

Distinguished Speaker Inspired Many About Artemis Missions

On March 11, 2022, AIAA Northern Ohio Section (NOS) welcomed Carlos Garcia-Galan, Manager of the NASA European Service Module (ESM) Integration Office, as our distinguished speaker for a presentation titled, "The Artemis Missions to Return to the Moon."

Carlos explained the overall goals of the Artemis Program, starting with the motivation for Mars and why Lunar operations are essential to achieve human missions to Mars. He described the complex lunar mission plans, starting with an uncrewed mission, then building a sustainable architecture featuring an international "Gateway" in lunar orbit. NASA's plans include commercial partners for robotic explorers and human landers. Carlos also covered the details of the hardware and software elements to achieve the many Artemis missions.

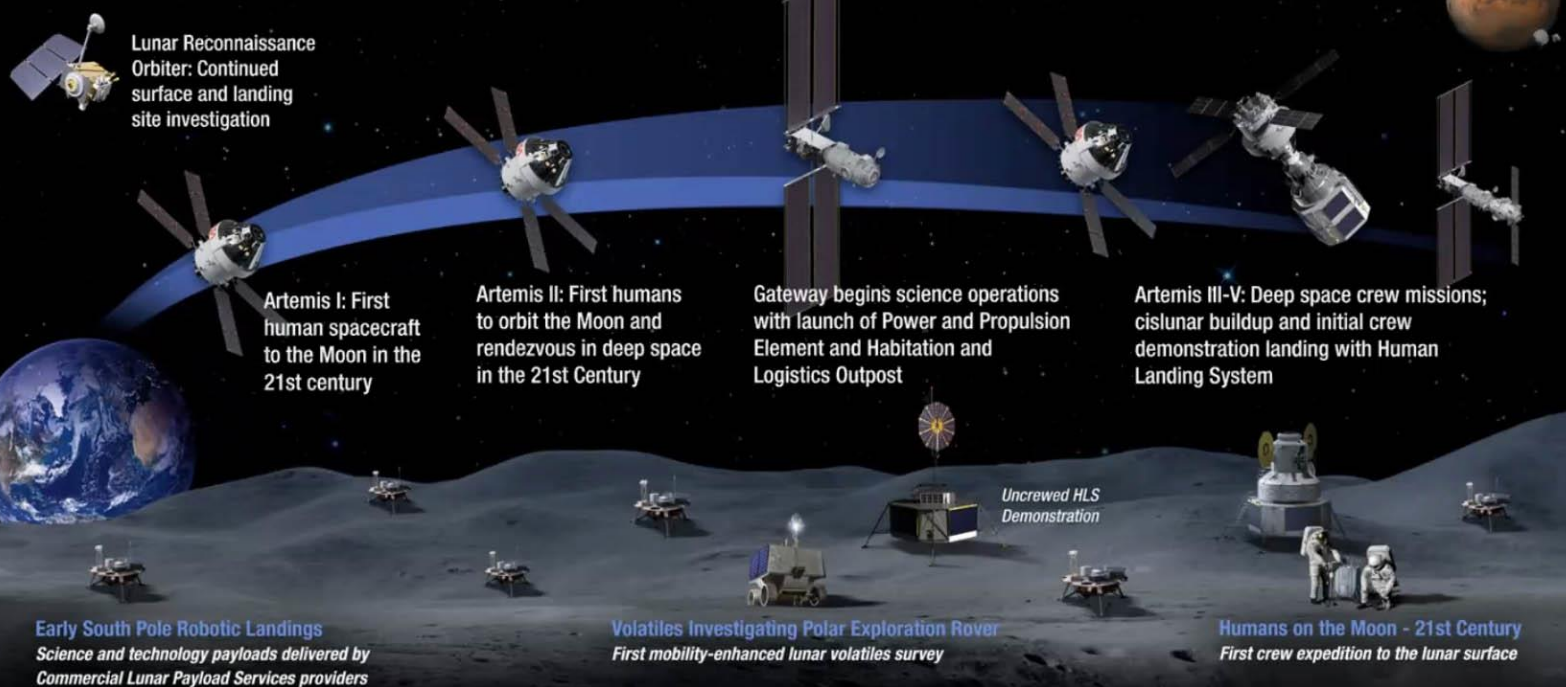
This inspirational and well-attended talk and Q&A session were especially timely with the first Artemis mission due to launch in late summer of 2022.

For more information, please contact Ann Over, Diversity, Equity & Inclusion Council Lead at aiaanos.diversity@gmail.com.

(Text: Ann Over; images courtesy of Carlos Garcia-Galan, NASA)



Artemis: Landing Humans on the Moon



LUNAR SOUTH POLE TARGET SITE



CREW MODULE

HABITABLE PORTION OF ORION SPACECRAFT
SPACE FOR CREW OF 4
HEAT SHIELD CAN WITHSTAND 5000° F

ORION

Section Chair's Corner



Hello, Northern Ohio Section.

My name is Joe Connolly and I am honored to serve as your current Section Chair. In the coming year our council leadership is hoping to create a broader aerospace community in northern Ohio. These past couple of years have been tough and we would like to see our section provide greater support to each other professionally and personally. The safety of our membership has been critical, thus we held a number of virtual events to leverage some benefits of quickly connecting people. In addition, we hosted outdoor events when possible. As restrictions ease, we are eager to resume regular in-person events. Our council leadership is exploring new initiatives to broaden our engagement and commitment to student success, which we hope to announce soon. We encourage you to reach out and provide your suggestions as well on things that we can do better. Please visit the AIAA Engage site (<http://engage.aiaa.org>), follow our social media pages, and reach out to the council via email (links and addresses may be found on the last page of this newsletter). Finally, we appreciate your patience over the past couple of years as we were not able to gather as desired, but we look forward to serving northern Ohio in the year ahead.

Biography: Joseph Connolly is currently working as an Aerospace Engineer in the Intelligent Control and Autonomy Branch at the NASA Glenn Research Center. In this position, Joseph serves as a technical lead for hybrid electric aircraft propulsion for the Hybrid Electric Thermally Efficient Core (HyTEC) Project and the Electrified Powertrain Flight Demonstration Project. Joseph is an associate fellow of AIAA and serves on the Guidance, Navigation, and Control Technical Committee and the Diversity Working Group. Joseph earned his B.S. in Aerospace Engineering from the Ohio State University, his M.S. in Control Systems from Case Western Reserve University, and his PhD in Aerospace Engineering from the Ohio State University.

A New Look: Diversity, Equity, and Inclusion



As a former NASA employee and leader of teams for over three decades, I learned that achieving excellence is about the people. At a national level AIAA also recognizes there must be a conscious effort to engage a variety of people to achieve success including a steady pipeline of aerospace talent, career development, partnerships, and aerospace technology in the 21st century. Hence, specific Diversity, Equity and Inclusion (DE&I) Goals were created.

I also believe terminology is critical, so what does AIAA mean by DE&I? Diversity is defined as the similarities and differences in the individual and organizational characteristics that shape AIAA. Inclusion is the means by which we utilize differing views and experiences to accomplish the AIAA mission. At the local level, AIAA NOS created a new Council position in 2021 to help achieve the national DE&I goals.

Aerospace projects virtually all include key metrics to define goals and judge success; likewise, AIAA DE&I has a new scorecard to measure progress of each Section. The DE&I scorecard consists of five categories: Events, Diverse Membership, Recruitment & Retention, Section Activities, and Section Actions. The combination of these activities helps achieve AIAA goals (not just DE&I), and many can be achieved “organically” as part of regular AIAA activities.

For more information or comments, please contact Ann Over, DE&I Lead at aiaanos.diversity@gmail.com.

People Profile: Halle Buescher

Meet Halle Buescher who joined the staff at HX5 Sierra in 2021 working for the NASA Glenn Research Center, after earning an undergraduate degree in Mechanical Engineering and a minor in Aerospace from Cornell University. Here's her engineering story, inspired by her love of sailing.

Halle grew up in Mentor, Ohio. Ever since she was a very small child, she enjoyed sailing. From middle school through college Halle sailed competitively, including the Varsity Sailing team at Cornell. There are many strong ties between engineering and sailing per Halle, "I've explained aerodynamics as being like a boat in the sky. Lift, drag, air foils, stall, force balance and velocity vector sums are all huge factors in competitive sailing." Given her immersion in sailing and academic experiences, Halle was clear on her goal to become a mechanical engineer specializing in aeronautics, controls, mechatronics/robotics, or aerospace.

Halle continues to be involved with sailing as a teacher for all age groups, and as a high school coach. She commented, "Sailing is a sport that people of all ages and abilities can enjoy." Halle always makes engineering connections when teaching because it helps people understand the boat and sailing techniques even better.

Halle also enjoys playing guitar and listening to music, another big part of her life. Her favorite genres played on her guitar are punk, folk, blues, and alternative rock. Her favorite genres of music to listen to are dance, indie, soft pop, disco, funk, and all kinds of rock. You can find her at local concerts by music groups MUNA, Phoebe Bridgers, or Mac DeMarco.



Halle has enjoyed being a member of AIAA NOS since January 2022 and is serving as the Young Professionals Chair. Stay tuned for future events and an opportunity to meet Halle, whose goal is to bring people together and make new connections.

What a great combination – mechanical engineering, sailing, music, and AIAA!

-- Ann Over, AIAA NOS Diversity, Equity & Inclusion Lead



"I've explained aerodynamics as being like a boat in the sky." – Halle Buescher

Beth Moses Talks Virgin Galactic's Cabin Test Program

The AIAA Northern Ohio Section (NOS) held a virtual lecture as part of its Distinguished Speaker Series on November 30, 2021, featuring Beth Moses, the Chief Astronaut Instructor at Virgin Galactic.

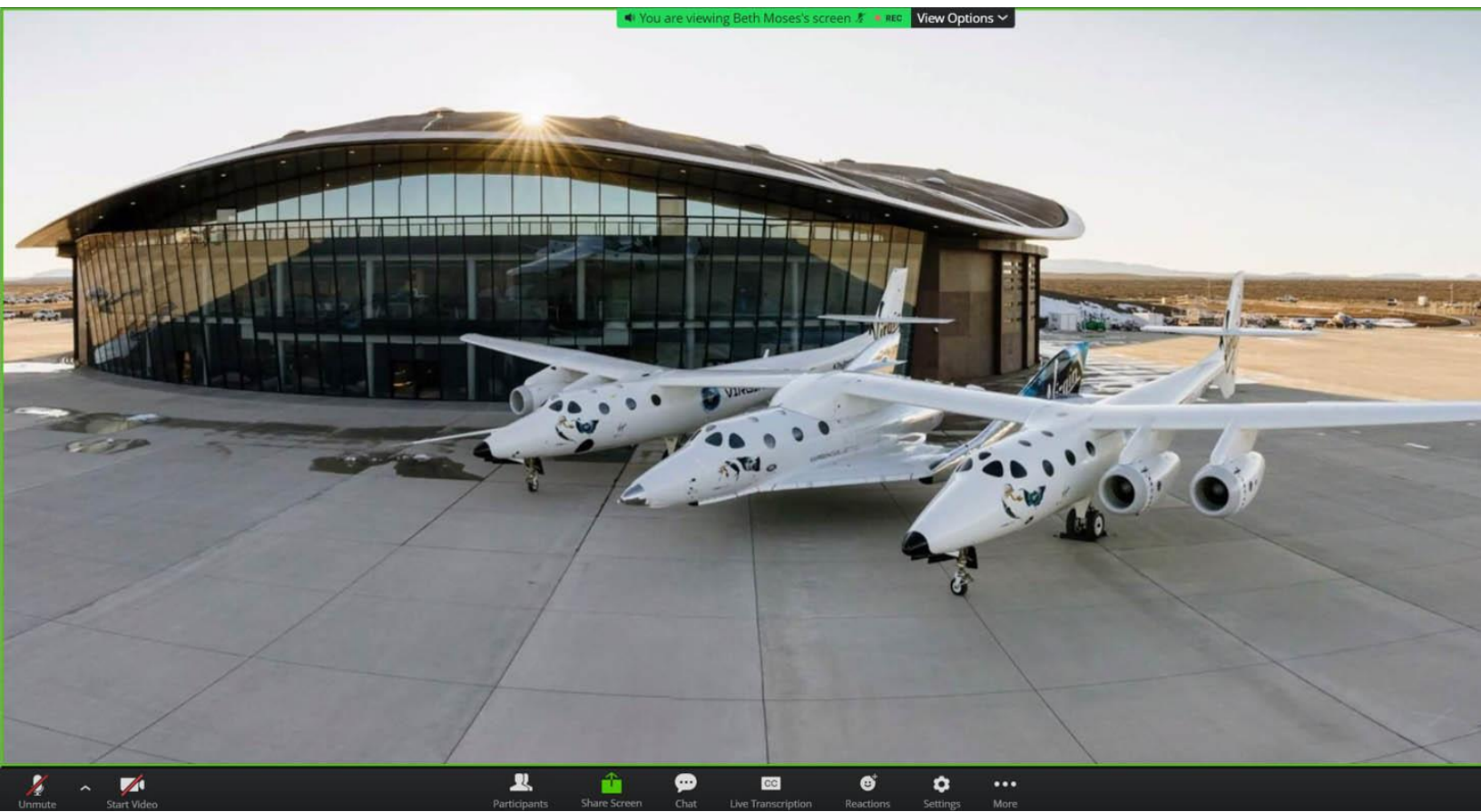
Beth's presentation on "Virgin Galactic's Cabin Test Program" covered the framework and progress of the cabin test program, which is underway to prepare Virgin Galactic's customer cabin for commercial service. The test program encompasses ground tests, parabolic tests, and component tests as well as un-crewed and crewed testing during glide flights and spaceflights. Beth incorporated many videos and pictures from the Virgin Galactic Unity 22 test flight, which made the talk extremely insightful, informative, and engaging. Unity 22 was a sub-orbital spaceflight of the SpaceShipTwo-class VSS Unity which launched on July 11, 2021. The crew consisted of pilots David Mackay and Michael Masucci along with passengers Beth Moses, Sirisha Bandla, Colin Bennett, and Richard Branson. Beth expounded on the various experiments conducted on this test flight, which included a NASA-supported experiment consisting of three NASA Kennedy Space Center Fixation Tubes containing *Arabidopsis thaliana* plants. During the flight, Sirisha Bandla activated the release of a preservative at critical data-collection stages to capture the plants' biochemistry at specific points during transitions into and out of microgravity: at 1 g before the rocket boost, just before entering microgravity, and after the conclusion of microgravity. Following the talk, Beth engaged the online audience in a spirited Q&A session.

Beth is a twice-flown professional suborbital astronaut and the Chief Astronaut Instructor at Virgin Galactic. She became the first female to work in space as a member of the flight crew on a commercial vehicle (Virgin Galactic's VSS Unity flight VF01). Beth is a former



NASA Extravehicular System Manager for the International Space Station, and she received her bachelor's and master's degrees in Aeronautical and Astronautical Engineering from Purdue University.

(Text: Cynthia Calhoun; images courtesy of Virgin Galactic)





Reliving the Mars Perseverance Mission with Todd Barber and Aaron Yazzie

The AIAA Northern Ohio Section held a virtual distinguished lecture on April 8th, 2021 via Zoom with 28 people attending. Todd Barber a Technical Lead for Mars 2020 propulsion system presented “Mars Perseverance Mission.” NASA’s Mars 2020 Perseverance rover landed on Mars on Feb. 18, 2021. Perseverance is the most sophisticated rover NASA has ever sent to the Red Planet, with a name that embodies NASA’s passion, and our nation’s capability, to take on and overcome challenges. It will collect carefully selected and documented rock and sediment samples for future return to Earth, search for signs of ancient microbial life, characterize the planet’s geology and climate, and pave the way for human exploration beyond the Moon.

Todd Barber has worked at JPL for just over three decades, his first job and his dream job in one. After being introduced to planetary science with a seven-year stint on the Galileo mission to Jupiter, Todd worked for over 20 years on the Cassini mission to Saturn, most of them as propulsion lead engineer. Mr. Barber has focused almost exclusively on propulsion mission operations, across myriad missions including Deep Space One, Deep Impact, Stardust, Dawn,



Aaron Yazzie, Lead Engineer for the Mars 2020 Perseverance Sample Acquisition Drill Bit Assemblies.

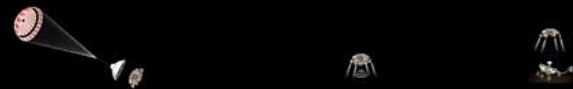
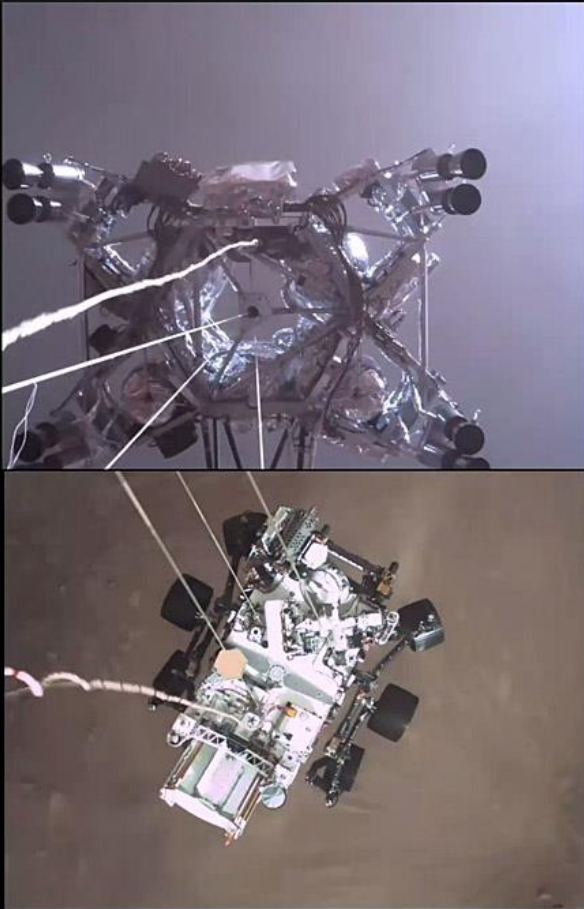


Todd Barber, Propulsion System Lead Engineer for Mars 2020 Perseverance.

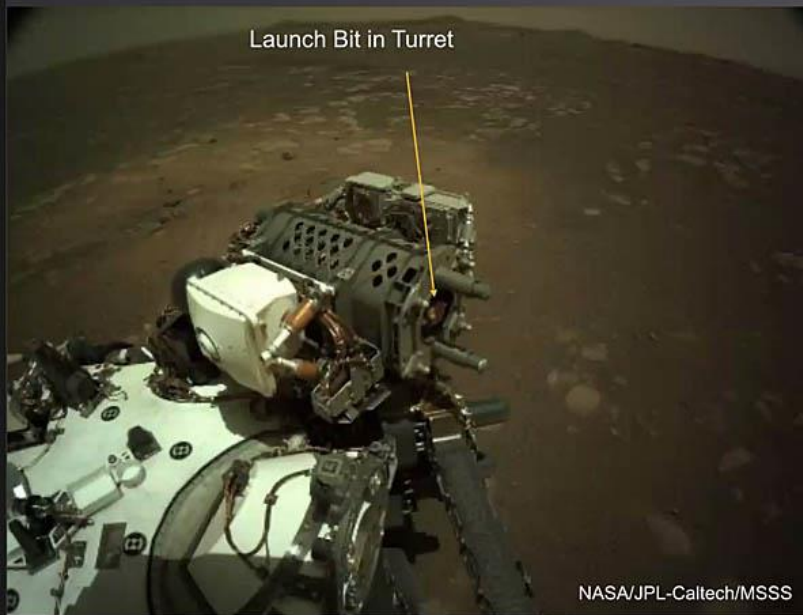
SMAP, and most recently, Voyager. He has also answered the allure of Mars by flying Spirit, Opportunity, Curiosity, and now Perseverance to the red planet.

This distinguished lecture also provided an opportunity to highlight Aaron Yazzie, a rising star in Aerospace. Mr. Yazzie’s most notable contribution to the exploration of Mars is as the lead engineer for the Mars 2020 Sample Acquisition Drill Bit Assemblies. Mr. Yazzie designed, developed, and delivered the Mars 2020 Drill Bit Assemblies, which include 6x Coring Bits, 1x Regolith Bit, 2x Abrading Bits, and 1x Launch Bit. These bit assemblies, used by the Mars 2020 Coring Mechanism, will abrade the top surfaces of rocks for science imaging, as well as acquire Mars rock core and loose rocky material samples to be cached in sample tubes and eventually returned to Earth in Mars Sample Return Campaign follow-on missions. It cannot be overstated how critical the development of this hardware is for a successful scientific mission. It is the drilling of Martian rocks that provides the data samples, and a first of its kind potential to capture samples that could be returned to Earth on a future mission. To accomplish this, Mr. Yazzie led a team of 15 or more personnel during critical stages and coordinated development with eight organizations both internal and external to JPL, along with eight vendors for fabrication of the hardware.

(Text: Joe Connolly; images courtesy of NASA JPL)



Unmute Start Video Participants 23 Chat Share Screen Record Reactions Leave



Unmute Start Video Participants 23 Chat Share Screen Record Reactions Leave

IWASM Lunch Talk and Future Partnering



On December 10th, 2021, AIAA NOS welcomed Sara Fisher, Executive Director of the International Women's Air and Space Museum (IWASM) for a presentation titled "Sharing the Stories and Impact of Women in Air & Space." Sara shared the history of IWASM that began as a committee of Ninety-Nines who in 1929 started saving memorabilia and history of female pilots. The Ninety-Nines is an international organization of female pilots in which Amelia Earhart was the first elected president. In 1986, the museum opened in Centerville, Ohio, and in 1998, the museum moved to the current location at Burke Lakefront Airport. Plans are forming for partnerships and future events, including a behind the scenes tour of the IWASM exhibits later this year.

For more information, please contact Ann Over, DE&I Lead at aiaanos.diversity@gmail.com.



Message from NOS Public Policy Chair

Last October, I attended the 6th Ohio Defense and Aerospace Forum and Ohio Aerospace Day, which were organized and conducted by the Ohio Aerospace Institute, JobsOhio, and the Dayton Development Coalition. These events brought together Ohio's state and national elected officials with aerospace and defense leaders to help grow Ohio's stature as an aerospace and defense leader. This year's theme was "Ohio, Speaking with One Voice." Congressmen Mike Turner (R-Dayton) and Tim Ryan (D-Youngstown) kicked off the event by emphasizing the bipartisan support for aerospace and defense in Ohio's congressional delegation. Governor DeWine committed to continue Ohio's leadership role in aerospace. The Governor's Aerospace and Defense Advisor, Mr. Joe Zeis, discussed the Governor's four aerospace and defense strategy pillars:

1. Preserve, protect, defend and expand Ohio's federal aerospace and defense installations
2. Increase the research portfolios and statewide synergies of Ohio's national level laboratories (AFRL, NASA Glenn, and Battelle)
3. Preserve and expand Ohio's aerospace and defense industry. Aggressively attract jobs, missions and companies to Ohio
4. Maintain and grow the government and commercial workforce: university educated, craftsman trained, and STEM/STEAM (adding Art to STEM)

Mr. Zeis highlighted NASA Glenn's roles in Orion, nuclear and electric propulsion, and surface fission power. Other speakers discussed Ohio's growing leadership role in advanced air mobility, energy storage, advanced materials, hybrid electric propulsion, aeropropulsion, and aerospace ground testing.

President of Sierra Space and former NASA Glenn Center Director Dr. Janet Kavandi was the keynote speaker for Ohio Aerospace Day. Sierra Space is Sierra Nevada Corporation's commercial space spinoff. Dr. Kavandi said that she looks forward to returning to Ohio and seeing friends from NASA Glenn when Sierra Space's Dream Chaser spaceplane undergoes thermal vacuum testing at Armstrong Test Facility in the fall of 2022.

I learned that federal aerospace and defense funding has an annual economic impact of over \$10.6 billion and supports over 108,500 jobs in Northeast Ohio. My experience at Ohio Aerospace Day drove home the importance of public policy advocacy to the AIAA, our section, and the aerospace enterprise in our region. To learn more about AIAA's public policy recommendations for 2022, please read:

<https://www.aiaa.org/docs/default-source/uploadedfiles/public-policy/2022-aiaa-key-issues.pdf>

Let's work together to understand AIAA's key public policy issues and recommendations and discuss these topics with our elected officials and decisionmakers.

Mike Heil
AIAA NOS Public Policy Chair

AIAA Congressional Visits Day 2022

By Mike Heil, AIAA NOS Public Policy Chair

After a two year absence, I am pleased to report that Team Ohio conducted a very successful AIAA Congressional Visits Day from March 14 to March 18. Accompanied by Ms. Noor Haj-Tamim, a student member from the AIAA Dayton-Cincinnati Section, I held Zoom meetings with 13 of Ohio's 16 Congressional offices and the office of Senator Rob Portman. We discussed AIAA's key public policy issues and recommendations and offered AIAA and our membership as a resource for unbiased professional advice on aerospace issues to the Congressional offices. The staffers appreciated learning about AIAA and our membership. I was impressed with the Ohio Congressional delegation's consistent and strong bipartisan support for AIAA, AIAA's public policy recommendations, and aerospace in Ohio.

AIAA's public policy recommendations for 2022 are in four areas:

- Support the commercialization of space
- Support the growth, evolution, and diversification of the aerospace workforce
- Invest in aerospace research and technology development to drive innovation and sustainability

- Support the recovery and advancement of the aerospace and defense industry, including workforce, infrastructure, and technology advancements

As the home of the Wright Brothers, John Glenn, Neil Armstrong, and many other iconic aerospace figures and institutions, Ohio is recognized worldwide as a leader in aerospace. We can do better by increasing our participation in AIAA Congressional Visits Day. CVD offers a great opportunity to engage with Ohio's congressional delegation and advocate for aerospace in our state and region.

CVD 2023 will likely return to being an in-person event on Capitol Hill in DC in mid-March, and there should be limited funding available to cover student member travel expenses for participating. Congressmen, Senators, and staffers always enjoy meeting constituents and especially enjoy meeting our AIAA student members. And it is always very educational to learn more about how Congress and our federal government operate. By supporting CVD, we support AIAA, our section, and aerospace in our region. Let's work together to ensure that our section has good participation in CVD 2023.



Mike Heil, AIAA NOS Public Policy Chair (upper right) and Noor Haj-Tamim from the AIAA Dayton-Cincinnati Section (lower left) discussing public policy over Zoom with Ohio Congressman Mike Carey (lower right) and his Legislative Aide, Brianna Tibbetts (upper left).

AIAA Northern Ohio Section Annual Awards Picnic

By Joe Connolly, Section Chair

On September 16th, 2021, the AIAA Northern Ohio Section (NOS) held its annual awards picnic at the Wallace Lake Canopy at Mill Stream Run Reservation. The outdoor in-person event was attended by 42 people, which comprised Section members and student STEM K-12 award winners. Attendees had the opportunity to spend some time socializing and enjoying a great picnic dinner catered by Famous Dave's Bar-B-Que.

The festive event was a good way to kick off the AIAA NOS events for the upcoming year. At the awards picnic we were able to recognize the section awards and member accomplishments. It has been a great year for AIAA NOS, and we thank our Past-Chair Christine Pastor-Barsi for her leadership. Please join me in congratulating our members for all of their great work.

Overall Section Awards

- 1st Place Large Section Communications Award - presented to sections that have developed and implemented an outstanding communications outreach program. Winning criteria include level of complexity, timeliness, and variety of methods of communications, as well as frequency, format, and content of the communication outreach.
- 1st Place Large Section Outstanding Activity Award - Young Aerospace Visionaries Contest (YAVC). To ignite or strengthen interest in STEM, particularly as it relates to the field of aerospace, students were invited to use their imaginations to push the boundaries of what is possible in the future to create a visual depiction of their futuristic vision of air or space travel technologies. Each visual submission was accompanied by a written essay describing the student's vision, providing rationale for it, and giving some background about their interest in the field of aerospace. There were different grade ranges for project judging, based on the student's grade level (K-4, 5-8, 9-12). A total of 26 applications were received from 7 different counties, 11 different schools and 1 home school student. Awards for the top three submissions, included monetary awards, admission to the Great Lakes Science Center, and the option to attend the section's Annual Picnic for engagement with section members and recognition.
- 3rd Place Large Section Young Professional Award – is presented for excellence in planning and executing events that encourage the participation of the Institute's young professional members, and provide opportunities for leadership at the section, regional, or national level.



Back Row: Ashlie Flegel (Region III STEM K-12 Outreach), Joe Connolly (AIAA NOS Chair), Jonathan Kratz (AIAA NOS STEM K-12 Outreach)
 Front Row: Laney Johnson (1st Place YAVC winner, 4th Grade, Minerva Elementary), Ariel Muck (3rd Place YAVC winner, 4th Grade, Minerva Elementary), Nigel Wenger (1st Place YAVC winner, 5th Grade, Green Elementary), Benjamin Brobst (1st Place YAVC winner, 9th Grade, Brecksville Broadview Heights High) & Hailey Frosch (2nd Place, 7th Grade, Swanton Middle)

Individual Member Awards

- AIAA Fellows, Class of 2021 – *Fellows shall be persons of distinction in aeronautics or astronautics and shall have made notable and valuable contributions to the arts, sciences or technology thereof.*
 - Dr. Stanley Borowski
- AIAA Associate Fellows, Class of 2021 – *Associate Fellows shall be persons who have accomplished or overseen important engineering or scientific work, or who have done work of outstanding merit or have otherwise made outstanding contributions to the arts, sciences, or technology of aeronautics or astronautics.*
 - Dr. Clifford A. Brown
 - Dr. Joseph W. Connolly
 - Ms. Peggy A. Cornell
- Service Awards: Diversity and Inclusion Award – *This award recognizes an individual or group within AIAA who has devoted time and effort and made significant contributions to the advancement of diversity and inclusion within the Institute. It also seeks to raise awareness on the value of a diverse membership and inclusive environment, and of important and challenging issues pertaining to diversity and inclusion in the aerospace workforce at large. This award also seeks to bring champions of diversity and inclusion at AIAA to the attention of its members as inspirational figures and enablers of opportunities for successful careers in aerospace. Lastly, this award seeks to inspire other members to engage in activities that will promote the Institute's diversity and inclusion.*
 - Dr. Dexter Johnson

Best Papers

- Student Paper Competition, Best Paper - Aerospace Sciences Group. "A Novel Flux Reconstruction Method for Diffusion Problems" (AIAA 2019-3063). Dr. H.T. Huynh.
- Best Paper - Propulsion and Energy Group. 2019 ASME Aerospace Division Propulsion Technical Committee Best Paper Award. "GRCop-42 Development and Hot-fire Testing Using Additive Manufacturing Powder Bed Fusion for Channel-Cooled Combustion Chambers" (AIAA 2019-4228). David L. Ellis.
- Best Paper - Propulsion and Energy Group. 2020 AIAA Gas Turbine Engines Best Paper Award. "Conjugate Heat Transfer Study of Innovative Pin-Fin Cooling Configuration" (AIAA-2020-0634). Dr. Ali A. Ameri.
- Best Paper - Propulsion and Energy Group. 2019 AIAA Electric Propulsion Best Paper Award. "High Power Demonstration of a 100 kW Nested Hall Thruster System (AIAA-2019-3809). Dr. Scott J. Hall.
- Best Student Paper - Aerospace Sciences Group. 2020 Plasmadynamics and Lasers Best Student Paper Award. "Complementary Laser Diagnostics of Metastable $N_2(A^3\Sigma^+, v)$ Molecules in Nonequilibrium Plasmas and in High-Speed Flows" (AIAA 2020-1743). Mr. Ilya Gulko.

Membership Anniversaries

- 40 years – Ann P. Over
- 50 years – Dr Marvin E Goldstein, Fellow
- 60 years – Francis J Wille



Completion of the First Young Aerospace Visionaries Contest

By Jonathan Kratz, STEM K-12 Outreach Chair

With the COVID-19 pandemic still constraining normal execution of educational outreach opportunities, the AIAA Northern Ohio Section (NOS) has sought to reach students in new ways. In 2020, the NOS challenged students with completing various aerospace related projects as COVID-19 lockdown restrictions ramped up and the academic year wound down. That experience served as inspiration for last year's efforts, which evolved into a different contest called the Young Aerospace Visionaries Contest. The contest was announced in February 2021 and students were able to work on their projects through April 2021. Judging was conducted in May, and awards were distributed in June.

The contest challenged students to create a depiction of what they believed aerospace technology would look like in the year 2050. They were also asked to write an essay that included a brief statement about their interest in aerospace, a description of their depiction, and rationale for their vision. It was our hope that this contest would ignite or strengthen the students' interest in STEM, particularly as it relates to the field of aerospace. The contest applicants were split into three judging categories based on grade level. Those categories were Kindergarten through 4th grade (K-4), 5th grade through 8th grade (5-8), and 9th grade through 12th grade (9-12). All grade levels were judged based on the same criteria but the specific weighting and expectations varied. The judges also tried to take into account the grade level differences within each grade range. The pictures were judged based on creativity, neatness, detail, and scope. The essay's were judged based on how well the students addressed the three purposes of the essay: (1) the student's interest in aerospace, (2) description of the vision depicted, and (3) rationale for the vision. For the younger students, more emphasis was placed on the drawing and creativity. For the older students, the emphasis was shifted more toward the essay and rationale for the vision.

Award Winners for Grades K-4 Category

Place	Name	Grade	School	County
1 st	Laney Johnson	4 th	Minerva Elementary	Stark
2 nd	Kaygen DiMario	4 th	Minerva Elementary	Stark
3 rd	Ariel Muck	4 th	Minerva Elementary	Stark
Honorable Mention	Karson Lutz	4 th	Minerva Elementary	Stark

The AIAA NOS provided a total of \$750 in cash awards, certificates, and an invitation to the Section's annual Awards Picnic. In addition, free admission to the Great Lakes Science Center in Cleveland, Ohio are offered to the awardees and up to 3 of their guests.

There were a total of 26 project submissions, which came from seven different counties, 11 different schools, and 1 homeschooler. The judges worked diligently to decide upon the award winners and the final award distribution. The judges were all members of the AIAA NOS council and included Christine Pastor-Barsi (Chair),

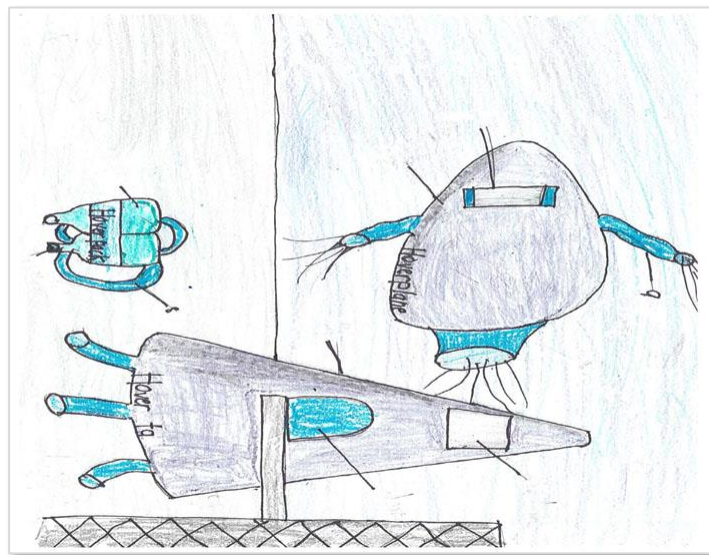


Figure 1. Laney Johnson's picture of hover technology envision for 2050

Edmond Wong (Communications), Jonathan Kratz (STEM K-12 Outreach), Aaron Hensley (University Outreach), and Dan Londrico (Young Professionals).

Initially the intent was to award a 1st, 2nd, and 3rd place winner for each grade category (K-4, 5-8, and 9-12). However, low participation in the 9-12 grade category led to a rearrangement of the award distributions, which worked well with the higher participation and competition amongst the younger grade ranges. The selected award winners are listed in the tables.

The K-4 winners were all 4th graders and they came from Minerva Elementary in Stark County. While there were several other applicants from other schools, the judges unanimously chose the applicants from Minerva Elementary to be part of their top 4 rankings. This is likely a testament to the teacher(s) at Minerva Elementary. The 1st place winner, Laney Johnson, envisioned an array of hover technologies to make air travel faster and easier. Her drawing is shown Figure 1. Kaygen DiMario received 2nd place with his vision of a hydrogen-powered flying car. Ariel Muck received 3rd place with a very imaginative Asteroid Destructor for protecting Jupiter and its moons, including Europa. Karson Lutz was chosen

Award Winners for Grades 5-8 Category

Place	Name	Grade	School	County
1 st	Nigel Wenger	5 th	Green Elementary	Wayne
2 nd (tie)	Mikayela Burkhart	7 th	Edgerton Local	Williams
2 nd (tie)	Hailey Frosch	7 th	Swanton Middle	Lucas
3 rd	Arianna Tucker	6 th	East Canton Middle	Stark
Honorable Mention	Thomas Lazzaro	6 th	Rocky River Middle	Cuyahoga

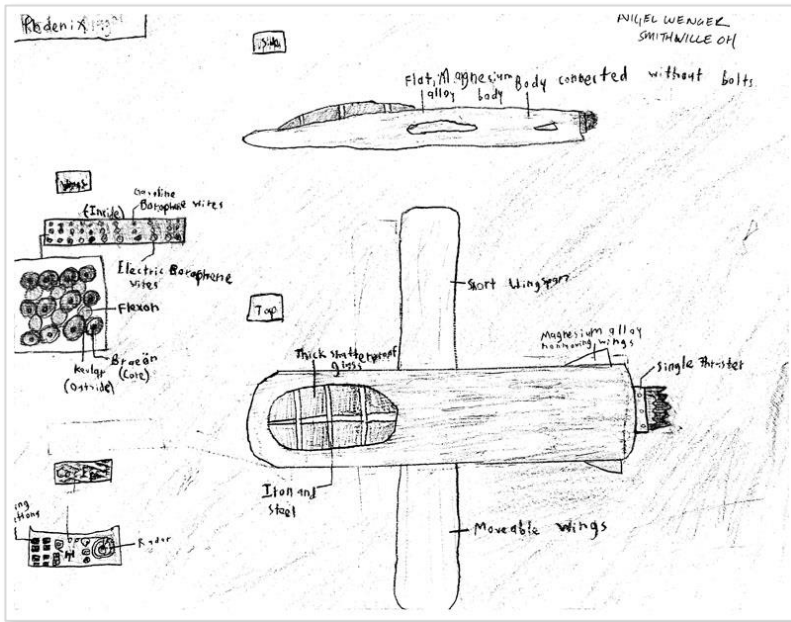


Figure 2. Nigel Wenger's picture of his Phoenix aircraft concept

receive an honorable mention for his vision of a high speed air transport called "rocket punch".

The 5-8 grade range was especially competitive. The first place winner, Nigel Wenger (5th grade), came from Green Elementary in Wayne County. His new airplane called the Phoenix was inspired by hawks and falcons with features such as moveable wing. Nigel's essay contained plenty of detail and imagination. His picture is shown in Figure 2. It was a hard call to award a 2nd place winner so, two were awarded instead. Mikayela Burkhart, a 7th grader from Edgerton Local Schools in Williams County, envisioned a wide scope of aerospace advances an exploration progress which included humans on Mars with the ability to travel the planet with planes and helicopters. She also speculated that oxygen and water could be returned to Mars surface and humans may even begin to colonize Venus. On Earth, Mikayela suspects that the speed of air travel will increase and aerospace technologies will continue to trickle into everyday life, advancing our quality of life. The other 2nd place winner, Hailey Frosch, came from Swanton Middle School in Lucas County. She envisioned a composite aircraft design that combined bird-inspired design features with pre-existing aircraft. The aim is to create a faster and more environmentally friendly air transport. Arianna Tucker (6th grade), the 3rd place winner from East Canton Middle School in Stark County, envisioned a swarm of autonomous space robots that NASA can use for surveilling space. Finally, Thomas Lazzaro (6th grade) from Rocky River Middle School in Cuyahoga County was awarded an honorable mention. Thomas, created a very nice picture of his aircraft design which included increased space for passengers and features that made it safer and more efficient.

There was only one applicant for the 9-12 grade category, but it did

Award Winners for Grades 9-12 Category

Place	Name	Grade	School	County
1 st	Benjamin Brobst	9 th	Brecksville Broadview Heights High	Cuyahoga

not disappoint. Benjamin Brobst (9th grade) from Brecksville Broadview Heights High School in Cuyahoga County submitted a very nice project worthy a his 1st place ranking. Benjamin proposed a "SkyDock" that would be kept in orbit around the Earth to serve as a docking station for spacecraft. Primarily it would be an adaptable and reusable location for in-space assembly of large spacecraft. Benjamin made a good case for how a "SkyDock" would be an efficient and sustainable solution for manufacturing large spacecraft and enabling human space travel and exploration on a much larger scale. Benjamin's attention to detail and his rationale were strong. Benjamin's depiction of the "SkyDock" is shown in Figure 3.

All of the awardees were invited to the 2021 annual AIAA NOS awards picnic. The awardees were recognized and given the opportunity to speak with the engineers and scientists in attendance to learn more about what they do and why aerospace is such a cool and rewarding field to pursue a career in.

Overall, the judges were very pleased with the quality of the projects. All of the students who participated in the contest did a very nice job. We plan to continue this contest on an annual basis and hope that the participation will grow.

Please encourage educators to become AIAA educator members and eligible students to become student members. This will allow them stay updated with our STEM K-12 activities. Feel free to direct your questions and ideas for new STEM K-12 outreach events to aiaanos.stem@gmail.com.

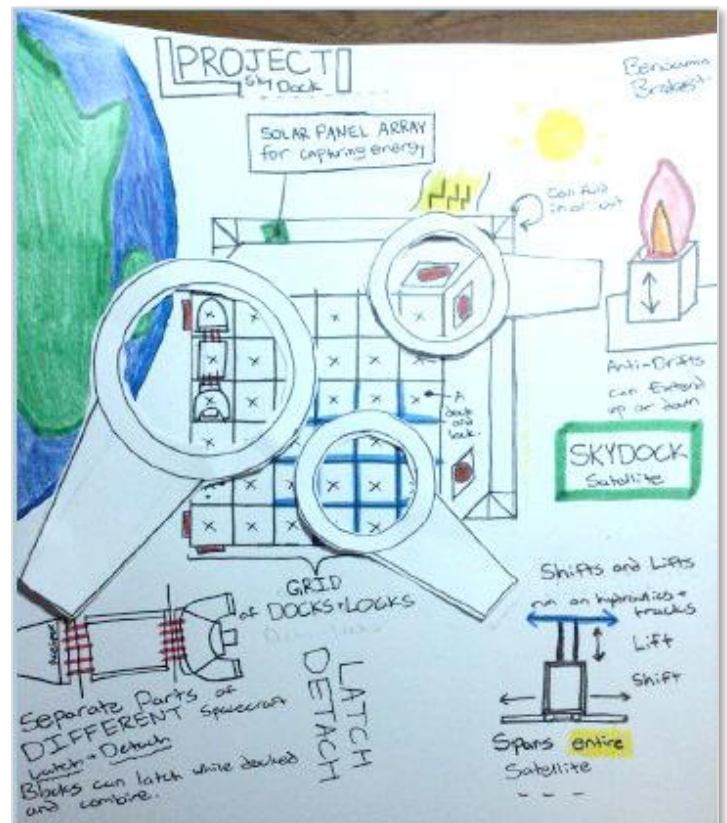


Figure 3. Benjamin Brobst's picture of his vision for a SkyDock

Volunteers Needed for 2022 Young Astronaut Day (YAD)

The AIAA Northern Ohio Section (NOS) plans to bring back the Young Astronaut Day (YAD) event in 2022. The event has not been held in the last two years due to restrictions and concerns associated with the COVID-19 pandemic. YAD is the largest AIAA NOS STEM outreach event. The event engages students across the age spectrum. Teams of students are challenged with various aerospace related activities in a friendly competition. In addition, a NASA astronaut, or other high-profile person within the aerospace community, is present to speak to the students. A Canstruction contest has been part of some of the past events, which goes to help local food banks. Other educational opportunities are provided. More information about this event can be found on the AIAA NOS webpage:

<https://aiaanos.org/yad>

This year's event will likely take place at Cleveland State University, as it did back in 2019. The target date of the event is Saturday, November 5, 2022. As we prepare for the comeback of YAD, we are looking for volunteers. This year we plan to implement a formal YAD council that will help to disperse and streamline the planning efforts. The council positions are listed below with some brief descriptions.

- **Overall Lead:** Overall leader of the YAD effort who provides the overarching plan and makes the final decisions or empowers others to make decisions (with input from the other leads and constraints given by the AIAA NOS Council). They are responsible for various tasks including directing volunteers and helping to coordinate the other leads.
- **Registration/Vice Lead:** Oversees the process for registering students/teams and will serve as their point of contact. Should work closely with the overall lead and be able to fill in for them if necessary. They may assist the overall lead with various tasks.

- **Activities Lead:** Responsible for planning, organizing, and executing the activities to be performed by the students on the day of the event. This includes recruiting activity lead volunteers, working with the volunteers to select the activities, scoring, etc.
- **Venue Lead:** Primary POC deciding where the event will take place and coordinating with the venue. They will be responsible for planning and managing logistics for the event.
- **Finance Lead:** Once the available money is determined, the finance lead will manage the money. They will make procurements and disperse money to the other leads. The AIAA NOS Treasurer will assume this role.
- **Communication Lead:** Will be responsible for making public announcements, documenting the event, and organizing the YAD communications. The AIAA NOS Communication Chair will assume this role.

Ashlie Flegel has been leading the event for several years now and will take on the Overall Lead role for one more year, after which she plans to step away from the lead role but will continue to support the event in other ways. We are looking for a volunteer to take on the lead role starting in 2023. This person will have the opportunity to work alongside Ashlie this year to learn the role. The Activities Lead position is also open.

If you are interested in serving in one of these roles, please contact Ashlie Flegel (youngastronautday@gmail.com) or Jonathan Kratz, AIAA NOS STEM K-12 Outreach Chair (aiaanos.stem@gmail.com). If you wish to volunteer for the YAD effort but don't want to take on one of these lead roles, there will be a virtual volunteer info session in June. Contact Ashlie to be put on the volunteer distribution list (youngastronautday@gmail.com).



Astronaut Doug "Wheels" Wheelock with 180 1st–8th grade students and 60 teachers/parents at the 27th Young Astronaut Day held in 2019.

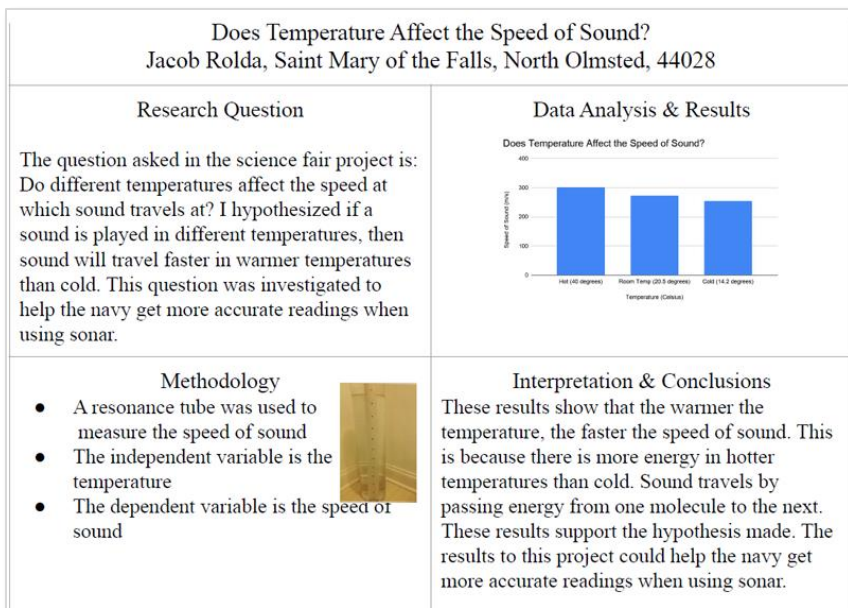
Promoting STEM through Special Awards Sponsorship at Local Science Fairs for 2021

By Jonathan Kratz, STEM K-12 Outreach Chair

In March 2021, the AIAA Northern Ohio Section (NOS) continued its support of the Northern Ohio regional science fairs. Each year NOS has offered cash awards for aerospace-related projects. The projects are judged by volunteer members of the section. Historically, the NOS has supported the Northwest District II Science Day (NWSDS) and the Northeastern Ohio Science and Engineering Fair (NEOSEF), and that support continued this year.

The projects were evaluated primarily on creativity, use and execution of a sound scientific approach, relevancy to aerospace, and the students' independence in completing the project. The students were grouped into judging categories based on grade level. The judges attempted to take the students' grade levels into consideration while judging their projects, particularly when comparing them to other projects from students of a different grade level within the same judging category (ex. comparing the work of a 5th grader to an 8th grader).

This year brought new challenges related to the COVID-19 pandemic that led to a new format for the science fairs. Both fairs were held virtually. The students presented their projects through a pre-recorded video format. Written reports were also provided. In the case of NEOSEF, the students provided a quad chart to summarize their project. The judges were given access to these materials and could evaluate the projects at their leisure over the course of a week or so. This contrasts with an in-person judging experience in which the judging and decision-making process takes place over the course of a few hours. There are perks and drawbacks to both formats. The virtual format provided some convenience to the judges. There was no need to travel to a designated location and there was much more time to judge the projects, giving the projects the time that they deserve. In-person judging is constrained by time and this is constrained further when multiple special and general award judges are trying to evaluate the same students. The increased time to evaluate the projects virtually allowed the judges the flexibility to work around their work and home life schedules. It also provided the judges with the opportunity to take a deeper look at the projects by investigating the reports, something that is not an



Quad chart for 1st place winning project (Grade 7-8) at NEOSEF by Jacob Rolda.

option with the time-crunch imposed by on-site science fairs. The increased time also allowed the judges to evaluate more projects than they may have had the opportunity to during an in-person event. The major drawback to the virtual format was the lack of direct interaction with the students. Neither fair had the ability to allow special award judges to ask questions, or to provide feedback and words of encouragement to the students. The lack of ability to ask questions made it more difficult to get clarity on the student's project and to discern the student's independence in completing their project. Some of this was remedied by the access to the students' reports but at the cost of additional time and effort on the part of the judges to search for answers through the supplied documentation. The main disappointment in not being able to directly interact with the students was that it eliminated the ability to provide direct words of encouragement to the students. This is usually one of the most rewarding aspects of being a judge. Furthermore, it's where we believe we can leave some of the biggest impressions on the students, strengthening their interest in STEM and aerospace. We hope that these science fairs and others will continue to adapt and evolve their format in the future to make the

2021 Northeastern Ohio Science and Engineering Fair (NEOSEF) Prize Winners

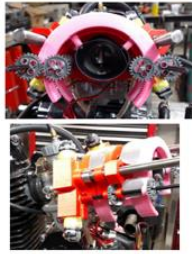
Prize	Name	School	Project
1 st place, \$50	Jacob Rolda, 7 th Grade	St. Mary of the Falls Elementary	Does Temperature Affect the Speed of Sound?
1 st place, \$50	Dmitry Lipert, 10 th Grade	St. Edward High School	Adjustable Carburetor Intake
2 nd place, \$25	Michael Zhu, 7 th Grade	Birchwood Elementary	Ethanol vs Gasoline: Which fuel is more environmentally friendly?
2 nd place, \$25	Gavin Bouffard, 8 th Grade	Euclid High School	How Far Can a Two-Liter Bottle Fly?
2 nd place, \$25	Ruth Anand, 12 th Grade	Home School	Smart Robotic Arm for Manipulation - A force sensitive robotic arm that utilizes AI based vision system to grasp objects intelligently
2 nd place, \$25	David Anand, 10 th Grade	Home School	Identifying Space debris from real satellites using an AI based vision system and RF signal detection

experience better for both the students and the judges. Regardless, NOS is happy to have had the opportunity to support these events.

NEOSEF is open to all students in grades 7-12 within Cuyahoga, Geauga, Lake, Lorain, Medina, Portage, and Summit counties. In recent years it has been held at Cleveland State University or John Carroll University. Last year the event was canceled due to the COVID-19 pandemic. The AIAA NOS is happy to have had the opportunity to return to supporting this event. The judging period started on March 3rd and ended on March 14th. The judges included Jonathan Kratz and Cynthia Calhoun who currently work at the NASA Glenn Research Center (GRC). The other two judges were NASA GRC retirees, John Adamczyk and Charles Niederhaus. A list of projects provided by the NEOSEF organizers was used to do an initial down-select of the projects based on relevancy to aerospace. This was discerned from the project titles and abstracts. A total of 25 projects were considered for awards. The students were grouped into two categories: 7th – 8th grade, and 9th – 12th grade. A 1st place winner and 2 runners-up were selected for each category for a total of six prizes totaling \$200.

The selected prize winners for the 7th – 8th grade category include Jacob Rolda (7th grade), Michael Zhu (7th grade), and Gavin Bouffard (8th grade). Jacob displayed the effects of temperature on the speed of sound and demonstrated a strong understanding and use of the scientific method while conducting his experiments. Jacob created acoustic waves of a known frequency inside a tube and adjusted the length of the air column in the tube until resonance was detected and the wavelength could be determined. From this, the speed of sound could be calculated. Michael did a nice study to demonstrate the difference in environmental impact between ethanol and gasoline. Gavin built an apparatus for launching pressurized two-liter bottles and tested it while experimenting with different test variables.

The selected prize winners for the 9th – 12th grade category include Dmitry Lipert (10th grade), Ruth Anand (12th grade), and David Anand (10th grade). Dmitry presented a very impressive project on an adjustable carburetor intake that he designed and tested on a running motorcycle engine. He designed and 3-D printed the parts and implemented electronic controls for the electro-mechanical air intake system using a micro-controller. Ruth was able to design and build a force-sensitive robotic arm and utilize vision-based artificial

Adjustable Carburetor Intake Engineering Project Quad Chart	
<p>Internal combustion engines are a very important part of our society running our cars, planes, and even generating electricity. Most automotive engines are tuned to be efficient in a single RPM range, leaving inefficiencies in much of its operating band.</p> <p>For my project, I designed and built an adjustable carburetor extension which automatically tunes to the engine's speed to maximize the power output throughout the entire RPM range.</p> <p>Some significant mechanical issues needed to be resolved in order to design a mechanism that could remain concentric over the carburetor opening while both its length and diameter are adjusted realtime to match the tube shape to the engine speed.</p>	 <p>All my tests were performed on a bench test set-up allowing full functional verification of my adjustable intake on a running motorcycle engine. Unfortunately, dynamometer test facility access was not possible due to COVID restrictions; which is needed to verify engine power.</p> <p>Figure 1 & 2: Prototype Adjustable Air Intake Extension on a running engine.</p>
<p>My design process included several phases to design the mechanical, electrical and software components needed:</p> <ul style="list-style-type: none"> • Design Concept: Worked through multiple failed ideas before arriving at a unique, patentable curved rack & pinion mechanism that facilitated the whole design solution. • 3D CAD Design & Prototyping: Designed/fabricated gearing systems built into mounting flanges and other needed parts. • Electronic Controls: Researched/purchased a microcontroller capable of running the electro-mechanical air intake system. • Program: Learned to write motor control algorithms, use timers to monitor sensor inputs and calculate engine speed. • Testing: Conducted a phased test approach, verifying function of mechanical, electrical or program pieces before incorporating into the next assembly level. Built running testbench engine for final integration testing. 	<p>My adjustable intake engineering project was a very challenging and demanding design effort. To prove my concept I needed to brainstorm feasible mechanical solutions, learn about electronic microcontrollers and learn how to write control softwares.</p> <p>I believe that my adjustable intake design is a very effective and efficient design, although it is disappointing that I do not yet have the dynamometer test data proving so. But the concept is solid, with the improvement of adjusting both the diameter and length which existing mechanisms cannot do.</p> <p>It has been rewarding to expand my mechanical skills and to learn completely new electrical and software design skills. I am also very proud of my unique, curved rack and pinion innovation which is the basis for my design success.</p> <p>I am looking forward to continuing to improve my design.</p>

Quad chart for 1st place winning project (Grade 9-12) at NEOSEF by Dmitry Lipert.

intelligence (AI) and a microcontroller to program the robotic arm to identify and pick up 3 different objects. Ruth's brother David proposed an intelligent space junk sweeper that utilizes AI and radio frequency signals to identify satellites from other space debris and to help remove unwanted items from orbit. David successfully built and tested a scaled prototype and used AI techniques to train it to identify satellites from space debris based on image and detection of radio frequencies. Ruth and David's projects were also noticed and recognized by the Cleveland Institute of Electrical and Electronics Engineers (IEEE) chapter at NEOSEF.

NWSDS is open to students in grades 5-12 within Defiance, Fulton, Henry, Lucas, Ottawa, Sandusky, Williams, and Wood counties. It is normally held at the University of Toledo. NWSDS was held in person in 2020 and so the format changes were unique to 2021. The judging period lasted from April 23rd to April 30th. The volunteer judges included Jonathan Kratz, Ashlie Flegel, and David Friedlander from the NASA Glenn Research Center as well as Dr. Babatunde Agboola from the Goodyear Tire & Rubber Company. A list of projects provided by the NWSDS organizers was used to do an initial down-select based on relevance to aerospace. A total of 15 projects were considered for awards. The students were grouped into two categories: 5th-9th grade, and 10th-12th grade. 1st and 2nd place awardees were selected for each category for a total of four prizes totaling to \$150.

2021 Northwest District Science Day (NWSDS) Prize Winners

Prize	Name	School	Project
1 st place, \$50	Elijah Moore, 5 th Grade	Trinity Lutheran School	Magnetic Force in Different Liquids
1 st place, \$50	Abdullah Muhammad Nasser, 10 th Grade	Bounty Collegium	Can Light and Magnets Make Spider Webs Move?
2 nd place, \$25	Isabella Marzano, 9 th Grade	Ottawa Hills High School	Extending Shelf Life of Strawberries with Botanical Extracts
2 nd place, \$25	Donald Adams, 11 th Grade	Pettisville High School	3D Modeled & Printed Drone Frame



NWSD 1st place recipient (Grade 5-9), Elijah Moore, testing the effectiveness of magnetism in different liquids

The selected prize winners for the 5th – 9th grade category include Elijah Moore (5th grade), and Isabella Marzano (9th grade). Elijah's enthusiasm for his project on magnetic forces in different liquids was contagious. He excelled beyond the expectations for a student his grade level. Elijah evaluated the effectiveness of magnets in various liquids and dreamed of applications in different engineering fields including in-space applications. Isabella used botanical extracts to extend the shelf life of strawberries. Her findings may have relevance to the preservation of food within aerospace applications such as in-space habitation and extraterrestrial colonization.

when it come to their education. As members of the AIAA NOS and active or retired employees within the aerospace community, we have an admitted bias toward STEM, particularly as it applies to aerospace. As such, we encourage students to consider aerospace as a future career field. Judging for the AIAA NOS sponsored awards is a rewarding way to give back to the community, re-juvenate your passion for STEM, and encourage the next generation of engineers and scientists. We plan to continue our involvement in local science fairs and hope to enlist your help in the future. Solicitations for judges typically go out in January. We hope you will keep an eye out for it!

The selected prized winners for the 10th – 12th grade category include Abdullah Muhammad Nasser (10th grade), and Donald Adams (11th grade). Abdullah had a very creative project in which he asked the question "Can Light and Magnets Make Spider Webs Move?" His scientific process was well thought out and he was very observant of other factors that could have affected his experiments but couldn't be controlled. He also alluded to applications of his project that included the development of materials that could have relevance to aerospace. Donald constructed a modular drone frame that would be adaptable for multiple payloads and uses and suitable for the expanding market of drone package delivery.

The judges would like to encourage each student to work hard and feed their creativity, imagination, and interest



The experimental setup for 1st place project (Grade 10-12) at NWSD by Abdullah Muhammad Nasser.

Greg Robinson Named to TIME100 List



Gregory L. Robinson, NASA's James Webb Space Telescope Program Director, and former Deputy Center Director at NASA Glenn Research Center was just named to the TIME100, which is TIME magazine's annual list of the 100 most influential leaders. Mr. Robinson oversees the program for the Webb telescope, which is the largest and most complex science observatory ever constructed. The telescope will allow unprecedented exploration of the universe and lead to countless new discoveries.

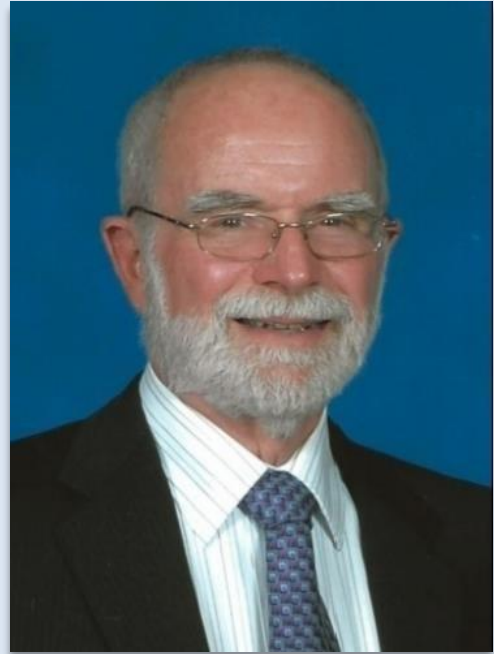
TIME published a tribute to Mr. Robinson's achievements written by John Mather, Webb senior project scientist and Nobel Prize in Physics laureate, which can be found at:

<https://time.com/collection/100-most-influential-people-2022/6177835/gregory-l-robinson/>

Mr. Robinson also recently received the Roy L. Clay Sr. Technology Pinnacle award at the "Innovation&Equity 21: 50 Most Important African Americans in Technology" event in San Francisco on March 5, 2022 in recognition of his accomplishments. Join us in congratulating Mr. Robinson on these prestigious honors.

(Text: Edmond Wong; photo courtesy of NASA)

Remembering Pat Finnegan



Patrick (Pat) Finnegan, a retiree of NASA Glenn Research Center (GRC) and active member of the AIAA Northern Ohio Section, passed away on July 12th, 2021 at the age of 87. He worked at GRC as a civil servant for 30 years and then another 10+ years as a support contractor. He was an incredible engineer who made significant contributions to a wide range of NASA projects.

Pat was actively involved in supporting educational outreach activities and was a major contributor for many years to our section's Young Astronaut Day. In his home workshop, he conceptualized, designed, built, and stored many of the hands-on, interactive student activities such as the bridge span competition, the astronaut simulator, and others. The students loved the many fun and challenging competitions he created for them.

(Text and photo: Chris Pestak)

Northern Ohio Section Officers and Council Members (June 1, 2021 – May 31, 2022)

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