



MARCH 28, 2020

**MAINE STATE**  
**SCIENCE FAIR**

# WELCOME TO THE 74<sup>TH</sup> ANNUAL

March 28, 2020 | Online



## A SPECIAL NOTE

This year, in an effort to hinder the spread of the novel coronavirus, we're taking the Maine State Science Fair online. Judges will interview students through conferencing on the morning of Saturday, March 28. Transitioning MSSF to a virtual fair has been possible only with the perseverance of hundreds of people: students, teachers, judges, and the dedicated staff of Maine Mathematics & Science Alliance and The Jackson Laboratory. We thank everyone who's come together to make it possible. We would also like to acknowledge the support UMaine gave to the fair in planning an in-person event, and we hope to work with them again soon to host the event on their campus.

*The Maine State Science Fair is affiliated with the Regeneron International Science and Engineering Fair (ISEF). Society for Science & the Public has canceled the event this year due to concerns about COVID-19.*



### **Awards for the 2020 Maine State Science Fair include:**

#### 3 Grand Prize Awards

- In lieu of a trip to present at Regeneron ISEF, the top three projects at MSSF will be awarded with \$500 prizes.

#### Awards for the top three projects in each category

#### Special Awards will be presented for the following organizations:

Acadia Institute for Oceanography  
American Meteorological Society  
Association for Women Geoscientists  
Bigelow Laboratory for Ocean Sciences  
Hurricane Island Foundation  
Office of Naval Research

Society for Science & the Public  
Stockholm Junior Water Prize  
The Jackson Laboratory  
The Reach project at MMSA  
University of New England  
U.S. Agency for International Development

Seven institutes of higher education will offer scholarships:



University of Maine will offer up to 12 full-tuition scholarships. They are renewable for up to four years and include admission to Honors College, a mentor, and research supply funds.



New this year! University of Southern Maine will offer up to four full-tuition scholarships. They are renewable for up to four years and include admission to Honors College and mentorship from a senior advisor.



College of the Atlantic will offer one \$20,000 scholarship. It is renewable for up to four years and applies to tuition.



University of New England will offer up to five \$5,000 scholarships. They are renewable for up to four years and apply to tuition.



New this year! Saint Joseph's College will offer two \$2,500 scholarships. They are renewable for up to four years and apply to tuition.



University of Maine at Augusta will offer two \$1,500 scholarships. They are renewable for up to four years and apply to tuition.



Husson University will offer up to five one-time scholarships worth \$1,000 each. Non-matriculated students eligible for this award.

## JUDGES

Matthew Ackley  
Research Assistant in Applied Mathematics,  
University of Maine

Tolu Adekeye  
Teaching/Research Assistant, University of Maine

Robin Arnold  
Administrative Specialist for Finance, University of  
Maine

Juliana Baranowski  
Student, University of Maine

Oumal Barkad  
Mechanical Engineer, BaselineES

Nikki Becker  
Observing Program Leader, National Weather  
Service, NOAA

Cara Belanger  
Project Scientist, Stillwater Environmental  
Engineering, Inc.

Ruby Boateng, PhD  
Postdoctoral Associate, The Jackson Laboratory

Nathaniel Boechat  
Research Intern, The Jackson Laboratory

Avery Bond  
Graduate Student, University of Maine

Craig Bossie  
Lead Software Architect, Milos, LLC

Mary Bourque  
Graduate Student, University of Maine

Ana Breit  
PhD Candidate, University of Maine

Matthew Brichacek, PhD  
Assistant Professor, University of Maine

Justin Brown  
Team Maine, University of Maine

Ayesha Bundy  
Lecturer, University of Maine

Kenneth Bundy  
Lecturer in Statistics, University of Maine at Augusta

Madeline Burgess  
Student, University of Maine

Scott Byrd, PhD  
Researcher, Maine Mathematics and Science  
Alliance

Brian Campbell  
Biology Specialist, Maine Department of Inland  
Fisheries and Wildlife

Damien Carter, PhD  
Trauma Surgeon, Maine Medical Center

Edward Cormier  
STEM Outreach Coordinator, Portsmouth Naval  
Shipyard

James Crowley  
Compliance Inspector, Pretreatment Coordinator,  
Maine Department of Environmental Protection

Robert Cuddy  
Student, University of Maine

Farahad Dastoor, PhD  
Lecturer, Director of School of Biology and Ecology,  
University of Maine

Jess Davis-Knowlton, PhD  
Research Fellow, Maine Medical Center Research  
Institute

Kevin Davis-Knowlton  
Senior Software Engineer, Blackhawk Network

Marti Dayton  
Adjunct Professor, Maine Maritime Academy

James Deaton  
PhD Candidate, University of Maine

James DellaPenna  
Retired, Northeastern University

Norm Dickinson  
Owner, Arctic Roofing

Daniel Dixon, PhD  
Sustainability Director, University of Maine

Matthew Dube, PhD  
Assistant Professor, Computer Information Systems  
and Data Science, University of Maine at Augusta



## JUDGES

Frank Dudish, PhD  
Lecturer, University of Maine

Anne Dunham  
Senior Principal Mechanical Engineer, Bath Iron Works

Amy Dunn, PhD  
Postdoctoral Associate, The Jackson Laboratory

Kat Duvall  
Education Manager, Hurricane Island Center for Science and Leadership

Jennifer Eberly, DVM  
State Veterinarian, Maine Department of Agriculture, Conservation and Forestry

Ivy Enoch  
Admission Counselor, College of the Atlantic

Saima Farooq, PhD  
Lecturer, University of Maine

Jennifer Fatula  
Assistant Lecturer, University of New England

Larry Feinstein, PhD  
Assistant Professor of Biology, University of Maine at Presque Isle

Barbara Fleck  
Professor of Engineering, Maine Maritime Academy

Lindsay Forrette  
Lab Coordinator, School of Marine Programs, University of New England

Elvira Forte, PhD  
Research Assistant IV, The Jackson Laboratory

Andrea Freed, PhD  
Science Educator, RSU 2

Daniel Gatti, PhD  
Faculty, Computer Science, College of the Atlantic

Navdeep Gogna, PhD  
Postdoctoral Associate, The Jackson Laboratory

Kourtney Graham, PhD  
Postdoctoral Associate, The Jackson Laboratory

David Guay  
Associate Dean, College of Arts and Sciences, University of New England

Nelson Haas  
Physician, MaineGeneral Medical Center

Niran Hadad, PhD  
Postdoctoral Associate, The Jackson Laboratory

Joseph Harman  
Professor of Engineering, Maine Maritime Academy

Helen Hess, PhD  
Faculty, Biology, College of the Atlantic

Zachary Hutchinson  
PhD Candidate, University of Maine

Katherine Jarvis  
Graduate Teaching Assistant, Department of Molecular and Biomedical Sciences

Gabriel Jensen  
Graduate Assistant, University of Maine

Cory Johnson  
PhD Candidate, University of Maine

Peter Kalajian  
Faculty, Watershed School

Pauline Kamath, PhD  
Assistant Professor, University of Maine

Leonard Kass, PhD  
Professor, University of Maine

Joshua Kelley, PhD  
Assistant Professor of Biochemistry, University of Maine

Rebecca Kelley  
Process Engineer, ON Semiconductor

Ruth Kermish-Allen, PhD  
Executive Director, Maine Mathematics & Science Alliance

Michael Kienzler, PhD  
Assistant Professor, University of Maine

Kyungin Kim, PhD  
Postdoctoral Associate, The Jackson Laboratory

Gordon Kramer  
Fisheries Biologist-Retired, University of Maine

Vivek Kumar, PhD  
Assistant Professor, The Jackson Laboratory

## JUDGES

Jordan LaBouff, PhD  
Associate Professor of Psychology & Honors,  
University of Maine

SuriyaPrakaash LakshmiBalasubramaniam, PhD  
PhD Candidate, University of Maine

Geneva Laurita, PhD  
Assistant Professor, Chemistry and Biochemistry,  
Bates College

Ari Leach  
Marine Resource Scientist II Area Biologist , Maine  
Department of Marine Resources

Leshar Leshar, PhD  
Associate Professor, Saint Joseph's College

Nick Levesque  
Software Engineer, Texas Instruments

Anne Lichtenwalner, DVM, PhD  
Director, Veterinary Diagnosis Lab, University of  
Maine

Cynthia Loftin, PhD  
Unit Leader, USGS-Maine Cooperative Fish and  
Wildlife Research Unit

Rebecca Long  
Agriculture and Food Systems Professional,  
University of Maine Cooperative Extension, Oxford  
County

Serge Maalouf  
Research/Teaching Assistant, University of Maine

Barry Magda  
Computer Curriculum Designer and Trainer, Central  
Maine Community College

Melissa Maginnis, PhD  
Assistant Professor of Microbiology, University of  
Maine

Gabriella Marafino  
Graduate Research Assistant, University of Maine

Elisabeth Marnik, PhD  
Postdoctoral Researcher, MDI Biological Laboratory

Colleen Mayberry  
Graduate Assistant, University of Maine

Sari Mayhue, PhD  
Graduate Teaching Assistant, University of Maine

Mackenzie Mazur  
PhD Candidate, University of Maine

Kashif Mehmood  
PhD Candidate, University of Maine

Emily Messina, PhD  
Assistant Professor of Microbiology, Husson  
University

Hannah Mittelstaedt  
Graduate Student, University of Maine

Joseph Mohan  
PhD Candidate, University of Maine

Sally Molloy, PhD  
Assistant Professor of Microbiology, University of  
Maine

Caroline Moore  
Teacher, Acadia Institute of Oceanography /  
Lincolnville Central School

Sara Morris  
Accounts Receivable Supervisor, Greenbacker  
Capital

Melody Neely, PhD  
Associate Professor, University of Maine

Colleen O'Loughlin, PhD  
Assistant Professor, Chemistry and Biochemistry,  
Bates College

Tionna Ouellette  
PhD Candidate, The Jackson Laboratory

Erin Owen, PhD  
Chair of Sciences, Husson University

Mitchell Paiker  
Graduate Student, University of Maine

Raghavan Palaniappan, PhD  
Staff Scientist II, IDEXX Laboratories, Inc.

Edna Pedraza Garzon  
PhD Candidate, University of Maine

David Plunkett  
Owner, Database Designs

Mark Royer  
PhD Candidate in Computer Science, University of  
Maine

## JUDGES

Jonathan Rubin, PhD  
Professor, University of Maine

Katherine Rudolph, PhD  
Associate Professor, Westbrook College of Health  
Professions; University of New England

Chakravarthy Sadacharan, PhD  
Associate Professor of Anatomy, University of New  
England

Jill Schoof  
Professor, Maine Maritime Academy

John Selleck  
Oil and Hazardous Materials Responder, Maine  
Department of Environmental Protection

Paul Shaw  
District Technology Director, AOS94/MSAD46

Isaac Shepard  
PhD Candidate, University of Maine

Juyoung Shim, PhD  
Faculty, University of Maine at Augusta  
Jonathan Silverman  
President, Central Maine Astronomical Society

Brett Smith  
President and Principal Engineer, Air Pollution  
Characterization and Control, Ltd.

Roger St. Amand  
Environmental Scientist, Atlantic Resource Co, LLC

Nicholas Starbird  
Assistant Professor, Maine Maritime Academy

Cara Sullivan  
PhD Candidate, Research Associate, University of  
Maine

Con Sullivan, PhD  
Assistant Professor of Biology, University of Maine at  
Augusta

Kate Tagai  
Senior Community Development Officer, Island  
Institute

Leonard Tan  
R&D Associate Scientist II, IDEXX Laboratories, Inc

Jill Tenny  
Assistant Lecturer of Physics, University of New  
England

Roberta Trefts  
Instructor, Husson University

Julia Upton, PhD  
Associate Professor, Husson University

Wibo van Noort, PhD  
Engineering Manager, Texas Instruments  
Paul Van Steenberghe  
Lecturer in Mathematics, University of Maine

Kristin Vekasi, PhD  
Assistant Professor, University of Maine

Carina Walter  
Behavioral Health Professional, Saco River Health  
Services

Helen Watts  
Senior Structural Engineer, Criterium Engineers

Rachel White  
Graduate Student, Animal and Veterinary Science,  
University of Maine  
Caitlin Wiafe-Kwakye, PhD  
Graduate Student, University of Maine

Michael Wilczek  
Graduate Student, University of Maine

Zachary Wood, PhD  
Postdoctoral Research Associate, University of  
Maine

Saman Zare, PhD  
Graduate Research Assistant, University of Maine



# EXHIBITS - Finalists in bold

## Animal Sciences - Behavior & Ecology

**The correlation between Harbor Seal (*Phoca vitulina*) molt stage and haul-out locations on Mount Desert Rock**  
**Thi Tran; John Bapst Memorial High School**

What is the Most Efficient Way to Get Rid of Fruit Flies?

Sammy Knight; Medomak Valley High School

Behavior and personality differences between female and male *Evarcha albaria*

Runzhe Yao; Gould Academy

Fruit flies behavior study

Esther Lang; Gould Academy

**Effects of light on mouse behavior**  
**Layla Openhym; Fryeburg Academy**

Rabbit Maze - *Oryctolagus Cuniculus*

Autumn Chabot; Nokomis Regional High School

Weather influences on animal behaviors

Shangyi Shen; Gould Academy

**Analysis of Smooth Periwinkle Behavior in Varying Light Conditions on Mount Desert Rock**  
**Sarah Dalton & Juliette Thompson; John Bapst Memorial High School**

Filtration of Tanks Using Organisms

Shyla Waltz & Tyler Leonard; Medomak Valley High School

**Assessing the Water Quality of Arctic Brook and Kenduskeag Stream Using Benthic Macroinvertebrates**  
**Lilian Nowak; Bangor High School**

**Mean Gulls: A Behavioral and Dietary Study of *Larus Marinus* and *Larus Argentatus* on Mount Desert Rock**  
**Maria Castellanos; John Bapst Memorial High School**

**Survey of Tardigrades in Central Maine**  
**Noelle Killarney; John Bapst Memorial High School**

**What Water Quality and Fish Density are Ideal for Fish?**  
**Bryce Carter & Tobiah Jordan-Spearrin; Hancock County Technical Center**

**Change in seal diets on Mount Desert Rock in correlation with climate change from 2000 to 2019**  
**Cecilia Doering; John Bapst Memorial High School**

**Using DNA Markers to Determine Source of Origin from a Mixed Stock Fishery - The West Greenland Atlantic Salmon Recreational Fishery**  
**Alexander Maker; Washington Academy**

## Animal Sciences - Nutrition & Development

**The Impact of Supplemental Nutrition on Bovine Eating Habits**  
**Ashton Caron; Nokomis Regional High School**

Differences in micro plastic found in green crabs, *Carbines maenas*, found on Mount Desert Rock and coast of Maine

Kaylee Stewart; John Bapst Memorial High School

**How does food type influence larval development in the green sea urchin?**  
**Hannah Dyer; George Stevens Academy**



## **Animal Sciences - Nutrition & Development (continued)**

Feeding Cows seaweed  
Jackson Boyd; Falmouth High School

**Detoxifying Superworm Waste to Fight Plastic Pollution**  
**Josephine Ek; Robert W. Traip Academy**

**Eliciting the Hatching Response in *Profilicollis Botulus***  
**Mikaela Kenny; Old Town High School**

**Precision and Relative Accuracy of Striped Bass Age, Proportional Length, and Origin Estimates from Both Scales and Sagittal Otoliths of Maine Striped Bass (*Morone saxatilis*)**  
**Patrick Wahlig; Falmouth High School**

**Extermination of Colonial Ascidians**  
**Ruth Havener & Cameron Bains; Medomak Valley High School**

Effect of Capsaicin on the respiratory rate in Fruit flies  
Thu Ho; John Bapst Memorial High School

**Correlating common periwinkles' spirals to the golden ratio and observing their surviving rate**  
**Sue Shim; John Bapst Memorial High School**

**Ocean Acidification and its affect on Oyster Shells**  
**Amelia Jalbert & Carissa Lucas; Falmouth High School**

**Minerals effects on Mussel Shells**  
**Noah Ludwig; Medomak Valley High School**

The Effects of pH on *Mya Arenaria*  
Kylie Weeks; Medomak Valley High School

Editing the Molting Season of the *Carcinus maenas*  
Zaniah Puchalski & Julia Kunesh; Medomak Valley High School

## **Biomedical & Health Sciences**

Muscle Sensor Controlled Prosthetic Hand  
Chance Guyton; Falmouth High School

Designing Instruments Compatible with Music Therapy Patients  
Kelly Yoon; Falmouth High School

**Effectiveness of Conventional Environmental Face Masks**  
**Arsh Agnihotri; Falmouth High School**

**Effect of Microplastics on Cultured Cells**  
**Swetha Palaniappan; Cape Elizabeth High School**

**Effects of agricultural practices on peanut allergy frequency and severity**  
**Logan Gardner; Old Town High School**

**The Science of Aging And Hutchinson- Gilford Progeria Treatments**  
**Zoe Morris; Nokomis Regional High School**

**Cytotoxic T-Lymphocyte Immunotherapy: A Cure for Antibacterial Resistant Gonorrhea**  
**Casey Crockett; Nokomis Regional High School**

**Neuromuscular Reaction Time in Humans**  
**Marian Easton; Nokomis Regional High School**

A 30 Second Lunch For a Time Crunched Society  
Hamish Bodine; Medomak Valley High School

## Biomedical & Health Sciences (continued)

### **The LD50 of ECL on Worms** **Joshua Bohm; Bangor High School**

Does the MMR Vaccination lead to Autism?  
Melissa Walker; Nokomis Regional High School

### **Synthesis of an Azobenzene - Based Cholesterol Mimic for Gated Ion Channel Modification** **Ijeoma Obi; Bangor High School**

Mucus preventing corrosion in our stomachs  
Riley Donovan; Nokomis Regional High School

Baseline Plasma Zinc and Risk of First Stroke in Hypertensive Patients.  
Eric Li; Gould Academy

### **Finding the best exercise for COPD patients** **Julia Perconti; Hancock County Technical Center**

Which Sport Conditions Athletes Best?  
Carter Rice; Nokomis Regional High School

How will you get into shape; a comparison between dance fitness and standard exercises  
Tiana Evans; Nokomis Regional High School

### **Effect of tropomodulin-2 deletion in mice on dopaminergic** **Elaina Cote; Mount Desert Island High School**

## Behavioral Sciences - Cognitive Psychology

Innervation of nucleus accumbens neurons  
Grace Campbell; Boothbay Region High School

### **The Requirement of Extracurricular Activities: Improving the Existential Crisis at Hand** **Glory Blethen; Boothbay Region High School**

### **The Impact of Expeditionary Learning and Field Trips on a Student's Knowledge and Understanding of a Topic** **Cortney Meader; Boothbay Region High School**

### **A K-12 Foreign Language Program: The Need For Second Language Learning From An Elementary Level** **Emma Brewer; Boothbay Region High School**

The Effect of Different Pen Colors and Cognitive Performance  
Hannah Pease; Nokomis Regional High School

### **The Effect of Grade Obsession on How Students Learn, and How a New Grading System Has the Potential to Reverse These Effects** **Kylie Brown; Boothbay Region High School**

Sense of Accomplishment- Checking off, crossing out, or leaving blank a to do list?  
Lauren Burke; Nokomis Regional High School

### **Differences in spacial awareness by gender.** **Teagan Blackie; Old Town High School**

The Effect of Color on Memory  
Abigail Bagley; Nokomis Regional High School

Selective Attention Test  
Shawn Thompson; Nokomis Regional High School

## **Behaviorial Sciences - Cognitive Psychology (continued)**

**Required Work Studies: the Key to Re-engage Students in their High School Experience and Promote Success after High School**  
**Emerson Harris; Boothbay Region High School**

The Stroop Effect  
Rylee Robinson; Nokomis Regional High School

**Relationship between Frequency of PowerSchool Logins, GPA, Difficulty of Classes, and Stress**  
**Shruti Joshi, Jack Forester & Ben Sylvester; Falmouth High School**

How Scents Affect your Ability to Focus  
Emily Mahoney; Medomak Valley High School

**Testing Reading Comprehension Through Different Mediums: Paper Text vs Digital**  
**Molly Hale; Greely High School**

The Effect of Food Color on Taste Perception  
Lia Herrick & Danielle McAtee; Nokomis Regional High School

A Later School Start Time for BRHS: Physical and Academic  
Ryan Russell; Boothbay Region High School

## **Behaviorial Sciences - Sociology & Mental Health**

**How pets affect stress and grades in high school students**  
**Lilian Parks; Nokomis Regional High School**

School Workload and its Effect on Students' Mental Well-Being  
Ashly Nyman & Lauryn Anderson; Nokomis Regional High School

**Predicting Risk of Developing Schizophrenia and Ways to Prevent/ Better it**  
**Abigail McKinley; Old Town High School**

**A Meta-Analysis of the Affects of the Lunar Cycle on Mental Health**  
**Lauren Eichler & Grace Kessler; Maine Coast Waldorf School**

Solving Music Performance Anxiety  
Owen Weber; Medomak Valley High School

**Broadband equity In Maine: how we can we become more connected?**  
**Sam Page; Boothbay Region High School**

**Moving Stories: Social-Emotional Learning Skills**  
**Alexandria Morgan; Washington Academy**

**Positive School Culture: Why it Must be Prioritized in Order to Improve the Environment and Empower the Students of Boothbay Region High School**  
**Isabel Harkins; Boothbay Region High School**

The Social Impact of Residential Moves  
Adelina Homewood; Deering High School

**Stereotypes & How They Effect Snap Judgement**  
**Margaret Kastelein; Lincoln Academy**

**Identifying Shifts in Race and Income that Lead to Voting Differences in Geographically Similar Locations**  
**Iann Leigh; Bangor High School**

**Behavioral and Social Differences Between Autistic Males and Females Throughout the Years**  
**Faith Foster; Nokomis Regional High School**

## Chemistry

Using chromatography to break down cosmetics  
MacKenzie Johnson; Nokomis Regional High School

**Determining If Sodium Alginate Has the Potential to Remediate Heavy Metal Contaminants From Water**  
Maya Elkadi & Kosisochukwu Ifeji; Bangor High School

**Synthesis of butadiene through Fallopia japonica and Lythrum salicaria**  
Erin McCarthy & Meaghan Caron; Bangor High School

**How does the method of crosslinking of sodium alginate mixed with calcium chloride affect it's performance as a waterproof coating in the marine environment**  
Jett Lindelof; Islesboro Central School

**Measuring Ocean Acidification and Possible Correlations to Stormwater**  
Naomi Noack; Bangor High School

Which is effective at cleaning clothing natural or chemical detergents?  
Thomas Crimmins; Harpswell Coastal Academy

**Absorption and Remediation of Heavy Metals using our Plastic Pollution Problems**  
Adam Elkadi; Bangor High School

**Nitrogen-doped nanoporous carbon photocatalyst formed from coffee waste**  
Jinkyu Kim; Gould Academy

**Physics, Chemistry, and Color**  
Adam Taddia; Baxter Academy for Technology and Science

**Researching Green Alternatives to Mercury for the Clemmensen Reduction**  
Thomas DiPhilippo; South Portland High School

**CNF/Starch/Glycerol Composites plasticized by MgCl<sub>2</sub>, NaCl, KCl and AlCl<sub>3</sub>**  
Ogechi Obi; Bangor High School

How can coffee ground and wood chip waste be decomposed to create a healthy, usable compost?  
Paige Blackwell & Natalie Liliav; Bangor High School

Ion detector design for a LEO Cubesat to determine the influence of ions on its orbital decay rate  
Marc Michaud; Machias Memorial High School

**Engineering an Inexpensive Water Filter Through Additive Manufacturing**  
Ahmed Saleh; Greely High School

## Computer Science & Mathematics

**An Analysis of Various Fibonacci-Type Sequences and Sums**  
Samanthak Thiagarajan; Bangor High School

**Local Search Optimization and the Virtual Keyboard Design Problem**  
Micah Pietraho; Brunswick High School

**Creating higher resolution radio astronomy maps**  
Liam Piper; South Portland High School

**Advantages of Unmanned Aerial Vehicle-Generated Photogrammetric Maps As Compared to Satellite Imagery in Analyzing Geographic Features: A Case Study of the Ecogeomorphic Characterization of Salt Pools in a Southern Maine Tidal Marsh**  
Wade Wahlig; Falmouth High School

**Designing a wireless sensor network for remote locations**  
Anthony Caccese; Bangor High School

## Computer Science & Mathematics (continued)

**Using Neural Networks and Drones to Identify and Eliminate the Aquatic Invasive Plant Species *Myriophyllum Spicatum***  
Cuthbert Steadman, Graham Glover & Beckett Mundell-Wood; Bangor High School

**Creating a Mini-Robot that Integrates Capacitive Sensing using a Microcontroller Programmed with Arduino Software**  
Aniela Holtrop; Maine Coast Waldorf School

**Ice Recognition RC Car**  
Kevin Lu & Thomas Pender; Falmouth High School

**Developing Deep Learning Networks for Dynamic Traffic Light Control**  
Nhan Ngo & Simon Socolow; Bangor High School

**Mathematical Analysis of the Ability to Transition to Underground Wiring**  
Adam Nussbaum; Brunswick High School

Seismic Source Determination Through Fourier-Filtered Deep Neural Networks  
Daniel Kirmani; Maine School of Science and Mathematics

App Using a Image Recognition API  
Varoone Meduri; Falmouth High School

**Creating a MATLAB 3D Digital Image Correlation App using 2D-DIC Algorithms**  
Kade Kneeland; Bangor High School

What is the best method to defend a network/system against simultaneous cyber attack instances?  
Cullen Couture, Justin Bulmer & Kegan Rodrigue; Edward Little High School

Searching the Web Offline  
Emerson Spencer-Reed; Harpswell Coastal Academy

Can I use AI in a business solution?  
Kyleigh McDonough, Zachary King & Noah Tirado; Edward Little High School

Making the Development of Virtual Reality Software Online and Easy  
Wei Shan; Gould Academy

## Engineering

**Building a Jet Engine from Widely Available Parts**  
Thomas Hall; Gould Academy

**Engineering a Prosthetic Hand through Additive Manufacturing**  
Minal Iftikhar; Bangor High School

**Manufacturing a Submersible Robot**  
Colton Trisch; Bangor High School

Engineering  
Aaron Yeung; John Bapst Memorial High School

Clock Design  
Kate Saidy; Gould Academy

**Real-time Fall Detection System for the Elderly Using Deep Learning and Thermal Imaging**  
Vetri Vel; Bangor High School

**Predictive Machine Learning Model for Estimating Driving Force of a Sailboat Using Rigging Data**  
Nathan Chatterton; Boothbay Region High School



## Engineering (continued)

**The study of laminated Timbers**  
**Oscar Hennin; Morse High School**

**Ropeless Lobster Trap**  
**Sydney Sheehan; Old Town High School**

How Does Temperature Affect The Tuning of an Instrument?  
Rachel Gross; Medomak Valley High School

**Improving Acoustics of the Medomak Valley High School Auditorium**  
**Kolyn Mattson; Medomak Valley High School**

An Air Propulsion Cannon Using Vortices  
Evan Galego & Asish Madarapu; Cony High School

Resonance Frequency of Building Materials of different volumes  
Adam Miller-Treat & Will Caron; Bangor High School

Desktop Clean Room for Home Use  
Andrew Gousse; Cony High School

Underwater ROV engineering  
Grady Burns; Lincoln Academy

## Environmental Sciences & Engineering

**The Correlation Between Global and Local Climate Change**  
**Silvia Davids & Anya Ganesh; Bangor High School**

**How fresh is new fallen snow**  
**Lillian Philbrook & Kerrigan Andrews; Hancock County Technical Center**

**Effects of Global Warming and Climate Change on Smooth Periwinkles on MDR**  
**Jenna Drake & Charles Collatos; John Bapst Memorial High School**

Frost Measurements  
Bryce Richards; Old Town High School

**Differences in the Climate of Littorina Littorea on the Shore of Bar Harbor Vs. the Climate of Native Periwinkles on Mount Desert Rock**  
**Jaelin Roberts; John Bapst Memorial High School**

**Using GIS and a water quality index to analyze biological contamination and observe chemistry fluctuation on littoral zones of seven recreational freshwater lakes and ponds in Maine**  
**Rowan Andrews; Bangor High School**

**South Portland Air Quality Analysis**  
**Chloe Grant, Addison Bracken & Rachel Kingsley; South Portland High School**

**Calculating Phytoplankton Biodiversity using Sampling and AI to Determine Ecological Conditions**  
**Quinn DAlessio; Bangor High School**

The differences of microplastic fibers found in tap water between countries.  
Zoe Stankevitz; Nokomis Regional High School

Road Salt: The Dangers of Our Over- Usage  
Marissa Peters; Boothbay Region High School

Conductivity Factors in Bangor Streams Concerning Larger Bodies of Water and Climate Change  
Hannah Osmer; Bangor High School

## Environmental Sciences & Engineering (continued)

**Matlab Code that Identifies Macroinvertebrates to Assess Quality of Maine's Waters**  
Leila Davids; Bangor High School

**Analyzing the effects of various climate conditions on the overall efficiency of a solar panel**  
Anthony Ayer; Harpswell Coastal Academy

**Particulate Matter and Dissolved Solids in Snow in Various Areas**  
Eben DeSilva; Falmouth High School

Comprehensive Analysis of the Bangor Stormwater Project  
Lizzie Liliav & Kelsey Hope; Bangor High School

Ethanol Environmental Impacts  
Thomas Rice; Falmouth High School

## Environmental Sciences - Water Quality

**Microplastics**  
Mia Wang; Gould Academy

Microplastic Prevention and Recycling Project  
Phoebe Schleh; Harpswell Coastal Academy

**Using ArcGIS to Model Water Quality Relationships Based on Lake Inlet and Outlet Location**  
Jordyn Miller; Bangor High School

Methodologies to filter out microplastics in water  
Sam Ahola, William Xu & Jacob Osmer; Bangor High School

Using Fungal Mycelia to Absorb Oil from Water  
Madeline Ahola; Bangor High School

**How Run Off From Different Brands of Fertilizer Impact the Eutrophication Process**  
Amber Halligan; Medomak Valley High School

Comparing Runoff Samples from a Storm drain Entry Point and Exit Point  
Brooke Sossong; Old Town High School

**The Effects of The Bangor Mall on Water Quality in the Penjajawoc Stream**  
McKayla Kendall; Bangor High School

**Risk of Algal Blooms and Hypoxia in a New England River**  
Rain Bugado; Noble High School

**Identifying and Classifying Plastics and Microplastics in Sediments**  
Ginny Hunt; Bangor High School

**A Study of Small Pond Pollution: An Examination of Road Salt**  
Addie Bourgoine; John Bapst Memorial High School

Identifying Harmful Algal Blooms  
Pema Williams; Falmouth High School

Safety of Maine's Drinking Water  
Declan Frueh; Falmouth High School

**Airborne EM Technology and Its Application in Detection of Underground Water**  
Liulu Yue; Gould Academy

**Nanocellulose-Based Materials in Desalination**  
Olivia Britton; Islesboro Central School

## Environmental Sciences - Water Quality (continued)

**Climate Change and how it affects the population range of Dinoflagellates**  
Kira Morlock; Old Town High School

## Materials Science

**Biodegradable Fishing Lures**  
Ariel Larrabee; Hancock County Technical Center

**The Development of Cellulose Nanofibers as an Alternative to Traditional Food Packaging**  
Joshua Chun; Belfast Area High School

**Vacuum-Forming with Cellulose Nanofiber**  
Acer Van Dis; Islesboro Central School

**CNF, silver nanoparticles, and a bandage materials**  
Renee Tran; Bangor High School

**The Future of Bioplastics**  
Trin Brown & Juliana Martin; Harpswell Coastal Academy

**3D printing with CNF and wood flour**  
Hazel Van Dis; Islesboro Central School

**Beeswax/Pine resin polymer for mycelium lobster buoys**  
Payton Ward; Islesboro Central School

**Bio-based alternative to nylon mesh bait bags**  
Shamus Dove; Islesboro Central School

**Biodegradable Additives and the Effects on Wood Pellets**  
Collin Peterson; Islesboro Central School

**An Alternative Use For The Shells of Crustacea**  
Morgan Flanders; Medomak Valley High School

**Cellulose Nanofibers: Drying and Modifications**  
Matthew Hafener; John Bapst Memorial High School

**Will it Waterproof? Creating a waterproof coating without the use of PFAS**  
Jaylee Rice; Nokomis Regional High School

## Microbiology

**Testing the Effectiveness of TBAB Surfactant-Sorbents in Removing Ampicillin from Synthetic Effluent**  
Linh Nguyen; Deering High School

**The effects of Manuka honey on cultured bacteria from frog infections (thrush) in equine frog tissue**  
Emma Markowitz; Boothbay Region High School

**Antimicrobial Agents**  
Beau Briggs; Nokomis Regional High School

**The Effects of DEET and Essential Oils on C. sporogenes and E. coli**  
Natalie Shields; Medomak Valley High School

**Preventing the growth of molds on fruit with aloe vera**  
Ashlyn Roy; Bangor High School

**The Effects of Escherichia coli on Acne Medication**  
Alacius Peavey & Autumn Harvey; Medomak Valley High School

## Microbiology (continued)

**Light Sterilization**  
**Owen Arsenault; Noble High School**

Bacteria on Phones  
Kyle Siebert; Harpswell Coastal Academy

**Converting activated sludge into bioplastics**  
**June Ho; John Bapst Memorial High School**

**The Effects of Prolonged Nitrogen and Sulfur Deposition on Spore Diversity of Arbuscular Mycorrhizal Fungi (AMF) from Bear Brook Watershed in Maine (BBWM)**  
**Melissa Tian; Bangor High School**

**The Development of Greywater Purifying Microbial Fuel Cells**  
**Frederick Oldenburg & Roland Ladd; Bangor High School**

**Lytic tendencies of bacteriophages found in water on Escherichia coli**  
**Aleah Sebrey; Medomak Valley High School**

Turbidity & E. coli Correlation  
Chinaza Moneke; Bangor High School

**Can bacteriophages be genetically modified to cure bacterial infections in humans**  
**Matthew Hartt; Old Town High School**

**Relationship between the vaping and cells**  
**Jiaqi Li; Gould Academy**

Effects of Antibiotics on Bacteria  
Allie Rice; Nokomis Regional High School

## Plant Sciences

**Sustainable Crop System on Mars**  
**Atticus Foster; Bangor High School**

**Homemade Herbicides Effects on Invasive Plants**  
**Natalie Dean & Caitlyn Christensen; Medomak Valley High School**

Plant Growth with Different Fertilizers  
Alyssa Creamer; Medomak Valley High School

**PH of Soil: How Alkalinity and Acidity Effects the Growth of Plants**  
**Lauren Holyoke; John Bapst Memorial High School**

Plant Growth Based on Types of Liquids  
Garret Hutchins; Medomak Valley High School

Effects of Starch on the Pea Plant  
Daniel Vannah & Dominic Ahearn; Medomak Valley High School

**Dissolved Oxygen from Kelp**  
**Isaac Burtis; Brunswick High School**

**How does seaweed farming impact Co2 in the ocean?**  
**William Grange; Old Town High School**

The Effects of Herbicides and Pesticides on Weeds  
Molly Jennings; Medomak Valley High School

## Plant Sciences (continued)

How Different Colored Lights Affect Photosynthesis  
Autumn Ripley; Medomak Valley High School

How Filtered Light and Reflective Fabrics Affect Plant Growth  
Brooke Powell; Medomak Valley High School

**Engineering a Sensor System for the Monitoring of Blueberry Barrens**  
Nicholas Geiser; Bangor High School

Using an Arduino-Powered System with Soil Moisture Sensors To Improve Automatic Plant Watering  
Lucas Sun, Austen Turner & Muhammad Drammeh; Bangor High School

**Using Biofiltration Media and Arbuscular Mycorrhizal Fungi (AMF) to Enhance the Phytoremediation of Heavy Metals from Stormwater Reconstructed Wetlands**  
Amara Ifeji; Bangor High School

**Caliciopsis canker damage on Eastern White Pine trees in Maine**  
Hannah Dunn; Bangor High School

Amount of fertilizer and its effects on plant growth  
Aiden Trafton; Nokomis Regional High School

**Blueberry bushes as an alternative to lawns**  
Elizabeth Chattley; Hancock County Technical Center

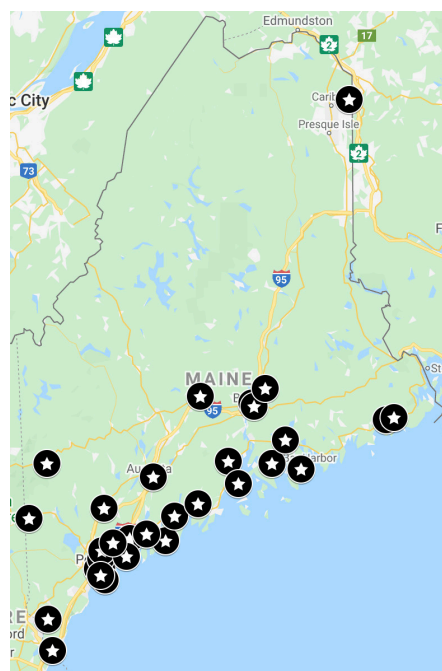


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