ROBERT E. MARTINSON '65

ENGINEERING & LIBERAL EDUCATION

SYMPOSIUM

The 14th Annual

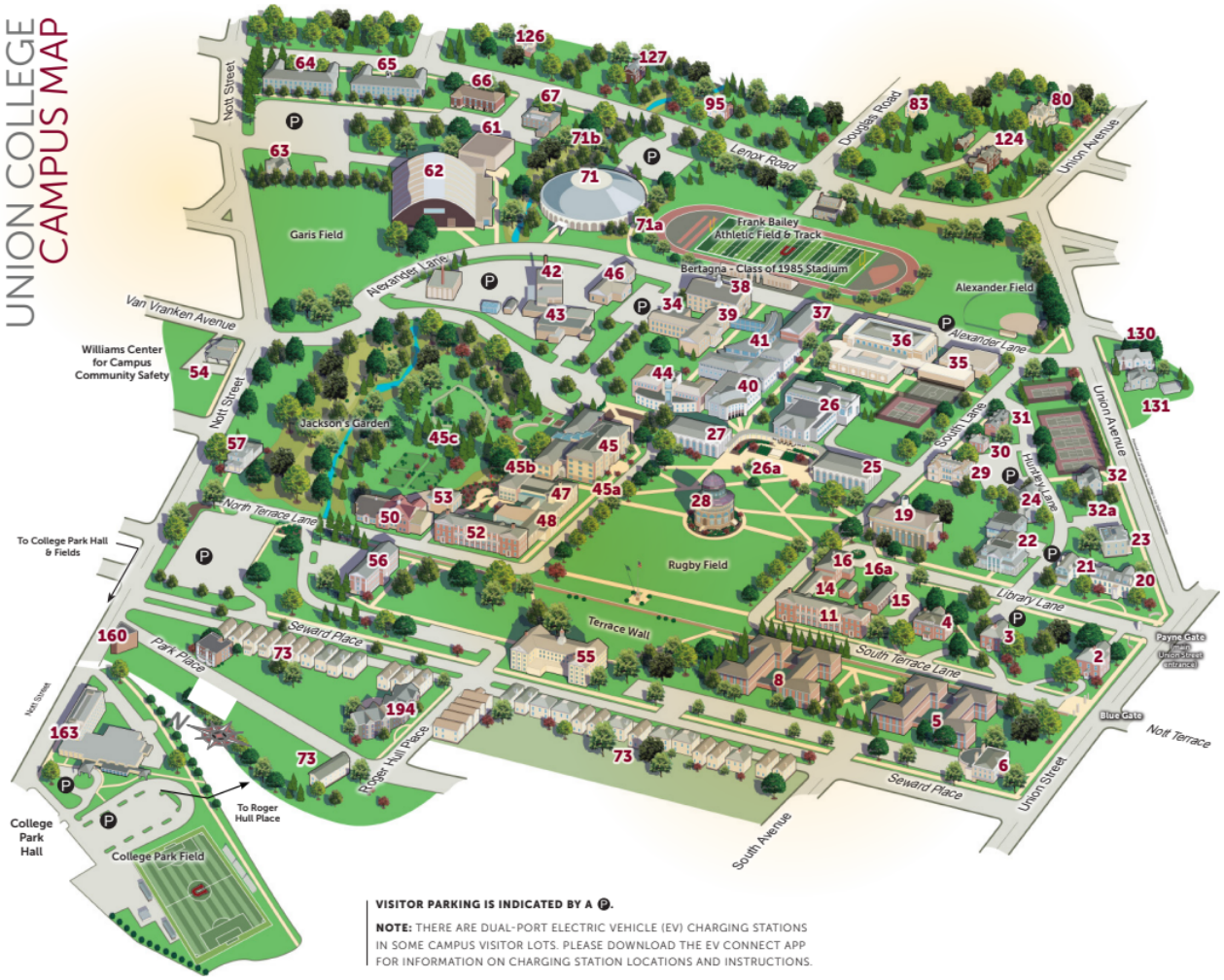
Robert E. Martinson '65
Engineering & Liberal Education Symposium

September 22 & 23, 2023
Union College
Schenectady, New York

UNION COLLEGE

FOUNDED 1795

UNION COLLEGE CAMPUS MAP



Key Locations

28 - Nott Memorial

22 - Stanley O'Brien '74 Center

40 - The Peter Irving Wold Center

163 - College Park Hall

Shuttle Schedule

Friday, September 22nd
Afternoon
Shuttle from Courtyard by Marriott to the Reamer Circle
Time: 10:45 am-1 pm
Pick Up: Courtyard by Marriott at Mohawk Harbor: 240 Harborside Dr. Schenectady, NY 12305
Drop Off: Reamer Circle

Before Keynote
Shuttle from Courtyard by Marriott to the Old Chapel Circle and back
Time: 4:00-5:30 pm
Pick Up: Courtyard by Marriott at Mohawk Harbor: 240 Harborside Dr. Schenectady, NY 12305
Drop Off: Old Chapel Circle

Keynote Event
Shuttle from Nott Memorial to College Park Hall
Time: 7:15pm - 7:45pm
Pick Up: Old Chapel Roundabout
Drop Off: College Park Hall

Shuttle from College Park Hall to Courtyard by Marriott
Time: 8:45 pm-9:30 pm
Pick Up: College Park Hall
Drop Off: Courtyard by Marriott at Mohawk Harbor: 240 Harborside Dr. Schenectady, NY 12305

Shuttle from College Park Hall to Old Chapel Roundabout
Time: 8:45 pm-10:00 pm
Pick Up: College Park Hall
Drop Off: Old Chapel Roundabout

Saturday, September 23rd
Morning
Shuttle from Courtyard by Marriott to Stanley O'Brien '74 Center
Time: 7:45-9:30 am
Pick Up: Courtyard by Marriott at Mohawk Harbor: 240 Harborside Dr. Schenectady, NY 12305
Drop Off: Stanley O'Brien '74 Center

Afternoon
Shuttle from Stanley O'Brien '74 Center to Courtyard by Marriott
Time: 3:15-4:00 pm
Pick Up: Stanley O'Brien '74 Center
Drop Off: Courtyard by Marriott at Mohawk Harbor: 240 Harborside Dr. Schenectady, NY 12305

WELCOME

Welcome to the Fourteenth Symposium on Engineering and Liberal Education, hosted by Union College in Schenectady, New York. We are grateful to have Dr. Francesca Rossi, IBM Fellow and the IBM AI Ethics Global Leader, with us to present the keynote address. We have an outstanding array of lightning talks and workshops from researchers and practitioners at the intersection of engineering and the liberal arts. We have woven these sessions into an exciting program that we hope will spark and promote engagement with a range of topics, resulting in continued connections and conversations beyond the E&LE symposium. On behalf of the Program Committee, we welcome you to our beautiful campus and hope that you have an inspiring symposium.

- Dr. Jennifer Currey, Symposium Chair

Program Committee

Chair

Jennifer Currey
Associate Professor & Chair
Electrical, Computer and Biomedical Engineering Department
Union College

Members

Lorraine Cox
Associate Professor of Art History
Visual Arts
Union College

Cole Belmont
Director of Makerspace Consortium
Academic Affairs
Union College

David Hans
Manager, z/OS Content Design & Development
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Doug Klein
Faculty Director of the Kelly Adirondack Center & Kenneth B. Sharpe Professor Emeritus of Economics
Union College

Nicole Marshall
Assistant VP for Academic Advancement & Research Administration
Director of the Grants Office
Union College

Samuel Kennedy
Administrative Assistant for Academic Affairs
Union College

ACKNOWLEDGEMENTS

We would like to recognize the Martinson family in memory of Dr. Robert E. Martinson '65 and his generous support of Union's Engineering and Computer Science Initiative, and specifically the naming of the Engineering and Liberal Education Symposium.

We gratefully acknowledge the support of the Laurence W. Levine '52 and Barry Traub '53 Endowed Lecture Fund on the Liberal Arts and Engineering.

Special thanks to Union College Facilities, Learning Environments, and Hospitality Services staff without whom this event would not be possible.

Our Land Acknowledgement

We acknowledge that we live, work, and study at Union College on the traditional homelands that were originally peopled by the Iroquois Confederacy (Haudenosaunee), including the Cayuga, Mohawk, Oneida, Onondaga, Seneca, and other tribes. What we call Schenectady is a Dutch version of a Mohawk word skahnéhtati, meaning 'The Place Beyond the Pines.' As a College, we honor the land itself with gratitude and acknowledge the people who have stewarded the land, lost lives, and had their land taken unjustly throughout the ages.

Symposium History

The Symposium on Engineering and Liberal Education began in June 2008, supported in part by a grant from The Mellon Foundation to Union College. In 2021, Robert E. Martinson '65 made a generous gift to support the College's Engineering and Computer Science initiative, including the Templeton Institute and the E&LE Symposium. Now in its 14th year, the Symposium focuses on intersections and connections of engineering and the liberal arts. A brief review of the learning outcomes desired of liberal education as promoted by the Association of American Colleges and Universities (AAC&U) and those promoted by ABET, show remarkable overlap. Through the integration of engineering and liberal education, we are able to work towards innovative and transformative solutions to the grand challenges that face society today and in the future.

Program at a Glance

Friday, September 22

11:00 a.m.	Registration opens *The Peter Irving Wold Center, The MacLean Family Atrium*
11:45 a.m. - 1:00 p.m.	Lunch *The Peter Irving Wold Center, The MacLean Family Atrium*
1:00 p.m. - 1:15 p.m.	Break - Registration moves to Stanley O'Brien '74 Center *Transition to Stanley O'Brien '74 Center, Room 117*
1:15 p.m. - 1:30 p.m.	Welcome & Opening Remarks *Jennifer Currey, Symposium Chair* *Michele Angrist, Stephen J. and Diane K. Ciesinski Dean of the Faculty and Vice President for Academic Affairs* *Stanley O'Brien '74 Center, Room 117*
1:30 p.m. - 2:45 p.m.	**Lightning Talks: Round 1: Exploring opportunities and grappling with risks of artificial intelligence** *Stanley O'Brien '74 Center, Room 117* *Moderated by: David Hans, IBM* *Genuine Human Intelligence Versus Synthetic Artificial Intelligence* Ashraf Ghaly, Union College *"Is it Live or is it Memorex?" And does it matter?* Maurice Aburdene and Laurie Aburdene, Bucknell University *Detecting Rapport from Non-verbal Behavior in Group Interaction* Jacky Doll, IBM and Rensselaer Polytechnic Institute
2:45 p.m. - 3:00 p.m.	Snack Break *Stanley O'Brien '74 Center, Downstairs Lobby*
3:00 p.m. - 4:00 p.m.	**A Guided Conversation: Liberal Education/Engineering & Society Division within ASEE and Beyond** *Stanley O'Brien '74 Center, Room 117* *Moderated by: Jennifer Currey, Union College* Marie Stettler Kleine, Colorado School of Mines
4:00 p.m. - 5:00 p.m.	Free Time & Networking Opportunities *Transition to the Nott Memorial*

Keynote

5:00 p.m. - 6:00 p.m.	Keynote Reception & Poster Session *Nott Memorial* *Student Poster Presenters* Mark D'Alessandro '24 - Integrating the Liberal Arts and Engineering Through Service Learning Alicia Cynamon '25, Aspen Morris '25, and Josue Itzun Recinos '25 - Templeton Institute Scholars
6:00 p.m. - 7:15 p.m.	**Keynote Address with Opening Remarks** *Nott Memorial* Opening Remarks *Union College President David R. Harris* Keynote Address - Artificial Intelligence: Latest advances, ethics issues, and impact *Dr. Francesca Rossi*
7:15 p.m. - 7:30 p.m.	Break *Transition to College Park Hall*
7:30 p.m. - 9:00 p.m.	Dinner *College Park Hall*

Saturday, September 23

7:45 a.m.	Registration *Stanley O'Brien '74 Center*
8:00 a.m. - 9:00 a.m.	Breakfast Buffet *Stanley O'Brien '74 Center, Downstairs Lobby*
9:00 a.m. - 9:15 a.m.	Break *Transition to Stanley O'Brien '74 Center, Room 117*
9:15 a.m. - 10:30 a.m.	**Lightning Talks: Round 2: A New Civic Engagement: Risk, Resilience & Empathy for Sustainable Future(s)** *Stanley O'Brien '74 Center, Room 117* *Moderated by: Cole Belmont, Union College* *Urban infrastructure, biography, and transformation: Lessons from an ancient Greek city* Angela Commito, Union College *Generative algorithms for Art and Architecture* Sam Keene, The Cooper Union *Engineered objects to thread the sociotechnical via narrative, history and design* Desen Ozkan, University of Connecticut and Avneet Hira, Boston College
10:30 a.m. - 10:45 a.m.	Snack Break *Stanley O'Brien '74 Center, Downstairs Lobby*
10:45 a.m. - 12:00 p.m.	**Lightning Talks: Round 3: Reflecting on the ethical considerations and impacts of a rapidly changing society** *Stanley O'Brien '74 Center, Room 117* *Moderated by: Nicole Marshall, Union College* *Educating Engineers for Civic-mindedness* Erhardt Graeff, Olin College of Engineering *A learning community to strengthen ethics across the engineering curriculum* Andrew Guswa, Smith College *Engineering for Human Rights: Five Principles to Guide Engineering Work for Equitable and Sustainable Communities* Davis Chacón-Hurtado, University of Connecticut
12:00 p.m. - 12:15 p.m.	Break *Transition to The Peter Irving Wold Center*

12:15 p.m. - 1:15 p.m.	Lunch *The Peter Irving Wold Center, The MacLean Family Atrium*
1:15 p.m. - 1:30 p.m.	Break *Transition to Stanley O'Brien '74 Center*
1:30 p.m. - 2:45 p.m.	**Lightning Talks: Round 4: Harnessing the power of collaboration with arts and humanities** *Stanley O'Brien '74 Center, Room 117* *Moderated by: Lorraine Cox, Union College* *Using a Student Investment Fund to Integrate Engineering and the Liberal Arts* Tomas Dvorak & Ashok Ramasubramanian, Union College *From Circuit Boards to Compositions: A Collaboration between Music and Engineering* Cherrice Traver & Christopher Chandler, Union College *Engineering and the Arts, a New Reality* Robert Dell, The Cooper Union and the University of Iceland
2:45- 3:30 p.m..	Feedback Playback & Symposium Retrospective *Stanley O'Brien '74 Center, Room 117* *Moderated by: David Hans, IBM*
3:30 p.m.	Closing Remarks *Stanley O'Brien '74 Center, Room 117* *Jennifer Currey, Symposium Chair*

KEYNOTE ADDRESS

Artificial Intelligence: Latest advances, ethics issues, and impact on education

Dr. Francesca Rossi

IBM Fellow and the IBM AI Ethics Global Leader

ABSTRACT

AI is going to bring huge benefits in terms of scientific progress, human well-being, economic value, and the possibility of finding solutions to major social and environmental problems. However, such a powerful technology also raises some legitimate concerns, related for example to the black-box nature of some AI approaches, the possible discriminatory decisions that AI algorithms may recommend, the accountability and responsibility when an AI system is involved in an undesirable outcome, the usage of data, the generation of false but plausible content, and the use or generation of copyrighted material. With its current capabilities, AI is having a rapid and profound impact on many human activities, including creative ones, as well as on education. Without adequate and responsible answers to these challenges, many will not trust AI, and therefore will not fully adopt it nor get its positive impact, while others will use it in an unsafe way. In this talk I will present the main issues around AI ethics and the impact of this technology on our life, and describe some of the approaches used to address them.

Brief Biography

Francesca Rossi is an IBM Fellow and the IBM AI Ethics Global Leader. She is based at the T.J. Watson IBM Research Lab, New York, USA, where she leads research projects and she co-chairs the IBM AI Ethics board. Her research interests focus on artificial intelligence, with special focus on constraint reasoning, preferences, multi-agent systems, computational social choice, neuro-symbolic AI, cognitive architectures, and value alignment. On these topics, she has published over 220 scientific articles in journals and conference proceedings, and as book chapters. She is a fellow of both the worldwide association of AI (AAAI) and the European one (EurAI). She has been president of IJCAI (International Joint Conference on AI) and she is the current president of AAAI. She is a member of the scientific advisory board of the Future of Life Institute, the board of the Partnership on AI, the steering committee of the Global Partnership on AI, and she chairs the 2023 AAAI/ACM Conference on AI, Ethics, and Society. She also co-chairs the OECD Expert Group on AI Futures. She has been a member of the European Commission High Level Expert Group on AI, that worked in 2018/2020 to support the European Commission on defining the AI ethics guidelines that led to the design of the current draft of the EU AI Act.

ABSTRACTS

Friday, September 22, 2023

Lightning Talks - Round 1: Exploring Opportunities and Grappling With Risks of Artificial Intelligence

1:30 p.m. - 2:45 p.m.
Stanley O'Brien '74 Center, Room 117
Moderated by: David Hans, IBM

Genuine Human Intelligence Versus Synthetic Artificial Intelligence
Ashraf Ghaly, Union College
Artificial intelligence (AI) is presently receiving a lot of media coverage. Experts and observers share their viewpoints regarding the potential impact AI could have on almost every aspect of life. There are those that celebrate the introduction and the use of AI, those that sound a cautionary note, and those that fear its impact and warn against allowing it to influence decisions that should only be made by humans. AI represents the mining of unimaginable quantities of data by powerful computer systems. The present proliferation of sensors, cameras, and even satellites in outer space made it possible for humans to acquire more data than they can analyze. At the heart of AI, computer algorithms reliant on machine learning have been developed to locate and crunch untold amounts of data to ultimately reduce this body of information to a simple outcome. This outcome could be useful but could also be risky if used in deriving vital conclusions or in making critical decisions. In that sense, AI is certainly a powerful tool that can help humans boil down a huge body of information to actionable insights. Lacking from AI-generated outcomes are the human touch and emotions. Most of the tough decisions humans are faced with involve a layer of emotions that only humans can appreciate and incorporate in the decision-making process. This presentation looks at fairness as a human attribute and how it could be achieved as viewed by humans versus the way it is “understood” by an AI system. The data reported in this presentation is based on exercises assigned to students where they were asked to develop a fair system for water distribution amongst the riparian countries of international trans-boundary rivers.

"Is it Live or is it Memorex?" And does it matter?
Maurice Aburdene and Laurie Aburdene, Bucknell University
AI has arrived and there is no turning back. How can we tell the difference between human and machine created works? And how best can we harness AI's powers to better interactions between Engineering and the Arts? We will present examples for your kind consideration. Just like the old commercials, see if you can tell: "Is it live or is it Memorex?" And does it matter?

Detecting Rapport from Non-verbal Behavior in Group Interaction
Jacky Doll, IBM and Rensselaer Polytechnic Institute
In common face-to-face interaction people exhibit non-verbal behaviors that are associated with rapport. Rapport-building behaviors such as facial expressions, body movements, and vocal cues are statistically correlated. This correlation becomes interesting as it relates to success in the workplace and in educational settings. On the other hand, failure to build rapport can lead to decreased collaboration, and interpersonal conflicts. This talk will present several different approaches to detect rapport from non-verbal behavior in teams or social interactions more broadly. It will discuss how to capture information from human group conversations and use it to drive the behavior of virtual characters.

A Guided Conversation: Liberal Education/Engineering & Society Division within ASEE and Beyond

3:00 p.m. - 4:00 p.m.
Stanley O'Brien '74 Center, Room 117
Moderated by: Jennifer Currey, Union College

Liberal Education/Engineering & Society Division within ASEE and Beyond
Marie Stettler Kleine, Jenn Stroud Rossmann, Desen Sevi Özkan, and Dean Nieusma - LEES/ASEE
This facilitated discussion aims to build and strengthen bridges between the Liberal Education/Engineering & Society (LEES) Division of ASEE and the Engineering & Liberal Education (E&LE) Symposium attendees. As LEES Program Chair for the upcoming ‘23-24 academic year, preparing for the annual ASEE conference in Portland, I aim to plan relevant programming for a wide network of scholars, educators, and program builders engaged in engineering and liberal education. Part of this work involves enrolling a large network of stakeholders engaged in this area in conversation to share what LEES is and discuss how the group’s effort and influence could expand; E&LE represents one obvious place to initiate this conversation. This session will start with a brief overview of LEES’s history in ASEE, how its focus and position has shifted and evolved since its inception, and preliminary ideas from LEES leadership for pursuing LEES-like efforts outside of the regular annual ASEE conference. This discussion hopes to both recognize ongoing conversations and work while generatively seeding new potential collaborations and promoting novel scholarly output by reimagining what recognizable contributions in this space might look like beyond traditional conference papers. This session is also meant to be attentive to how faculty members and administrators are incentivized and/or discouraged from engaging in this work. This conversation is designed not to create redundant work for active LEES members and/or E&LE attendees but hopes to be reactive to and build upon what is already being done.

Saturday, September 23, 2023

Lightning Talks - Round 2: A New Civic Engagement: Risk, Resilience & Empathy for Sustainable Future(s)

9:15-10:30 am
Stanley O'Brien '74 Center, Room 117
Moderated by: Cole Belmont, Union College

Urban infrastructure, biography, and transformation: Lessons from an ancient Greek city
Angela Commito, Union College
The ancient Greek city of Notion on the western coast of Turkey enjoyed a period of vibrancy as a harbor town with strategic military advantages. Urban development across its rocky promontories was made possible by rainwater collection in underground cisterns and an aqueduct in the form of a long-distance terracotta pipeline with an inverted siphon. But a few centuries later, during a period of unprecedented regional prosperity under the Roman Empire, Notion was largely abandoned. This paper uses the results of recent, on-going archaeological research at Notion to address a series of questions: How can we write the biography of a city through its changing infrastructure? Where can we see the disparate and often negative impacts of the forces of geopolitics and imperialism that have often shaped our understanding of history? What do we miss when we assume "successful" cities are the norm, and what do we gain by viewing a "failed" city as valuable and worthy of study? Finally, how can a long-term perspective of urban transformation in the past help us move forward? Rather than applying a value system based on longevity to the study of an urban community, this research focuses on the many lessons to be learned when the members of a community exchange one vision of their future for another in response to changing circumstances.

Generative algorithms for Art and Architecture
Sam Keene & Ben Aranda, The Cooper Union
We present a novel interdisciplinary course which engages students from the Schools of Art, Architecture and Engineering. The collaborative course focuses on generative algorithms applied to creative works. We will discuss our experiences with co-teaching and encouraging collaboration across vastly different disciplines. We will share examples of in-class exercises, assignment prompts and examples of work. The course culminates in a final exhibition, open to the public. Some key themes emerge from the final works. First, generative algorithms are opening up new avenues for creative work. Second, creative applications of machine learning often reveal the flaws and bias present in these methods.

Engineered objects to thread the sociotechnical via narrative, history and design
Desen Ozkan, University of Connecticut & Avneet Hira, Boston College
Engineers create processes and products that sit within societal context. For many engineers, this societal context remains an afterthought to the design process, consequently left out of the problem's framing. In this paper, we share three pedagogical approaches that we have used to engage engineering students in thinking about societal contexts of engineered objects, including —pulse oximeters, headphones, and bicycles. These objects have deep sociotechnical entanglements in the present but also historically. Our approaches include: 1) putting objects "on

trial" in which students role play different stakeholders —the FDA, the engineers and scientists, the health care professionals, and the patients, to build a case for locating responsibility for the pulse-oximeter's statistically significant racist outcomes; 2) scripting and recording podcasts to share sociotechnical aspects of the life of a chosen objects like the connection between the headphones' use and perception with issues of class and capital; and 3) developing virtual representations to communicate how engineered objects interact with society, e.g., an animation of how bike routes connect various locations in the city of Chicago. We will share data from three cohorts of students from two different universities and our instructional tools in our presentation.

Lightning Talks - Round 3: Reflecting on the ethical considerations and impacts of a rapidly changing society

10:45 a.m. - 12:00 p.m.
Stanley O'Brien '74 Center, Room 117
Moderated by: Nicole Marshall, Union College

Educating Engineers for Civic-mindedness
Erhardt Graeff, Olin College of Engineering
Cultivating authentic, civic-minded professionals should be a core purpose of higher education, according to Carolin Kreber in her 2016 book *Educating for Civic-mindedness*. She believes this requires carefully designed, community-engaged learning experiences that have a "transformational" effect on students. Engineering education rarely achieves this high bar. Rather, engineering's culture and its most common approaches to nurturing ethical and social responsibility appear in tension with certain civic virtues. A call to action for "civic professionalism" in engineering is due. This paper will apply Kreber's framework to understanding the task of nurturing civic-minded engineering professionals, summarizing the existing landscape of transformative experiences in engineering education and diagnosing the challenges and possibilities for enhancing these efforts, as expressed in interviews with leading educators and practitioners of civically-engaged engineering.

A learning community to strengthen ethics across the engineering curriculum
Andrew Guswa, Smith College
In 2022-2023, a group of faculty from our engineering and philosophy departments engaged in a learning community to deepen our understanding of ethics and engineering, develop a coherent and appropriately scaffolded plan for how ethics is incorporated across the engineering curriculum, and modify a set of courses to implement that plan. Previously, the introduction and teaching of engineering ethics and professional responsibility was ad hoc, and we sought to weave ethics and ethical reasoning throughout the engineering curriculum in a thoughtful and scaffolded way that matches the educational development of students. Our work comprised a three-part approach: shared readings and discourse to build our own knowledge; individual work to identify opportunities in our courses; and collaborative development of a plan for the coherent incorporation of ethics across the curriculum. We developed a spiral, iterative framework that asks students to develop and refine their own engineering ethic, informed by authoritative

sources (e.g., ASCE Code of Ethics, philosophies of interpersonal ethics) and tested via case studies and examples from departmental decisions. In their ethic, we ask students to consider both imperatives (behaviors or acts that one must do or must not do) and principles for trading off costs and benefits among groups (which could be non-human and/or in the future). The intent is that students will be asked to call upon and refine their engineering ethic in multiple classes throughout their engineering education.

Engineering for Human Rights: Five Principles to Guide Engineering Work for Equitable and Sustainable Communities.
Davis Chacón-Hurtado, Shareen Hertel, and Minju Lee, University of Connecticut
Engineers' work directly impacts the welfare of society and the relationship between people and the natural environment. However, technological developments and engineering work only sometimes reflect on the role of engineering within such complex and interrelated social and environmental systems and how it could help build more sustainable and resilient communities. Therefore, different frameworks focused on social and environmental justice have started to emerge in the past decade. Here, we present five principles of an "engineering for human rights" framework that could be used to advance the understanding of the role of engineering in society and to guide the application of ethical principles focused not only on the betterment of humankind but on building stronger and equitable communities for the future. These principles of distributive justice, broad participation, explicit consideration of duty-bearers, and accountability for all actors involved are explained in the context of a case study in Engineering.

Lightning Talks - Round 4: Harnessing the power of collaboration with arts and humanities

1:30 p.m. - 2:45 p.m.
Stanley O'Brien '74 Center, Room 117
Moderated by: Lorraine Cox, Union College

Using a Student Investment Fund to Integrate Engineering and the Liberal Arts
Tomas Dvorak & Ashok Ramasubramanian, Union College
Student Investment Funds (SIFs) present an experiential learning opportunity for students from several disciplines. We describe how the co-curricular setup of Union College's SIF enables integration of engineering and the liberal arts. There are three components that facilitate this integration. First, students enroll in a practicum - a ⅓ credit, free, no-prerequisites course that meets once a week in the evening under the supervision of a faculty member. Students can enroll in the course as many times as they want (and completing it during three trimesters counts as a free elective). Second, the selection of investments emphasizes that only examination of disparate sources of information has the potential to generate unique insights. Thus, the investment analysis requires a collaboration of people with different sets of skills, and with different domains of expertise. Finally, the management of the fund includes being responsible owners of the assets and participating in the governance of the companies the fund owns. This includes voting the fund shares for members of the board of directors, executive pay, major corporate decisions such as mergers and acquisitions, and shareholder proposals. We argue that shareholder activism is an excellent opportunity for students to debate and express their social

values, and an important way of influencing corporate behavior on a range of issues including the environment, labor relations, social and ethical issues.

From Circuit Boards to Compositions: A Collaboration between Music and Engineering
Cherrice Traver & Christopher Chandler, Union College
At Union College, we have created a new Music Technology minor designed for students interested in exploring the creation of music and sound through computerized electronic systems and acquiring skills to pursue careers or advanced studies in this field. Using Union's Interdisciplinary Studies Program framework, the minor consists of six existing and newly developed courses drawn from the Music, Electrical Computer and Biomedical Engineering (ECBE), Computer Science, and Visual Arts departments. Students are required to take three core courses and three electives. By establishing a program for collaboration among students from diverse academic backgrounds, the Music Technology minor seeks to inspire fresh perspectives and ideas at the intersection of music and engineering. For the E&LE symposium, we plan to explain the goals, learning objectives, structure, and course content for the three core courses in the program. We will discuss how students engage with analog and digital technologies and fundamental concepts through creative expression and engineering design. We will share examples of student projects, highlighting instances where interdisciplinary learning has led to meaningful cross-disciplinary experiences. Our presentation will shed light on the developing but impactful contributions made by students in exploring the potential of combining engineering with music and the liberal arts. While Union's Music Technology minor represents an innovative step towards bridging disciplines, it is still in its very early stages, and we plan to pose some open questions and challenges for the minor for discussion. Through this presentation, we aim to inspire dialogue and critical reflections on the importance of promoting interdisciplinary approaches in education, as well as how such programs can foster a collaborative spirit and nurture future professionals with a broader perspective on artistic and technological innovations.

Engineering and the Arts, a New Reality
Robert Dell, Cooper Union and the University of Iceland
We now live in a global community where mutual respect and cooperation are essential to create our sustainable future. Engineering and the arts both need lateral thinking for true progress. We can successfully promote interdisciplinary approaches to artistic and creative expression for greater synergy, which is often problematic due to basic misunderstandings. These can include differing views of the perceived objectives of both disciplines, which can be reduced by a proper forum to develop shared objectives. Successful forums, including MIT's Center for Advanced Visual Studies, where the author was a Fellow and Project Director, need institutional support and committed leaders to prosper. Successful collaborations can also easily occur on a smaller scale with proper guidelines and shared expectations. Basic approaches, usable strategies and common obstacles will be cited, with specific examples garnered from over forty years of successful national and international collaborations.

Notes

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