May 11, 2025

CISPA Helmholtz Center for Information Security
Saarbrücken, Germany

Dear CISPA Admissions Committee,

I am writing to express my strong interest in pursuing a PhD at the CISPA Helmholtz Center for Information Security. As a final-year software engineering student at ENSAM Casablanca, I have cultivated a passion for web security, cryptography, and secure system design. Throughout my internships and academic projects, I have built and deployed full-stack platforms with modern frameworks such as React, Next.js, Laravel, and Flask, while progressively shifting my focus towards the security aspects of web and decentralized applications.

At CISPA, I am particularly interested in the research areas of **Algorithmic Foundations and Cryptography (RA1)**, **Trustworthy Information Processing (RA2)**, **Threat Detection and Defenses (RA4)**, and **Secure Connected and Mobile Systems (RA5)**. During my internship at Naoris Consulting, I developed an automated pentesting framework that combined LLMs with open-source tools for intelligent vulnerability reporting. Additionally, in academic projects such as marathon bib detection and data extraction automation, I have gained strong experience in building intelligent and secure full-stack systems. These experiences sharpened my understanding of practical security challenges in complex web architectures.

One high-level research question I would like to explore is the **automated security analysis and formal verification of decentralized web applications (DApps)**. As Web3 technologies become increasingly integrated into traditional frontend frameworks (e.g., React-based DApps interacting with Ethereum smart contracts), new attack surfaces emerge at the intersection of frontend logic and blockchain backends. Vulnerabilities such as insecure transaction handling, fake wallet signature requests, and state inconsistency attacks remain underexplored. My ambition is to develop formal models capturing the transaction workflows between user wallets, DApp frontends, and smart contracts, and to design hybrid static-dynamic analysis tools that can detect vulnerabilities specific to decentralized web applications. Strengthening the cryptographic guarantees and user-facing security in DApps could have a profound impact on the future of secure, decentralized internet services.

Given my background and interests, I would be particularly excited to work with **Dr. Christian Rossow** at CISPA, whose expertise in systems and web security would be highly valuable for the analysis of complex DApp ecosystems. I am also keen to explore collaborations with **Dr. Michael Backes** regarding the formal cryptographic aspects of decentralized systems.

I am confident that my strong technical foundation, practical experience, and deep motivation for research will enable me to contribute meaningfully to CISPA's cutting-edge research

environment. Thank you for considering my application.

Sincerely,

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