

Winners Announced for Virginia State Science and Engineering Fair

LEXINGTON, Va., April 15, 2016 – More than 260 high school students from across the commonwealth took part in the 31st annual Virginia State Science and Engineering Fair held April 9 at Virginia Military Institute.

The governor's award and grand prize went to Camille Yoke of Maggie L. Walker Governor's School in Richmond for her project in the earth and planetary science category, "Constructive Interference of Seismic Surface Waves Antipodal to Crater Impact Sites on Terrestrial Bodies."

The second grand prize went to Marissa Sumathipala of Broad Run High School in Ashburn for her project in the cellular and molecular biology category, "FOXO Transcription Factor: A Novel Therapeutic for Cardiometabolic Disease."

Taking the third grand prize was Vishnusai Karri from the Roanoke Valley Governor's School for Science and Technology in Roanoke. His project, in the chemistry category, was titled, "Alginate-Based Gel Particle Drug Delivery System for Curcumin."

Grand prize runner-ups were Jake Cui and Siona Prasad, both students at Thomas Jefferson High School for Science and Technology in Alexandria. Cui won first place in the biochemistry sciences category for "A Machine Learning Approach to Identifying Ordered Binding Regions on Order-Disorder Protein." Prasad took the top prize in the environmental sciences category with a project entitled, "Identifying Greenhouse Gas Hotspots in Megacities."

These projects are qualified for entry in the Intel International Science and Engineering Fair, to be held May 8-13 in Phoenix, Ariz.

Photographs of the event are available for purchase at www.vmi.edu/photostore.

First- through third-place category winners, honorable mentions and special award winners are as follows:

Alexandria

American Meteorological Society, National Oceanic and Atmospheric Administration (NOAA) – Brian Johnson, "Are North Atlantic Tropical Cyclones Becoming More Frequent?" *Hayfield Secondary School*

Animal Sciences, third – Sanjana Challa and Niharika Vattikonda, "The Effect of Vitamin B-12 Concentration on Planarian Learning Rate," *Thomas Jefferson High School for Science and Technology*

Behavioral and Social Sciences, second – Julian Vallyeason, "Role of Sensory Signals in Maintaining Dominance Hierarchies in Crayfish," *Thomas Jefferson High School for*

Science and Technology

Biochemistry, first; Mark Licata Award for Biotechnology, honorable mention – Jake Cui, “A Machine Learning Approach to Identifying Ordered Binding Regions on Order-Disorder Protein Interfaces,” *Thomas Jefferson High School for Science and Technology*

Biochemistry, third – Shruti Anant and Suzie Bae, “Synthesis of Novel LTA4H Enzyme Activators for Chronic Obstructive Pulmonary Disease,” *Thomas Jefferson High School for Science and Technology*

Cellular and Molecular Biology, second; Mark Licata Award for Biotechnology, second; Virginia Dental Association Awards – Neeraj Prasad, “Identification of Potential Biomarkers for Neuroblastoma,” *Thomas Jefferson High School for Science and Technology*

Chemistry, second; Virginia Dental Association Awards – Jason Wei, “Improving Lateral Flow Immunoassay Sensitivity by a Palladium Catalyzed Dye Reaction,” *Thomas Jefferson High School for Science and Technology*

Chemistry, third – Han Gu, Rebecca Linick and Jared Nireberg, “Investigating the Biosorption and Desorption of Heavy Metals by Sargassum,” *Thomas Jefferson High School for Science and Technology*

Computer Science, first; Intel Excellence in Computer Science – Suhas Sastry, Eric Wang and William Xu, “Hardware Module-Based Message Authentication in Intra-Vehicle Networks: Cybersecurity for Connected Cars,” *Thomas Jefferson High School for Science and Technology*

Computer Science, second; Leidos Awards, Honorable Mention – Ana Humphrey, “ColiFind: A Digital Image Analysis Application to Identify E. coli Colonies in Coliscan easygel Tests,” *T.C. Williams High School*

Engineering: Electrical and Mechanical, second; Leidos Awards - Applied Sciences, honorable mention – Ishaandeep Lubana, “Piezoelectric Generator,” *Thomas Jefferson High School for Science and Technology*

Engineering: Materials and Bioengineering, honorable mention; Yale Science and Engineering – Joseph Chong, “Fabrication of Flat and Microstructured Polydimethylsiloxane (PDMS) Surfaces Patterned by Breath Figure Formation,” *Thomas Jefferson High School for Science and Technology*

Environmental Management, third – Katherine Barbano and Eugene Jeong, “Manufacturing Renewable Fuel Blocks from Waste Plant Material to Mitigate Climate Change,” *Thomas Jefferson High School for Science and Technology*

Environmental Sciences, first; American Meteorological Society; Leidos Awards -

Applied Sciences, honorable mention; U. S. Metric Association – Siona Prasad, “Identifying Greenhouse Gas Hotspots in Megacities,” *Thomas Jefferson High School for Science and Technology*

Environmental Sciences, honorable mention – Mollie Passacantando and Ian Tucker, “Optimizing Growth of *Thalassiosira* Populations with Sodium Metasilicate and Iron (III) Chloride,” *Thomas Jefferson High School for Science and Technology*

Leidos Awards, third – Valerie Chen, “A Novel Combinatorial Method with Data Mining to Detect Critical Errors in Embedded Software Systems,” *Thomas Jefferson High School for Science and Technology*

Leidos Awards, honorable mention – May Kyaw and Eric Liu, “The Exploration of Colorectal Cancer with the Use of Orange Data Mining Software, Cytoscape Network Analysis, and LEfSe Analysis on Taxonomic Microbiota Data,” *Thomas Jefferson High School for Science and Technology*

Mark Licata Award for Biotechnology, honorable mention – Mihir Patel, Ethan Wu, and Adam Yee, “Smartphone Enabled Intelligent Digital Ruler (iDr) for Remote Wound Assessment,” *Thomas Jefferson High School for Science and Technology*

Plant Sciences, second – Nicola Kubzdela, “Effect of Light on Growth Characteristics and Nutritional Content of Lettuce Varieties (*Lactuca sativa* L.) at Different Harvest Ages,” *Thomas Jefferson High School for Science and Technology*

Arlington

ASM Materials Education Foundation – Megan O'Briant, “Power of Touch: Challenges in Designing Haptic Sensing and Feedback for Neural Controlled Robotic/Prosthetic Hand,” *Yorktown High School*

Engineering: Materials and Bioengineering, first – Megan O'Briant, “Power of Touch: Challenges in Designing Haptic Sensing and Feedback for Neural Controlled Robotic/Prosthetic Hand,” *Yorktown High School*

Leidos Awards – Applied Sciences, Honorable Mention – Kelton Williams, “Reinventing MagLev: Quantum Locking,” *Washington Lee High School*

Microbiology, first – Kathleen Love, “The Effect of the Type of Material in a Sponge on the Number of *Escherichia coli* Colonies Grown,” *Yorktown High School*

Physics and Astronomy, third – Emma Sophie Moore, “The Effect of the Placement of an Anti-Resonant Tube on the Main Body Resonances of a Violin,” *Yorktown High School*

U.S. Air Force – Cory Dudka, “Using Piezoelectric Elements to Harness The Potential Energy of Turbulent Airflow,” *Washington Lee High School*

Virginia Section of the America Water Works Association, honorable mention – Bilguunzaya Battogtokh, “Photodegradation of Organic Dyes Through Improved Catalysis Across a Graphene Oxide-Doped Titanium Dioxide Substrate,” *Yorktown High School*

Ashburn

Cellular and Molecular Biology, first; Mark Licata Award for Biotechnology, first – Marissa Sumathipala, “FOXO Transcription Factor: A Novel Therapeutic for Cardiometabolic Disease,” *Broad Run High School*

Ashland

Engineering: Electrical and Mechanical, first; Central Virginia Chapter INCOSE – Ashley Harris, “The Effect of a Bridge Pier Column's Configuration on Minimizing Local Scour for Existing Circular Pier Columns,” *Patrick Henry High School*

Bealeton

Physics and Astronomy, second – Hannah Steele, “Shielding Space Radiation,” *Liberty High School*

Blacksburg

Virginia Dental Association Awards – Emma Stowe and Emma Strickland, “Can We Build a Bone? BMP-2 Delivery of Osteoblastic Differentiation,” *Blacksburg High School*

Burke

Energy and Transportation, third – Brenden Duffy, “Helping The Solar Panel Reach Its Full Potential,” *Lake Braddock Secondary School*

U.S. Air Force – Eric Smith, “Controlling the Flight Duration of a Model Rocket by Modifying the Descent Rate in-Flight,” *Lake Braddock Secondary School*

Chantilly

ASU Walton Sustainability – Daniel Mitchell, “Analyzing Filtration Methods for Wastewater from a Microbial Fuel Cell,” *Chantilly High School*

ASU Walton Sustainability – Randall Weidman, “Genetically Derived Susceptibilities of Strawberries,” *Chantilly High School*

Mathematical Sciences, second; Leidos Awards, second – Palash Shah, “Predicting the future with supervised machine learning algorithms,” *Westfield High School*

Charlottesville

Mark Licata Award for Biotechnology, honorable mention – Mriganka Mandal, “Induced Mortality of Lung Cancer Cells Using an Egg Specific Target,” *Albemarle High School*

Mathematical Sciences, third – Evangeline Sackett, “Fractal Dimension and Rivers in Virginia,” *Monticello High School*

Plant Sciences, first – Ashwin Swaminathan, “Drought Resurrection: A Novel Method to Induce Drought Resistance in Plants,” *Albemarle High School*

Daleville

Plant Sciences, honorable mention – Samuel Lavinder, “An Automated Homeostatic Aeroponic System for Optimized *P. vulgaris* Growth,” *Lord Botetourt High School*

Fairfax

Computer Science, third – Samuel Scheele, “Chess AI,” *W.T. Woodson High School*

Energy and Transportation, honorable mention; U.S. Navy/Marine Corps – Riley O'Hara, “Rocket Stove Enhancements for Improved Combustion - Increasing Efficiency of Cookstoves to Empower & Improve Respiratory Health of Impoverished Women in Developing Countries,” *Robinson Secondary School*

Microbiology, honorable mention – Marlaina Horewitz and Karis Oh, “The Effect of Glove Material on Bacterial Growth,” *W.T. Woodson High School*

U.S. Air Force – Abdullah Agcayazi, “Stabilizing plank style flying wings through Chevron wing extenders,” *James W. Robinson Secondary School*

Falls Church

Engineering: Materials and Bioengineering, third – Arman Khan and Joseph Welsh, “The Foundation of the Future: The Effect of Varying Sand Concentrations in Mortar on the Water Absorption & Strength of Mortar Slabs,” *George C. Marshall High School*

Stockholm Jr. Water Prize; Virginia Dental Association Awards – Katherine DeLong, “The Effect of Varying Nitrate Concentrations on the Absorptive Capacity of Sodium Polyacrylate,” *George C. Marshall High School*

Fishersville

Animal Sciences, honorable mention – Anthony Randozzo, “The Effects of Diets Based on Location on the teeth of Virginia White-tailed Deer,” *Shenandoah Valley Governor's*

School

Microbiology, second; Virginia Section of the America Water Works Association, honorable mention – Sydney Henriques, “The Effect of Disinfectants on the Development of Resistance in *Escherichia coli*,” *Shenandoah Valley Governor's School*

Hampton

Environmental Sciences, second; Stockholm Jr. Water Prize; Virginia Section of the America Water Works Association, second – Rhiannon Edwards, “Low Cost Continuous Flow Microbial Desalination Cells for Environmentally Sustainable Integrated Water Treatment,” *New Horizons Governor's School for Science and Technology*

Medical and Health Sciences, third; Leidos Awards - Applied Sciences, second – Robin Bai, “Novel Nano-medicine Therapy to Treat Multidrug Resistance Cancer,” *New Horizon's Governor's School for Science and Technology*

Henrico

Leidos Awards, first – Oliver Hamilton, “Investigations into Cardiology: Categorizing Heart Rhythms using Machine Learning,” *Mills E. Godwin High School*

Mathematical Sciences, honorable mention – Andrew Niu, “The Effect of Trend Investing Strategy over Different Investment Horizons on Return,” *Mills E. Godwin High School*

Virginia Dental Association Awards – Pranav Neyveli, “A Novel Alternative to Antibiotics: Gold Nanoparticles,” *Center for Medical Sciences at Mills E. Godwin High School*

Herndon

Behavioral and Social Sciences, honorable mention – Rini Gupta and Shalini Shah, “The Effect of Binaural Beats on Memory Test Scores,” *Herndon High School*

American Psychological Association – Noah Rempfer, “The Effect of Color on Short-term Memory,” *Central Virginia Governor's School*

Lynchburg

Cellular and Molecular Biology, honorable mention – Thomas Baker, “A comparison of the effects of lipopolysaccharides O55:B5 and O111:B4 on RAW 264.7 murine macrophages,” *Central Virginia Governor's School*

U.S. Navy/Marine Corps – Rhiannon Cire, “The Effect of Fractal Dimension on Human Classification of Mythological Creatures,” *Central Virginia Governor's School*

Manassas

Virginia Dental Association Awards – Mary Ostrich, “The Effect of Music on Concentration,” *Seton School*

McLean

Behavioral and Social Sciences, third – Emily Lu and Yunzhu Pan, “Environmental Triggers on Relapse of Alcohol Addiction in Fruit flies,” *Langley High School*

Virginia Section of the America Water Works Association, third – Amanda Smith and Oksana Vickers, “The Effect of Desalination Method on Overall Efficiency,” *Langley High School*

Midlothian

Biochemistry, second; Leidos Awards - Applied Sciences, honorable mention – Lawrence Early, “A Novel Approach to Sickle Cell and the Hypoxic Response: The Induction and Stabilization of HIF-1a from the Inhibition of PHD2,” *Clover Hill High School*

Pulaski

Animal Sciences, first; Ricoh Sustainable Development Award; Virginia Dental Association Awards – Emily Llaneras, “Slaying the Destructor Part II: Doseage Optimization and effects of Oxalic Acid on Honeybee Hives,” *Southwest Virginia Governor's School*

Engineering: Electrical and Mechanical, honorable mention – Isaac Payne, “Aerodynamic Camper Device,” *Southwest Virginia Governor's School*

Medical and Health Sciences, second; Virginia Dental Association Awards – Julian Elmasry, “Revolutionary Blood Test Tube 2.0,” *Southwest Virginia Governor's School*

Microbiology, third; Virginia Section of the America Water Works Association, first – Morgan Fisher, “Effect of Water Source on Occurrence of Bacteria and Mycobacterium avium DNA in Shower Heads,” *Southwest Virginia Governor's School*

Purcellville

Energy and Transportation, first – Ryan Taylor and Minh-Tam Tran Le, “An Investigation of Exoelectrogenic Microbial Communities and the Effect of pH on the Performance of a Microbial Fuel Cell,” *Woodgrove High School*

Richmond

Biochemistry, second; Leidos Awards - Applied Sciences, honorable mention – Krishna Gandhi, “A Novel Approach to Sickle Cell and the Hypoxic Response: The Induction and Stabilization of HIF-1 α from the Inhibition of PHD2,” *Math and Science High School at Clover Hill*

Earth and Planetary Science, first; Association for Women Geoscientists; NASA Earth Systems Science – Camille Yoke, “Constructive interference of seismic surface waves antipodal to crater impact sites on terrestrial bodies,” *Maggie L. Walker Governor's School*

Roanoke

Behavioral and Social Sciences, first – Alexis McBride, “Network Topology and Recovery Phenotype Effects on Social Media Engagement,” *Roanoke Valley Governor's School for Science and Technology*

Biochemistry, honorable mention – Nabeel Raza, “Assay Development for the Measurement of Rotavirus Polymerase Activity,” *Hidden Valley High School*

Chemistry, first; U.S. Navy/Marine Corps; Leidos Awards - Applied Sciences, first – Vishnusai Karri, “Alginate-Based Gel Particle Drug Delivery System for Curcumin,” *Roanoke Valley Governor's School for Science and Technology*

Energy and Transportation, second – Virginia Trinkle, “Effect of Acid Pre-digestion of Spent Barley Malt in Biogas Reactors,” *Roanoke Valley Governor's School for Science and Technology*

Engineering: Materials and Bioengineering, second – Marcus Banks and Lucy Travers, “The Effects of Natural Fibers and Potassium Chloride on the Properties of Concrete,” *Roanoke Valley Governor's School for Science and Technology*

Environmental Management, second – Richard Qiu, “A Control Circuit to Sense and Maintain Environmental Carbon Dioxide Concentration,” *Roanoke Valley Governor's School for Science and Technology*

Environmental Management, honorable mention; Virginia Section of the America Water Works Association, honorable mention – Annalee Rader and Gwyneth Strobe, “The Filtration of Contaminated Water Using Metals and Herbal Extracts,” *Roanoke Valley Governor's School for Science and Technology*

Plant Sciences, honorable mention– Christopher Fechisin and Christopher Snodgrass, “An Automated Homeostatic Aeroponic System for Optimized *P. vulgaris* Growth,” *Roanoke Valley Governor's School for Science and Technology*

U.S. Navy/Marine Corps – Mark Tenzer, “The Development of Machine Learning

Algorithms to Diagnose Eosinophilic Esophagitis,” *Roanoke Valley Governor's School for Science and Technology*

Stafford

Earth and Planetary Science, second – Leia Otterstatter, “The Effect of Sine Wave Frequencies on Vortex Disruption: A Step to Ending Tornado Destruction,” *Colonial Forge High School/Commonwealth Governor's School*

Stephens City

Society for In-Vitro Biology – Savannah Del Cid, “Prolonged Stimulation of *P. fusiformis*, *P. lunula*, and *P. noctiluca* Negatively Effects the Endurance of All Varieties of Bioluminescent Algae Except *P. noctiluca*,” *Sherando High School*

U.S. Air Force – Sean Buono, “The Effect of Speed On Electricity Produced in a 3D Printed Charging Case,” *Sherando High School*

Sterling

Cellular and Molecular Biology, third – Saahithi Budharaju, “Apoptotic Response of Cancer Cells to Resveratrol, Nitidine Chloride, and Cepharanthine,” *Loudoun County Academy of Science*

Chemistry, honorable mention; Leidos Awards - Applied Sciences, third; U.S. Navy/Marine Corps – Soham Dessai, “The Use of the Alternated Soaking Process to Create a Chitin-Goethite Nanocomposite Optimized in Tensile Strength,” *Loudoun County Academy of Science*

Computer Science, honorable mention – Gadi Licht, “A new synergistic Scatter/Transform Hybrid Cloak,” *Loudoun County Academy of Science*

Environmental Management, first – Mehr Kumar and April Xie, “Determining the Potential Secondary Impacts Associated with Microorganismal Biodegradation of Microplastics in the Marine Environment,” *Loudoun County Academy of Science*

Medical and Health Sciences, first – Jennah Whitehill, “Investigating Antidepressants as a Potential Treatment for Concussions,” *Loudoun County Academy of Science*

Medical and Health Sciences, honorable mention – Joseph Stefano, “Testing the Relationship Between Intermittent UVa Irradiation and Cancer Development in *D. melanogaster*,” *Loudoun County Academy of Science*

Stockholm Jr. Water Prize – Malvika Kuncham, *Loudoun County Academy of Science*, and Jeevna Prakash, *Dominion High School*, “Combating the Algae Blooms in the Chesapeake Bay Using the Photosynthesis Inhibiting Toxin of the Bacteria *Vibrio*

shilonii”

U.S. Air Force – Derek Mamrol, “The Effect of Wing Surface Modifications on Elliptical Wing Stall at Different Angles of Attack,” *Loudoun County Academy of Science*

Vienna

Mark Licata Award for Biotechnology, third; Virginia Dental Association Awards – Sach Thakker, “Interspecies Comparative Pharmacology: An in depth Look at Human and Rat Alpha 7 nAChR's,” *James Madison High School*

Virginia Beach

Mathematical Sciences, first – Ryan Schleicher, “Mathematically Modeling Respiration While Running,” *Ocean Lakes High School*

Plant Sciences, third – David Griffith, “In-Home Farming: A Comparison of Two Types of Hydroponics,” *Mathematics and Science Academy at Ocean Lakes High School*

Warrenton

Environmental Sciences, third – Meredith Palmore, “Reuse of *Rattus norvegicus* 18S Oligonucleotide Primer for the DNA Amplification of *Notophthalmus viridescens*,” *Mountain Vista Governor's School*

Leidos Awards, honorable mention – Ivy Sandberg, “Data Analysis on Diagnosing Breast Cancer,” *Mountain Vista Governor's School*

Mu Alpha Theta – Kristen Kelly, “The Relationship Between North Atlantic Oscillation and *Gadus morhua*,” *Mountain Vista Governor's School*

Physics and Astronomy, first – Micensie Barrett, “Fighting Fire with Base Frequency and Harmonic Overtones,” *Mountain Vista Governor's School*

Yorktown

Animal Sciences, second – Sarah Lewis, “The Effect of Water Movement on Oyster Filtration Rate,” *Tabb High School*

Earth and Planetary Science, third – Rachel Shaffer, “The Effect of Blade Pitch on Energy Output of a Windmill,” *Tabb High School*

Engineering: Electrical and Mechanical, third – Noah Fields, Brian Fox and Gavin McCabe “Kidminder,” *York High School*