ILLINOIS

COLLEGE OF ENGINEERING

Department of Electrical & Computer Engineering
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To Whom It May Concern:

I am pleased to write this letter **recommending Mr. Bo Pan for admission** to your graduate program. I have known Bo as a student in one of my classes. Bo is a talented young engineer with superior academic performance. I think that he has great potential as a graduate student and will do well in whatever program he chooses to pursue.

Bo is a senior at ZJUI, our joint campus with Zhejiang University in Haining, China, which opened in 2016. I taught on the campus in the 2018-2019 academic year, and taught most of Bo's peers, but he started in Civil Engineering, so I did not get to interact with him myself until much later. Students at ZJUI earn both UIUC degrees (in his case, a BS in Computer Engineering) and ZJU degrees. The program has been able to attract top talent in China: for the class of 2021, a comparison based on UIUC GPA puts the top two-thirds of ZJUI CompE students among the top third of UIUC CompE students, and that ratio continues all the way up. Purely based on GPA, Bo's UIUC GPA of 3.99 puts him in the **top 0.5% of UIUC CompE students academically**.

We routinely bring our best students into positions on course staff in order to help the next generation of students while giving our top students opportunities to develop their communication skills. Given his academic capabilities, it's not surprising that my colleague, Volodymyr Kindratenko, invited Bo to join his **staff for the ECE 120 class. Such a position also attests to Bo's ability and maturity.**

Unfortunately, due to the pandemic, Bo was not able to make the usual visit to the UIUC campus. However, I did get to meet him last semester, Spring 2021, when he enrolled virtually in my ECE391 course, which I co-taught with Zbigniew Kalbarczyk. ECE391 is our systems programming class, and is required for all CompE students. In the second half of the course, **teams of four students develop their own operating systems for the IA-32 (x86) ISA**. Before doing so, they must learn x86 assembly and learn to read code—each of these skills is mastered through an individual assignment. The difficulty is high, in part because of the diversity of skills needed and the novelty of these skills for most of the students, and the course is **widely regarded as one of the most challenging courses in ECE**. For the operating system, students set up the interrupt descriptor table, write drivers for the interrupt controller, keyboard, real-time clock, and terminal, create basic page tables, implement a read-only file system and a variety of system calls include process creation and mapping of text video memory directly into

applications, and support both time-sharing and display switching amongst three virtual terminals.

Bo's programming assignments, both individual and team-based, were outstanding, including the final project. He also did well on exams. Among the 227 students who completed the course (the number started around 270), Bo ranked in the **top 8%, earning a solid A.**

While ECE391 is challenging for most students, our best students can do more. Thus, since around 2006, Microsoft has sponsored a design competition based on the operating system project. Teams are required to correctly implement the basic functionality described earlier in order to compete, but are then allowed to extend their operating systems, for which they receive small amounts of extra credit. We hold demonstrations from the best teams, then vote for the winners and award prizes based on the complexity, reliability, and overall impressiveness of the team's additional work. Bo's team extended the base operating system with support for high-resolution graphics and a GUI, a mouse driver, a clock application and GUI, and a sound driver with keyboard-based controls to play music. Bo's team worked well together, attesting to Bo's **outstanding teamwork skills.**

In summary, Bo is a great candidate for your graduate program. He is **one of our best students**, and we would be happy to have him join us here for graduate school, but he has decided to stay in China to complete his education. **I recommend him highly for admission to your program.**

Sincerely,

Steven S. Lumetta, Associate Professor
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