Master's Thesis

Memory Encryption of Non-Volatile Flash
**Description:** The growing popularity of non-volatile flash memory in various applications, including data storage and embedded systems, has raised significant security concerns. Data stored in these memories can be vulnerable to unauthorized access and tampering. Memory encryption is a vital technique to safeguard sensitive information from potential threats. In this thesis project, you will work on advancing the state-of-the-art in memory encryption techniques for non-volatile flash memory.

**Project Overview:** Non-volatile flash memory, commonly used in a wide range of electronic devices such as smartphones, tablets, and solid-state drives (SSDs), is susceptible to data breaches if not adequately protected. Memory encryption is a crucial technique to safeguard data from unauthorized access or tampering. This master’s thesis project aims to explore, design, and implement memory encryption mechanisms for non-volatile flash memory devices.

**Key Tasks:**
1. Literature Review: Conduct a comprehensive review of existing memory encryption techniques and their suitability for non-volatile flash memory.
2. Design and Implementation: Integrate an appropriate encryption algorithm into a non-volatile flash memory controller, considering factors such as performance, security, and compatibility.
3. Performance Analysis: Evaluate the performance overhead of memory encryption, including e.g. latency, throughput, and area.

**Prerequisites**
Motivation to learn, or experience with:

- Strong background in cryptography, computer security, and embedded systems
- Proficiency in hardware description languages (e.g., Verilog or VHDL) or SystemC
- Familiarity with Platform Architect is a plus.
- Excellent problem-solving skills and a passion for cybersecurity research

**Contact**
Interested candidates are encouraged to submit the following application materials to jens.noepel@tum.de:

- A cover letter explaining your motivation and qualifications for this research opportunity.
- Your updated CV/resume.
- Academic transcripts and relevant certificates.

You can also contact me for inquiries or more information about the position. I would be happy to discuss the details or other related topics with you.

Join us in making advancements in memory encryption technology and contribute to enhancing the security of non-volatile flash memory devices. We look forward to welcoming a motivated and talented student.

**Advisors**
Jens Nöpel