

November | December 2020

The following newsletter has been created to engage with those passionate about Humanitarian Engineering (HE) by providing information and resources to our subscribers. This issue highlights key events, projects, and opportunities for involvement all related to HE at Mines and around the world.

December Graduate

We are so proud of our 2020 fall HE graduate, Graham Braly! Graham is graduating from Mines with a degree in Electrical Engineering and a Leadership in Social Responsibility minor. In spite of a very unusual final semester, we are so impressed by Graham's hard work and dedication to Humanitarian Engineering. We can't wait to see where he goes next.

Graham, please stay in touch!



Past Events



November Humanitarian Engineering and Science (HES) Colloquium

Climate Change from the Streets

By Nick Yavorsky

On Tuesday, November 10th, the HES Program held its third colloquium of the fall semester. The event centered on a presentation given by Dr. Michael Méndez who spoke about his life's work wrestling with challenges surrounding environmental justice. In January of 2020, Dr. Méndez published a book on his work entitled *Climate Change from the Streets*. This book served as the primary content of his presentation.

Dr. Méndez grew up in Southern California and subsequently spent 15 years working within the California State Legislature analyzing climate change policy and how it affected marginalized communities within the state. In addition to his work within the

November | December 2020

legislature, Dr. Méndez has also spent considerable time in academia. Currently, he is an assistant professor in the School of Social Ecology at the University of California, Irving.

Dr. Méndez's book and presentation centered on the argument that solutions to climate change challenges must be viewed through a social equity lens and across a multitude of scales. He argues that solutions to climate change and public health are closely linked and the most effective solutions enact change in both arenas. After discovering a lack of literature in the field of environmental justice, and specifically a lack of literature that addressed the intersection of environmental protection and its impact on communities of color in California, Dr. Méndez made it his goal to shed light in these areas. Dr. Méndez's presentation was powerful, thought-provoking, and was truly representative of the spirit of the HES program. We thank Dr. Méndez for his time and hope we are able to hear him speak again in the near future.

December HES Colloquium

RETOS and Solutions in Humanitarian Engineering and Science

By Cecilia Schroeder

Diana María Duarte Gómez is an industrial engineer who helped develop RETOS, which is a platform that connects South American communities with students globally. Gómez spoke about how RETOS began, its trajectory, and its future. RETOS focuses on rural communities, as 44% of the population lives in rural communities. In Colombia alone, 20% of these communities live in poverty. Gómez presented on the concept of co-creation, in which communities and students work together to create shared value within these rural communities. RETOS utilizes co-creation globally and hopes to utilize this strategy long-term in order to continuously improve communities with the support of universities. Gómez also explained how their platform is being developed and the ways RETOS works with universities. The platform has three phases: 1) connect students with communities using artificial intelligence, 2) co-creation process support, and 3) measure and make visible the community co-creation system. The involvement of RETOS within universities is sure to inspire a new generation of humanitarian engineers who will work together with communities in the future. For more information on RETOS, please visit the article "[HE + RETOS = Reaffirming our commitment to justice, community, and sustainability amid a pandemic](#)" in the HE @ Mines section of the newsletter.

November | December 2020

Gold Nuggets: A Humanitarian Interview Series

Dr. Kevin Moore

By Kevin Greene

For the second installment of the Gold Nuggets interview series, I had the great pleasure of interviewing Dr. Kevin Moore. Dr. Moore has had positions in engineering and consulting but has spent much of his career working in academia. While a dean at Mines he worked to start and shepherd the Humanitarian Engineering department. He is now the executive director of the Humanitarian Engineering program and will be working to raise more money and see the program flourish into the future.



The conversation was varied and explored Dr. Moore's diverse career, some of the history of the HE program, and his ideas on how engineers can make a beneficial impact on the world. Much of the conversation centered around how engineers from disciplines that are not seen as traditionally being compatible with Humanitarian engineering (like electrical engineering) can work to create a more socially just world. Dr. Moore talked about aligning one's passions with one's passion for making a difference in the world. Dr. Moore was very insightful and was able to talk about these topics from both a very personal individual level and from a high-level perspective.

I am thankful I had the chance to have this conversation and am excited Dr. Moore will have a continued presence in the Humanitarian Engineering department. If you would like to watch this interview or any other interview, they are available [here](#).



Dr. Alexis Navarre-Sitchler

By Nina Guizzetti

Earlier this month, Humanitarian Engineering posted its third and final Gold Nuggets interview of the Fall 2020 semester. This interview was hosted by former Schultz scholar and incoming Master's in Geological Engineering student, Cassidy Grady, and me. We hosted Dr. Alexis Navarre-Sitchler, Associate Professor in Geology and Geological Engineering. Dr. Navarre-Sitchler's specialty is

November | December 2020

aqueous geochemistry, with a special focus on CO₂ contamination of groundwater. Dr. Navarre-Sitchler led Cassidy and me, as well as other attendees, through a discussion regarding accountability and responsibility in terms of her work in geochemistry. She talked about ethical obligations to the public and the environment and how geochemistry is interconnected with public interests and health.

We also discussed Dr. Navarre-Sitchler's recent selection as a Ben Fryrear Endowed Chair for Innovation and Excellence at Mines. This award includes three years of funding to further Mines' mission and vision. Dr. Navarre-Sitchler discussed her future plans with this award and how she plans to develop that vision. We are excited to see what Dr. Navarre-Sitchler will do with this award in the coming years.

We are looking forward to hosting more Gold Nuggets interviews in Spring 2021 which will include insightful discussions about Humanitarian Engineering themes in different disciplines. Please watch for additional information in future newsletters and other HE outreach!

HE @ Mines

HE + RETOS = Reaffirming our commitment to justice, community and sustainability amid a pandemic

Dr. Elizabeth Reddy
HE Assistant Professor



Dr. Juan Lucena
HE Director, Undergraduate Programs



The Mines Humanitarian Engineering (HE) Program has always been proud of engaging with communities in the most responsible and socially just ways to ensure that the solutions our students co-create with communities are sustainable into the future. This is why the three pillars of our program (represented in our logo) are: social justice, community, sustainability. But how do we continue with this commitment at a time when it is impossible to travel and engage communities in a safe, caring, respectful and empathic way?

November | December 2020

To overcome this incredible challenge, the HE team is partnering with RETOS, an organization of interdisciplinary professionals dedicated to matching Latin American communities facing challenges and creative students around the world. RETOS uses an innovative artificial intelligence platform to analyze information about their partner communities (e.g., their context, needs, actors, etc.) and students (e.g., majors, interests, course requirements, etc.) in order to build relationships for successful community development projects. RETOS then defines and supports community engagement processes to make sure that those relationships grow in respectful ways and that communities can give meaningful input to shape students' work. According to Diana Duarte, co-founder of RETOS, "Our vision is to foster a community-based co-creation ecosystem where Latin American communities co-create solutions with the support of students from universities across the globe. We partner with university programs that believe in multidisciplinary work as a strategy to generate social impact and a more equitable world. We are very excited to start this alliance with the Humanitarian Mining Engineering Program. We have no doubt that together we will transform many realities"



RETOS team and students in co-creating activities with community members in Colombia.

Source: RETOS

Currently, RETOS has identified a number of exciting projects in Colombian communities aimed at everything from improving beekeepers' and fruit farmers' production and markets to working with street recyclers; from finding meaningful employment for Venezuelan refugees to and generating localized energy for community micro-grids. For Spring 2021, two of these projects will be presented to senior students undertaking their Capstone experience as part of the

Engineering for Communities Design Studio (ECDS). The first involves finding ways to recycle tetra-pack waste and its essential materials (aluminum, cardboard, plastic) to be used in artisanal products, and the second requires designing an avocado harvesting process that will improve product quality and marketability.

ECDS Project Advisor Dr. Beth Reddy is excited to begin a partnership with an organization that shares the values of the HE Program. "The RETOS team has the capabilities to facilitate collaborations between engineering students and the communities they design for," says Reddy. "They're going to be great partners for the HE Program." Once the projects are staffed by the appropriate students, many of whom

November | December 2020

are already members of our HE community, the RETOS team will use its AI platform to help the communities and students start building relationships and doing real-world engineering with social justice, community, sustainability in mind.

AASHE Global Conference on Sustainability in Higher Education: Sustainability as a Socio-Technical Problem

Julianna Valenzuela
Civil Engineering '21

This Fall, I had the honor of presenting at the 2020 AASHE Global Conference on Sustainability in Higher Education. With the immense presence of social unrest, the global pandemic, and the struggles that educators and students alike have faced with going remote, the conference targeted topics of social justice, education reform, and how to incorporate more sustainable initiatives on campuses. To be in the same 'room' (online, of course) as other researchers, scientists, and innovators who were dedicated to making the world a better place was exactly the reminder I needed in the midst of the mid-semester-stress-inducing, world-on-fire atmosphere we've all been slugging through: We are not alone.



Maybe sometimes it feels like we are fighting the whole world to try and save it, but I have found that that is simply not the case. There are many brilliant, motivated, and downright powerful people doing everything they can day in and day out to create change. And we are as much a part of that community as those who lead the conversations and write policies. I find myself always in need of the reminder that while this fight can sometimes seem so daunting, we are much more powerful than we give ourselves credit for. I hope that as the semester draws to a close, you remember that and stay inspired and motivated to keep working towards a sustainable and just future for us all. We cannot give up. The world is counting on us!

If you are interested in listening to my presentation on socio-technical applications of sustainability in science and engineering, you can check it out on our HE Youtube channel [here](#).

November | December 2020

Faculty Spotlight

Dr. Stephanie Claussen

Teaching Professor, Engineering, Design, & Society and Electrical Engineering (through December 2020)

Assistant Professor, San Francisco State University (in January 2021)



When I applied to join Mines in early 2012 as an Associate Teaching Professor in the Electrical Engineering Department, I described in my cover letter what attracted me to the university. One of the things I mentioned, nearly nine years ago, was the Humanitarian Engineering Program. I love this fact because, even though it took a few years of being here before I was formally affiliated with the program and able to contribute to it in meaningful ways, this was something I was clearly hoping for from the moment I arrived at Mines. (I also recall attending various HE Colloquia during my first semester at Mines, a totally new and anonymous face in the crowd of eager students and faculty!)

And yet, I am a completely different engineer today than I was then. I have learned so much from my Mines colleagues and students about what it means to work as an engineer in a just and socially responsible way. I have spent time the past few months reflecting on how that learning and development came about. It was certainly, in part, through formal learning experiences like on-campus workshops offered by HE faculty and collaborators, interactions at conferences, and reading the research papers of my colleagues. In fact, it has been occasionally surreal to have the chance to work alongside researchers whose work I had been reading for years before coming to Mines - what an honor!

But I think I have gained even more from informal interactions and mentorship with colleagues who had the patience to teach me and the willingness to work alongside me. One of the strengths of HE (besides the students, who will always be my #1 favorite thing about Mines) is the fact that the program brings together social scientists, engineers, and researchers who don't know which of these to identify with. Despite these diverse backgrounds, we are somehow able to (sometimes? occasionally?) settle upon a shared language and common goals in order to grow the program – and perhaps change engineering education and practice, in some small way, together.

November | December 2020

A few of my favorite memories as part of the HE program: an initial meeting with Juan Lucena in 2013 in which he put Lauren Cooper (now at Cal Poly San Luis Obispo) and me through the ringer as we worked to get his support for a grant we were submitting with HE themes; collaborating with Jessica Smith on a 400-level electrical engineering elective (enabled, in part, through my joint appointment in EE and Engineering, Design and Society and funds from HE); advising Mines Without Borders with Greg Rulifson (now at USAID) and later Leslie Light; leading a study abroad trip to Kenya which we designed with an eye towards enacting HE's values and best practices; learning from HE affiliated faculty, staff and friends like Katie Johnson, Dean Nieuwma, Junko Munakata Marr, CJ McClelland, Beth Reddy, Mirna Mattjik, Jon Leydens, and Julia Roos; and, of course, the HE students I have been able to teach through five semesters of Engineering for Social and Environmental Responsibility and the students who learn about social justice, social responsibility, and sociotechnical engineering in a more subtle (or not-so-subtle!) way in my EE classes.

I still have so much growing left to do, and I am excited to continue it at my new institution, San Francisco State University, where I will begin an Assistant Professor appointment in January 2021. My new position will focus on engineering education research, and part of my responsibilities will be representing the School of Engineering within the Metro Success Program, a program at SF State specifically designed to serve low income, first-generation students with an emphasis on social justice and equity. When I interviewed for this new job, I drew heavily upon my knowledge from and experience with HE, and I am excited to put into practice so much of what I have learned from my colleagues and students at Mines in this new position.

HE Alumni Spotlight

Dot Walch, 2019 Civil Engineering and Humanitarian Engineering minor graduate

Dot Walch graduated in May 2019 with a degree in Civil Engineering and a minor in Humanitarian Engineering. Since graduating, Dot taught math in Guinea, was evacuated with 7,000+ other Peace Corps volunteers in March, applied to and interviewed for dozens of jobs, and accepted a position as a Civil Engineer administering community economic development grant projects with the Department of Commerce: Economic Development Administration.

After graduation, the HE alumna volunteered as a Peace Corps education volunteer in Guinea, West Africa. During the three-month training, she lived with a Guinean host

November | December 2020

family, practiced French, learned about the Guinean school system and its French colonial ties, and ate lots of the region's spicy rice and sauce. Dot then moved to the village Fougou, a rural village in the mountainous Fouta Djallon region. School started slowly because teachers and students were unsure if a nationwide teacher strike for educators to be paid a living wage would restart this year after a series of strikes in 2018 was not met with the policy change that many Guinean teachers and groups were asking for. As Dot grew more familiar with the region from talking with friends and walking and biking the countless mountain paths, she learned of many exciting projects that neighbors and village officials were working on:



- A group of farmers in Fougou formed a collective to grow, sell, roast, and market coffee beans internationally. They are planning ways to rely less on gas-powered motors to run the equipment and the coffee collective building and install solar panels.
- The market organizer of Fougou's massive weekly outdoor market was constructing large pavilions so that vendors could set up their stands and protect the products from rain during the rainy season. During the dry season, he struggled to get vendors to pay for a more expensive spot under the pavilion.
- The mayor and his team secured several computers for the youth and community center. Dot helped plan computer literacy lessons that will be offered to adults and teenagers in Fougou.

Dot and her friends in Fougou going on a walk. From left: Dot; Oumou, a 10th-grade student; Kadyatou, a tailor; Madame Fatoumata, 7th-grade French teacher; Madame Traore, primary school teacher; and Ramatoulaye, market vendor.

Countless other activities were being led by community leaders everywhere Dot looked in her community from tree planting for reforestation to beekeeping with the women's farm collective to starting a library at the middle school. Dot struggled to find ways to be the best resource for her community. Teaching was hard and new, and she only spoke French while many women mostly spoke Pular, the local language. The most impactful

November | December 2020

experiences for Dot and some of her counterparts was inviting other teachers and community leaders to come to Peace Corps hosted trainings to learn about project development, malaria prevention, youth leadership, etc. One training inspired one of Dot's coworkers so much that they collected all the funds necessary and completed the library project they had been working on starting for three months.

Unfortunately, in March, Dot and all the other Peace Corps volunteers were put on a plane and sent back to the United States. Dot and many others were forced to leave their students, friends, work, and incomplete projects. At the time, it was unclear if we would be back in a couple of months or if it was the end of Peace Corps altogether. Despite being on different sides of the world, Dot is very grateful for WhatsApp and Facebook messenger to still be able to talk with friends and get the gossip of Fougou.

Once it became clear that Dot could not return to Guinea anytime soon, she began looking for a job in the middle of a global pandemic. The HE alumna received ten different job offers across the country. In July she was hired through the CARES Act as a Civil Engineer for the Denver Regional Office of the Department of Commerce: Economic Development Administration. Dot administers grants for construction projects that are responding to the economic impacts of coronavirus. In her job, Dot uses the critical thinking and communication skills she developed in her HE classes and projects to work with grant recipients and execute successful community-driven economic development projects.

Director's Corner

Dr. Jessica Smith
Director, Humanitarian Engineering Graduate Programs

Our first semester of the Humanitarian Engineering and Science master's program is in the books! Congratulations to our first cohort of students for finishing a challenging semester of coursework, research, and outreach in the midst of the pandemic. We launched two brand-new classes designed for the program: Introduction to Engineering & Society, taught by EDS Division Director Dean Nieuwsma, and Advanced Engineering for Sustainable Community Development, taught by HE Director of Undergraduate Programs Juan Lucena. In the spring we will



November | December 2020

launch Humanitarian Geophysics, taught by Associate Professor Jeff Shragge (Geophysics).

One of the highlights of this semester was a highly engaging colloquium series, organized by Professor Beth Reddy in collaboration with our colleagues at Western Colorado University. We hosted both academics and community practitioners to help us think about what humanitarian engineering and science is – and could be. Corrie Knapp (University of Wyoming) inspired us to think about collaborative science, Mines alum Christopher Caskey shared a model for more sustainable entrepreneurship in rural Colorado, Michael Méndez (University of California - Irvine) pushed us to consider how climate change activism can also include social justice, and Diana María Duarte Gómez shared the RETOS platform to connect students with community-based projects in Colombia (please also see the associated article on pages 4-6).

Our students have risen to the challenge of addressing the COVID-19 pandemic by contributing to on-campus research by Professor Alina Handorean. They are also busy advancing their thesis research and practicum projects, which range from community-based pollution assessment to engineering education research on the funds of knowledge of engineering students who are the first in their families to attend college.

We wish you a safe and healthy 2021!



Humanitarian Engineering Newsletter

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