2024-2025 Internship Proposal at TIMA Laboratory

Security Breach Detection in IoT Devices using Machine Learning, Neural Networks and Data Mining

Abstract:

As the Internet of Things (IoT) continues to expand, the security of connected devices has become a critical concern. IoT devices are often vulnerable to a range of cyber threats, including unauthorized access, data breaches, and malicious attacks. These vulnerabilities can compromise the integrity, privacy, and functionality of entire systems, making effective breach detection and prevention essential. Traditional security methods are often inadequate due to the unique challenges posed by IoT environments, such as limited resources and diverse hardware configurations. To address these challenges, advanced technologies like machine learning, neural networks, and data mining offer promising solutions for identifying security breaches and predicting potential threats. This internship project aims to explore these techniques to improve IoT device security, enhance threat detection, and develop proactive measures to safeguard against emerging risks in a rapidly evolving landscape.

Project description:

This research internship focuses on enhancing the security of IoT devices through advanced machine learning, neural networks, and data mining techniques. The intern will develop a rule-based system for detecting security breaches and propose predictive mechanisms to anticipate potential threats. By analyzing data collected from IoT devices, the project will explore the effectiveness of various AI-based models in identifying vulnerabilities and preventing attacks. The intern will implement and test machine learning, neural networks, and data mining models, compare their performance, and contribute to advancing IoT security using cutting-edge technologies. Programming languages such as Python, or other suitable languages, can be used to implement and test the proposed methods.

Tasks of the internship:

- Implementing various machine learning, neural network, and data mining models to analyze datasets from IoT devices and detect security vulnerabilities.
- Proposing an AI-based method for predicting security breaches and attacks in IoT devices.
- Collecting and analyzing experimental results from the implemented models and comparing their performance.

Scientific environment:

The candidate will work within the TIMA Laboratory (https://tima.univ-grenoble-alpes.fr/) in collaboration with the AMfoRS (Architectures and Methods for Resilient Systems) research group.

Profile & requested skills:

We are looking for a highly motivated Engineering School or M2 Master's student. Applicants must hold a Master 1 degree (or equivalent) obtained within the last three years at the application deadline, in a related field such as computer science, microelectronics technologies, hardware security, or emerging advances in Artificial Intelligence. Interpersonal skills, dynamism, rigor, and teamwork abilities will be highly valued. Candidates should be fluent in English and have strong English writing skills.

Allowance: Internship allowance will be provided.

Application instructions:

If you are interested in the topic please send your complete application to: mohammadreza.heidari-iman@univ-grenoble-alpes.fr.

A complete application consists of:

Cover letter: A brief motivation statement by the applicant, explaining their connection to the position, how the position

aligns with their background, and how it supports their future career goals (maximum 1 page).

CV: Academic and professional background, detailing relevant experience, particularly research.

Relevance for Application: The applicant should include a clear description of how his or her scholarly background and expertise apply to the project outlined above and how they might add value to it.
Our laboratory welcomes applicants with diverse backgrounds and experiences. We regard gender equality and diversity as a strength and an asset.
Depending on the student's motivation, the internship may lead to a doctoral project.

Contact:

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