FENN ACADEMY

at CLEVELAND STATE

FENN ACADEMY HIGHLIGHTS

A CONSORTIUM OF NORTHEAST OHIO HIGH SCHOOLS, CORPORATIONS, GOVERNMENT AND THE WASHKEWICZ COLLEGE OF ENGINEERING AT CLEVELAND STATE UNIVERSITY

Cleveland State University 1964

Washkewicz College of Engineering

Academic Year 2015/2016

MESSAGE TO OUR STAKEHOLDERS

Welcome to our Annual Highlights for Fenn Academy, Academic year 2015/2016 .

The last academic year was very successful for the Fenn Academy at the Washkewicz College of Engineering. We continued to grow, now totaling 65 participating middle schools and high schools, and more than 35 corporate and government partners who generously support our efforts in various ways. New member schools included Geauga County I-STEM High School, Polaris Career Center, Midview and Madison High School. Over 1,400 students benefitted from our services this year, both on and off campus. For many, it was the first time they had ever visited Cleveland State University and they left with a very positive impression.

Working together, we provided creative and fun educational activities that encouraged young students to pursue post-secondary education and careers in the engineering profession. Students participated in our Engineering Activity Day tours, the annual Engineer-For-A-Day job shadowing program and individual tours, including an opportunity for prospective students to sit in on actual engineering classes. Our students and staff also lent support to events including VEX Robotics, FIRST Robotics, the Tech Corp Summer Camp, the Cleveland Clinic's Health Care+ Pathways Program and Goodyear's Career Day in Akron. Washkewicz College of Engineering faculty, students and staff also participated in the Northeastern Ohio Science and Engineering Fair, serving as judges, presenters and tour guides. Other events or programs supported by the Fenn Academy included Junior Day, OP STEM, Passport to IT, CSU's Spring and Fall Open Houses, Major Exploration Day and regional college fairs at Kent State University and The University of Akron.

The Fenn Academy proudly hosted the 2016 Solar Sprint Car Race for the first time at CSU, bringing 160 students, teachers and parents to visit the campus. Sponsored by the U.S. Department of Energy, the race engaged students from Brecksville, North Olmsted, Westlake and Lake middle schools in a fun, hands-on, outdoor competition involving small-scale, home-made solar cars. Students also toured engineering labs, met faculty, staff and students and had an opportunity to sit in a Tesla electric car and a Honda hybrid car.

As a result of these outreach efforts, the Washkewicz College of Engineering continued to experience impressive enrollment increases, up more than 10% compared to the same time last year. To further this success, our Fenn Academy goals for the 2016/17 academic year include greater outreach to women and other underrepresented groups, additional programming with the Cleveland Metropolitan School District and a new event for first generation college students and parents. An additional activity for STEM educators and guidance counselors is also anticipated.

Each of us has a significant role to play to encourage students to pursue engineering careers. We truly value the support and advice that we receive from our colleagues in the private and public sectors. We also appreciate the generosity of our alumni, whom we encourage to provide continued support for Fenn Academy scholarships and each of the activities mentioned above.

Please take a few moments to review these highlights. You will certainly be impressed by the teamwork and innovation that make the Fenn Academy so popular and successful. We invite you to actively participate!

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Washkewicz College of Engineering

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Director, Fenn Academy
Professor, Mechanical Engineering

GREGG G. SCHOOF, M.S.S.A.
Assistant Director, Fenn Academy
Manager, Engineering Student Programs

MISSION STATEMENT

Our mission is to encourage middle and high school students to pursue an engineering degree by expanding students', teachers' and parents' knowledge and enthusiasm for the engineering profession.

This is achieved by:

- Assisting science, mathematics, pre-engineering and technology teachers, as well as guidance counselors with information about engineering careers
- Inspiring prospective students with engineering information and related activities
- Helping students prepare for undergraduate engineering programs
- Increasing the number of underrepresented students in engineering
- Collaborating with regional industry and educational partners
- Introducing middle and high school students to college life

BENEFITS FOR MIDDLE SCHOOLS AND HIGH SCHOOLS*

- Participation in Washkewicz College's Free Engineering Activity Day on-campus activities
- Small grants for middle school or high school engineering competitions or projects
- Participation in the Engineer For A Day job shadowing program at local engineering organizations*
- Summer camp activities for students or teachers when funding is available
- Access to CSU's facilities
- High school curriculum consultation with Washkewicz College faculty
- Share information about Cooperative Education Programs
- Participation of Washkewicz's faculty, students and staff in middle school or high school sponsored college and career fairs and STEM related events
- Collaborative projects with Fenn Academy member teachers and counselors
- Joint proposals to acquire funding for engineering related educational initiatives

**Opportunities cited above may require advance notice, appointments, pre-registration or fees, as well as pre-approval from parents, high school administrators or CSU/Washkewicz College officials.*
Call (216) 687-5267 and speak with Hannah Rosen or email H.ROSEN30@CSUOHIO.EDU for details.

FENN ACADEMY PARTNER HIGH SCHOOLS

Aurora High School
Avon High School
Bay Village High School
Beachwood High School
Beaumont High School
Benedictine High School
Berea-Midpark High School
Brecksville/Broadview Heights High School
Brooklyn High School
Cleveland Heights High School
Cuyahoga Heights High School
Cuyahoga Falls High School
Cuyahoga Valley Career Center
Dansville High School
Euclid High School
Garfield Heights High School
Geauga iSTEM Early College High School
Hearts for Jesus Christ Christian Education Institute
Horizon Science Academy
Hudson High School
Independence High School
Jane Addams High School
John F. Kennedy High School
John Hay High School - Cleveland Early College High School
John Hay High School - Cleveland School of Science and Medicine
John Hay High School - Cleveland School of Architecture and Design
Lakewood High School
Lorain County Joint Vocational High School
Lutheran West High School
Madison High School
Max Hayes High School
MC² STEM High School
Mentor High School
Midview High School
New Tech East High School
New Tech West High School
Nordonia High School
Normandy High School
North Royalton High School
Olmsted Falls High School
Orchard STEM Middle School
Parma Senior High School
Perkins High School
Perry High School
Polaris Career Center
Revere High School
Rhodes High School
Richmond Heights High School
Rocky River High School
Roosevelt High School
Shaker Heights High School
St. Joseph Academy
St. Martin De Porres High School
Stow-Monroe Falls High School
Success Tech Academy
Tallmadge High School
Twinsburg High School
Valley Forge High School
Villa Angela-St. Joseph High School
Westlake High School
Wickliffe High School
Woodridge High School

Membership in the Fenn Academy is free. A Memorandum of Understanding must be signed by school administrators in order to participate. To learn more, visit **www.csuohio.edu/fennacademy** or call (216) 687-5267.

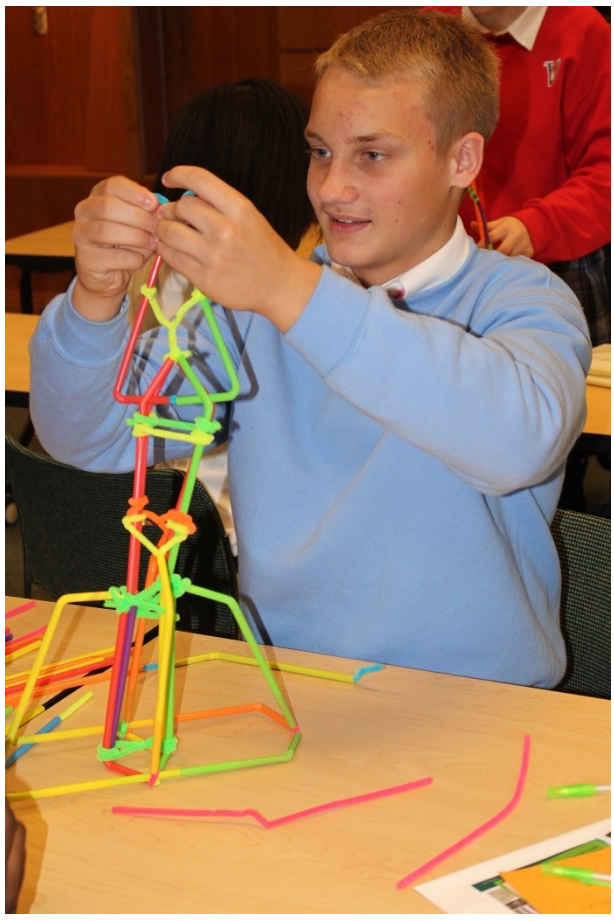
REACHING DIVERSE STUDENTS

The Academy has partnerships with schools in several diverse inner ring Cleveland suburbs including Lakewood, Shaker Heights, Garfield Heights, Cleveland Heights/University Heights and Euclid. In addition, the Fenn Academy currently serves two all-female high schools including St. Joseph Academy and Beaumont School. The Fenn Academy also partners with the HEARTS for Jesus Christ Christian Education Institute, a specialized school for home schooling families in grades 1-12, as well as Lutheran West High School.

Fenn Academy member high schools in the Cleveland Metropolitan School District (CMSD) include MC^2 STEM High School, the Design Lab at Jane Adams High School, Max Hayes High School, John Hay Early College High School, Rhodes High School, New Tech East High School, John F. Kennedy High School, Orchard STEM School and Horizon Science Academy (part of a national charter organization, located in the City of Cleveland and predominantly composed of CMSD students).

In addition, our staff works with College Now Greater Cleveland, a college preparatory program for high school students. We also collaborate with the ACE Mentor Program of Cleveland, a nationwide program that prepares students for STEM careers. The Washkewicz College of Engineering provides matching scholarship funds for ACE students who enroll in engineering at CSU.

We are committed to providing equal opportunities for all students and welcome new partner high schools to the Fenn Academy. For information, visit www.csuohio.edu/fennacademy or call Gregg Schoof, Manager of Engineering Student Programs, at (216) 687-5272.



FENN ACADEMY SMALL GRANTS MAKE A BIG DIFFERENCE

The Fenn Academy's Small Grants Program was available for teachers in our partner schools to help make a significant difference in the educational experience of hundreds of students. The purpose of the grants, ranging from $500 to $1,500, was to provide some additional resources to teachers who have developed creative activities to encourage their students to explore engineering careers.

Schools that were selected in 2015/16 included Orchard STEM School (Cleveland Metropolitan School District), Perry High School (Perry, Ohio), and St. Joseph Academy (Cleveland, Ohio). The winning schools received a total of $3,000.

Orchard STEM Bridge

The Engineering Club at Orchard STEM School, led by teacher Tamera Zelwin, collaborated with Glen Shumate, from the Construction Employers Association, along with Katherine Florek, a civil engineering student from CSU's Washkewicz College of Engineering, to create weekly activities around the theme of building bridges.

Through sessions with Glen Shumate, Orchard teachers and their engineering student mentor, the Orchard students took what they learned about bridges' different purposes/designs and drafted a bridge design to be used in an area outside their school. Students also determined the materials that were needed to stay within a limited budget. Students further learned about LEED certification and sustainability. Later, students presented their designs to all the members of the Engineering Club, as well as to Glen Shumate and a group of construction workers, who will eventually build the bridge.

Perry High School Giving Garden

The Giving Garden at Perry High School was a civil/ environmental engineering capstone project led by teacher Sarah Rivera, aimed at repurposing an outdoor area to make it accessible to all students, staff and the community. The plan included making the area handicap and wheelchair accessible. In addition, new paving materials were explored, including paving stones, gravel and recycled materials, as well as artificial grass, to prevent wheelchair tires from sinking into the terrain. Funding was used to purchase cedar raised bed kits, pavers, porous concrete, styrofoam and other materials.

Participating students were involved in each step of the design process, including research about materials. Students also interviewed people with disabilities to understand their struggles and constraints. In addition, students learned how to collaborate with the school's administrative staff, custodians and maintenance departments to stay within school guidelines. That was followed by producing multi-dimensional sketches, creating a digital model of the garden, and proposing final designs to a panel of judges.

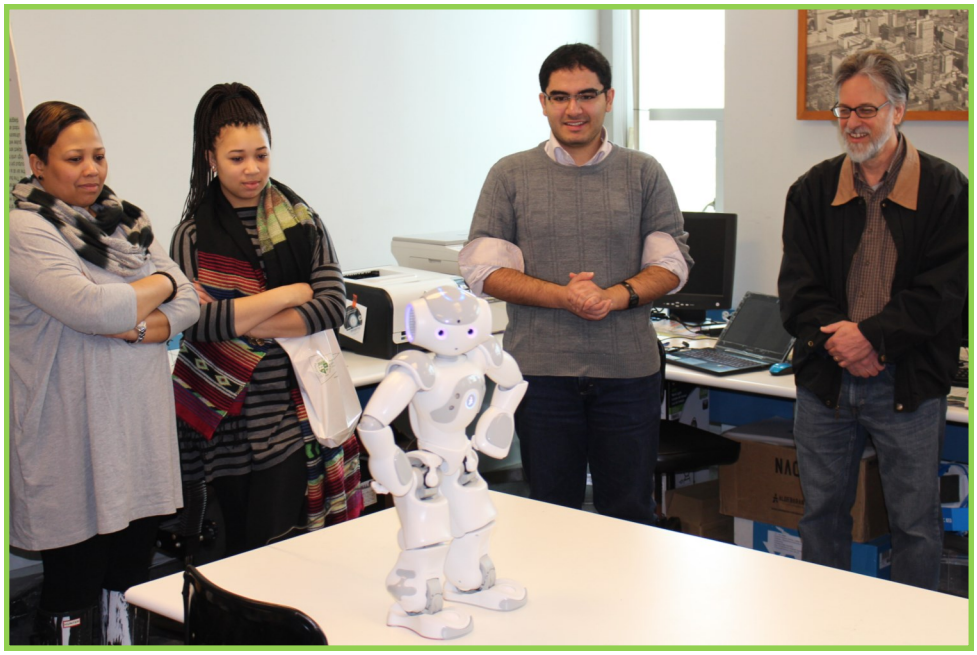
St. Joseph Academy

Under the leadership of Mary Ellen Scott, a teacher in the Engineering Department at Saint Joseph Academy, the school proposed engaging up to 70 female students each year in the skills and authentic experiences necessary to pursue a career in engineering, a field in which women have been traditionally underrepresented. The school's project involved a team of Honors Independent Study students in researching the presence of microplastics in Lake Erie. The students' preliminary research found that about 80% of the plastics come from beach and boater debris and about 15% come from beauty products washed down the drain.

Fenn Academy funding was used to support the students' interest in environmental engineering by subsidizing field trip costs for beach clean ups and a visit to CSU's Washkewicz College of Engineering. Students also visited the City of Cleveland's Division of Water Pollution Control. Supplies for the students' research was also purchased with grant funds.

At the end of their project about 30 students prepared and shared a one minute public service animation that could be understood by younger students, as well as teens and adults. A classroom activity was also created and students planned to share their findings by visiting up to ten grade schools. In an effort to have a positive impact on the environment, students distributed more than 1000 biodegradable PLA sandwich bags and collected pledge cards from the students to encourage their parents to use these compostable bags when packing lunches.

Fenn Academy Small Grant applications are taken online, usually in October or November, each year. About three to six grants are provided to either middle school or high school teachers, depending on available funds. For more information, contact Gregg Schoof at (216) 687-5272 or Hannah Rosen at (216) 687-5267.

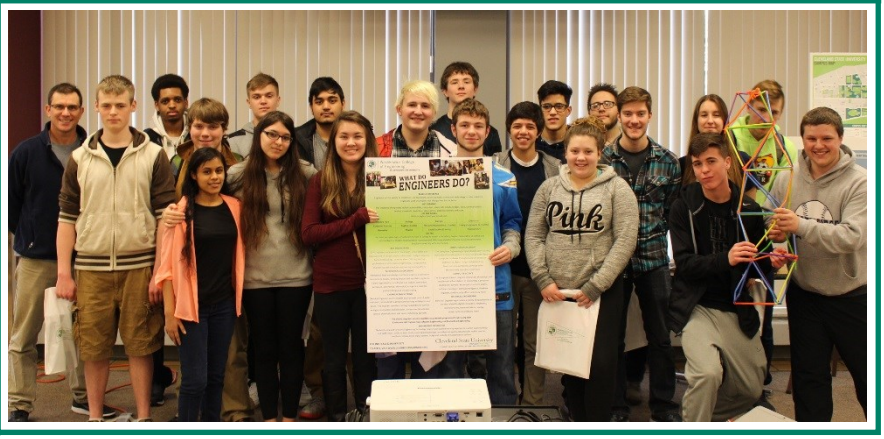


ON AND OFF CAMPUS
FENN ACADEMY ACTIVITIES-JULY 1, 2015 TO JUNE 30, 2016

Engineering staff, faculty and students gave engineering presentations to local high school and middle school students throughout the year, both on and off campus. The following list shows how many students were reached during this academic year. Routine follow-up was done with all students using email, Facebook, Twitter, postcards and telephone calls.

ACE Program	7
Avon High School	24
Benedictine High School	25
Brooklyn High School	27
Cleveland Heights High School	14
Cleveland School of Science and Medicine	6
Cuyahoga Falls High School	28
Cuyahoga Heights High School	18
Engineer for a Day Program	104
Euclid High School	15
Fall Open House	64
Goodyear Career Day	25
Health Care Pathway Program	17
iSTEM Geauga Early College High School	39
Individual Visits	48
John F. Kennedy High School - PACT	18
Junior Day Program	13
Lakewood High School	131
Lakewood - off campus visit	80

Madison High School	29
Major Exploration Day	12
Max S. Hayes High School	13
MC^2 STEM High School	16
NE Ohio Career Fair at Kent State University	19
New Tech East High School	41
Normandy High School	40
Operation STEM at CSU	84
Orchard S.T.E.M. School	26
Passport to IT Program	13
Perry High School	27
Revere High School	17
Rocky River High School	29
NE OHIO Science and Engineering Fair	38
Seton Catholic School	47
Shaw High School	20
Solar Sprint Car Race	160
Spring Open House 2016	50
Stow-Munroe Falls High School	2
Tech Corp Camp	15
Twinsburg High School	5
Valley Forge High School	19
Total	**1425**



SOLAR CAR RACE

The Solar Sprint Car Race, with support from the U.S. Department of Energy and the Washkewicz College of Engineering, took place on May 18, 2016. More than 160 middle school students from Lee Burneson Middle School in Westlake, Brecksville Middle School, Lake Middle School near Hartville, and North Olmsted Middle School brought their small scale solar cars to the Fenn Hall outdoor plaza for a four hour competition that demonstrated the creativity and ingenuity of each team, as well as the viability of solar power.

Engineering student recruiting assistants Arpit Patel, Mario Muscarella, Prahar Vaidya, Julie Atol and Anvesh Chowdary helped to lead the Competition.

Engineering professors, Dr. Joanne Belovich and Dr. Ton van den Bogert, provided interesting tours of the Unit Operation Lab and the Human Motion and Control lab, while graduate assistant Mario Muscarella and Manager of Student Programs, Gregg Schoof, provided an overview of engineering fields to all participating students.

Special thanks to Kurt Thonnings and his team from Westlake High School for bringing this exciting competition to Cleveland State.

THE ENGINEER FOR A DAY PROGRAM

Since 1999, the Washkewicz College of Engineering has been coordinating the Engineer For A Day Job Shadowing Program for area high school students. At least 100 students are selected to participate in the program annually. Juniors and seniors are given first priority. Students are placed at up to 30 companies or engineering organizations throughout Northeast Ohio.

Students and parents attended an orientation and open house at CSU on the Saturday morning prior to the shadowing day. The open house enabled visitors to discover more about engineering requirements, available scholarships, student activities, Co-operative Education, financial aid and student services.

Prior to the shadowing day, companies received a printed guide that offered suggestions for how to make the shadowing day an interesting experience. They were also provided with student's contact information and permission forms prior to a students' visit.

Shadowing assignments were offered at both private and government based engineering organizations, including the Cleveland Clinic, NASA Glenn Research Center, GM, Ford, Middough, Turner Construction, Lubrizol, Parker Hannifin, First Energy, NALCO, ODOT, the Northeast Ohio Regional Sewer District, and many more. Additional organizations are sought annually.

Employers were asked to keep the students on site for the length of a school day. They offered tours, hands-on activities, video presentations, one-on-one discussions and useful information about the career paths of participating engineering volunteers. In many cases, sponsoring organizations also provided lunch.

Students also visited off-site projects like bridges or highway projects. Additional sites included sewage treatment plants, power plants, testing labs, medical facilities, auto assembly lines, data centers, design facilities, and more. Visits informed the students about the wide range of available opportunities within each field. The ability to work in teams was also emphasized.

For more information about the Engineer For A Day job shadowing program please contact Gregg Schoof, Manager of Engineering Student Programs, at (216) 687-5272 or at g.schoof@csuohio.edu.

2016 ENGINEER FOR A DAY SPONSORING ORGANIZATIONS

The 2016 Engineer For A Day Job Shadowing Program provided opportunities for more than 100 students in grades 9-12 to spend a day with volunteer engineering sponsors. Students came from 45 high schools in Northeast Ohio. We thank all of the organizations, both public and private, as well as sponsoring engineers for helping to prepare the next generation of engineering professionals.

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Ohio Turnpike and Infrastructure Commission 1949

Parker

SOUNDWICH NVH & THERMAL SOLUTIONS

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VF

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Process Technology

Thanks to members of the Washkewicz College Visiting Committee who encouraged participation in the Engineer For A Day job shadowing activity. We also gratefully acknowledge Lincoln Electric, Middough Inc. and Lubrizol for their financial support for the 2016 Engineer For A Day orientation.

SPECIAL THANKS FOR SERVICES AND PARTNERSHIPS

The Fenn Academy worked closely with the following organizations in education and outreach activities:

Cleveland State University – College of Education and Human Services
Cleveland State University – Maxine Goodman Levin College of Urban Affairs
Cleveland State University – Office of Admissions
Cleveland State University – OPSTEM/LSAMP
College Now Greater Cleveland & Upward Bound
Cuyahoga Community College
First Robotics
Goodyear Tire and Rubber – "Picture Yourself as an Engineer"
Lorain County Community College
Parma City Schools – "Full STEaM Ahead"
Project Lead the Way
TEN80 Education
The ACE Mentor Program of Cleveland
The American Society of Engineering Education (ASEE)
The Cleveland Engineering Society (CES)
The Cleveland Metropolitan School District (CMSD)
The Cleveland Technical Societies Council (CTSC)
The National Science Foundation (NSF)
The Northeast Ohio Regional Sewer District
The Ohio Board of Regents (OBOR)
The Ohio STEM Learning Network (OSLN)
The Saint Joseph Science Center
The Six District Educational Compact
The U.S. Army
The West Shore Career Technical Education District
VEX Robotics

We also thank students from the following engineering chapter organizations for their support, including student shadowing, presentations, open houses and tours:

Engineers Without Borders
Eta Kappa Nu – Electrical Engineering Honor Society
Joint Engineering Council
Tau Beta Pi – The National Engineering Honor Society
The American Institute of Aerospace and Aeronautics
The American Institute of Chemical Engineers
The American Society of Civil Engineers
The American Society of Mechanical Engineers
The American Society of Engineers of Indian Origin
The Institute of Electrical and Electronics Engineers
The Joint Engineering Council
The National Society of Black Engineers
The Society of Automotive Engineers
The Society of Hispanic and Professional Engineers
The Society of Women Engineers

THANKS FROM STUDENTS

“ Thank you for allowing us to come and tour Cleveland State. I am truly thankful that I am fortunate enough to be in this program and could tour the University. It took all of my expectations and knocked them out of the park. I was blown away by what was shown and described to us. Before this visit, Cleveland State was low on my college wish list, but now it is at the top. The way the curriculum was described has me very excited for my future in engineering, and the current tuition and available scholarship make me confident that I could actually pay for it.
Thanks again for giving us such a memorable experience. ”

Brady P.
Theodore Roosevelt High School

“ I thoroughly enjoyed my Engineering Day at the FBI. It was really interesting. I wasn't sure what an engineer would do at the FBI but now I have a better appreciation of what that means. The info session at CSU and the tour was good. I better appreciate what CSU has to offer. It certainly is an impressive place and the engineering program sounds awesome. ”

Spencer S.
Gilmour Academy

“ Thank you for selecting me to be part of the CSU Engineer For A Day Program. I visited Fredrick, Fredrick, and Heller in Broadview Hts. While visiting FF&H I got to see what mechanical and electrical engineers do to design the duct systems and electrical systems for new or renovating hospitals. Going to FF&H was a good learning experience to see what real engineers do besides building bridges! It helped me get an idea of what I want to do later on in life by visiting other places to see what other companies or jobs there are that would be very beneficial to my career path. ”

Christine U.
Rocky River High School

RECOGNITION OF ENGINEERING FACULTY, STAFF & STUDENT SUPPORT

Our faculty, staff and students make our community outreach possible and provide stimulating lessons that engage visitors in fun, informative "hands on" activities. We also thank others at CSU for their support.

Akshata Datar
Ali Kaddah
Anaamika Maddipati
Ankur Mantri
Annalise Kelleher
Anvesh Chowdary
Arpit Patel
Audrey Wiggins
Becky Laird
Brianna McKinney
Cristina Wayton-Sanchez
Danielle Vath
David Epperly
Deeksha Singh
Diane Tupa
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Dr. Norbert Delatte
Dr. Paul Lin
Dr. Pong Chu
Dr. Ton van den Bogert
Dr. Woodrow Whitlow
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Duane Crockrom
Gregg Schoof
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The Felicia Peters Pollock Fenn Academy Scholarship

Jerald Neff

Robert Schieman

Lubrizol

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SUPPORT FENN ACADEMY

Fenn Academy relies on donations from corporations, foundations, alumni and individuals to conduct year-round outreach and programming and to offer student scholarships to attend CSU's Washkewicz College of Engineering.

Please consider making a tax-deductible donation to the Cleveland State University Foundation. Gifts of all amounts are greatly appreciated to support the operation of Fenn Academy. Named and non-endowed Scholarship (principal can be spent) require an annual donation of at least $12,500 and named and endowed Scholarship (principal cannot be spent) require annual donation of at least $25,000.

MEMBERSHIP AND DONATIONS

To discuss Fenn Academy activities and membership, please contact:

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FENN ACADEMY at CLEVELAND STATE

Learn more about Fenn Academy at

www.csuohio.edu/fennacademy

Additional information about the Washkewicz College of Engineering may be found at

www.csuohio.edu/engineering

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