ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

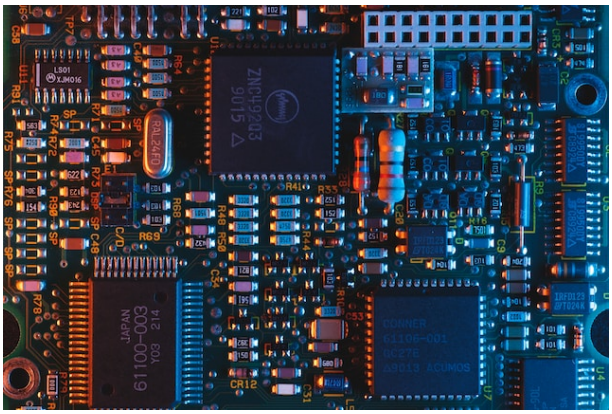
Distributed Computing

Prof. R. Wattenhofer

Automated Electronic Component Placement and Routing

Beyond games, the real world is full of harder-than-NP-complete problems in deterministic environments. One such problem is printed circuit board (PCB) layout design. When designing a printed circuit board (PCB), two critical tasks are component (such as resistor) placement and wire routing. In the past, these tasks were solved by humans, as traditional algorithms could not handle their complexity. However, recent advancements in graph neural networks (GNNs) and reinforcement learning (RL) are making their automation feasible. GNNs are typically used for feature extraction, while RL is used for behaviour learning. Self-supervised methods and reinforcement learning are promising avenues to solve PCB placement and routing. Prior work has shown that GNNs and RL can be used for chip standard cell (sub-component) placement and has explored automated chip routing.

This thesis aims to automate electronic component placement and routing for PCB layout design to simplify and accelerate the PCB design process. In the process, we want to explore self-supervised and RL-based approaches, different network architectures and training methods, as well as, optimize system performance using any applicable techniques.



Requirements: Strong motivation as well as coding skills. Prior experience or background with PCBs, GNNs, RL, and self-supervised learning is a big advantage.
We will have weekly meetings to discuss open questions and determine the next steps.

Interested? Please contact us for more details!

Contact

- Florian Grötschla: fgroetschla@ethz.ch, ETZ G63
- Benjamin Estermann: besterma@ethz.ch, ETZ G60.1