The Tennessee Junior Science and Humanities Symposium is sponsored by the United States Departments of the Army, Navy, and Air Force, and is administered by the Academy of Applied Science in cooperation with the University of Tennessee, Knoxville.

The University of Tennessee is an EEO/AA/Title VI/Title IX/ Section 504/ ADA/ADEA institution in the provision of its education and employment programs and services. All qualified applicants will receive equal consideration for employment without regard to race, color, national origin, religion, sex, pregnancy, marital status, sexual orientation, gender identity, age, physical or mental disability, or covered veteran status.

The 52nd Annual

Tennessee Junior Science and Humanities Symposium

February 23-24, 2017
Welcome to the 52nd Annual Tennessee Junior Science and Humanities Symposium

February 23-24, 2017

Location:
Holiday Inn World’s Fair Park
525 Henley Street
Knoxville, TN 37902
865-934-3291

Sponsored by the United States Departments of the Army, Navy, and Air Force and is administered by the Academy of Applied Science in cooperation with the University of Tennessee, Knoxville.
Dear JSHS participant,

Evaluators from Purdue University are conducting a study to learn about student experiences in Junior Science & Humanities Symposium (JSHS). We are asking you to fill out this survey because you participated in JSHS. Your feedback will be used to help us improve JSHS for students in the future and provide important information about your experiences. The sponsor of JSHS, the Army Educational Outreach Program (AEOP), is paying for this study. In 2017, more than 7000 students and 1000 adults will participate in JSHS and evaluators from Purdue University want to hear from you and your research mentor.

Here’s how you can help:
Complete the JSHS Regional Survey using the hyperlink below. Your parent or guardian has already provided permission for us to ask you to participate in the survey. Now, it is up to you to decide whether you want to participate or not. The survey takes 25-30 minutes to complete on average.

JSHS Regional Student Survey Link: http://www.cvent.com/d/zfq9yr

Pass this email along to adult(s) who supported you as you prepared for JSHS. Ask them to complete the JSHS Mentor Survey using the hyperlink below. The survey will take 25-30 minutes.

JSHS Mentor Survey Link: http://www.cvent.com/d/zfq9hn

If you have any questions about these surveys or your participation in the evaluation study please contact the AEOP Evaluation team at Purdue University – Dr. Carla C. Johnson – carlacjohnson@purdue.edu or at (765) 494-0019.

Thank you so much for your participation in the evaluation of JSHS!

If you have questions or concerns regarding the evaluation process, please contact me. I appreciate your efforts to increase the participation in the survey process. It is absolutely essential to the success of the JSHS program at the regional and national levels.

Thank you and best of luck with your events.
Tina White

Junior Science & Humanities Symposium
Academy of Applied Science
24 Warren St., Concord, NH  03301
Tel. 603-228-4520
http://www.jshs.org

FUELING THE SPARK OF GENIUS
The mission of the Academy of Applied Science is to provide programs, pathways and information to develop the intellectual capacity, critical thinking, creativity, and problem-solving abilities of students so that they may become contributing, and forward-thinking members of the science, technology, engineering, mathematics and invention community.
On behalf of the research offices of the military, the Academy of Applied Science is pleased to announce the 55th National Junior Science & Humanities Symposium, scheduled April 26-30, San Diego, California. The National JSHS will bring together 230 high school students who qualify for attendance by submitting and presenting original scientific research papers in regional symposia held at universities nationwide. Approximately 130 adult leaders, high school teachers, university faculty, ranking military guests, and others attend and join in encouraging the future generation of scientists and engineers and celebrating student achievement in the sciences.

Participation

All regional symposia student finalists are invited to present their research at the 55th National JSHS. The top two regional delegates are invited to compete for military-sponsored scholarships by presenting their research in oral sessions held on Friday. All other regional delegates are invited to present their research in poster sessions held on Thursday. Sessions will be organized by disciplines that are designated by the students during the registration process (abstract and paper submission). All sessions will be held at the Hyatt La Jolla.

The scientific and educational program

Unique activities for JSYS participants include:

✓ The Student Research Presentations highlight the 55th National JSHS and feature the STEM achievements of outstanding students representing the U.S., Puerto Rico and the DoD Dependents Schools of Europe and the Pacific.

✓ “DoD STEM Experiences,” will allow students and teachers to engage with DoD’s world-class STEM professionals and provide exposure to the Department’s cutting edge research and technologies.

✓ The Banquet and Awards Ceremony on Saturday will feature recognition for all participants and the announcement of undergraduate, tuition-based scholarships awarded to 24 students in eight categories of National JSHS competition.

Come join the celebration at the 55th National JSHS — and discuss the future exciting STEM opportunities. We look forward to seeing you there!

More information can be found at http://www.jshs.org/nationalreg.html.
STUDENT ORAL PRESENTATIONS
Holiday Inn World’s Fair Park (Cumberland Room)

Friday, February 24

9:00 a.m.—9:15 a.m. Welcome and Opening Remarks

Session I

9:30 a.m. Developing a Heat Map Visualization to Predict Crime Through Survival Analysis
Shems-Eddine Belhout
Hillsboro High School

9:50 a.m. Preparation, Characterization and Photocatalytic Activity of Fe-doped TiO2 Nanoparticles
Dell Zimmerman
Chattanooga School for the Arts & Sciences

10:10 a.m. Characterization of Small Molecules in Relation to Manganese Uptake in Huntington’s Disease Mutated Striatal Cells
Taylor Duncan
School for Science & Math at Vanderbilt

10:30 a.m. Exploring Allium Sativum Extract’s Effect as a Treatment for Cancer Cells
Emily Earls
Hillsboro High School

10:50 a.m. Passive Dynamic Walker: A Study of the Effects of Mass, Height, and Platform Slope on Velocity
Spencer Flint
Farragut High School

11:10 a.m. Designing Acoustically-Driven Microrobots to Stimulate Active Matter
Wilson Huang
Oak Ridge High School

11:30 a.m.—12:30 p.m. Lunch—LeConte / Summit Room

Other organizations that helped make the 52nd Annual Tennessee Junior Science and Humanities Symposium a success:

Oak Ridge National Labs (ORNL) and Barbara Penland for our wonderful experience and tour

The University Of Tennessee, Army ROTC Dragoons for Presenting our Nations Color

A SPECIAL THANKS TO THE FOLLOWING FOR DONATING DOOR PRIZES:

UNIVERSITY OF TENNESSEE VOLSHOP
UNIVERSITY OF TENNESSEE VOLTECH
THOMPSON-BOLING ARENA
KATHRYN WEAVER, UTK DEPARTMENT OF CLASSICS VOLSTEACH PROGRAM
Saturday, February 25

Session II
12:30 p.m.  
Accuracy of Resting Functional MRI for Language Lateralization in Temporal Lobe Epilepsy  
Alice Irizarry  
School for Science & Math at Vanderbilt

12:50 p.m.  
Initial Investigation on the Effect of Elemene and Sulforaphane in Breast Cancer Cell Line  
Kaiyi Jiang  
The King’s Academy

1:10 p.m.  
Aquaponics vs. Traditional Farming  
Alexandra Paladian  
Cleveland High School

1:30 p.m.  
Characterization of the Growth Condition and Corrinoid Biosynthesis in Dechloromonas aromatic Strain RCB  
Rachel Penumadu  
Farragut High School

1:50 p.m.  
Modeling Collective Motion with Periodic Obstacles  
Logan Rumbaugh  
Oak Ridge High School

2:10 p.m.—2:30 p.m.  
Refreshment Break  
Parkview Atrium

2:30 p.m.—4:00 p.m.  
Poster Session

6:00 p.m.—8:00 p.m.  
Awards Banquet and Dinner  
LeConte / Summit Room
STUDENT POSTER PRESENTATIONS
Holiday Inn World’s Fair Park

Poster Session

Ryan Armstrong
Oak Ridge High School
"Quantifying the Evolution of Gas from Li-ion Battery Materials?"

Dylan Payne
Oak Ridge High School
"Correcting image distortion from an SEM"

Albert Liu and Shailey Shah
Chattanooga School for the Arts & Sciences
“Feat Fireman Integrated Fuels Survey of a Control Plot at Smith Mountain / Cherokee National Forest”

Ellis Lambert
Lambert Homeschool
Danny Lawson
Lawson Homeschool
"Exploring Gene Editing"

Oak Ridge National Laboratory (ORNL)

Oak Ridge National Laboratory is the largest US Department of Energy science and energy laboratory, conducting basic and applied research to deliver transformative solutions to compelling problems in energy and security.

ORNL’s diverse capabilities span a broad range of scientific and engineering disciplines, enabling the Laboratory to explore fundamental science challenges and to carry out the research needed to accelerate the delivery of solutions to the marketplace. ORNL supports DOE’s national missions of:

- **Scientific discovery**—We assemble teams of experts from diverse backgrounds, equip them with powerful instruments and research facilities, and address compelling national problems;
- **Clean energy**—We deliver energy technology solutions for energy-efficient buildings, transportation, and manufacturing, and we study biological, environmental, and climate systems in order to develop new biofuels and bioproducts and to explore the impacts of climate change;
- **Security**—We develop and deploy “first-of-a-kind” science-based security technologies to make the world a safer place.

ORNL supports these missions through leadership in four major areas of science and technology:

- **Neutrons**—We operate two of the world’s leading neutron sources, which enable scientists and engineers to gain new insights into materials and biological systems;
- **Computing**—We accelerate scientific discovery through modeling and simulation on powerful supercomputers, advance data-intensive science, and sustain US leadership in high-performance computing;
- **Materials**—We integrate basic and applied research to develop advanced materials for energy applications;
- **Nuclear**—We advance the scientific basis for 21st century nuclear fission and fusion technologies and systems, and we produce isotopes for research, industry, and medicine.

Nine of ORNL’s major facilities are available to visiting scientists and engineers from around the world. Several thousand researchers come to Oak Ridge each year to conduct experiments with the support of ORNL R&D staff.
The Tennessee Science and Humanities Symposium Program (TJSHS) is jointly sponsored by the research offices of the United States Departments of the Army, Navy, and Air Force in cooperation with leading research universities throughout the nation. The Department of Defense generously provides funding for the National Symposium and the TJSHS scholarships. The TJSHS program is administered nationally through the Academy of Applied Science.

### NATIONAL SPONSORS

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### PARTICIPATING SCHOOLS

<table>
<thead>
<tr>
<th>School</th>
<th>Teacher Sponsor</th>
<th>Location</th>
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<tbody>
<tr>
<td>Chattanooga School for the Arts &amp; Sciences</td>
<td>Kelly Davis</td>
<td>Chattanooga City, Hamilton County</td>
</tr>
<tr>
<td>Cleveland High School</td>
<td>Jeannie Cuervo</td>
<td>Cleveland City, Bradley County</td>
</tr>
<tr>
<td>Farragut High School</td>
<td>Neely Tonos</td>
<td>Farragut City, Knox County</td>
</tr>
<tr>
<td>Gatlinburg-Pittman High School</td>
<td>Carol Pullium</td>
<td>Gatlinburg City, Sevier County</td>
</tr>
<tr>
<td>Hillsboro High School</td>
<td>Joshua Swartz</td>
<td>Nashville City, Davidson County</td>
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<tr>
<td>Lambert Homeschool</td>
<td>Ruth Lambert</td>
<td>Knoxville City, Knox County</td>
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<tr>
<td>Lawson Homeschool</td>
<td>Darunee Lawson</td>
<td>Knoxville City, Knox County</td>
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<tr>
<td>Oak Ridge High School</td>
<td>Tammy Carneim</td>
<td>Oak Ridge City, Anderson County</td>
</tr>
<tr>
<td>School for Science &amp; Math at Vanderbilt</td>
<td>Christopher Muller</td>
<td>Nashville City, Davidson County</td>
</tr>
<tr>
<td>Tellico Plains High School</td>
<td>Mitchel Witt</td>
<td>Tellico Plains City, Monroe County</td>
</tr>
<tr>
<td>The King’s Academy</td>
<td>Susan Reynolds</td>
<td>Seymour City, Sevier County</td>
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### FINANCIAL SUPPORT

Funding for the Tennessee Junior Science and Humanities Symposium is provided by a grant from the Academy of Applied Science. The University of Tennessee, College of Arts and Sciences has provided supplementary support.
JUDGING PANEL

Dr. Peggy Bertrand, Professor
Clinical Assistant Professor
University of Tennessee
College of Education, Health & Human Sciences
Dr. Peggy Bertrand taught physics, mathematics, environmental science, and research at Oak Ridge High School, where she also served as Science Department Coordinator. She currently is on the clinical faculty of the VolsTeach program at the University of Tennessee, where she teaches and mentors future mathematics and science teachers. Dr. Bertrand has been a consultant for the College Board and the Educational Testing Service for many years, serving in the areas of assessment and professional development. She has published articles in The Science Teacher and The Physics Teacher and has authored many College Board publications.

Dr. Ranjan Ganguly, Professor
Biochemistry & Cellular and Molecular Biology
University of Tennessee
College of Arts & Sciences
Dr. Ranjan Ganguly's research focuses on the role of cytochrome P450 enzymes (CYPs) in the development of insecticide resistance in insects. CYPs are found in all organisms including humans. They play a major role in detoxification of drugs, toxins and various environmental pollutants.

Mr. Cliff Watson, Safety and Health Consultant
HASP, Inc.
Mr. Clifford Watson began his aerospace career when he accepted a position in Middletown Connecticut at the Pratt and Whitney Aircraft facility as an Experimental Test Operator where he conducted tests of hardware for a variety of jet engines including the JT9D power plant for Boeing 747 aircraft and the TF30-P100 used by the U.S. Air Force TFX swing-wing fighter/bomber, later known as the F-111.
Mr. Watson transferred to the Department of Energy K-25 Site in Oak Ridge, Tennessee as the Facility and Nuclear Criticality Safety Manager in 1991. In 1995, Mr. Watson resigned from Martin Marietta and began a new career as a Safety and Health consultant. He and his wife, Peggy are founders of HASP, Inc.

TENNESSEE SPONSORS AND SUPPORTERS

The Tennessee Junior Science and Humanities Symposium is hosted by the University of Tennessee, Knoxville, and is administered through the College of Arts and Sciences. Judges are provided by the College of Arts and Sciences and the College of Engineering.

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College of Education, Health and Human Sciences

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College of Arts and Sciences

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