



DISSERTATION DEFENSE



AUSTIN ROVINSKI

Towards Free, Open, and Ubiquitous Hardware Design

Thursday, February 24th

10:00am – 11:30am

3316 EECS

[Virtual](#)

Passcode: 779156

Meeting ID: 919 1391 6871

ABSTRACT: In 1965, Gordon Moore posited that the number of transistors on an integrated circuit would double every 18 months. With some adjustments, the prediction largely remained true for decades and revolutionized technology as we know it. A lesser-known contributor to Moore's Law was the "Mead and Conway Revolution" in VLSI, initiated by Carver Mead and Lynn Conway. Prior to this revolution, integrated circuit design was mostly done manually and required deep expertise from top-level integration all the way down to fabrication effects. Mead and Conway transformed this manufacturing knowledge into a set of design rules which were fit for use in automation. This innovation enabled integrated circuit design to scale with computers rather than humans, and effectively kick-started the electronic design automation (EDA) industry.

Moore's Law is reaching a slow but inevitable end as transistor counts take longer and longer to double. Because chips can no longer rely on foundry improvements to improve performance, architectural innovations need to pick up the slack. Certain domains such as machine learning, genomics, graph processing, drug discovery, financial trading, and others have turned to hardware acceleration. EDA software has not seen such focus and is at risk of stagnating chip development. In this dissertation, I discuss key issues limiting the pace of innovation in hardware design, including complexity of design integration, inaccessibility of EDA tools, and lagging EDA tool performance. Then, I present three of my works which address these issues: Celerity, OpenROAD, and SpeEDAr. These works represent a multi-faceted approach to speed up design innovation by improving design methodologies, providing open-source EDA tooling, and improving end-to-end EDA tool performance.

CHAIR: Prof. Ronald Dreslinski, Jr.