Experiential Learning in Computer Architecture using Remote Hardware: A Case Study

Erin Sorbella and Dr, Thomas M. Schmidt, Computer Science Clinical Professor, Pace University, Pleasantville, New York, USA

We present our findings following the introduction of remote hardware labs to aComputer Organization course at Pace University. Computer Organization is atraditionally theory-heavy course that familiarizes students with thefundamentals of computer hardware. Motivated by a shared goal to enhanceinteractive learning in computer science courses at Pace, students were invitedto participate in FPGA (Field-Programmable Gate Array) lab modules as part oftheir coursework. We hypothesized that empowering students to createtheirown hardware designs with FPGAs would improve student engagement andunderstandingof the course material. Throughout the semester, studentsprogressed from logical circuits inVerilog to developing their own 8-bitcomputer processors. To facilitate access to the necessary equipment, wecollaborated with LabsLand, a provider of remote FPGA labs. Student surveysand interviews yielded a positive reception to the newly incorporated labmodules; however,some concerns arose due to the limitations of a remote labformat. The given lab modules, the design of the 8-bit processor, anoverview of student responses, and statistical examination of and comparison to a control group will be presented in further detail.