



Title: Analog Circuit Generation Using General-Purpose AI Agents: Write Your Design Skills into SKILL.md

Abstract: Analog circuit design remains highly dependent on expert knowledge, iterative simulation, and heuristic decision-making. Recent specialized AI agents for analog circuit generation have demonstrated the potential of automating parts of this process. However, such approaches often embed design knowledge inside dedicated models or closed agent workflows, making it difficult to inspect, modify, transfer, or accumulate the designer's practical expertise.

This presentation proposes an alternative approach: analog circuit generation using a general-purpose AI agent guided by an external design knowledge file, named SKILL.md. In this framework, SKILL.md is a human-readable Markdown file that explicitly describes design rules, sizing heuristics, topology selection criteria, naming conventions, simulation procedures, debugging strategies, and prior design cases. A general-purpose AI agent, such as OpenClaw, reads this file and uses it to generate circuit descriptions, simulation inputs, analysis scripts, and correction plans.

We plan to compare this method with a specialized analog design agent, AnalogCoder-Pro, under common circuit generation tasks such as current mirrors, differential pairs, common-source amplifiers, and two-stage operational amplifiers. The comparison will evaluate design success rate, number of correction iterations, simulation convergence, generated code validity, and achieved circuit performance. The central hypothesis is that a general-purpose AI agent equipped with explicit and editable design knowledge can approach the performance of a dedicated analog AI agent, while improving transparency, portability, and human controllability.

This work emphasizes a shift from model-centric analog design automation to knowledge-centric agentic design automation. Rather than hiding design expertise inside a specialized model, the proposed approach externalizes the designer's knowledge into a reusable and maintainable file. This enables human designers to write their design skills into SKILL.md and collaborate with general-purpose AI agents in analog circuit generation.