

Industrial Advisory Board Meeting

April 24, 2023



ELECTRICAL AND COMPUTER ENGINEERING COLORADO STATE UNIVERSITY



What we'll cover today

- Department updates, news, numbers
- Prep for E-Days and breakout session
- Review projects at E-Days
- Lunch, pick top 3 projects
- Breakout session





Welcome new member



Evan Everett

Program Director

Numerica

Department Update

Edwin Chong | Department Head Professor of Electrical and Computer Engineering



Personnel Updates

- Update on faculty searches
 - Computer Engineering
 - Lasers and Optics
- Dean search underway
- Amy Parsons named new CSU president





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CSU lasers likely to be key to fusion power future

With the recent achievement of fusion ignition, ECE is poised to play an important role in the quest for abundant, carbon-free energy.







ECE showcased research, education at Spur Hydro opening

Besides highlighting our work to fight climate change, we hosted displays and interactive demos for families.



Branislav Notaros elected president of global engineering society

He was named 2024 president of the IEEE Antennas and Propagation Society. His service as president-elect commenced in January.





ECE researchers combine classical and quantum optics for super-resolution imaging

Led by Randy Bartels, the team is on a mission to invent powerful light microscopes that can resolve large swaths of biological material in unimaginable detail.





Tony Maciejewski tapped to lead NSF Division of Electrical, Communications and Cyber Systems

He retains his faculty appointment with CSU. His new role will allow him to serve a temporary term with the National Science Foundation – typically around two years.



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ECE sponsored statewide youth robotics competition held at CSU

The department hosted tours and demos for participants and families





Student Accolades



Kyoshi Yamamoto selected for prestigious NSF Graduate Fellowship

He was 1 of 8 students across the university to receive one of the country's top STEM fellowships.







Fall 2022 Outstanding Grad: Shavauntay Dukes

Shavauntay never dreamed he'd go to college. Yet, he persisted through a challenging major amid a global pandemic, while adjusting to the demands of becoming a first-time parent.



Grad student spotlight: Vishwa Venkat Kapa

Kapa grew up on an exotic fruit farm in India. He always wanted to develop technologies to improve agricultural operations – and one day produce dragon fruit wine.

"I have gained skills to create helpful solutions for real life."



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Research spotlight: Ph.D. student Cheng Guo

"My research focuses on monitoring and identifying individual wild African leopards. The approach is similar to facial recognition technology but applied to leopards in the wild."





Enrollments



National Undergraduate Enrollment by Discipline





Undergraduate Enrollments by Major





Freshman Enrollment





Freshman Enrollment: ECE vs. CS





3-year comparison of confirmed undergrads as of April 10

		Fall 2023	Fall 2022	Fall 2021
Confirms	BME + EE	6	6	8
	BME + CpE	7		
	Computer	18	30	36
	Electrical	16	26	21
	EE/Lasers	2	1	
	EE/Aerospace	5		
	Total	54	63	65



- Demographers predict an "enrollment cliff" beginning in 2025, when the traditional college-age population will start shrinking for the foreseeable future
- As demographics shift, data suggest future students will be increasingly Latinx
- ECE enrollments dropping nationwide

"We're not seeing a return of what we might call the lost freshmen of fall 2020 and fall 2021There's not a lot of evidence in these numbers that they're coming back now."*

Doug Shapiro, National Student
Clearinghouse

*NPR: "The college enrollment drop is finally letting up. That's the good news." - 10/20/22

ECE Freshman Enrollment: Colorado Institutions



Data does not include biomed dual degrees Sources: ASEE, CSU IR



ECE Graduate Enrollment



*Includes RI & non-RI; all campuses



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Graduate Enrollment Outlook

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Comparison of admitted students

		Fall 2023	Fall 2022	Fall 2021
Admits	MS EE	45	37	52
	MS CpE	33	15	24
	PhD EE	7	3	1
	PhD CpE	0	0	1





Degrees Awarded



Undergraduate Degrees Awarded





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Projected Undergraduate Degrees SP23





EERING

Graduate Degrees Awarded



MS EE 🛛 MS CpE PhD EE 🖉 PhD CpE ME



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Research Update





Broad Range of Cross-Disciplinary Research





Robotics to benefit society

Satellites and AI to study climate





New technologies for data-driven world

Novel tech to detect gravitational waves



Lasers to generate clean energy



Techniques to track, protect wild leopards



Virtual biopsies for melanoma detection



Super-resolution imaging to see unimaginable detail

CSU RESEARCH EXPENDITURES 2013-2022

RESEARCH EXPEDITURES HAVE INCREASED





ECE Total Research Expenditures





Implementing action items from last spring and fall

- Improve retention; build sense of belonging with emphasis on women
- Enhance hands-on learning
- Show depth and breadth of discipline and connections to ECE career paths
- Foster meaningful K-12 outreach; need to reach middle school students
- Tie ECE programs to Spur campus
- Launch new events and workshops







CreatorSpace: Before













CreatorSpace: Now







Prep for Breakout Session

The rise of ChatGPT and our role in the future of artificial intelligence

What is ChatGPT?



"ChatGPT is a natural language processing tool driven by AI technology that allows you to have human-like conversations and much more with the chatbot."

*ZDNet



ChatGPT example

I asked ChatGPT: What should an Electrical and Computer Engineering department head tell his Industrial Advisory Board about the rise of ChatGPT and the role of engineers in the future of artificial intelligence?

ChatGPT's reply:

As an AI language model, I can suggest some talking points that an Electrical and Computer Engineering department head could discuss with their Industrial Advisory Board:

- Acknowledge the impact of AI and its increasing importance in society
- Highlight the importance of electrical and computer engineering in Al
- Discuss the potential of AI in various industries
- Highlight the need for interdisciplinary collaboration
- Emphasize the importance of ethical considerations in AI development



ChatGPT response to breakout question #1

Threats:

Dependence on technology: The widespread use of AI-based technologies in education could lead to a dependence on technology, making students less independent and reducing their critical thinking and problem-solving skills.

Loss of human interaction: The use of AI-based technologies in education could lead to a reduction in human interaction, making it more difficult for students to develop important social skills and emotional intelligence.

Privacy and security concerns: The use of AI-based technologies in education raises concerns about privacy and security. The collection of data by these technologies needs to be carefully managed to protect students' personal information.

Opportunities:

Personalized learning: AI-based technologies can provide personalized learning experiences that are tailored to individual students' needs, abilities, and interests. This could lead to more effective and efficient learning outcomes.

Access to knowledge: AI-based technologies can provide access to a vast amount of knowledge and information that might not be available in traditional learning environments. This could provide students with new opportunities for learning and skill development.

Enhanced teaching and assessment: Al-based technologies can help teachers to assess students' performance more accurately and provide feedback in real-time. This could lead to more effective teaching and improved learning outcomes.

Flexibility and convenience: AI-based technologies can provide flexibility and convenience for students who might not have access to traditional learning environments. This could be particularly beneficial for students in remote or underserved areas.

Overall, ChatGPT and other AI-based technologies have the potential to transform education by providing new opportunities for learning and knowledge acquisition. However, it is important to carefully manage the use of these technologies to address any potential threats and ensure that they are used in a way that enhances, rather than undermines, education.



ChatGPT response to breakout question #3

Technical Skills: Engineers working with AI technologies should have a strong foundation in mathematics, statistics, and computer science. They should be familiar with programming languages such as Python, R, and C++, and have experience with machine learning algorithms, data structures, and optimization techniques.

Domain Knowledge: Engineers should have domain-specific knowledge in the area where they are implementing AI. This can include knowledge of manufacturing processes, healthcare systems, financial markets, etc. Engineers need to have a deep understanding of the domain to develop effective AI solutions that are tailored to specific business needs. **Ethics and Responsibility:** AI engineers should have a strong understanding of ethics and social responsibility. They should be able to develop AI solutions that are transparent, unbiased, and fair. They should also be aware of the potential ethical implications of AI technologies and ensure that the solutions they develop are aligned with social values.

Communication Skills: Engineers should have excellent communication skills to explain complex technical concepts to non-technical stakeholders. They should be able to communicate the benefits and limitations of AI technologies and address any concerns or questions that stakeholders may have.

Creativity and Innovation: Engineers should have a creative and innovative mindset to develop new solutions that leverage AI technologies. They should be able to think outside the box and come up with new ideas that can help solve complex business problems.

Continuous Learning: Engineers should be committed to continuous learning to keep up with the latest trends and advancements in AI technologies. They should be willing to adapt to new technologies and processes to ensure that they are always delivering the best solutions.



Prep for project reviews

Instructions for Judging

1. Evaluate the 6 finalists. (Upon return, you will be asked to vote for the top 3 teams.)

2. Evaluate professionalism skills for selected projects using the forms provided.

3. Visit any other additional teams you can within the available time.



Leave for Ballroom Return by 12:30pm

Working Lunch

Top 3 projects, general impressions of E-Days

General Impressions

- How are we doing overall?
- Are students equipped with the skills they need to seamlessly transition into the workplace?
- What are the strengths, weaknesses of the teams you observed?
- Which projects stand out, and what makes them great?
- How can we improve?



Breakout Session: The rise of ChatGPT and our role in the future of artificial intelligence

Questions for Breakout Session

- Will ChatGPT undermine education? What are the threats and opportunities?
- How is your business sector and company applying AI technologies?
- What technical and non-technical skills do you need from the engineering workforce to both leverage AI and to ensure/maintain customer or public trust in the technology, products, or services?



Discuss Results of Breakout Session

Lynda Allen | Mike Dolan

Facilitators





Closing Remarks

Edwin Chong



