

EDUCATION	<b>Ph.D. in ESE, University of Pennsylvania</b> <span style="float: right;"><i>Aug'16-Jul'18, Aug'21-Present</i></span> Advisor: Prof. André DeHon Research Interests: FPGA design methodology, Tools/CAD for FPGAs, Hardware Acceleration
	<b>B.S. in ECE, Carnegie Mellon University</b> <span style="float: right;"><i>Aug'12-Dec'15</i></span> Recipient of David Tuma Project Award – Best ECE Capstone Project Award Graduated with University Honors
ACADEMIC RESEARCH	<b>Software-like Incremental Refinement on FPGA [1]</b> <span style="float: right;"><i>Feb'23-Present</i></span> Advisor: Prof. André DeHon, University of Pennsylvania <ul style="list-style-type: none"> <li>Proposed a fast incremental refinement strategy for FPGA designs that resembles SW compilation</li> <li>Designed a runtime bottleneck identification for HLS dataflow designs using FIFO full/empty counters</li> <li>Created a multi-clock system with a NoC (400MHz) and compute kernels (200–400MHz)</li> <li>Accelerated design tuning time by <math>1.3\text{--}2.7\times</math> while improving application latency by <math>2.2\text{--}12.7\times</math></li> </ul>
	<b>Network-on-a-Chip (NoC) on FPGA [2]</b> <span style="float: right;"><i>Sep'22-Jan'23</i></span> Advisor: Prof. André DeHon, University of Pennsylvania <ul style="list-style-type: none"> <li>Designed a novel asymmetric Butterfly Fat Tree NoC in Verilog that excels in unbalanced traffic</li> <li>Analyzed throughput and worst case latency in realistic graph workloads and synthetic traffic patterns</li> <li>Achieved up to 76% more throughput than existing Butterfly Fat Tree NoC with the similar resource usage</li> </ul>
	<b>Parallel FPGA Compilation using Hierarchical Partial Reconfiguration [4]</b> <span style="float: right;"><i>Jan'22-Aug'22</i></span> Advisor: Prof. André DeHon, University of Pennsylvania <ul style="list-style-type: none"> <li>Open-sourced the Makefile/Python/Tcl based FPGA's parallel compilation framework (<a href="#">link</a>)</li> <li>Provided flexibility in sizes of compile slots for parallel FPGA compilations, utilizing Xilinx Nested DFX</li> <li>Only 2–5 min to compile realistic benchmarks, from HLS to bitstream (<math>2.2\text{--}5.3\times</math> speedup over Xilinx Vitis)</li> </ul>
	<b>Accelerating FPGA Compilation using NoC and Partial Reconfiguration [6][7]</b> <span style="float: right;"><i>May'17-Aug'18</i></span> Advisor: Prof. André DeHon, University of Pennsylvania <ul style="list-style-type: none"> <li>Designed packet parser, reassembly buffer, and FIFO modules in Verilog for the NoC interface</li> <li>Analyzed Xilinx Vivado's compile speed with case studies and revealed the limitations of the vendor tool</li> <li>Showed <math>4.5\times</math> speedup in PnR time over Xilinx Vivado's compilation with a divide-and-conquer approach</li> </ul>
	<b>Detecting Voltage Anomalies in Scan-Testing Environment on FPGA</b> <span style="float: right;"><i>Dec'14-Oct'15</i></span> Advisor: Prof. Shawn Blanton, CMU <ul style="list-style-type: none"> <li>Implemented a synthesizable, fine-grained voltage sensor on FPGA using carry chains and latches</li> <li>Analyzed voltage activities for three different ISCAS'89 circuits in at-speed scan testing environment</li> </ul>
INDUSTRY EXPERIENCE	<b>AMD, San Jose, CA, USA</b> <span style="float: right;"><i>(incoming) May'24-Aug'24</i></span> <i>(incoming) FPGA Architecture Intern</i>
	<b>AnaPass, South Korea</b> <span style="float: right;"><i>Jul'20-Jul'21</i></span> <i>SoC Engineer (in fulfilment of military service)</i> <ul style="list-style-type: none"> <li>RTL verification of Timing Controller IP for Samsung Tablet display</li> </ul>
	<b>Korea Advanced Institute of Science and Technology (KAIST), South Korea</b> <span style="float: right;"><i>Aug'18-Jul'20</i></span> <i>Research Engineer (in fulfilment of military service)</i> <ul style="list-style-type: none"> <li>Projects on Radar-based fall detector, FPGA-based beamforming system, IQ imbalance calibration</li> </ul>
	<b>CoMira Solutions, Pittsburgh, PA, USA</b> <span style="float: right;"><i>Jun'14-Aug'14</i></span> <i>Hardware Engineering Intern</i> <ul style="list-style-type: none"> <li>Optimized hardware implementation of CRC in area and timing using a table-based approach</li> </ul>
	<b>HW/SW co-design for VGG16, University of Pennsylvania</b> <span style="float: right;"><i>Nov'21-Dec'21</i></span> <ul style="list-style-type: none"> <li>Designed a systolic array based FPGA acceleration kernel for 2D convolution function using HLS</li> <li>Integrated multiple FPGA kernels (on AWS EC2 F1) with PyTorch using C++ extension</li> <li>Demonstrated <math>11\text{--}14.8\times</math> performance improvement over the SW baseline of 2D convolution (<a href="#">report link</a>)</li> </ul>

PUBLICATIONS	[1] <b>REFINE: Runtime Execution Feedback for INcremental Evolution on FPGA Designs</b> <b>D. Park</b> , A. DeHon ACM Int. Symp. on Field-Programmable Gate Arrays ( <b>FPGA</b> ), 2024 – (acceptance rate: 22.5%)	
	[2] <b>Asymmetry in Butterfly Fat Tree FPGA NoC</b> <b>D. Park</b> , Z. Yao, Y. Xiao, A. DeHon IEEE Int. Conf. on Field-Programmable Technology ( <b>FPT</b> ), 2023	
	[3] <b>ExHiPR: Extended High-level Partial Reconfiguration for Fast Incremental FPGA Compilation</b> Y. Xiao, <b>D. Park</b> , Z. Niu, A. Hota , A. DeHon ACM Transactions on Reconfigurable Technology and Systems ( <b>TRETS</b> ), 2023	
	[4] <b>Fast and Flexible FPGA development using Hierarchical Partial Reconfiguration</b> <b>D. Park</b> , Y. Xiao, A. DeHon IEEE Int. Conf. on Field-Programmable Technology ( <b>FPT</b> ), 2022 – (acceptance rate: 25.2%)	
	[5] <b>HiPR: High-level Partial Reconfiguration for Fast Incremental FPGA Compilation</b> Y. Xiao, A. Hota, <b>D. Park</b> , A. DeHon IEEE Int. Conf. on Field-Programmable Logic and Applications ( <b>FPL</b> ), 2022 ( <i>Best Paper Candidate</i> : 7.0%)	
	[6] <b>Reducing FPGA Compile Time with Separate Compilation for FPGA Building Blocks</b> Y. Xiao, <b>D. Park</b> , A. Butt, H. Giesen, Z. Han, R. Ding, N. Magnezi, R. Rubin, A. DeHon IEEE Int. Conf. on Field-Programmable Technology ( <b>FPT</b> ), 2019 – (acceptance rate: 25.0%)	
	[7] <b>Case for Fast FPGA Compilation using Partial Reconfiguration</b> <b>D. Park</b> , Y. Xiao, N. Magnezi, A. DeHon IEEE Int. Conf. on Field-Programmable Logic and Applications ( <b>FPL</b> ), 2018	
TALKS	<ul style="list-style-type: none"><li>• <b>REFINE: Runtime Execution Feedback for INcremental Evolution on FPGA Designs</b><ul style="list-style-type: none"><li>– at AMD – FPGA Architecture team, San Jose, CA, USA (<i>slides</i>)</li><li>– at Altera – FPGA Architecture team, San Jose, CA, USA (<i>slides</i>)</li><li>– at FPGA 2024, Monterey, CA, USA (<i>slides</i>)</li></ul></li><li>• <b>Asymmetry in Butterfly Fat Tree FPGA NoC</b><ul style="list-style-type: none"><li>– at FPT 2023, Yokohama, Japan (virtual) (<i>talk video, slides</i>)</li></ul></li><li>• <b>Fast and Flexible FPGA development using Hierarchical Partial Reconfiguration</b><ul style="list-style-type: none"><li>– at FPT 2022, Hong Kong (<i>talk video, slides</i>)</li><li>– at ESE PhD seminar, University of Pennsylvania, Philadelphia, PA, USA (<i>slides</i>)</li></ul></li><li>• <b>High-level Partial Reconfiguration for Fast Incremental FPGA Compilation</b><ul style="list-style-type: none"><li>– at FPL 2022, Belfast, Northern Ireland (<i>slides</i>)</li></ul></li><li>• <b>Case for Fast FPGA Compilation using Partial Reconfiguration</b><ul style="list-style-type: none"><li>– at FPL 2018, Dublin, Ireland (<i>slides</i>)</li></ul></li></ul>	<div>Mar'24</div> <div>Mar'24</div> <div>Mar'24</div> <div>Dec'23</div> <div>Dec'22</div> <div>Oct'22</div> <div>Aug'22</div> <div>Aug'18</div>
AWARDS/ SERVICE	<ul style="list-style-type: none"><li>• Student Recognition Award, University of Pennsylvania</li><li>• Best Presentation Award, Penn ESE PhD seminar (F2022-S2023)</li><li>• <b>Samsung Electronics Global Fellowship</b> with post-graduation employment offer</li><li>• <b>Best Paper Candidate</b>, FPL2022</li><li>• PhD Fellowship, University of Pennsylvania</li><li>• <b>Best ECE Capstone Project Award</b> (Project: Neural Networks on FPGA), CMU</li><li>• University Honors, CMU</li><li>• Penn ESE PhD students seminar organizer</li><li>• Judge, Research Experience for Undergraduates, University of Pennsylvania</li></ul>	<div>Apr'23</div> <div>Apr'23</div> <div>Oct'22</div> <div>Aug'22</div> <div>Aug'16</div> <div>May'16</div> <div>May'16</div> <div>Feb'23-Dec'23</div> <div>Aug'23</div>
TEACHING ASSISTANT	<ul style="list-style-type: none"><li>• <b>SoC Architecture</b> (ESE5320), University of Pennsylvania<ul style="list-style-type: none"><li>– Co-authored homework labs on multi-core, SIMD, HW acceleration, HLS, Xilinx Vitis</li><li>– Held C/exam review sessions and weekly office hours for the graduate level course (20-40 students)</li><li>– TA rating for Fall 2022: 3.74/4, the highest of all 7 offerings of the course's history</li></ul></li><li>• <b>Mathematical Foundations of Electrical Engineering</b> (18-202), CMU</li><li>• <b>Structure and Design of Digital Systems</b> (18-240), CMU</li></ul>	<div>Fall 2021, Fall 2022</div> <div>Fall 2014</div> <div>Spring 2014</div>
SKILLS	<b>Hardware</b> Verilog, Vivado, Vitis HLS, Quartus, HDL Simulation tools, OpenCL <b>Software</b> C++, Python, PyTorch, scikit-learn, Tcl, Shell scripting	