



WASHINGTON STATE
Academy of Sciences
Science in the Service of Washington State

**2024 ANNUAL
REPORT**



LETTER FROM THE PRESIDENT

As we approach the 20-year mark since the establishment of WSAS by the Washington State Legislature, I want to take a moment to recognize how far we have come as an organization. The WSAS now has over 400 members from universities, industries, national labs, and nonprofits across the state who are increasingly engaged in contributing their expertise to the state. With the help of members and staff, the Academy conducts numerous projects at the request of the state legislature and state agencies and is exploring new ways to bring a science

perspective to policymaking including developing a science and technology policy fellowship program.

In FY24 the Academy held its largest symposium to date on Sustainable Aviation bringing together members of the aviation community, researchers and policymakers to discuss the technologies, infrastructure, workforce and policies needed to move towards a sustainable future. We similarly brought together experts and policymakers for a wide-ranging discussion on an emerging issue for our state and the world around 6PPD and 6PPD-quinone, a tire

chemical that is deadly to some salmon species. WSAS members also supported the state in reviewing grant proposals and nominations, ensuring that they are scientifically sound.

All of this cannot be done without the hard work of our staff and members. In particular, I want to thank our outgoing Executive Director Donna Gerardi Riordan and outgoing President John Roll for their service and dedication to this organization and for helping to establish its reputation as a trusted source of independent, evidence-based advice across a growing network of policymakers in the state.

I am excited to welcome Melanie Roberts as the new WSAS Executive Director. She is a thoughtful and strategic leader who brings with her a wealth of highly relevant experience and networks in science policy both nationally and in the state. The board

and I have great confidence that under Melanie's leadership WSAS will continue to grow and help decision makers consider how to integrate science and technology for the benefit of Washington state citizens, governments and businesses.

Looking ahead, we aim to build on WSAS's success and broaden our impact across the state. Achieving this requires engaged members—stay tuned for more opportunities to get involved with WSAS in the coming year. With the help of members, WSAS will continue to provide nonpartisan, science-based insights to guide Washington's future.

We look forward to working with our members and partners to continue expanding the capacity for evidence-informed decision making in our great state. ■



Allison Campbell
President
WSAS



VISION FOR THE **FUTURE**

As I write this, I am only several weeks into my tenure as the Academy's new executive director. It is an honor to take the helm as WSAS showcases another extraordinary year of serving as Washington's independent scientific and technical advisory body.

I am especially grateful to my predecessor, Donna Gerardi Riordan, for her steadfast leadership over the past seven years. She has transformed WSAS from a small program with a big mission and no staff into an organization with a talented staff; a diverse, passionate, and growing membership; and an array of projects that draw upon their multidisciplinary expertise.

The success of WSAS is due to the collective efforts and contributions of many, including the board, members, partners, and donors who provide expertise and financial resources that drive our work. I also want to recognize and thank the Washington

State Legislature for establishing WSAS, increasing our core budget three years ago to provide organizational sustainability, and for their commitment to ensuring that Washington state has credible, relevant scientific technical information to inform decisions, implement effective programs, and empower communities.

Advancing our mission of "science in the service of Washington state" at a time when the national dialogue seems hopelessly divided presents both a challenge and opportunity for Washington. While WSAS was modeled after the National Academies of Science Engineering and Medicine, we recognize the need to evolve and create new engagement models that are regionally relevant and responsive in a time of rapid change.

I look forward to further expanding opportunities for researchers and leaders in Washington to team up on tough problems. ■



Melanie Roberts
Executive Director
WSAS

ABOUT US

The Washington State Academy of Sciences (WSAS) is a nonpartisan, nonprofit organization established by the Washington State Legislature in 2005 to advise state agencies, the Legislature, the Governor's office and others on public policy issues involving science and technology. WSAS accomplishes its mission "Science in the Service of Washington State" through a structure that mirrors both the form and function of the National Academies wherein senior scientists and engineers are elected by their peers and agree to serve when they confirm their membership. WSAS mobilizes the research community in Washington and beyond to provide timely, credible expertise on issues that affect Washington state.

BOARD OF DIRECTORS



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Laboratory Fellow
Pacific Northwest National Laboratory

MELANIE ROBERTS*

Executive Director, *ex officio*

THANK YOU FOR YOUR SERVICE

Term ended in 2024

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Washington State University

SURESH BASKARAN

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Washington State University

JOHN STARK

Director, Washington Stormwater Center
Professor, Department of Entomology
Washington State University

DONNA GERARDI RIORDAN

Executive Director, *ex officio*

* New board member in 2024

† New officer in 2024

FISCAL YEAR 2024 HIGHLIGHTS

This reports reflects work done between July 2023 - June 2024.

108 members engaged in WSAS committees & projects (p. 8)

36 new members elected (p. 8)

3 state agencies served (p. 10-11)



Washington State
Department of
Commerce



DEPARTMENT OF
ECOLOGY
State of Washington



PUGET SOUND
PARTNERSHIP

170 sustainable aviation symposium registrants - largest symposium to date (p. 12-13)

11 students selected to represent WA state as 2024 delegates to the American Junior Academy of Sciences (p. 14-15)

\$100k grant awarded to plan a Science & Technology Policy Fellowship program for Washington state (p. 16)



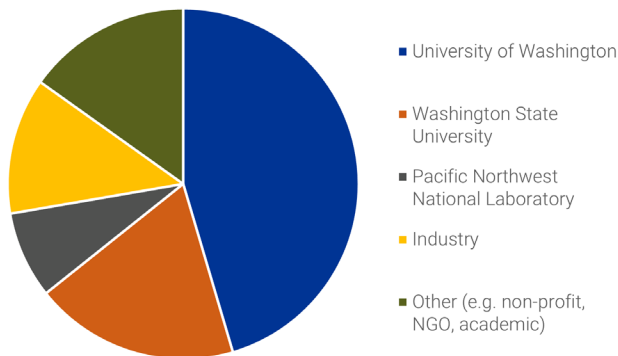
In FY24, WSAS members elected [36 new members](#) in recognition of their outstanding record of scientific and technical achievement, and their willingness to work on behalf of the Academy to bring the best available science to bear on issues within the state of Washington.

We are thrilled to honor these scientists, engineers, and leaders in the public, non-profit and private sectors for their distinguished and continued achievements. We look forward to tapping their expertise and knowledge to advance the Academy’s mission of science in the service of Washington state.

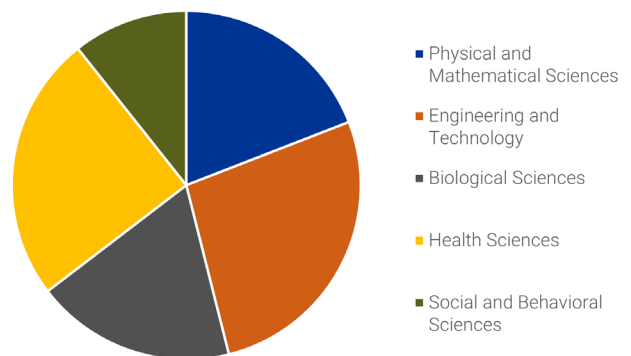
John Roll, WSAS Past President

WSAS members volunteer their time and expertise to help ensure Washington state policies, decisions and programs are informed by the best available science. Our **400+ members** are nationally recognized for their scientific and technical expertise across physical sciences and mathematics, engineering and technology, biology, agriculture, health, and human behavior. Members hail from academia, industry, and government research laboratories across the state.

Member Affiliation



Member Expertise





Remembering WSAS member Dr. Ka’imi Sinclair as a scientist, cultural innovator and advocate

On March 27, 2024, WSAS hosted a lecture in [honor of the late Dr. Ka’imi Sinclair](#). The lecture was supported by a generous donation from the Hoveida Family Foundation. Dr. Sinclair was elected to the Academy in 2021 for her work to increase health equity through implementation and evaluation of culturally informed health promotion interventions. For over 20 years she worked tirelessly to eliminate health disparities in American Indian, Native Hawaiian, Pacific Islander and Latinx people. WSAS’s Committee on Tribal Engagement and Collaboration continues to explore how the Academy can best work in collaboration with, and support the science and technology needs of, Native American tribes in Washington state.



Dr. Sinclair’s good friend and colleague Dr. Spero Manson – a member of the National Academy of Medicine who is widely acknowledged as one of the nation’s leading authorities on Indian and Native health – spoke of her personal and scientific legacy.



WSAS President John Roll presented Dr. Sinclair’s family with her WSAS membership certificate.



A UNIQUE RESOURCE FOR WASHINGTON STATE AGENCIES

WSAS regularly convenes panels of experts to independently review proposals, reports, nominations or other relevant products on behalf of state agencies or commissions, nonprofit organizations, or for-profit companies, ensuring that they are scientifically sound. In FY24 WSAS assisted the WA Department of Commerce in reviewing proposals and the Puget Sound Partnership in reviewing nominations.

Clean energy fund, research development and demonstration review panel

WSAS was asked by the WA Department of Commerce to vet and recruit a panel of scientific and technical experts in relevant fields to review proposals submitted to Commerce's Clean Energy Fund (CEF) Research, Development, and Demonstration (RD&D) program. This program funds projects that engage in strategic research and development of new and emerging clean energy technologies.

Puget Sound Partnership science panel

Every year WSAS reviews nominations to the Puget Sound Partnership (PSP) Science Panel and submits its recommendations to PSP's Leadership Council. This activity is codified in the authorizing legislation for the PSP which is the state agency leading the region's collective effort to restore and protect the Puget Sound. The PSP Science Panel advises PSP's efforts to develop a comprehensive, science-based plan to restore the Puget Sound.

We had the privilege of working with WSAS to conduct a comprehensive technical review of multiple grant applications for the Clean Energy Fund at the Washington State Department of Commerce. WSAS demonstrated exceptional expertise in review of the varied proposed energy technologies and also displayed an ability to provide clear and understandable feedback. Their thorough evaluation process helped us assess complex methodologies and projects, and ensure alignment with the funding and agency priorities.

Jacqueline West, Clean Grid Section Supervisor, Washington State Department of Commerce

CONVENING TO EXPLORE WHAT'S POSSIBLE

WSAS is uniquely positioned to convene discussions where scientifically sound, locally relevant information can help to inform decisions or expand the solution space. During FY24, WSAS convened leading thinkers to share the latest research and explore new ideas and solutions on topics important to Washington state including 6PPD and sustainable aviation.

The science of 6PPD and 6PPD-Q

On May 3, 2024 WSAS convened relevant interested parties in Seattle, WA, to discuss the science and environmental impact of 6PPD and its transformation product 6PPD-quinone. Together, scientists, state officials, and others explored what is and isn't known about these chemicals, their effects on the environment, and potential mitigation strategies.

6PPD is a chemical used in tires to prevent degradation and is converted to the toxic contaminant 6PPDQ upon reacting with ozone. 6PPDQ has been linked to high mortality rates in coho salmon, highlighting a critical environmental issue.

While the primary environmental source of 6PPDQ is understood to be vehicle tire wear, significant knowledge gaps remain, including the mechanisms of toxicity, impacts on other species, and potential human health effects. Attendees also discussed potential mitigation strategies such as rain gardens, porous pavements, and chemical filtration, noting the challenges and uncertainties associated with each approach. Identifying effective replacements for 6PPD in tires and further research into both mitigation and alternatives were emphasized as crucial next steps.

PARTICIPANTS

- Washington State University, Washington Stormwater Center
- University of Washington Tacoma Urban Waters Center
- Nisqually Tribal Council
- WA State Legislator
- U.S. Tire Manufacturers Association
- Governor's Office of Policy & Outreach
- University of Saskatchewan, Toxicology Center
- Carnegie Mellon University, Institute for Green Sciences
- WA State Department of Ecology
- The Nature Conservancy
- Oregon Department of Transportation
- Northwest Indian Fisheries Commission

[READ THE 6PPD ROUNDTABLE SUMMARY](#)

Hearing the needs of the scientific and policy community, WSAS hosted a multi-disciplinary, cross-agency workshop to open communication channels and identify barriers to progress on the emerging contaminants, 6PPD and 6PPD-quinone. WSAS identified the need for an initial conversation that was intimate, focused, and allowed for full participation from all invited practitioners. The day provided for a comfortable conversation to discuss opportunities to remove barriers and identify where the scientific and policy communities should focus to expedite finding solutions. WSAS was supportive, kept the group aligned with the workshop goals, and defined post-workshop actions.

*Tanya Williams, 6PPD Lead Planner,
Washington State Department of Ecology*



Sustainable Aviation in Washington State

Connecting Policy, Technology, Infrastructure & Workforce Development Needs

August 17, 2023 | The Museum of Flight, Seattle

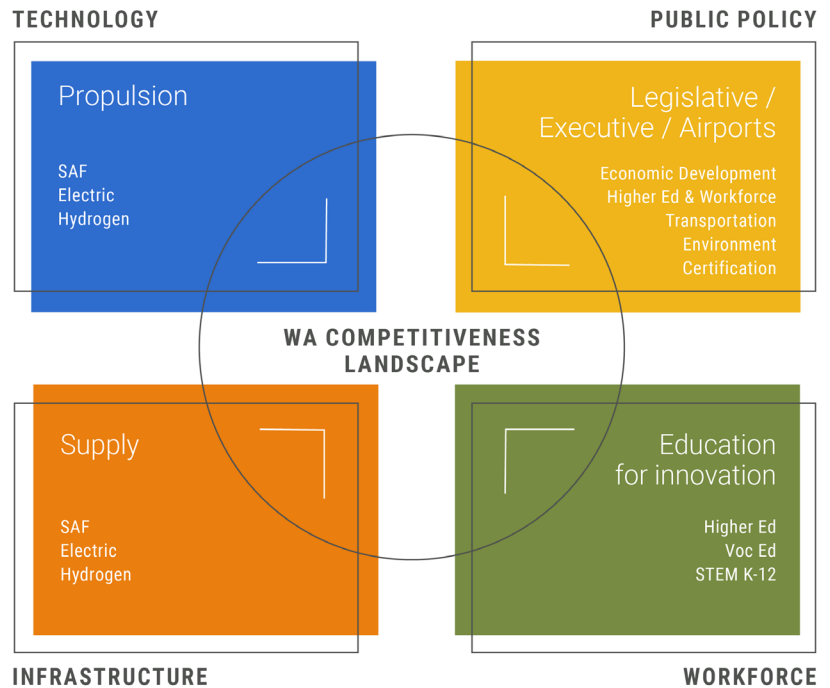
READ THE SYMPOSIA PROCEEDINGS

The 16th Annual Symposium of the Washington State Academy of Sciences featured a topic of critical importance to both Washington state and the world: sustainable aviation.

Making aviation sustainable embodies all the challenges and opportunities posed by climate change. People need and want to fly, cargo needs to be transported, and the demand for air travel will continue to increase as the world economy grows. But aviation is already responsible for two percent of global emissions of carbon dioxide, and that percentage will increase as other sectors of the economy decarbonize. Reducing and then eliminating the emission of carbon dioxide from aircraft will be essential if the world is to achieve the goal of stabilizing atmospheric levels of greenhouse gases.

Washington state has its own goals to reduce greenhouse gas emissions, but the state also needs to sustain its economic vitality. More than 130,000 jobs and over \$70 billion in revenue depend on the continued success of the various elements of the aviation ecosystem in Washington state. That ecosystem involves not just airplanes but airports, the production of fuel, and the transportation of fuel to airplanes. It involves not just the operation of aircraft but their successful development, production, and maintenance. Furthermore, aviation encompasses regional, national, and international transportation needs, and each of these market segments has its own challenges and opportunities.

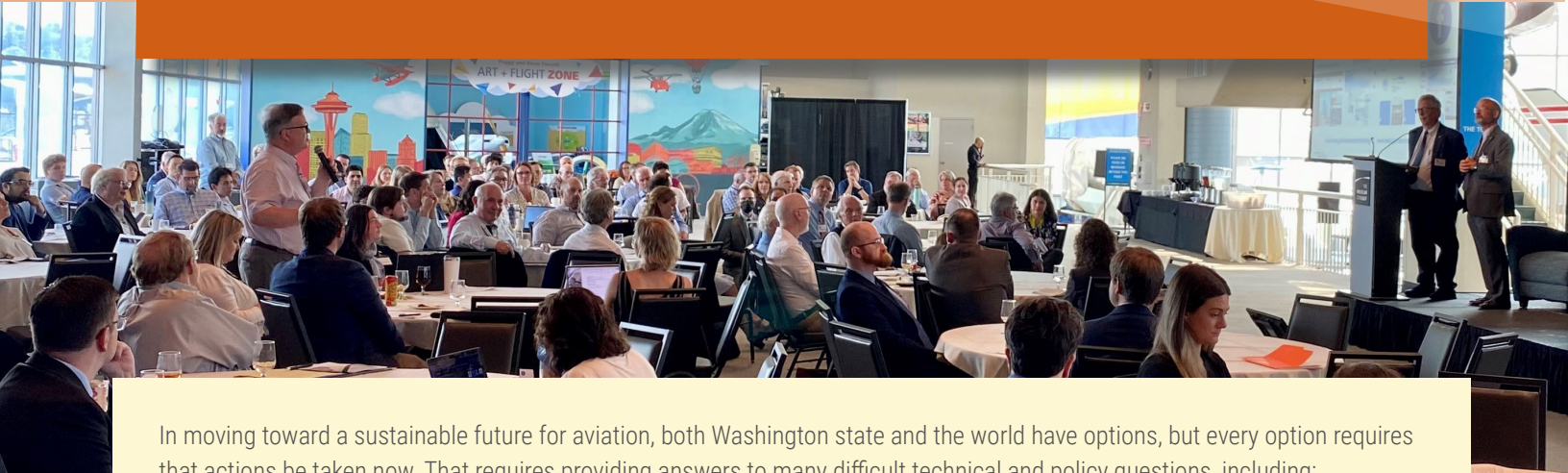
The WSAS symposium brought together members of the aviation community, academia, WSAS and state government to discuss Washington state’s path to leadership in this rapidly developing sectors.



GEEKWIRE | [Flying clean: National experts say ‘bold action’ required to cut carbon from aviation](#)

WSAS was uniquely positioned to bring together technologists and state and national policy makers to learn about and discuss the technology, infrastructure, and workforce development challenges that will need to be addressed by Washington state as the aviation industry transitions to a sustainable future. This symposium provided a fantastic opportunity to have wide ranging discussions about how to best enable this critical transition and help create a bright future for aerospace in our state.

Roger Myers, Symposium Chair, WSAS Past President and retired executive director at Aerojet Rocketdyne



In moving toward a sustainable future for aviation, both Washington state and the world have options, but every option requires that actions be taken now. That requires providing answers to many difficult technical and policy questions, including:

- What is the appropriate balance between the various sustainable aviation propulsion options?
- How will this balance change as technologies mature?
- What fraction of sustainable fuel production should be allocated to each sector of transportation, including aviation, trucking, rail, automobiles, and shipping?
- What fraction of sustainable fuel production should be allocated to each sector of the economy given the competing needs of society?
- What will be the impacts of scaling up the production, distribution, and storage of different sources of energy?
- Where will Washington and the world get the skilled workforce to develop, produce, operate, and maintain all the various elements of the new sustainable aviation ecosystem?

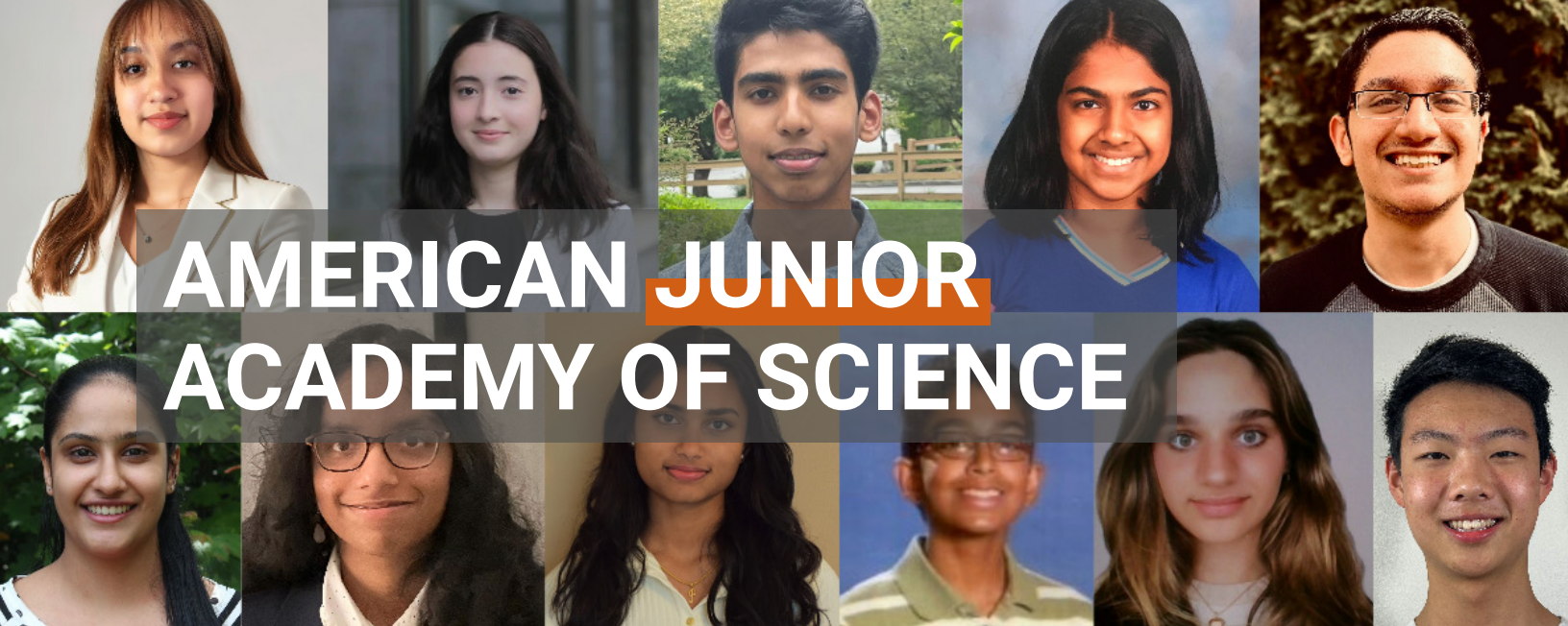
The WSAS symposium examined these and many other questions.

THANK YOU TO OUR SPONSORS



**CLEAN FUEL
WASHINGTON**





CELEBRATING THE FUTURE OF STEM

Every year WSAS nominates exceptional high school students to be inducted into the [American Junior Academy of Sciences \(AJAS\)](#) at the annual meeting of the American Association for the Advancement of Science (AAAS). Last year WSAS sent 11 aspiring scientists to Denver, CO to present their research to their peers and other scientists, meet and network with senior scientists and gain exposure to various STEM career paths.

View the original research done by these delegates [here](#).



HOVEIDA FAMILY FOUNDATION

SPONSORS

2024 DELEGATES

Annie Adhikary, Tesla STEM High School

Identification of Novel Diagnostic Neuroimaging Biomarkers for Autism Spectrum Disorder

Alessandra Azure, Newport High School

The Effects of Limiting Citrate-Derived Acetyl-CoA Synthesis on the Development of Exhaustion in CD8 T Cells

Dhruv Darbha, Redmond High School

Democratizing Produce Waste Reduction Using Hyperspectral Imaging

Priya Emani, Olympia High School

Identifying Possible Biological Processes Affected By Non-Target Proteins of SARS-CoV-2

Rohak Jain, Interlake High School

Deciphering a Sleeping Pathogen: Uncovering Novel Transcriptional Regulators of Hypoxia-Induced Dormancy in Mycobacterium Tuberculosis

Advaita Motkuri, Richland High School

AmEyeDrunk? The Future of Intoxication Detection

Padmaja Senthil Kumar, Lewis & Clark High School

Structural Basis for the Allosteric Modulation of GABAA Receptors by Diazepam

Zain Shariff, Curtis Junior High School

Microwave-Related Tissue Changes Using Ultrasound: Processing Images into Spectral Colors

Nikki Taleghani, Tesla STEM High School

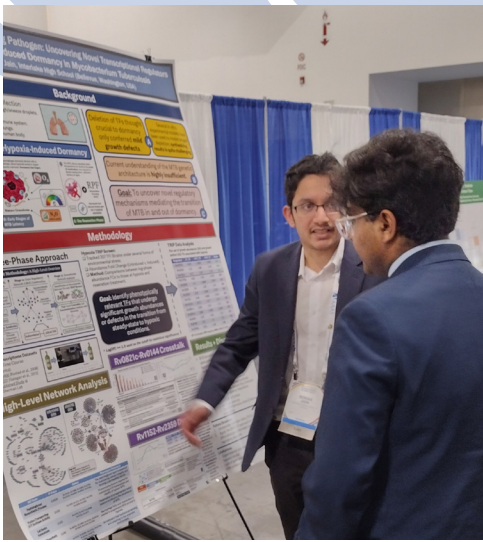
Carbon Dot and Cyanoacrylate Fuming Method for Latent Fingerprint Detection

Kosha Upadhyay, Bellevue High School

MemSpark: An Artificially Intelligent Virtual Reality System for Non-Intrusive Cognition Therapy and Evaluation of Dementia

Jerry Yao, Walla Walla High School

CamVisors: Cost-Effective Real-Time Object Detection Using Contrastive Captioners for the Blind



Having the opportunity to go to the AJAS Annual Meeting was one of the best experiences of my life. I met so many like-minded people with the same passion for STEM and innovation as me. AJAS widened my horizons: I was able to visit new places and learn about other opportunities I wouldn't have come across if not for AJAS. It was especially special to be able to present my project to a receptive and supportive audience, encouraging me to continue my journey in STEM engineering and research.

Jerry Yao, 2024 AJAS Delegate



Before participating in AJAS, I did not know many people passionate about biomedical engineering. I was the only student from my school who engaged in science fair research. AJAS allowed me to network with so many people and make friends who I am still in close contact with. I felt valued in the field of science. The experience has pushed me to do more with my research in the future.

Zain Shariff, 2024 AJAS Delegate

Meeting with experts and fellow researchers at the AJAS Annual Meeting provided me with insightful feedback and also opened avenues for new connections. This was my first science conference, and it taught me so much and set me up for future research I wish to conduct.

Dhruv Darbha, 2024 AJAS Delegate

A wide-angle photograph of the Washington State Capitol building, a grand neoclassical structure with a large central dome and a portico supported by columns. The building is surrounded by lush green trees and a well-maintained lawn. In the foreground, there is a paved walkway with a circular stone feature and two black metal park benches. The sky is blue with some light clouds.

TRAINING EARLY CAREER SCIENTISTS TO SUPPORT POLICYMAKERS

Building a Science & Technology Policy Fellowship in Washington State

In FY24 WSAS [received a \\$100,000 grant](#) from the National Conference of State Legislatures State Science Policy Fellowship Planning Grant Initiative to support the planning of a [science policy fellowship program in Washington state](#). Over the grant period, WSAS worked collaboratively with legislators and other interested parties to design a nonpartisan fellowship program that meets the needs of policymakers in Washington state. WSAS also participated in NCSL's peer network to learn about best practices, tools and strategies for developing and managing state fellowship programs.

CEI Torrance Scholars

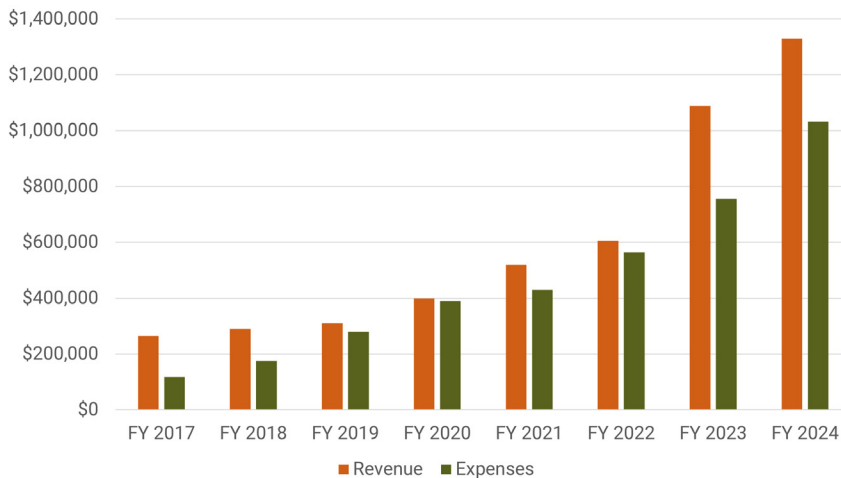
WSAS works with the Clean Energy Institute (CEI) at the University of Washington (UW) to provide UW graduate students with an introduction to policymaking at the state level. Students learn about ongoing S&T issues of interest to the state and the role that scientists and engineers can play in advising state legislators.

- TYSON CARR**, Chemistry
- SPENCER CIRA**, Chemical Engineering
- ROSE LEE**, Chemical Engineering
- DUNCAN REECE**, Chemical Engineering
- AARON THOMAS**, Materials Science & Engineering
- LIAM WRIGLEY**, Chemistry



FINANCES FY 2024

WSAS PERFORMANCE



REVENUE BREAKDOWN

State Funding	\$1,078,961
Grants	\$125,958
Member Dues	\$48,760
Donations	\$61,280
Other	\$14,727
TOTAL REVENUE	\$1,329,686

Carryover funds were used to recruit a new executive director in FY25. Private funds were invested in the future growth and sustainability of the organization.

THANK YOU TO OUR GENEROUS DONORS

The following donors made contributions to WSAS between July 2023 and June 2024.

\$25,000+

Hoveida Family Foundation

\$5000+

Mark Torrance Foundation

\$1000+

Brian Atwater
Anjan Bose
Allison Campbell
Gary Foss

\$250-\$999

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Washington State Academy of Sciences
415 1st Ave N, PO Box 9293 Seattle, WA 98109
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