Thesis Title	Exploring AI-Driven Design Automation in Full-Custom NAND Flash Development
Target Audience	Master's Degree Students (Thesis duration: 6–9 months)
Location	Micron branch in Avezzano - high flexibility in on-site presence
Topic	This research investigates the potential for increased integration of AI-based design automation techniques within the full-custom semiconductor design workflows, specifically targeting leading-edge NAND Flash memory devices. NAND Flash is the predominant non-volatile memory technology used in smartphones, solid-state drives, USB sticks, and many other storage devices. NAND Flash is a highly complex system tasked with controlling the Fowler-Nordheim tunneling process with extreme precision across hundreds of millions of replacement-gate cells, each exhibiting slight physical variations. To achieve this, the device incorporates multiple subsystems: analog circuitry that generates high-voltage signals from standard power supplies (e.g., up to 30V from 3.3V), high-speed datapath circuits capable of gigabyte-per-second data transfer, core logic managing cell arrays and signal sequences for read/write/erase operations, and a proprietary microcontroller executing tens of thousands of operations in real-time. The design and integration of these subsystems rely on a multifaceted workflow involving full-custom circuits/layout, RTL-based APR flows, and sequences development. This workflow is supported by a vast and detailed body of documentation, essential for maintaining design consistency, enabling collaboration, and preserving know-how. However, both the complexity of the workflow and the effort required to produce, maintain, and consult documentation can become significant obstacles to innovation—especially when relying on traditional, manual approaches. This research identifies two key opportunities for AI-driven automation: 1. AI-driven automation of structurally repetitive and cognitively demanding design tasks, with a focus on machine learning techniques to learn from historical design data and accelerate execution. These tasks—such as manual layout design—are often repeated across projects but require expert judgment and deep contextual understanding, making them ideal candidates for intelligent automation. 2. Intelligent documentation interfaces: Developing AI agents capable of understanding and learning from existing documentation, and interacting with designers to answer queries, retrieve relevant information, and provide contextual insights. This can dramatically improve knowledge accessibility, reduce onboarding time, and support real-time decision-making in complex design environments. By addressing these areas, the research aims to unlock new efficiencies and foster innovation in the design of next-generation NAND Flash technologies.
Preliminary Exploration Material	• What is NAND Flash: https://en.wikipedia.org/wiki/Flash_memory • Introduction to Fowler-Nordheim tunneling: https://en.wikipedia.org/wiki/Quantum_tunnelling

Notes	A monthly allowance and meal vouchers are available for this thesis. Please inquire for details.
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