

COMMONGROUND

A University of Utah - Department of Mining Engineering Publication | 2023





LETTER FROM THE CHAIR

DEAR MINING ENGINEERING FACULTY, STAFF, AND STUDENTS,

I trust this message finds you in good health and high spirits. I am thrilled to share some significant updates, achievements, and upcoming events that highlight the progress we are making during the 2023-2024 academic year.

A groundbreaking collaboration between the department and the Rocky Mountain Center for Occupational and Environmental Health aims to address challenging issues in mining safety. The collaboration will provide opportunities for faculty and students to engage in research projects focusing on promoting safety and health in the industry, both locally and globally.

Related to safe operations, our department's Center for Mine

Safety & Health Excellence, in collaboration with Minverso, has successfully developed the initial phase of a first-ever metaverse health & safety training program. Leveraging virtual reality (VR) and augmented reality (AR) technologies, this program will soon include an immersive "mine evacuation" training module. This innovative approach will enhance our understanding of worker behavior during emergencies and contribute to improving safety and preparedness.

Our students continue to showcase excellence in academics, extracurricular activities, and research. Notably, a graduate student has developed a "smart glasses system" with a thermal-imaging camera, enhancing visibility in various mine environments during emergencies. This system facilitates seamless

communication between miners and rescue teams, ensuring safety in challenging conditions.

I am delighted to share that our freshman student enrollment has seen a significant increase from five students in 2022 to 15 in 2023. We anticipate a continued upward trend, with approximately 29 first-year students expected to join our department in the upcoming fall semester. This achievement reflects our collective efforts and commitment to attracting bright minds to the field of mining engineering.

As a testament to our growing success, we regularly stage open houses where we invite high school students and parents from both urban and rural communities to witness the innovative methods and systems developed by our faculty and students using

emerging technologies. Your participation in these events is crucial to help us showcase our achievements.

We highly value our department's strong ties with the industry and actively work to strengthen these connections, providing increased opportunities for collaboration, internships, and employment for

our graduates. My sincere thanks to our faculty, staff, students, and stakeholders for their dedication and hard work in fostering these valuable relationships.

In conclusion, let's continue to build a thriving and collaborative community within the Mining Engineering Department. Your contributions are vital to our

ongoing success, and I look forward to achieving even greater milestones together.

Kind Regards,

Chair Charles Kocsis

RECOGNITION

OUTSTANDING RESEARCH FACULTY AWARD

PRATT ROGERS

STEVEN KOICHEVAR AWARD

CHASE ROBERTSON

EXTRA MILE AWARD

EMILY BALLARD

OUTSTANDING ACADEMIC ACHIEVEMENT

SHINAYA HARRIS (FRESHMAN)

ALI CAMACHO (SOPHOMORE)

ETHAN ARBUCKLE (JUNIOR)

JOHN E. WILLSON DISTINGUISHED STUDENT AWARD

ZACH BROWN

THE WATCHMAN AWARD

BEN LYDDALL

OBLAD SILVER MEDAL OF EXCELLENCE

DAVID SAWYER

Read more at mining.utah.edu

Cover: Miners investigating a tunnel.

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IMMERSIVE VR FOR REAL WORLD TRAINING

(above and next page) Stills from VR experience teaching real world health & safety protocols. Credit: Minverso

THE CENTER FOR MINE SAFETY AND HEALTH AT THE DEPARTMENT OF MINING ENGINEERING, UNIVERSITY OF UTAH IN COLLABORATION WITH MINVERSO HAS DEVELOPED THE INITIAL PHASE OF A FIRST-EVER METAVERSE PLATFORM WHICH INCLUDES A HEALTH & SAFETY TRAINING PROGRAM FOR THE MINING INDUSTRY DEVELOPED USING VIRTUAL REALITY (VR) TECHNOLOGY.

This collaborative initiative blends cutting-edge technology with academic expertise for the benefit of both students and the mining industry.

“This mining metaverse is not just technological innovation,” says Department Chair Charles Kocsis. “It is, most importantly, a product of shared experience and dedication to providing students and the mining industry a holistic and immersive learning experience.”

To achieve this, qualified faculty and department research assistants, along with the U and the company Minverso, a VR training company headquartered in Chile, created a research team to

build, test, and validate an innovative Health & Safety training program to be coupled later with a mine evacuation training system for mine workers.

The initial phase of the system was made available to the public in early February 2024. It provides real-time guidance/training to underground mine workers in case of emergency and saves lives while establishing a far-reaching culture of safety and health at underground mines in the US and worldwide.

At the department’s open house in October 2023, students and visitors were given the opportunity to don oculus headsets and experience VR first-hand by entering two portals: one to a classroom modeled after one in the Sutton Building and another leading to a mine in which they could traverse and handle the controls of underground equipment.

VR technology promises not only to serve future mining companies that

can customize the VR experience to their own sites but will also serve as a recruitment tool for the department and other mining engineering programs, says Minverso Commercial Director Dallin Wood. With the launch of the technology “people [are now] experimenting with technology and what it’s like to be a miner. Hopefully,

“The initial phase of this metaverse platform includes an immersive Mine Rescue simulation scenario.”

we can bring in students excited to learn about mining. For example, a recent feature includes operating a drilling rig from start to finish, including initiating the development blast.”

For the next phase, the research team will include experts in psychology, education, and health sciences from the U.

SAFETY FIRST

Of course, improving safety records in mines—for current operators and future mining engineers—is always

foremost in the industry’s mind. “The initial phase of this metaverse platform,” explains Kocsis, “includes an immersive Mine Rescue simulation scenario in which underground miners work together to neutralize a fire that started in the engine compartment of a load-haul-dump (LHD) machine.”. “This real-world scenario demands critical thinking and swift collaboration between mine workers to perform tasks in the right sequence from de-energizing the mining equipment, extinguishing the fire, followed by ramping up the auxiliary ventilation system to dilute the gases generated by the fire below each of their threshold limit value.”

Wood says that the technology promises to deliver “training without risks.”

Eventually, the next iteration of VR will include augmented reality (AR) technology, which allows real-time experiences with other users superimposed, not unlike what some games such as the popular Pokémon Go currently deploy. The possibilities

of AR oculi are immeasurable, eventually using not only the built-in headset cameras but exterior cameras in spaces where other real persons actually exist but appear as avatars. Remote operation of real automated equipment particularly in hazardous mine areas will be part of the coming application of this technology for the mining industry. With each advancement, the goal is to see improvements in safety for the mine workforce.

NEXT PHASE

The next phase of this collaborative initiative will add the immersive Mine Evacuation training module to the metaverse platform. This will help model and understand workers’ behavior in case of emergency while increasing the confidence of miners in reaching the closest refuge station or exiting the mine in case of an underground fire or other emergency.

“This collaborative metaverse platform maximizes educational efficiency by offering a bridge

between theoretical knowledge and practical mining applications,” explains Kocsis. In addition, the simulated space for high-complexity mining operations prepares students for the dynamic challenges offered by the mining industry. ◀



High school students experiencing VR Credit: Marina Gish





DENEES HAYES

COAL MINER'S DAUGHTER

Hayes in front of AI modified background. Photo Courtesy of Denee Hayes.

“THE WORK I’VE DONE BOTH WITHIN AND OUTSIDE OF THE MINING INDUSTRY HAS HELPED ME UNDERSTAND WHAT THE OUTSIDE COMMUNITY THINKS ABOUT MINING,” SAYS DENEES HAYES BSME’02.

She explains there is a misunderstanding about how mining contributes to green energy, sustainability and the environment. Through her diverse work experience, she developed the talking points and negotiating skills to be a moderator and mediator between mining and environmental groups.

“It really shaped the work that I’m doing today in mining, manufacturing as well as in utilities and other sectors.”

While not on the trajectory of the late Loretta Lynn, whose 1971 Grammy-winning song “Coal Miner’s Daughter” (and later, the Academy Award-winning bio-pic starring Sissy Spacek) told the story of the country singer’s upbringing in Kentucky and her elevation into stardom, Hayes’ journey is no less auspicious. In fact, Hayes’

career may end up having a profound impact on the defining issues of our times. Arguably, it already has.

Hayes was raised in Farmington, NM by parents who owned an oil and gas business. Her father, from a family of miners, was from Carbon County, Utah and worked in oil and gas as well as in mining sales. He also drove a truck for the coal mines in Wyoming. Even before high school graduation, Hayes showed an interest in getting a degree in mining engineering. Poised to swoop in, the University of Utah offered a full-ride scholarship

The stakes right now in reimagining the mining sector as it relates to a green economy could not be higher.

and, critically, the industry offered internships and experiences starting the summer before she arrived on campus in 1994.

THOUGHT LEADER

Since graduation from the U in 2002 Hayes has become a thought leader in the necessary convergence of mining and the new green economy. This, while working for nine years in-house

with Utah’s Kennecott Copper until 2020 when she pivoted to private consulting, which she continues to this day. On the academic side, she was the first woman chair of the Mining Engineering Department’s industrial advisory board.

The stakes right now in reimagining the mining sector as it relates to a green economy could not be higher. Regarding the climate challenge at large, we really only have one chance to get it right, according to *New York Times’* David Wallace-Wells. In a recent Tanner Humanities Lecture at the U, the climate journalist reported that half of all carbon emissions have come about in just the last 25 years. Even more

startling, the weight of that carbon (yes, there are methods of measuring it), is more than the total mass of everything ever built by humans and still standing on earth.

Hayes and her colleagues and collaborators may well be up to the herculean task as they look more closely at the complexity of the mining/environment conundrum,

and to find allies. “I like the ability to pull together—the interdisciplinary approach—to solve these problems and issues,” she says. “Diversity of thought and mining engineering gave me the technical knowledge and the language to work between the parties.” She views her training at the U as forging her into a “jack of all trades,” earning a degree that crosses various kinds of engineering with the pure sciences of physics, chemistry and high-level mathematics. This interdisciplinary approach has threaded through her training and work experience via software development, utilities, manufacturing, architecture, mining engineering, integrated operations, and corporate leadership, all while deploying her signature bridge-building skills.

The span between mining and the environmental ethic is not a small one, and it is by dint of Hayes’ experience in a variety of sectors that she has forged her current work as a consultant. “The work I think I did [at Kennecott and elsewhere] gave me a view of two sides, really seeing how the industry has a PR problem and that mining [professionals] have really pitted themselves against environmentalists and other industries, and how we really need to show that if you are pro-green energy you have to be pro-mining.”

At first blush, such a statement seems counterintuitive, but she continues. “If

you think about the trajectory society is currently on, there are ebbs and flows in everything for green energy” whether it’s photovoltaic materials to convert sunlight into electric energy or other sources of renewable energy, like wind and hydropower.

THE GREENING OF AMERICA

To keep up with green economy demands, Hayes explains that the world “will need to mine the same amount of copper between now and 2030/40 as we have in all of humanity.” And that is an example of just one metal. “Because there’s that much

“We really need to show that if you are pro-green energy you have to be pro-mining.”

copper that goes into those things [i.e., green technologies, coupled] with population growth, even power transmission—from coal or a green energy source— you still utilize copper and a whole host of other critical minerals within that energy transmission and distribution.”

Hayes is quick to remind us that more than half of the periodical table goes into producing and running your cell phone. Furthermore, “anything in the periodic table needs to be mined.”

The challenge of greening America is not just about extraction of critical metals from new as well as historical mines which are being re-opened and are using new technologies to re-mine, for example, tailings. It’s also about water use, of particular concern

to those of us in the West. Part of building a consensus between two opposing sides is to hold a space for both without papering over reality, on either side.

“We now have an opportunity to right some of the wrongs of mining in the past and some of the ways that we didn’t understand how we were harming the Earth,” she says, not only referencing Environmental Protection Agency-designated superfund sites of mines but seeing the sector from the view of digital optimization of the entire value chain. These involve

standards, both enforced by governmental regulations as well as industry best practices that don’t exist outside

the US which is why Americans have relied on questionable extraction services outside the country, something that Hayes finds unacceptable. “If we want to continue leading the lives we are leading, we have to do our own extraction operations of critical materials ethically.”

Ethical practices extend as well to current mining employees and can only add to efficiencies that stakeholders demand. Hayes values “helping connect the executive level strategy to the front line, figuring out how to get the



Hayes in the field. Credit: Denee Hayes

front line activated to enact that strategy. You're leading people and focused on their safety and well-being and not just managing the tasks at hand," she says.



Hayes with her father.

three or four women in the department. That hasn't changed much in the last 30

years with most mining organizations reporting only 7-10 percent of a work force made up of women. "The real work needs to be for everyone to understand that a career in mining is a career for the environment, for green energy, and having that will be an attraction for people to come in. [We need to] make it psychologically safe to work in this industry, which it hasn't always been. It's work that we all have to do. When you're trying to tackle these large problems in industry you really need the diversity of thought that comes out of these different mining programs."

MOVING THE NEEDLE

And clearly for Hayes, it's not just about operations, safety and profit—or even of financial stakeholders for that matter. It's about moving the needle in the industry towards not only a greener way of doing things, but a more just and equitable way of doing those things as well.

The systemic reimagining of mining is a daunting proposition, and it requires bringing in diverse voices to inform, what Hayes calls, the "broader topics of that broader conversation." She well remembers being an undergraduate—one of only

years with most mining organizations reporting only 7-10 percent of a work force made up of women. "The real work needs to be for everyone to understand that a career in mining is a career for the environment, for green energy, and having that will be an attraction for people to come in. [We need to] make it psychologically safe to work in this industry, which it hasn't always been. It's work that we all have to do. When you're trying to tackle these large problems in industry you really need the diversity of thought that comes out of these different mining programs."

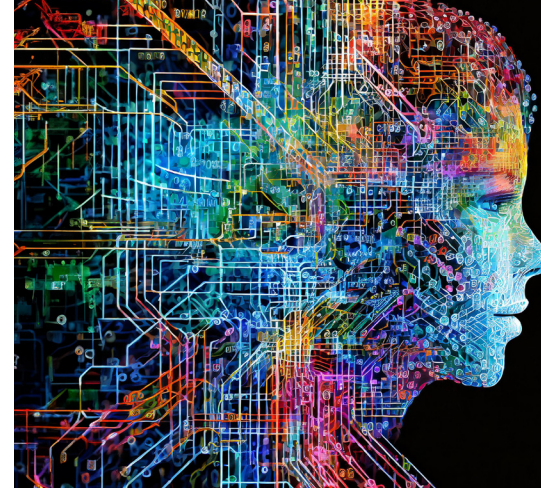
The U's program is no different. As with other institutions of higher education, its metrics of success are research, funding, student enrollment, and student success. "Industry needs to do its part to help create a pipeline of students to the U as well as look to the university to do some of their important research. The same holds true in reverse; universities need to be asking industry what will be most

impactful for mining of the future." If things don't change, mining engineering departments across the country like the one here at the U will dwindle and die.

CRITICAL MATERIALS, CRITICAL THOUGHT

Fewer and fewer programs in all academic fields means less and less diversity of thought, which is critically needed. Hayes intends to advocate for better associations between industry and the university for this very reason. It's a personally held mission that might have not only a macro difference but a micro one as well in these challenging times. She and her husband are the proud parents of another proverbial "miner's daughter," and her daughter is likely to be better positioned to consider a degree and a career in mining engineering because of her mother's continuing hard work in the sector.

When Denee Hayes recently won an honorary alumna award at the department's most recent awards ceremony, the coal miner's daughter had her dad in the room. "He was ecstatic to come and see me," she says with a smile. ◀



MAKING MACHINE LEARNING ACCESSIBLE TO EVERYONE

"MANY CALL THIS THE AGE OF INFORMATION" SAYS RAJIVE GANGULI, THE MALCOLM MCKINNON PROFESSOR OF MINING ENGINEERING AT THE UNIVERSITY OF UTAH.

"It is perhaps more accurate to call it the age of data since not everyone has the ability to truly gain from all the data they collect. Many are either lost in the data or misled by it. Yet, the promise of being informed by data remains."

Ganguli who is also the College of Mines and Earth Science's associate dean (assessment) has launched UteAnalytics, a new, free analytics software which makes artificial intelligence (AI) or machine learning (ML) accessible to all.

Founder of the ai.sys group at the U, Ganguli says that as long as a client knows their data (that is, is an expert in their domain), they can use UteAnalytics to understand better the problems they are trying to solve. The research group's mission is to seek insight from data and models systems and to develop computational tools for education and research.

At various points in time, Ganguli has developed ML tools that his students could use in class. Years ago it occurred to him that more could benefit from ML if only his workflow and tools were more user-friendly. His vision was finally brought to fruition by graduate student **Lewis Oduro MS'23** who leveraged the numerous public domain ML tools available to programmers and converted the concept into Windows-based software.

"The tool is problem agnostic," Ganguli says. "Hence it can have a broad group of users. I have used it for a variety of projects I am involved in, including mining, atmospheric sciences/air quality and COVID-19/hospital admissions."

Before the formal launch last year, he reports that tens of subject matter experts (SMEs) who are non-coders had already subscribed to receive the software in advance. "Many are professionals across a broad spectrum of fields from social science to business," along with scientists and engineers.

MASTER OF A DOMAIN

Potential clients for UteAnalytics may be "master of their domain," with large

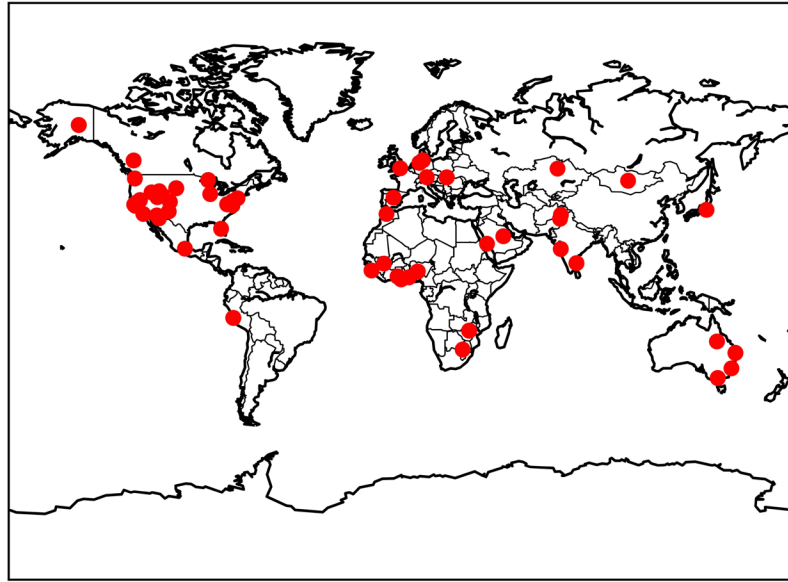
sums of data in various formats and curious about what insights they can gain with ML, but they know nothing about it and certainly not about how to code ML or even do basic data analysis.

Designed to empower the domain expert, UteAnalytics allows a client to clean their data (remove nulls, convert data type from string to numeric, etc.); apply filters, to consider data within specific magnitudes, among other functions; conduct exploratory data analysis on the data; and apply linear regression, random forests (regression and classification) and neural networks (regression and classification).

The software also allows users to estimate effect of



The duo at Oduro's hooding ceremony.



Location of UteAnalytics downloads to date.

each feature (input) on the output as well as develop models in advance of predicting on a new dataset.

Daniel Mendoza, who holds faculty appointments in the Department of Atmospheric Sciences and elsewhere at the U, is an early adopter of the software. Through his work with air quality monitors on UTA trains and electric buses in Salt Lake Valley, he and his team have successfully collected data for over eight years for particulate matter and ozone data and now nitrogen oxides.

“When we look at neighborhood-specific data we can drill in and really see some social justice impacts,” Mendoza reported last year. Today, he is “using UteAnalytics to quickly and efficiently analyze the temperature data that we’ll be collecting in real-time from our mobile and

stationary sensors. UA,” he says, “gives researchers the power to look at data in a very streamlined way without endless hours of coding. The included tools facilitate a thorough interpretation of data and save time without compromising reliability.”

The difference that data — assisted by UteAnalytics tools — makes in Mendoza’s work on air quality is most recently seen in the Urban Heat Watch campaign, involving citizen scientists who are helping collect data along the streets of Salt Lake Valley. As one of the top three urban heat islands in the nation, the Salt Lake City metropolitan area features a groundbreaking monitoring program. In fact, no where else in the world is there an initiative that exists at this density and scale than in Utah’s capital city and environs. And now UteAnalytics is helping Utah’s clean air initiative as well.

AN AUSPICIOUS LAUNCH

Since the launch last summer, 60 percent of the downloads have stemmed from non-academic professionals and academic researchers. (The rest are students. The downloads came from those in engineering, business, sciences including social science and medical fields, and many users have already asked to renew their licenses.

“This is a tool that is making an impact around the world,” says Ganguli. “It has been useful to a wide variety of fields. It’s cool that those not engaged with academic research have been a core group of users.”

UteAnalytics is just the latest deliverable for Ganguli who has led approximately \$13M in projects as primary investigator. With the launch of UteAnalytics, it’s the fruition of a long-term ambition that, now available to the public, has an auspicious future ahead of it.

Meanwhile, Oduro, who defended his thesis this past spring, has since taken a job near Phoenix, Arizona as a mining engineer at Freeport-McMoRan, a leading international mining company. Under Ganguli’s tutelage and support, Oduro was the principal player in building UteAnalytics as desktop software used for data analytics and building predictive ML models. ◀

THE U GOES TO GREENLAND

FACULTY MEMBERS RAJIVE GANGULI AND MICHAEL G. NELSON AND THEIR TEAM IN THE U’S MINING ENGINEERING DEPARTMENT WERE SELECTED FOR A \$1.2M COOPERATIVE AGREEMENT TO ASSIST GREENLAND WITH MINE TRAINING.

Partnering with the University of Alaska Fairbanks, the team possesses decades of mining and training experience in the northern lands of the world’s eight northernmost countries (a.k.a, the “Arctic Eight”). Together they are assisting the KTI Råstofskolen, Aatsitassalerinermik Ilinniarfik or KTIR (Greenland School of Minerals & Petroleum) in advancing its training capabilities to address the growing mining sector in the world’s largest island.

Founded in 2008 in the city of Sisimiut, situated among picturesque wide

valleys and steep mountains in central-western Greenland, KTIR ensures a skilled workforce for the Greenlandic mining and construction industries. The school offers students international courses and apprenticeship programs.

The goals of the project are to advise KTIR on the design and construction of an underground mine training facility (UMTF) by developing six courses that enhance KTIR’s training offerings for the mining sector, provide training in mine search and rescue, and to familiarize KTIR and government stakeholders with major elements of the mining sector.

During the past two years of the exchange, several courses have been developed to help KTIR add mining-related coursework to their curriculum. Some activities involved faculty/staff exchanges. KTIR visited the department for

mine rescue training led by Nelson, who is now retired. Another group of KTIR staff received hands-on training in underground mining activities (drilling, blasting, etc.) at the University of Alaska Fairbanks.

Ganguli also helped the US Department of State organize a ministerial level visit to Utah to meet with various sectors of the Utah mining industry. Then, in November 2023 he traveled back to Greenland, this time with Kocsis, to attend an intergovernmental meeting between the governments of Greenland and the US. At the meeting in Nuuk, Ganguli informed Honorable Naaja Nathanielsen, the Minister of Mineral Resources, and her staff, about workforce development challenges in mining, particularly in the Arctic. As part of the visit, Kocsis conducted training on mine ventilation at KTIR in Sisimiut. Following the training, Ganguli hosted a robust discussion on artificial intelligence. ◀



THE REAL MINING WAS THE FRIENDS WE MADE ALONG THE WAY

THE MINING OPEN HOUSE LAST FALL WAS AN INTRODUCTION TO THE PUBLIC, INCLUDING STUDENTS LOOKING FOR A MAJOR, BUT FOR TWO SENIORS IN THE UNIVERSITY OF UTAH'S DEPARTMENT OF MINING ENGINEERING, IT WAS THE FINAL YEAR OF A HARROWING UNDERGRADUATE CAREER.

Harrowing not because of the rigorous training in Vulcan and Python software; or the upper-division math that (with one additional class) would have given them a minor; and it wasn't because of the summer internships in various

cool mining environments simpatico with the on-boarding to mining

engineering they were more than eager to engage.

No. It was because of the COVID-19 pandemic.

"We only had one mining class in-person the first semester," says **Ian Sutcliffe**. "It was rough." It took two years before his cohort was able to go on their first field trip to a mine, which usually happens as a second semester experiential.

For **Alex Carhart**, who is also a senior, getting ready to graduate this year, it was not only the pandemic that proved to be a hurdle but changing from one major in the College of

Engineering to mining engineering in the College of Science. It was in their introductory mining class that the two became fast

friends, a friendship that has taken them the distance through summer internships that proved, as it seems to for undergraduates, to seal the deal.

In the case of Sutcliffe, who grew up in Murray, his first-year internship found him driving a water truck on site. This "baptism by fire" for both (Carhart also got hands-on experience driving trucks and heavy equipment) gave them on-the-ground experience that perfectly complemented their classroom training.

"I was driving the old trucks and the water truck for a good half of summer," says Sutcliffe, "and I'm really glad I did because the more mining classes I've taken, the more I've enjoyed it. My first internship really got me involved."

For Carhart, who is from Anchorage, the chance to work in long-range strategic mine planning gave him experience on the other end of operations—the big picture of planning and logistics. Both credit these internships, as well as the travel opportunities with the department, for cementing their passion for the field.

The chance to visit Greenland as sophomores was a pivotal experience, recalls Sutcliffe. "I was kind of bouncing around chemical engineering and then I heard about mining and decided to try that instead." For Carhart, who also traveled to a trona (the mineral name for what becomes baking soda) mine in Wyoming and a coal mine in Utah, the field trips finally happened in his junior year when pandemic restrictions began to lift.

Now, with graduation looming, both have secured jobs in their field. Sutcliffe will return to the trona mine where he interned, while Carhart has accepted a position in the graduate

development program at Rio Tinto Kennecott in Salt Lake City. There he will rotate through different areas of the operation over two years to find the right fit before settling into a permanent role. But before they start work they will travel with the department to Mongolia to visit one of the largest copper mines in the world.

Their undergraduate journeys, while filled with pandemic headaches, gave them technical knowledge through software, math and geology classes, as well as critical field experience at mines and with companies. Perhaps most importantly, it allowed them to forge a lasting friendship that helped motivate them through to graduation.

They also earned perspective on the industry they will soon help manage and lead.

"It's an interesting thing that might be in my lifetime—space mining," says Sutcliffe, on innovations that may come out of demand for finite resources. Both see a path forward for mining, even with increased environmental regulations, through better technology, safer autonomous equipment, and reclamation plans built into project costs. But most of all, through educated young professionals like themselves entering the field with openness, optimism, and care for the planet we call home. ◀

DID YOU KNOW?

This image is courtesy of **Dan Christensen's** BS '22 senior design project. Because Christensen enjoyed Minecraft, he decided to import the design of the pit into a virtual image in the popular video game. This is being further developed to be its own "world" where it can be a tool to further awareness and understanding of mining operations and safety protocols. ◀



Carhart (left) and Sutcliffe (right)

DISTINGUISHED ALUMNI

by KIM MCCARTER, PROFESSOR EMERITUS



THE JOHN E. WILLSON DISTINGUISHED ALUMNUS AWARD WAS

ESTABLISHED IN 2000 TO RECOGNIZE GRADUATES OF THE UNIVERSITY OF UTAH'S MINING ENGINEERING PROGRAM WHO HAVE SET HIGH STANDARDS BY THEIR PROFESSIONAL ACCOMPLISHMENTS AND SERVICE TO THE MINING INDUSTRY.

The 2023 distinguished alumna is **Amanda Smith** BS'01 and MS'02. She was awarded in April of last year.

Currently owner and manager of SmithWengel Consulting LLC, Smith has accumulated over 20 years of global professional experience in mining, manufacturing, rail, logistics, technical studies, and supply chain management.

DISTINGUISHED BROWNING SCHOLAR

Originally from Provo, Smith decided to become a mining engineer at age 12 after a mining engineer visited her 6th grade class. She worked hard to graduate with high honors a year early from Provo High School. Her courses included AP calculus, AP chemistry, and AP US history along with English, biology and French. Her English

Instructor describes Smith as a “goal-setter” and “one who sets her mind to a task and then does all in her power to accomplish it.”

In 1997, Smith applied for and received a Browning Scholarship to pursue her degree in mining engineering. A year later, her scholarship was upgraded to the Distinguished Browning Scholar Award. Her interest in, and ability to apply computer technology was recognized and she was hired as a teaching assistant for the department's ACAD course, following her first year. Subsequently, she was old enough (18 being the required age to work in a mine) to accept summer internships with the Bridger Coal

Smith [is] a “goal-setter” and “one who sets her mind to a task and then does all in her power to accomplish it.”

Company in Rock Springs, Wyoming and Newmont Gold in Elko, Nevada. She also worked for the Utah Division of Oil, Gas and Mining while attending school.

Upon completing her MS, Smith accepted a position at Rio Tinto Kennecott Utah Copper as a mine planning engineer. In part due to her graduate work in blasting, she was considered and offered a job the

day of her site interview. This was the beginning of a highly successful career with Rio Tinto.

While at the Bingham mine, Smith progressed through various engineering and supervisor roles, ultimately becoming superintendent-mine monitoring and control where she established a team and successfully implemented a new operating system. Typically, superintendents at the mine had been male. Achieving this promotion as a young, capable woman was particularly significant.

DOWN UNDER

In 2010, Smith moved to Australia to work as the mine operations superintendent at Rio Tinto Gove. The attractions to this position were an opportunity to experience a different culture and increased responsibilities.

As superintendent, Smith was responsible for over 100 employees across the operations, maintenance, and technical teams. She initiated step-change improvements in safety, mine planning, reporting, reconciliation, and leadership, resulting in zero recordable injuries along with record equipment utilization. From there, she advanced to acting mine manager where her span of control increased over materials handling and a full port operation.

Smith's next move in Australia was working fly-in fly-out in Perth, Australia for Rio Tinto Iron Ore as mine services manager. She was responsible for site health and safety, training, business improvement, infrastructure, village and dewatering teams with her team setting new operational records. After another stint as a mine manager, in 2013, Smith's mine services role transitioned to cover two sites and more than doubled in size. This enabled her to lead significant transformation, resulting in a greater than 10 percent reduction in department operating costs and an introduction of various cross-site synergies.

LEAD TRAIN CONTROL

In 2015, Smith transitioned to lead train control of the largest rail network in Australia and one of the most complex logistics chains inside Rio Tinto. Her leadership was instrumental in the introduction of an electronic train control system, and commissioning of AutoHaul®, the world's first fully autonomous heavy haul rail network. She also focused on improving team engagement, resulting in decreased operational costs.

Next, Smith became a business executive to the managing director, productivity and technical support for Rio Tinto globally. In this role, she was exposed to all of Rio Tinto's operations, traveled extensively, and supported some of the key global initiatives that have contributed to the company's success. It also honed her interest for what she would

tackle next. After nearly nine years in Australia, it was time to return to the US where she led a digital transformation project across the Rio Tinto Kennecott value chain.

In 2019, she accepted the operations general manager role for Rio Tinto's California Operations. Here she led a team of more than 900 people with great care through the COVID-19 pandemic, while also navigating the politics of mining in California, supporting local communities, being an active member on the California Chamber of Commerce, and yielding record site performance.

PIVOT TO CONSULTING

Highlights of her time leading this team were the delivery of the first battery-grade lithium from the site's pilot plant and the success and genuine care displayed by her team.

In early 2022, and after over 19 years with Rio Tinto, Smith decided to transition into consulting where she saw she could make a positive impact across a diverse range of fields and organizations. SmithWengel

Consulting has supported global clients and a targeted project in Ghana, Africa. The change has also provided her more time and space to pursue personal interests and support the community through volunteering.

Smith and her husband and partner Craig Wengel have settled in St. Petersburg, Florida, where Smith enjoys fitness, investing and data analysis, cooking, traveling, and spending time with friends, Persian cats, or at the beach. ◀

John E. Willson (1912-2002), former chair of the department of mining engineering, led a distinguished career as an engineer in industry, as a teacher, and as an advisor and consultant. In 2000 the award named after him was established to recognize distinguished alumni and deserving students in the department.

AutoHaul® shipping a load in Australia. Credit: Rio Tinto





Thank you to all of our alumni and friends who contribute to the Department of Mining Engineering. Your support enables us to provide exceptional education, conduct groundbreaking (literally) research, and prepare the next generation of leaders in our discipline.

If you'd like to support our efforts, please consider contributing to the

MINING STUDENT EXPERIENCES FUND,

which provides hands-on, real-world industry experiences for students.



This year, donations will be used to support a student trip to Mongolia to visit the Oyu Tolgoi mine. In the future, this fund will be used for additional experiences to prepare mining engineering students for impactful careers.

We are grateful for your investment in our students, faculty and staff. We'd love to hear from you or have you stop by campus for a visit. You are always welcome here at the University of Utah!

For more information about giving to Mining Engineering, contact:



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