Inspired by the *Wisconsin Idea* during my doctoral studies at the University of Wisconsin-Madison (UW-Madison), I believe that education should reach beyond the boundaries of traditional classroom settings. This concept underscores the notion that education is not merely a transitory phase but a perpetual force propelling personal and societal progress [1].

With this in mind, I am committed to designing engaging courses, promoting a collaborative learning environment, and encouraging students to consistently contribute to the ever-growing body of knowledge and innovation, especially in the age of large language models (LLMs), both in their academic pursuits and in their future careers.

My passion for teaching is rooted in the opportunity to re-visit and expand on what we know, often sparking new research perspectives. The interactions between students and teachers not only enrich our view of the world but also help in the continuous transfer of knowledge.

In teaching courses on AI, Machine Learning (ML), High-Performance Computing, and Systems, I prioritize a clear and organized approach. My aim is not only to establish a strong foundational understanding but also to ignite a curiosity for deeper exploration. My foremost objective in teaching is to cultivate critical thinking in Computer Science, underscoring the significance of AI, ML, and system techniques, as well as their interplay in developing efficient and reliable ML models. In subsequent sections, I will reflect on my past teaching and mentoring experiences, express my aspirations as a faculty member, and discuss teaching strategies that I find profoundly effective with students.

1 Teaching and Mentoring Experiences

During my time at UW-Madison, Carnegie Mellon University (CMU), and as a guest lecturer at Mohamed bin Zayed University of Artificial Intelligence (MBZUAI), I was fortunate to have opportunities to teach both junior and senior-level graduate courses. My teaching experiences spanned from guest lecturing in courses like ECE 826: *Theoretical Foundations of Large-scale Machine Learning* at UW-Madison to ML 710: *Parallel and Distributed ML Systems* at MBZUAI.

Unlike conventional courses where guest lecturers typically contribute just a few lectures over an entire semester, my role in the MBZUAI ML 710 course was more like a co-creator. Before the Fall 2022 semester, MBZUAI lacked graduate-level courses specifically on ML systems. Collaborating with Professor Qirong Ho, the course's primary instructor, we jointly developed the curriculum, designed homework assignments, created course materials—including slides—and wrote the midterm exams from scratch. In Fall 2022, only three students enrolled in the course. Yet, by Spring 2023, enrollment increased to 15 students. While many universities offer courses related to ML systems, *e.g.*, CMU 15-849: "Machine Learning Systems", such courses tend to be seminar-based, focusing primarily on paper reading. In contrast, the MBZUAI ML 710 course, which I had a hand in shaping, is a pioneering effort. Targeted at junior graduate students, it emphasizes foundational knowledge rather than just paper discussions.

During my time at UW-Madison's Department of Computer Sciences and CMU's Machine Learning Department, I had the privilege of mentoring a diverse group of 11 students, encompassing both undergraduates and graduates. Our collaborative efforts yielded a spectrum of outcomes, from open-source projects to publications in top-tier ML and systems conferences. Several of these students have since embarked on impressive academic journeys. For instance, Dacheng Li, a former Master's student at CMU, commenced his Ph.D. studies in the Electrical Engineering and Computer Sciences department at the University of California, Berkeley in the fall of 2023. In a similar vein, Rulin Shao, after earning her Master's degree in Computer Science from CMU, initiated her Ph.D. program at the University of Washington's Computer Science and Engineering department in the same year.

2 Teaching Plan and Methods

2.1 Teaching Plan

I am prepared to teach undergraduate and graduate courses in **AI, ML, Deep Learning, High-Performance Computing, Operating Systems, and Distributed Systems**. With additional preparation, I am also capable of teaching courses in **Computer Vision, Natural Language Processing, and Convex and Non-Convex Optimization**.

The plan to create a new ML system course. I am eager to create a new course centered on ML systems based on my research and part of the materials I developed for the ML710 course at MBZUAI. In this new proposed course, students will explore the core principles and structures of distributed ML algorithms. Students will also gain a deep understanding of how aspects like compilation and resource management impact the efficiency and scalability of

[1] https://www.wisc.edu/wisconsin-idea/

parallel ML algorithms. The main goal of the course is to equip students with the skills to assess, create, and put into action parallel ML methods in different distributed computing environments.

2.2 Teaching Methods

As a teacher, I aim to ignite a passion for learning in my students and strengthen their critical thinking and problem-solving skills. In achieving this, I believe in using a variety of teaching methods described below.

Innovation-oriented teaching in the age of LLMs. In an era with tools like GPT-4, the emphasis on simply acquiring knowledge is diminishing in educational contexts. Instead, education should guide students on how to apply this easily accessible knowledge effectively in the real world. I am committed to reshaping the existing courses to focus on addressing complex real-world problems with the aid of AI. While students are encouraged to utilize AI, the emphasis is on its judicious use for problem-solving.

Practical learning through projects. Inspired by the *Constructivist Learning Theory*, which champions hands-on experiences, I intend to support graduate students as they figure out their individual research agenda [1,2]. My goal is to help students define and refine their objectives, making certain that their projects align with the course content and result in meaningful and applicable outcomes.

Flipping the classroom. I am a deep believer that a flipped class keeps student learning at the center of teaching. This method lets students interact with course materials at their convenience, turning in-person classes into vibrant, hands-on sessions. Here, students can delve deeper into concepts with guided oversight. This approach also adapts to different learning speeds, allowing students to familiarize themselves with topics before class, ready for practical exercises and rich discussions. I am keen to embrace this approach in my courses, as it promotes active student involvement and provides timely, personalized feedback. By adopting this strategy, I aim to create a more active, cooperative, and effective learning space in university classrooms.

Regular feedback and guidance. As a teacher and mentor, I intend to closely monitor the progress of projects, offering precise technical and research advice to ensure they are completed both thoroughly and promptly. To achieve this, I plan to hold regular meetings, either weekly or bi-weekly, with each project team.

Education with community engagement. I plan to host end-of-semester poster sessions, open to the entire university community and the public, allowing students to present their projects and research findings and extending the influence of our courses and research to a wider audience.

Engaging with individuals from both academia and industry. Diverse thinkers bring varied viewpoints and approaches to challenges. By inviting researchers to deliver guest lectures, I aim to broaden my students' perspectives on research. Additionally, I plan to have industry researchers and engineers share their insights on real-world product challenges to further deepen our discussions.

By incorporating these strategies, I aim to equip my students with the skills, knowledge, and perspectives necessary for intellectual and professional growth.

References

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[2] E. Von Glasersfeld. Cognition, construction of knowledge, and teaching. *Synthese*, 80:121–140, 1989.