew Reynolds, Eric Gustafson, Sophie Chretien, Henry Livingston, Noah Wolf
Advisors: William Michaelson (RBE, CS, ECE), David Planchard
Sponsors: Solidworks, Peterson Steel, Aimtec, SendCutSend, Hoerr Racing Products, Palmer Raceway, Forgione Engineering, Enhanced Street Performance, Autodesk, CBRE

34. Repurposing PLA into 3D Printing Filament
Students: Adam Murrison, Collin Levin, Connor Cumming, Ethan Knight
Advisor: John Sullivan

35. Clearing Ocean Plastic Trash
Students: Daniel Correa, Sakeena Ghandour, Khalil Haboub, Kaitlin Kelley, John Muirhead, Lily Spero, Shane Stevens, Eli Zimmerman
Advisors: Joseph Beck (CS), Nicholas Bertozzi (RBE), Selçuk Güçeri

36. Fuel Cell Cooling System
Students: Karl Ghosn, Alferid Hussin Shifa
Advisors: Ahmet Can Sabuncu
Sponsor: Honeywell International, Inc.

37. Developing a Household Level Smart Composter
Students: Sola Hoffman, Emily Giancola, Hayley Gray, Rebecca Marion, Grace Rydout
Advisor: Sarah Jane Wodin-Schwartz

38. Design and Manufacturing of a Wankel Engine
Students: Daniel Colgate, Kevin Pine, Ferris Florman, Patrick Keiran, Christopher Martin, Deniz Terek
Advisor: Selçuk Güçeri

39. EHD Driven Smart Vapor Compression Cycle
Student: Ashton Lyon
Advisor: Jamal Yagoobi

40. The Design of New Synthesis Approach for Low-Cost, Low Environmental Impact Boride
Students: Edwin Joseph, Sanjeet Pawar, Brian Montenegro
Advisors: Yu Zhong, Jize Zhang, Rui Wang
Sponsor: Saint Gobain

41. Alpine Ski Edge Sharpness and Slicing
Students: Richard J. Kern, Dylan Z. Flegel
Advisor: Christopher A. Brown

42. Device to Aid in Mechanical Ventilation of Obese Patients
Students: Giulia Herszage Rocha, Mackenzie Damon, Kelly McDonald, Rachel Chan, Madelyn Thrasher
Advisor: Kristen Billiar
Sponsor: Dr. Farrukh Ahmad, Saint Vincent Hospital

43. High Energy Passive Solar System Design in Santa Fe, New Mexico
Students: Emma Driscoll, Jade Veth, Maren Cork, Sarah Abatiello, Effelia Warden, Sydney Smith
Advisors: Selcuk Guceri, Stephen Kmiotek (CE), Elisabeth Stoddard (IGSD)

44. Detecting Ice Nucleation in Supercooled Red Blood Cell Samples
Students: Madison Gass, Grace Jolin, Isabel Nearing, Kathryn Woodland
Advisors: Sakthikumar Ambady (BME), Ahmet Can Sabuncu
Sponsor: Massachusetts General Hospital

45. Electric Triumph Spitfire MKIV (1972)
Students: Bradley Sprunger, Blaise Pingree, Grace Magnotta, Wynn Roberts, Shane Donahue, Sean McMillan, Rachael Smith, Patrick Flanigan
Advisors: Nicholas Bertozzi (RBE/ME), Joshua Cuneo (CS), Donald Brown (ECE), Craig Putnam (RBE)

46. A Robotic Platform for At-Home Ultrasound Diagnostic Imaging
Students: Abbey Blauser, Madeline Brady, Christopher Thomas, Elizabeth Viveiros
Advisors: Yihao Zheng, Ziming Zhang (ECE)

47. Transfection Device to Modify Mammalian Cells
Students: Steven Defreitas, Emily Frick, Benjamin Nguyen, Gianluca Panza
Advisors: Sakthikumar Ambady (BME), Aswin Gnanaskandan, Ahmet Can Sabuncu

48. 6-Axis Mobile Construction 3-D Printer
Students: Aaron Longo, Christian Stilwagen
Advisor: Mohammad Mahdi Agheli Hajiabadi

49. Non-linear spring systems for managing loads in sports
Students: Jenny Albores, Dylan Ham, Walter Rodriguez, Skyler Wise
Advisor: Christopher A. Brown

50. RoboCup Small Sized League Soccer Robots
Students: Spencer Belleville, Ashley Espeland, Evan Vadeboncoeur, Yifei Zhao, Miya Judy, Logan Rinaldi, Conner Christensen, David Lapointe, Noah Page, Nathan Rogers, Benjamin Schwantes
Advisors: Siavash Farzan (RBE), Alireza Ebadi, Stephen Bitar (ECE), Joshua Cuneo (CS)

51. Medical Simulation Testbed for Interventional Cardiology and Neurology
Students: Nick Miragliotta, Michael Nason, Victor Paiz, Marc Rosenthal, Isadora Sorpol
Advisors: Yihao Zheng and Ziming Zhang (ECE)

Physics Department

Olin Hall 107

9:30am
STEM Education Research: Impacts of Ungrading
Mike MacGregor
Advisor: Ben Pollard

9:45am
WPI Hybrid Power/Research Reactor: Developing the Facilities to Perform Small Angle Neutron Scattering
Clark Apuy, Aaron Demers
Advisor: David Medich

10:00am
Feasibility of Using a PIPs Detector for Neutron Detection
Nicole Dombrowski (MA)
Advisor: David Medich

10:15am
Spectroscopy of Cosmological Molecules
Amy Welch
Advisor: Douglas Petkie

10:45am
Laboratory Spectroscopy of Glycolaldehyde for Interstellar Applications
Mara Decesare, Alex Kiely
Advisor: Douglas Petkie

11:00am
Microwave Photonic Integrated Circuit Characterization
Nathaniel Gamboa, Thomas Emrick (MME)
Advisor: Douglas Petkie

11:15am
High Frequency Moisture Detection for Pulp and Paper Applications
Sahana Venkatesh
Advisor: Douglas Petkie

12:30pm
Adapting Taylor Dispersion to Microfluidics Scale
Geneva Isaacson
Advisor: Francesca Bernardi (MA)

12:45pm
Modeling Diffusion in Microchannels with Dead-End Pores
Spencer Francis
Advisor: Francesca Bernardi (MA)

1:00pm
Intro to Acoustics Course Development
Rhys Forster
Advisor: Joe Stabile (MME), Rudra Kafle

1:15pm
Black Hole and Quantum Heat Engines
Maxwell Dargie
Advisor: Padmanabhan Aravind

1:30pm
Effects of Physical Confinement on Cancer Cell Mechanics
Mason Miguel
Advisor: Qi Wen

1:45pm
Quantum Sensing of Magnetic Biomaterials
Camille McDonnell
Advisor: Raisa Trubko

Professional Writing

POSTER SESSION, 11:00am to 12:00pm
Higgins House

Analysis of Poverty Stoplight's Organizational Questionnaire and the Relationship between Survey Design and Response Rate
Kayla Brown
Advisors: Ryan Madan (PW) and Andrew Trapp (IE)
Sponsor: Poverty Stoplight

A Rhetorical Framework for Programming Language Design
Alex Friedman
Advisors: Yunus Telliel (PW) and Rose Bohrer (CS)

Incidence of Female Reproductive Cancers in Correlation with Socioeconomic Status in NY State as a Marker of BPA Exposure
Hope Hutchinson
Advisors: Brent Faber (PW) and Natalie Farny (BBT)

A Public Health Study on the Unintended Impacts of Marijuana Legalization in the United States
Khaled Jarad
Advisors: Brent Faber (PW) and Afzal Taimoor (BME)

Creating an Inclusive & Accessible Patient Education Booklet for a Decellularized Wound-Healing Patch
Anastasia Mina
Advisors: Shana Lessing (PW) and Sakthikumar Ambady (BME)

Exploring Standardization: The Implementation of SOPs in Physics
Sahana Venkatesh
Advisors: Kevin Lewis (PW) and Douglas Petkie (Physics)

Exploring the Crossroads: Augmented Reality and Tabletop Role-playing Games
Shawn Finnigan
Advisors: Kevin Lewis (PW) and Melissa Kagen (IMGD)

Robotics Engineering Department

Unity Hall – Room 243

8:30am
Bird Deterrent Robot
Name(s): Brandon Chong; Jack Leserman; Jake Mercier; Jeremy Trembley; Jolie Walts
Advisor Name(s): Professors Greg Lewin; William Michalson; Jing Xiao

8:45am
CLARA – Continuum Locomotive Alternative for Robotic Adaptive exploration
Name(s): Derik Pignone; Blaise Schroeder
Advisor Name(s): Professor Cagdas Onal

9:00am
Robot Escape Room
Name(s): Olivia Bell; Nathan Clune; Lillie DeHaemer; Liang Lu; Grace O'Reilly; Zachary Sarrett
Advisor Name(s): Professors Berk Calli; Melissa Kagen; Gillian Smith

9:15am
Symbiotic Multi-Agent Construction 3.0 (SMAC 3.0)
Name(s): Jacob Leavitt; Kayla Lepping; Jose Rivera; Brian Shin
Advisor Name(s): Professors Greg Lewin; Carlo Pinciroli

9:30am
Upper Body Motion Mechanism
Name(s): Jacob Bernard; Ryan Kievra
Advisor Name(s): Professor Mohammad Mahdi Agheli Hajiabadi

9:45am
Wheeled Bipedal Robot
Name(s): Brian Boxell
Advisor Name(s): Professors Mohammad Mahdi Agheli Hajiabadi; William Michalson

10:15am
Robot Ecosystem for Monitoring Climate Change
Name(s): Maya Angeles; Kalina Bonofiglio; Matthew Haahr; Joshua Palmer; Brandon Simpson; Lauryn Whiteside
Advisor Name(s): Professor Markus Nemitz

10:30am
Bone-in Soft Hand
Name(s): Brian Fennell; Mason Figler; Ndenda Mutsaku Fierro; Joelynn Petrie; Ethan Turett
Advisor Name(s): Professors Mohammad Mahdi Agheli Hajiabadi; Markus Nemitz

10:45am
Humanoid Nursing Robot Research Platform (Gopher)
Name(s): Maanav Iyengar; Yveder Joseph; Hoang Nguyen
Advisor Name(s): Professors Jane Li; Bashima Islam

11:00am
Super-elastic Continuum Robot for Endoscopic Articulation and Manipulation (SCREAM 5.0)
Name(s): Christopher DeMaio; Julia Farnum; Ananya Gopalan; Jacquelyn Lopez
Advisor Name(s): Professors Loris Fichera; Yuxiang Liu

11:30am
Assessing Path-Planning Algorithms for Collaborative Multi-Robot Exploration with Memory Constraints
Name(s): Nicholas Grumski; Abigail Hyde
Advisor Name(s): Professor Carlo Pinciroli

11:45am
Creating a Multi-Robot, Multi-Human, Multi-Platform System
Name(s): Samantha Braun; Alyssa Magaha
Advisor Name(s): Professors Jane Li; Carlo Pinciroli

12:00pm
Khepera IV Gripper Module for Multi-Robot Self-Assembly and Collective Transport
Name(s): Yasmine Aoua; Chandler Garcia; Julian Poindexter; Zachary Rivernider; William Stanley
Advisor Name(s): Professors Carlo Pinciroli; Gregory Lewin; Stephen Bitar

12:15pm
Small-Size Soccer Robots
Name(s): Spencer Belleville; Conner Christensen; Ashley Espeland; Logan Rinaldi; Nathan Rogers; Benjamin Schwantes; Evan Vadeboncoeur; Yifei Zhao
Advisor Name(s): Professors Siavash Farzan; Stephen Bitar; Alireza Ebadi; Joshua Cuneo

1:30pm
Beach Swarm – Phase IV
Name(s): Lucia Bernard; Sophia Cheng; Cooper Ducharme; Benjamin Watkin
Advisor Name(s): Professors Nicholas Bertozzi; Haichong Zhang

1:45pm
DigSafe Autonomous Cable Detection
Name(s): Victoria Heffern; Grace Holden; Zach Jester; Leo Morris
Advisor Name(s): Professors Gregory Lewin; Jing Xiao

2:00pm
Electric Conversion of a Triumph Spitfire MKIV (1972)
Name(s): Shane Donahue; Patrick Flanigan; Grace Magnotta; Sean McMillan; Blaise Pingree; Wynn Roberts; Rachael Smith; Bradley Sprunger
Advisor Name(s): Professors Nichola Bertozzi; Donald Brown; Joshua Cuneo; Craig Putnam

2:15pm
Modular Package for Autonomous Drive (mPAD)
Name(s): Rohan Anand; Martin Bleakley; Allison Colon-Heyliger; Ian Khung; Ishan Rathi
Advisor Name(s): Professor Kaveh Pahlavan; Pradeep Radhakrishnan

2:30pm
NASA Lunabotics Competition 2022 – 23
Name(s): Alexander Brattstrom; Carter Bullock; Roopsa Ghosh; Patrick Hagearty; Helen Le; Joshua Moy
Advisor Name(s): Professors Kenneth Stafford; Joshua Cuneo; Hektor Kashuri

2:45pm
Sailbot
Name(s): Samuel Alden; Douglas Moore; Cameron Pelletier; Owen Pfannestiehl; Joshua Unger
Advisor Name(s): Professors William Michalson; Kenneth Stafford

3:15pm
Bimodal Quadruped Robot (BiQu)
Name(s): Hushmand Esmaeili; Yuen Lam Leung; Freud Oulon; Aadhya Puttur
Advisor Name(s): Professors Mohammad Mahdi Agheli Hajiabadi; William Michalson; Andre Rosendo

3:30pm
Development of 3D Printed Humanoid Robots, Koalby and Ava, as Lab Assistants
Name(s): Aashish Singh Alag; Zeñia Alarcon; Emily Austin; Tessa Lytle; James Van Millegen
Advisor Name(s): Professors Kaveh Pahlavan; Pradeep Radhakrishnan

3:45pm
Getting 3D Printed Humanoid Robots, Koalby and Ava, to Stand and Walk!
Name(s): Joshua Fernandez; Erin Lee; Tessa Lytle; Finbar O'Sullivan; Casey Snow
Advisor Name(s): Professors Kaveh Pahlavan; Pradeep Radhakrishnan;

4:00pm
HURON: Full Sized Humanoid Robot (Lower Body)
Name(s): Rachel Dancy; Jonathan Gong; Aislin Hanscom; Cameron Huneke; Peter Lam; Curtis Lee; John Marcotte; Rahil Parihkh; Angelo Ruggeri; Brendan Sang; Kyle Staubi
Advisor Name(s): Professors Mohammad Mahdi Agheli Hajiabadi; William Michalson; Markus Nemitz; Cagdas Onal; Karen Troy

4:30pm
PRIMO (mobile printer): 6-axis 3D Printing Construction Robot
Name(s): Aaron Long; Christian Stilwagen
Advisor Name(s): Professors Mohammad Mahdi Agheli Hajiabadi; Markus Nemitz

4:45pm
Automated Quality Analysis of Disc Golf Discs
Name(s): Vanessa Cardaropoli; Ayden Duncan; Greg Marshall; John Robinson
Advisor Name(s): Professors Gregory Lewin; Jing Xiao

5:00pm CNC Alarm Resolution and Work Cell Monitoring with a Robotic Arm
Name(s): Brian Francis; Mayank Govilla; Niko Neather
Advisor Name(s): Professors Siavash Farzan; Greg Lewin; Jing Xiao

5:15pm
Machines Building Machines
Name(s): Elena Bachman; Jared Minnich; Ronald Pfisterer
Advisor Name(s): Professor Markus Nemitz

Social Science & Policy Studies

POSTER SESSION, 9:30am to 11:30am
Salisbury Labs 411

Analysis of Stigma Towards the Mental Health Discussion via Social Media
Rachelle Gonzales, Jada Hinds-Williams, Josephine Kim, Mark Buono
Advisors: Jeanine Skorinko, Adrienne Hall-Phillips, Nima Kordzadeh

Understanding and Optimizing Mistake Messages in Mathematics
Shannen Lin, Chayanne Sandoval-Williams, Siddhartha Pradhan
Advisors: Stacy Shaw, Neil Heffernan

Experiences of Worcester Polytechnic Institute Undergraduate Robotics Students with Rest in Academics
Kersten Prince, Brianna Meisser
Advisors: Jeanine Skorinko, Stacy Shaw

Revised Affordable Housing for the Modern Family
Max Wojtas, Lucas Kamal, Talia Mamayek, Danforth Kenerson
Advisors: Crystal Brown, Leonard Albano, Soroush Farzin

Monitoring Ocean Microplastics Through Citizen Science
Colby Frechette, Iris Morin
Advisors: Laureen Elgert, George Heineman

High Energy Passive Solar System Design in Santa Fe, New Mexico
Sydney Smith
Advisors: Elisabeth Stoddard, Selçuk Güçeri, Stephen Kmiotek

Some Characteristics of Agricultural Social Networks in Central Massachusetts are Affecting Implementation of Sustainable Agriculture
Abraham Koffman, Jeffrey Compere
Advisors: Laureen Elgert, Michael Elmes

Designing Wayfinding Signage for the Sandwich Fish Hatchery
Julia Naras
Advisor: Laureen Elgert

The Impact of Language on US Abortion Legislation
Catherine Stevens Pittelli
Advisors: Crystal Brown, Rebecca Moody

An M-Estimator for the Survivor Average Treatment Effect
Lora Dufresne
Advisors: Alexander Smith, Adam Sales

Exploring the Effect of CBD on C. elegans with 6-OHDA-induced Parkinson's Disease to Determine Potential Therapeutic Effects
Claire Behning, Amanda Holbrook
Advisors: Jim Doyle, Jill Rulfs, Mike Buckholt, Jagan Srinivasan, Suzanne Scarlata

Leadership and Performance: Flight Simulator
Michaela Champagne
Advisors: Jeanine Skorinko, Jim Doyle, Michael Radzicki

Trafficking of the Dopamine Transporter
Lali Berelashvili
Advisors: Jeanine Skorinko; Suzanna Scarlata; Haley Melikian, UMass Chan Medical School

Investigating microglial senescence
Christina Tsillas
Advisors: Jeanine Skorinko; Angela Incollingo Rodriguez; Robert Dempski; Dori Schafer, UMass Chan Medical School

Temperament, Self-Deception & Personality
Austin Jandrucko
Advisors: Jeanine Skorinko, Jim Doyle

Predictors of Dissociative Experiences
Gabrielle Willett, Assumption College
Advisor: Maria Kalpidou, Assumption College

Quality of School-Based Mental Health Services and Student Well-Being
Angelina Davis, Assumption College
Advisor: Maria Kalpidou, Assumption College

Trait Mindfulness and Memory Performance
Kyra Belden, Assumption College
Advisor: Leamarie Gordon, Assumption College

The Effect of Gratitude and Compassion on Persuasion Processing
Patrick Otto, Assumption College
Advisor: Maria Parmley, Assumption College

STEM Education Center

Innovation Studios 105

SESSION – Major Qualifying Projects (MQPs)/RET Presentations & Posters

10:15-11:45 am

Genetically Engineering a Plasmid to Develop a Live-Dead Reporter System in Mycolicibacterium smegmatis
Elizabeth Lemay
Advisor: Scarlet Shell

Hydrothermal Liquefaction: Green Waste = Green Energy
Joelis Velez Diaz
Advisor: Mike Timko

WPI Projects Program and Sponsorship

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.