2019 NSPE-CO™ NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS – COLORADO AWARDS

October 24, 2019

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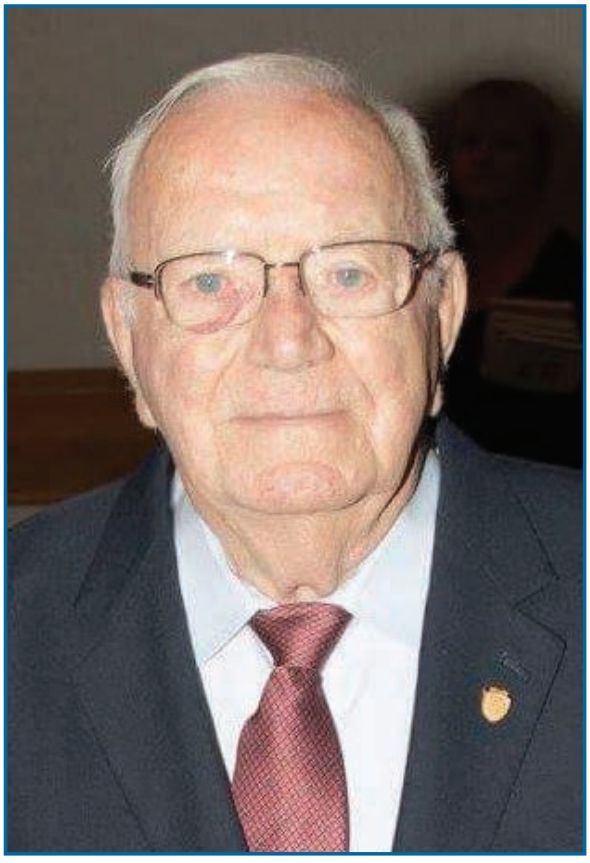
The Gene Burdick Leadership Award

The late Gene Burdick, P.E., F.NSPE, PLS, joined the Professional Engineers of Colorado (which evolved into the National Society of Professional Engineers-Colorado) in 1972. Within four years, he was elected chapter president of the Jefferson Chapter. Seven years later he was elected state president. He then served six years in service as Colorado's alternate director on the national House of Delegates. In 2008, he was awarded the title of "Director Emeritus," which could suggest his service was wrapping up. In 2013, when the Central Chapter experienced a sudden and serious leadership void, Gene Burdick again stepped up. At 80, retired with 40 years of service to NSPE behind him, he became Central Chapter President. Upon his election, he went to work immediately building a young and motivated leadership team around him. In spring 2016 Gene was selected as an NSPE Fellow, recognizing his service at the chapter, state and national level.

Gene died on October 22, 2016 but left an indelible and lasting legacy. In 2017, The 50th Anniversary of Bridge Building was dedicated to Gene. In 2018, we inaugurated the Gene Burdick Leadership Award which recognizes an NSPE-CO leader who has worked to maintain, strengthen and grow NSPE-CO. The recipient of this award will be selected by the current NSPE-CO president in consultation with the executive committee. Among the considerations for the award are exemplifying the traits that Gene demonstrated: Gene had a strong commitment to integrity and ethics, open-mindedness, compassion, strong listener, a role model and mentor for younger engineers, and a strong belief in the profession and the long term health of NSPE-CO as an organization.



The 2019 Recipient of the Gene Burdick Leadership Award is:

Ben Railsback, M.S., P.E., F.NSPE

Ben Railsback joined NSPE shortly after becoming a licensed Professional Engineer and has exhibited a long-term dedication to the organization and what NSPE represents. He is a dedicated member of NSPE-CO and has played a vital role in both chapter and state leadership.

The late Gene Burdick, P.E., F.NSPE, PLS, recruited Ben into leadership at a time the Central Chapter needed a new generation of leadership to carry NSPE forward. Ben began as secretary, was elected as a chapter director (serving on the state board) and became interim-president following the sudden out-of-state move by the then-president. Six months later, he was elected to a full term as chapter president.

Ben was (and remains) a key member of the state's largest chapter. While serving as chapter president, Ben led an initiative to hold meetings at companies within the chapter to increase the visibility of the NSPE.

His belief in NSPE, along with his personable nature and strong leadership skills led to his being elected Colorado state vice president, leading to his service as president in 2017-18. He took an active role in legislative issues effectively testifying against several bills that would have greatly undermined licensure. He presented a positive and well-reasoned stance affirming the value of licensing to the health, safety and welfare of the public. The bills were defeated.

Ben continues to be an active member of NSPE-CO and a resource and role model for other leaders. He currently serves as NSPE-CO's House of Delegates member, representing the state at the national level. He is a Trustee for the NSPE-CO Education Foundation. Ben is a go-to member and leader for NSPE-CO. He continues a strong commitment to cultivating future engineers and is one of the strongest voices for recruiting and retaining NSPE members.

Like Gene Burdick, Ben Railsback was selected to the membership grade of NSPE Fellow. Fellows represent just over 1% of total NSPE membership. Mary Ann Burdick, Gene's widow, shared "I am very pleased that Ben is receiving the Gene Burdick Leadership Award. I know Gene would be extremely happy about that because he had so much respect for Ben."

We congratulate Ben Railsback, recipient of the 2019 Gene Burdick Leadership Award.

About NSPE

In 1934, a group of professional engineers met in New York City to establish an organization dedicated to the non-technical concerns of licensed professional engineers. The National Society of Professional Engineers stands today as the only national organization committed to addressing the professional concerns of licensed PEs across all disciplines.

Our Vision

A world where the public can be confident that engineering decisions affecting their lives are made by qualified and ethically accountable professionals.

Our Mission

To foster licensed professional engineers in service to society.

About NSPE-CO

The National Society of Professional Engineers - Colorado was organized as a member State of the National Society of Professional Engineers in 1949 as "The Professional Engineers of Colorado." The name changed to The National Society of Professional Engineers-Colorado (NSPE-CO) to more closely align with NSPE.

NSPE-Colorado and its Local Chapters support members in the ethical and professional practice of engineering, preserving the health, safety and welfare of the public while promoting the growth and development of the profession. We also work to cultivate future Engineers.

About the NSPE-CO Awards

The NSPE-CO Awards began in 2013, with the goal of honoring excellence in Engineering within Colorado.

Patrick Roberts, P.E., chaired the awards for the first four years and continues to provide invaluable advice and support. Thank you Patrick.

Thank you to 2019 NSPE-CO Awards Chair, Pamela Quillin, P.E. for all of her work.

Nominations for all categories were submitted by individual members, chapters and friends of NSPE-CO. Award finalists and honorees were selected by a panel of judges from among all entries received. Multiple committees composed of NSPE-CO leaders reviewed entries in assigned categories. Our thanks to those who made nominations, the outstanding review teams and our sponsors.

NSPE-CO™ NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS – COLORADO

Part of NSPE-CO's mission is "cultivating future engineers." We honor these educators that are doing just that.

2019 Middle School Educator of the Year

Dan Eulberg

Dan Eulberg is a retired middle school mathematics teacher. His work in the classroom inspired numerous students to love mathematics and pursue STEM (Science, Technology, Engineering and Mathematics) careers. He ran his school's Mathcounts program for many years. When he retired from teaching, he enthusiastically volunteered to become a MathCounts coordinator, starting the North Metro Districts Chapter Competition. He obtained school district support, developed a strong team of volunteers and did fundraising for the program. He has maintained that support for many years and continues to run the chapter competition.

NSPE-CO and the MathCounts program appreciates all Dan Eulberg has done to promote learning, mathematics and MathCounts to so many Colorado middle school students.

2019 High School Educator of the Year

Michael Smith

Aurora Central High School

Michael Smith is a high school teacher and professional contractor. In his engineering and science classes, he provides hands-on learning. He works to expand students thinking and provide them real-world skills they can apply to their lives and possible careers in engineering. Smith doesn't simply teach engineering principles but engages students in thinking about real world situations. He helps them analyze problems they face and problem solve using the skills they have learned. His efforts have opened-up the possibility of an engineering career to students that might not have thought about it before.

2019 University Educator of the Year

Roxann Hayes, PhD, P.E.

University of Colorado - Denver

Roxann Hayes, PhD, P.E., has been teaching engineering students for a decade, with an emphasis on transportation-related courses. She often invites industry experts into the classroom. She designs valuable field trips including a recent bike trip around Denver, which allowed her students to experience bike-friendly transportation planning issues first-hand.

Hayes is an advocate for professional licensure, stressing the importance of becoming a Professional Engineer to her students. She uses study material for the P.E. exam in her class assignments, giving students a feel for preparing for the test. She serves on a NCEES (National Council for Engineers ad Surveyors) committee, creating future exam questions.

Her dedication to preparing her students for an engineering career shows through her helping students find real-world internships which can lead to full-time employment. She is a past president of the Colorado Section of ASCE.

2019 High School Student of the Year

Ethan Hughes

Erie High School

Ethan Hughes excelled as he completed the requirements for Erie High Schools Engineering & Aerospace Diploma. He is known for his exceptional work ethic and humble and capable attitude. He helps every team he is a part of perform better and helps produce results that move the team forward in a positive way.

Hughes has pursued a rigorous course load in his quest to become an engineer. He has taken every AP and Honors math and science course the school offers, strengthening his base as a computational and technical thinker.

Before Erie High School offered AP Computer Science, he took the initiative to take the class online, specifically because the skills he would develop in that class would benefit his Senior Design team in their creation of a drone prototype. His skill and demeanor launched his Senior Design team to the forefront as they competed at the national level as state champions in the 2019 Real World Design Challenge.

2019 University Student of the Year

Julia Stone

Colorado School of Mines

Julia Stone is a Masters student at Colorado School of Mines in Chemical Engineering. She has an undergraduate degree from Cal Poly in Mechanical Engineering, where she also was a teaching assistant. She worked on ASHRAE's Applied Engineering Challenge, and Cal Poly Rose Float for Pasadena's New Year's Parade.

Following graduation from Cal Poly, she was a Mechanical Facilities Engineer at Intel. She made the decision to continue her education and enrolled at the Colorado School of Mines.

According to the nomination of Julia, "she is very hardworking and is attempting to get the most out of Mines by participating in research even though it is not required for her degree." Her follow-through and perseverance as well as her willingness to help her classmates sets Julia apart.

2019 Young Engineer of the Year

Mark Sundstrom, P.E.

Martin/Martin Consulting Engineers

Mark Sunstrom earned a B.S. in Civil Engineering with a minor in Mechanical Engineering from the Colorado School of Mines in 2015. This year, he became a licensed Professional Engineer.

He conducts himself in a positive and professional manner with clients and colleagues. Within Martin/Martin he is sought out for collaboration on design challenges and for his expertise with design software. He prepares and delivers presentations to the Civil Engineering Department, recently including Permeable Interlocking Concrete Pavers and Updated Stormwater Detention Pond Design Parameters.

Sundstrom keeps the health and safety of the public as the foundation of his design. He works closely with other team members, clients and stakeholders and effectively communicates the "why" of design decisions.

2019 Public Sector Engineer of the Year

William McCormick, III, P.E.

Colorado Dam Safety

Bill McCormick has been the Chief Engineer for Colorado Dam Safety since September 2011. He leads a team of professional engineers stationed around the state whose mission is to prevent the loss of life or property from dam failures and maximize the safe storage of water in Colorado. He has promoted collaboration and consensus between regulators, dam owners, and engineers. Under his leadership Colorado has been recognized nationally for one of the leading State Dam Safety Programs in the country.

He is president-elect of the Association for State Dam Safety Officials (ASDSO). He has a B.S. in Geology from the State University of New York College at Oswego and a B.S. and M.S in Geological Engineering from the University of Missouri, Rolla.

McCormick is one of those truly special engineers who are committed to the application of their professional discipline for the improvement of infrastructure and safety of society.

2019 Project Manager of the Year

Cade Caldwell, P.E.

Knott Laboratory

Cade Caldwell started his career in the field as a surveyor, where he learned all about the development and proper layout of public roadways and infrastructure. As he progressed into a crew leader, he was able to pass along and train junior staff members on the trade, his first teaching experience. He continued into design engineering where he was able to contribute significantly to the overall design of the projects from his past experiences in the field.

With vast amounts of field experience, he was able to conceptualize his designs and bring real-world solutions through the design phase and into construction. As Caldwell moved into forensic engineering, his vast experience in design and construction allowed him to thoroughly evaluate design, construction sequencing and management issues that contribute to or cause damage to structures.

2019 Woman Engineer of the Year

Sandra Scanlon, P.E.

Director of Electrical Engineering, BCER Engineering

Sandra Scanlon, P.E., launched her electrical engineering firm SSG MEP. She and her team have provided electrical, lighting and low voltage systems design for new and remodeled facilities within medical, municipal, educational, commercial and transit facilities, highways, roadways, and streetscape sectors. in 2017, SSG MEP was acquired by Denver based engineering firm BCER to enhance services in electrical, lighting and transportation.

She is licensed as a Professional Engineer in ten states.

A long-time advocate for STEM outreach, she is a founding member of the Denver School of Science and Technology. For eight years, she has sponsored a Habitat for Humanity Woman's Build Day and is an advocate for safe and affordable housing for all. She is a member of NSPE-CO, NFPA Society of Women Engineers (SWE) and the Institute of Electrical and Electronics Engineers.

2019 Manager of the Year

Robert Philbrick, P.E.

Technical Manager, Detector Technology Laboratories, Ball Aerospace

Robert Philbrick, P.E., has more than 35 years of focal plane design and characterization experience. He has designed countless CCD image sensors for space based remote sensing. Prior to joining Ball Aerospace where he started the Detector Design and Development Group in 1999, he spent 15 years at the Microelectronics Research Laboratory at Eastman Kodak Company in Rochester, New York.

He was a Presidential Scholar at Clarkson University, Potsdam NY earning a BSEE. And Magna Cum Lade at Rochester Institute of Technology where he earned a MSEE.

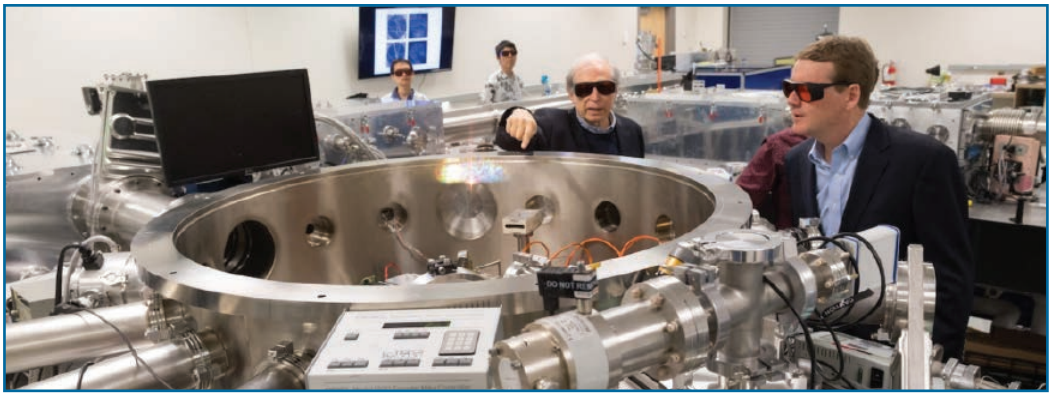
Philbrick has held lead detector positions on Deep Impact, NPOESS-OMPS, RALPH (Pluto), MRO-HiRISE and Kepler programs and consulted on many other programs.

He actively mentors junior engineers and technicians. He has identified no less than eight areas of major internal research and development that provide junior engineers important on-the-job training. Their work improves the ability to forecast weather events, assess agricultural land health and investigates existence of dark energy and black holes.

ELECTRICAL AND COMPUTER ENGINEERING
COLORADO STATE UNIVERSITY

2019 Public Sector Project of the Year

Revolutionizing Engineering Departments at Colorado State University and Beyond



A diverse team of educators is redefining what it means to teach and learn in the Department of Electrical and Computer Engineering (ECE) at Colorado State University.

Despite tireless efforts and incremental progress to realize "The Engineer of 2020," engineering educators are still working to adapt their practices to today's students. Students continue to leave the discipline at unsatisfactory rates, women and minorities are still vastly underrepresented in the field, and those who ultimately graduate from undergraduate engineering programs may find themselves grappling to fully understand the role of an engineer in a constantly changing world.

Historically, topics within engineering have been taught in individual courses. When taught this way, students may feel like they are learning material in a vacuum, and they struggle to see how their knowledge fits together to help them engineer a better world.

While educators have been working for years to unravel the ECE retention problem through attempts that have been largely course- or project-based, CSU has approached the challenge from a holistic perspective to cultivate a student-centric culture that embraces people of all backgrounds.

Supported by a high-profile RED (Revolutionizing Engineering Departments) grant from the National Science Foundation, educators at CSU have abandoned the course-centric approach to teaching. Taking a systems-view of the ECE curriculum, faculty have been empowered to work in multifaceted teams to show students the connections between fundamental ECE concepts and how that knowledge drives innovation.

They have implemented fundamental changes in the delivery and integration of content, with special emphasis on the rigorous technical core of the program—the sophomore and junior years. Faculty are taking a bird's eye view of the curriculum to identify the fundamental technical concepts of an ECE education, independent of courses. These concepts are then rearranged and synchronized into cohesive learning studio modules (LSM). Each LSM is self-contained and addresses one anchoring concept and a set of sub-topics in a core competency area. With the goal of connecting abstract concepts to the real world of engineering, the faculty teams have also designed and implemented knowledge integration activities to put learning in context. Using familiar applications such as the smartphone, these interactive, team-based learning exercises show students how ECE fundamentals are integrated to form the building blocks of modern technologies.

Extending beyond ECE, the CSU Math department also shifted the ordering of material in its Differential Equations course to align with the sophomore year LSMs.

In addition to overhauling deeply technical content, faculty are working together to embed creativity, foundations, and professionalism threads from the freshman to senior years of the program. These threads reinforce essential subjects that impact a student's ability to thrive as an engineer.

The Engineer in Residence program—a unique partnership with the Institute of Electrical and Electronics Engineers—brings practicing engineers into the laboratory to mentor and advise students. The impactful program is creating authentic opportunities for students to hone professional skills and see the value of professionalism through the lens of seasoned engineers.

The Department of Electrical and Computer Engineering (ECE) believes their efforts Revolutionizing Engineering Departments at Colorado State University shows great potential for changing the way students learn engineering across the nation while reversing the attrition trend in engineering education. They are creating a new generation of well-rounded, ethically accountable engineers who are ready to tackle the critical problems facing society.

2019 Private Sector Project of the Year

3D Interactive Visualization of a Near-Fatal Pedestrian Accident

Knott Laboratory was hired as a forensics engineering consultant to investigate and provide a scientific visualization of a motor vehicle accident involving a pedestrian. The accident occurred at a downtown Denver intersection, near a construction site. At the time of the accident, a construction worker was directing two cement trucks, one that was arriving and another leaving the site. One of the cement trucks made contact with the construction worker. The purpose of the investigation was to reconstruct the accident within a three-dimensional virtual environment, evaluate multiple witness statements and establish the likely causation of the incident.

By developing interactive animations for use in forensic engineering and court room presentations, Knott Laboratory demonstrated that multiple case theories can be presented in a single animation. It became possible to evaluate potentially contradictory witness scenarios from their vantage point with the ability to stop, pause, and rewind the event in real time. Having completed such a comprehensive analysis, the visualization project wasn't challenged in court, and resulted in a beneficial settlement between both parties involved in the case.

This project required cooperation and coordination of multiple personnel in multiple disciplines. Forensics animators performed an inspection of the accident site. This included scanning of the intersection with a high-definition 3-dimensional laser scanner, flying an aerial drone to take imagery of the accident site, and photogrammetry utilizing thousands of site photographs. With this information, the forensic animators created a 3-D model of the accident site. The forensics engineers used a physics-based and scientifically-validated simulation software program to analyze the model and define the path of the cement trucks at the time of the accident. After simulating how the accident occurred, the forensic engineers and animators then worked together using innovative programming to create visualizations depicting how the accident occurred and could have been prevented.

Visualizations have been used for decades to help interested parties evaluate how an accident occurred. In the past, they were very basic or had limited flexibility in camera positions. In contrast, the interactive visualization is analogous to a video game in which the user can move the viewpoint to wherever they want in the accident scene and control various scenarios. The ability, using just a laptop, to interact within an animated environment gives the professional engineer and others the ability to explore multiple scenarios rather than a potentially biased and one-sided argument in a case.

The flexibility offered by interactive visualization will assist in future investigations where there are conflicting witness statements. The ability to adjust and analyze significant factors in a case will increase the chance for resolution in cases. In the future, virtual reality or augmented reality headsets can be used in conjunction with these interactive visualizations to give a deeper immersion into the modeled accident scene.

This investigation is just one example of how interactive visualization could be applied. Visualizations can also be used in industrial accidents or viewing constructing phases of a building project.

2019 Private Sector Project of the Year

1144 Fifteenth

The tallest building to be constructed in Denver since the 1980s (and the forth tallest overall), 1144 Fifteenth stands 603 feet tall with 40 stories, 1,200,000 gross square feet and 640,000 SF of office space. The building offers 13 floors of window-glazed parking, a double-height lobby, a 5,000 SF state-of-the-art fitness center, a "living room" style tenant lounge, three sculpted terraces, and two retail spaces on the ground floor. The building culminates in a sloped crown system reflective of Colorado's unique mountains and rocky geography. Column free corners and floor to ceiling glass framing provide panoramic Rocky Mountain views.

Martin/Martin served as the civil and structural engineer-of-record for the building.

Part of 1144 Fifteenth's significant appeal comes from its sheer size, but also from its unique shape. The top 16 floors of the building slope into the signature crown supported by custom steel framing. The geometry

of the crown held numerous design challenges including structuring a 35-foot-tall parapet capable of resisting high winds loads. The parapet structure houses a 160,000-pound building maintenance/window washing unit but lacks a roof diaphragm to distribute the lateral loads. To account for the out-of-plane lateral loads, Martin/Martin designed a creative framing scheme with wide-flange steel columns spanning vertically to a unique horizontal truss. In-plane lateral loads are resisted by multi-tiered steel-braced frames. Martin/Martin closely coordinated development of the steel framing connections with the fabricator, Puma Steel, to accelerate fabrication and erection. To support the height of the skyscraper on the constricted site footprint, Martin/Martin developed a foundation system at the core of 10-foot diameter auger cast concrete piers, the largest ever to support a building in Colorado. To resist wind and seismic base shear, Martin/Martin coordinated closely with the geotechnical engineer, CTL | Thompson, to employ a system that resists base shear through a combination of pier lateral capacity with the capacity of the grade beams socketed into bedrock.

The building uses high strength recycled materials and low-emittance glazing, generating a 10 percent lower energy profile than similar structures. The use of high strength elements minimized the overall tonnage required, reducing energy consumed for material production. The concrete and steel also integrate recycled content. The external façade of the building features floor-to-ceiling windows with low emittance glass glazing. Each floorplate features cantilevered floors to support column-free perimeter offices and conference rooms, an unprecedented office amenity. With 10-foot ceilings, light can reach 42 feet into the building's core, emphasizing natural luminosity and lessening energy used for artificial light. The low emittance glazing reduces radiant heat gain from outside temperatures, cutting energy needs for the internal heating and cooling system.

With lack of adequate staging room, construction scheduling was paramount, requiring detailed coordination between suppliers and construction teams to time material deliveries to the minute. "Hensel Phelps understood at the beginning of the project that this job would require a collaborative project team that included the elite stakeholders in the engineering community. We found that partner in Martin/Martin."—*John Naccarato, Project Manager, Hensel Phelps*