The growing carbon footprint of AI and cloud computing demands that we train engineers and scientists who are experts in computational methods and also understand the broader sustainability implications of their work. Today's students are eager to engage in this urgent challenge, but current curricula often lack focus on societal decarbonization in general and sustainable computing in particular. I aim to bridge this gap by bringing these critical topics into the classroom, encouraging diverse participation, and fostering a culture of collaboration across disciplines. Specifically, I will equip students with the technical skills and interdisciplinary mindset to tackle computing's environmental impact. My teaching experience – spanning multiple course assistantships, guest lectures, and the mentorship of over two dozen students – has prepared me to guide the next generation of computing professionals toward solutions that are technically sound and socially responsible.

Teaching Interests I am a quintessential interdisciplinary person with an undergraduate degree in electrical power engineering, a master's in energy systems engineering, a Ph.D. in computer engineering, and research experience on core computer science problems. Therefore, I can *teach courses on core computer systems topics*, such as systems engineering, distributed systems, cloud computing, high-performance computing, embedded systems, and mobile computing. I can also *teach electrical and electronics engineering courses*, including courses on electric circuits, digital and analog electronics, power electronics, and power systems. I would also like to *introduce elective courses or offer seminars on research-related topics*, such as sustainable computing, datacenter energy systems, energy and environment, computer systems and society, societal decarbonization, heterogeneous computing, elastic computing, metrics in sustainable computing, and lifecycle analysis in computing.

Teaching Philosphy Beyond the foundational goal of helping students develop a deep understanding and technical expertise in computer and energy systems, my teaching and mentoring engagements will be guided by four key considerations.

First is *environmental consciousness*. I aim to highlight the environmental implications of modern computing applications and prepare students to integrate sustainability considerations into designing high-performance, resource-efficient systems. Second is *impact orientation*. I will inspire and equip students to pursue accelerated innovation, scale up mature solutions, and make a difference through climate-focused entrepreneurial efforts. Third is *hands-on learning through rapid prototyping*. My research approach centers on building system prototypes to test feasibility, which will shape my teaching style. I will encourage students to experiment, build, and iterate on their designs, creating a classroom environment that values discovery and practical understanding. Fourth is *prioritizing simplicity*. My industry collaborations have reinforced my belief that simple, interpretable solutions are superior to complex, black-box methods. In my teaching, I will emphasize developing the simplest effective solution, which enhances resource efficiency, improves safety, and eases maintenance.

Through this focus on environmental consciousness, impact-driven learning, project-based approaches, and practical simplicity, I will equip students with the technical expertise, interdisciplinary insight, and adaptability needed to lead responsibly.

Teaching & Mentoring Experience As a teacher and mentor, I will bring substantial experience in lecture delivery, mentoring, community development, and course management expertise gained as a teaching assistant.

❶ – Mentoring I have been very fortunate to work with more than two dozen amazing students (13 Ph.D. students, 2 masters students, and 9+ undergrads) at different institutions during my academic career thus far. Under my mentorship, *my students have published 27 first-author publications at top computer and energy systems venues*, while another 10+ are under review. My mentoring approach is to treat each student individually and allow them to bring their unique problem-solving approach while progressing toward the ultimate objective. This approach has unlocked their potential and created a happy work environment. An undergraduate honors student I mentored at UMass Amherst said, *"Working in Professor Shenoy's lab and learning from senior lab member Dr. Noman Bashir has been a great motivator for me to apply for graduate school."* The student has since joined Carnegie Mellon University for their Ph.D. Our joint paper on deep decarbonization of residential heating received the Best Paper award at the International Green and Sustainable Computing Conference (IGSC). Through my mentoring, I have always strived for diversity in gender (12/24 male and 12/24 female), race, ethnicity, and thought process.

❷ – Community Building Building a community and providing a platform for students and young researchers working on energy systems and sustainability topics is crucial. In 2023, I *co-launched the official ACM SIGEnergy Graduate Student Seminar* with Prof. Zoltan Nagy from UT Austin [1]. It is a monthly virtual seminar series for graduate students to present their ongoing work to peers and mentors worldwide. The seminar series provides an opportunity for knowledge exchange between the two conferences organized by SIGEnergy: ACM e-Energy and ACM BuildSys. Since 2022, I have also been a *co-chair and organizer of the annual SIGEnergy Workshop on Societal Decarbonization (SoDec) [2].* This workshop provides a vibrant venue for researchers within and outside the ACM SIGEnergy community to discuss challenges and opportunities for societal decarbonization. I will also be the *lead chair and organizer of the inaugural SIGEnergy workshop on carbon-based metrics,* which will be held alongside ACM SIGMETRICS 2025.

❸ – Lectures and Tutorials Over the years, I have gained valuable experience delivering lectures and tutorials on various computer and energy systems topics to audiences with a broad range of expertise in computer science and engineering.

Since Spring 2022, I have *delivered an annual lecture on sustainable computing and computing for sustainability* in Prof. Prashant Shenoy's Distributed and Operating Systems graduate-level class at the University of Massachusetts Amherst. The lecture highlights the environmental implications of computing technologies while outlining the use of computer systems and algorithms for improving the efficiency of societal systems. During the Spring of 2024, I *co-taught a graduate-level seminar course on Machine Learning for Decarbonizing Electric Energy Systems* with Prof. Marija Illic, which focused on analyzing the suitability of ML/AI methods for modeling, analytics, operation, control, and fault diagnostics tasks in electric grids.

While delivering lectures to a live audience in a classroom is a fulfilling experience, I want to contribute to the broader efforts to integrate sustainability considerations into higher education and have an impact at scale. To that end, I partnered with Madeline Gonzalez Allen, IBM's Corporate Social Responsibility Manager for Academia, and *developed an on-demand session for a conference organized by the Association for the Advancement of Sustainability in Higher Education (AASHE) [3].* Our session, "Sustainable AI - How Higher Education Can Advance Addressing the Environmental Impacts of Gen-AI," provides resources for educators to understand the implications of AI and how to incorporate them into their teaching.

Most importantly, we need to instill environmental consciousness in our younger generation as they will face the worst impact of climate change. To that end, in 2022, I *revived and co-organized The UMass Turing Summer Program [4]*, which is a three-week summer program for High School students interested in learning about Computer Science and how computing can address challenges in areas such as healthcare, energy, and many others. After co-organizing the program for two years, I participated as a speaker to give a lecture on the unique sources of energy in 2024.

❹ – Teaching Assistant At the University of Massachusetts Amherst, I supported *Algorithms for Computer Engineering* and *Systems Programming* courses. In the *Algorithms for Computer Engineering* course, I focused on helping students build a deep understanding of algorithm correctness, performance evaluation, and how computational structures impact efficiency. I guided students through foundational mathematical techniques to evaluate algorithms, equipping them with the skills to select and adapt algorithms to fit specific challenges. Reviewing assignments and exams also provided insights into common challenges, allowing me to adjust explanations and focus on clarity in complex topics. In *Systems Programming*, I led students through core concepts in Unix-based software engineering, covering topics such as process control, I/O, and concurrent programming. The course featured a semester-long project divided into iterative assignments, which gave students hands-on experience in analyzing and designing complex systems. Conducting this course during the first full semester of COVID-19, I adapted to remote instruction by breaking down material into manageable segments and holding extra support sessions. With a mixed cohort of sophomores and juniors, I focused on bridging experience gaps and ensuring foundational understanding, sharpening my skills in adaptability and responsiveness.

At the National University of Computer and Emerging Sciences (NUCES-NU) in Islamabad, Pakistan, I was a TA for *Advanced Embedded Systems*. I supported students in mastering embedded systems fundamentals such as memory-mapped I/O, API design, and device drivers. I guided students through rapid prototyping and PCB design, emphasizing practical skills and industry standards. In this project-based course, students formed teams to design, prototype, and test embedded solutions, using microcontrollers like `MSP430` and `mbed`. My role also involved overseeing labs and providing technical guidance, ensuring students met high standards in design and code quality suitable for real-world applications.

References

[1] *ACM SIGEnergy Graduate Student Seminar*. https://sites.google.com/view/sigenergy-seminar/home. 2023.

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[3] *Association for the Advancement of Sustainability in Higher Education (AASHE) Conference & Expo*. https://www.aashe.org/conference/. 2024.

[4] *UMass Turing Summer Program*. https://lass.cs.umass.edu/turing/. 2024.