TECH SUMMIT

PURDUE UNIVERSITY

2025 Questions and Answers

1. *CS jobs have been down tremendously from their peak, and even though some new jobs have come from AI development needs, it's not clear whether or not the job market can recover, and in which aspects of CS/AI they would recover. Could you provide some insight?*

    a. I think it is still to be seen how much the overall job market suffers as a result of AI, vs. a large supply of CS graduates. That being said, I think the key to succeeding in an AI-inflected job market is to be someone who uses AI to become a better developer: companies will want to see employees who can most effectively augment their skills with AI. Put another way: AI will make good, prepared CS graduates 10x more productive, and AI will make unprepared CS graduates obsolete.

2. *The potential of quantum computers to compromise current encryption methods raises concerns and introduces new cybersecurity risks. Who is developing quantum-resistant security solutions?*

    a. This is an exciting, and active, area of research. The two most-pursued directions are cryptography that uses quantum technology, such as quantum key distribution, and cryptography that is resistant to known quantum technology (post-quantum cryptography). PQC is far enough along that it is already starting to go through the standardization process.

3. *Does academia or industry contribute more to AI research and what are the implications?*

    a. It is true that the "headline" advances will come from industry: the data, power, and compute demands of large-scale training and inference mean that it requires huge amounts of investment to make advancements in foundation models. But there is a lot of room for innovation and contributions from academia, including work on showing robustness, ensuring security and providing formal guarantees; on innovating in systems and hardware to design the next generation of AI systems; and on identifying new domains to tackle with AI.

4. *Advancements in AI—like advancement in tech- faster model training, new arch., agent-based apps, public education, and secure policies—are progressing unevenly and often seen in silos. What's needed to better align these domains for responsible, efficient, and impactful AI deployment at scale?*

    a. This is another area where academia has a real role to play, tying together all of these concerns.

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5. How can the US handle the ever increasing demand for power?

a. From Seungjin:

i. Currently, nuclear power serves as a baseload energy source, providing approximately 20% of U.S. electricity — which accounts for more than 50% of the nation's carbon-free energy. With its impressive capacity factor of more than 92%, delivering clean and reliable energy 24/7, the federal government, together with bipartisan support from congress, has been in support of deploying advanced reactors (AR) including Small Modular Reactors (SMR) to address the need for increasing demand. Especially, the SMR is considered well-suited for supplying clean and reliable power for energy-intensive data centers accounting for its flexibility and dispatchable power. The U.S. Department of Energy estimates an additional 200 gigawatts (GW) of new nuclear capacity is needed to keep pace with future power demands and reach net-zero emissions by 2050. To meet this goal, it is also estimated that we need additional nuclear workforce from the current approximately 100,000 to 375,000, not to mention developing nuclear supply chains and infrastructures. While such challenges exist, this also present opportunities. Purdue Engineering together with the School of Nuclear Engineering has been at the forefront in addressing these needs including the nuclear study performed with Duke Energy for the campus needs, SMR feasibility study for Indiana, and the recent Purdue-led $6M infrastructure revitalization consortium project funded by U.S. DOE, which establishes Center of Excellence for SMR/AR technologies. With its unique physical and cyber test facilities, Purdue is uniquely positioned to address technical, educational and training needs for SMR/AR technology development and deployment.

b. From Vassilis

i. Electric utilities and grid operators are facing an unprecedented increase in load demand due to the accelerated electrification in various sectors, including transportation, manufacturing, heating, and computing. Data centers currently consume approximately 10% of the electricity generated in the US, and their demand is expected to double within the next few years. California is expected to see an increase of 10 GW over the next decade. As we reconsider the energy mix in the US, we are midst of an opportunity of a generation to improve the efficiency, safety, and affordability of our grid infrastructure. By leveraging data, communication, and control technologies, we can capitalize on the characteristics of new loads to build a smarter grid infrastructure. Electric vehicles, data centers, batteries, and smart buildings can defer load demand or shift energy across time or even space. If we seize this opportunity, grid planners may not have to oversize generators and transmission lines to serve peak demand that occurs only once or twice a year. For example, the 750,000 electric vehicles moving on the streets of California constitute a resource of 9 GW if properly

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and smart buildings can defer load demand or shift energy across time or even space. If we seize this opportunity, grid planners may not have to oversize generators and transmission lines to serve peak demand that occurs only once or twice a year. For example, the 750,000 electric vehicles moving on the streets of California constitute a resource of 9 GW if properly coordinated. Advanced sensing, automated dispatch of distributed energy resources, pragmatic planning and operation of existing resources (nuclear, renewables, natural gas), market designs, and AI-augmented operational tools could give grid operators confidence on the hottest days.

7. Which school does Quantum computing belong to at Purdue?

a. Quantum is a truly interdisciplinary endeavor at Purdue, with key researchers in ECE, Physics, Material Science, Chemical Engineering, Chemistry, Computer Science, and more. Many of these researchers work together under the umbrella of the Purdue Quantum Science and Engineering Institute (PQSEI)