



COLLEGE of ENGINEERING  
AND PHYSICAL SCIENCES

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SCHOOL OF COMPUTER SCIENCE

## PhD Qualifying Examination

**Timothy Martin**

**Friday March 11, 2022 at 11:45am via Zoom**

*The Integration of Machine Learning Probes and  
Frameworks into the FPGA Placement Flow*

**Chair:** Dr. Joe Sawada

**Advisor:** Dr. Gary Grewal

**Co-Advisor:** Dr. Shawki Areibi [SoE]

**Non-Advisory:** Dr. Neil Bruce

**Non-Advisory:** Dr. Dave Calvert

### **Abstract:**

Placement is an important and challenging step in the FPGA CAD process. In recent years designers have demanded increased performance as FPGA circuits have grown in size and complexity with logic blocks numbering in the millions. Existing FPGA CAD tools struggle to support these designs, with long compile times and many costly iterations required to reach design closure. Developments in machine learning have shown promise in enhancing the FPGA placement process to better handle modern circuit designs.

This work proposes several machine-learning driven probes to create a dynamic placement process that adapts to the unique features of each circuit to achieve improved quality-of-results while simultaneously reducing the time required to place large designs.