



COLLEGE of ENGINEERING
AND PHYSICAL SCIENCES

SCHOOL OF COMPUTER SCIENCE

MSc Defence

Wednesday August 21, 2024, at 10AM, In-person (REYN 1101)

Tom Cheng

Reinforcement Learning for Circuit Partitioning

Chair: Dr. Stacey Scott

Advisor: Dr. Gary Grewal

Co-Advisor: Dr. Shawki Areibi (SoE)

Non-Advisory: Dr. Andrew Hamilton-Wright

Abstract:

In the field of Electronic Design Automation (EDA), dividing a complex circuit into smaller subcircuits is a critical step. This process, known as circuit partitioning, minimizes the connections needed between these subcircuits while dividing the overall design. This can simplify the problem, and further enhance the performance and efficiency of other EDA tasks, such as placement and routing. A popular method for circuit partitioning is the Fiduccia-Mattheyses-Sanchis (FMS) algorithm, which is a local search heuristic. While it is efficient, the FMS algorithm has two weaknesses: it relies heavily on a good initial solution and can become caught in suboptimal solutions.

This research explores various methods to construct better initial solutions for circuit partitioning. As well, it investigates the application of reinforcement learning (RL) techniques to overcome the local minima problem inherent in the FMS algorithm. By leveraging RL, this study aims to enhance the ability of the FMS algorithm to navigate the solution space more effectively, thereby achieving higher-quality partitions.