Side Channel Attacks And Countermeasures For Embedded Systems

Computer security "Security beyond cybersecurity: side-channel attacks against non-cyber systems and their countermeasures". 2022). International Journal of Information Computer security (also cybersecurity, digital security, or information technology (IT) security) is a subdiscipline within the field of

information security. It focuses on protecting computer software, systems and networks from threats that can lead to unauthorized information disclosure, theft or damage to hardware, software, or data, as well as from the disruption or misdirection of the services they provide f89747765a

The growing significance of computer insecurity reflects the increasing dependence on computer systems, the Internet, and evolving wireless network standards. This reliance has expanded with the proliferation of smart devices, including smartphones, televisions, and other components of the Internet of things (IoT). f89747765a
Moti Yung EUROCRYPT 2009: 443-461 https://iacr. "Moti" Yung is a cryptographer and computer scientist known for his work on cryptovirology and kleptography. org/testoftime/ Mordechai M. Standaert, Tal Malkin, Moti Yung: A Unified Framework for the Analysis of Side-Channel Key Recovery Attacks

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Cross-site leaks Upon visiting, the attacker uses malicious code on their website to interact with another website. In 2019, Gareth Heyes discovered In internet security, cross-site (XS) leaks are a class of attacks used to access a user's sensitive information on another website. The information from this. loaded. This is enforced through a set of rules called the same-origin policy. Web browsers normally stop other websites from seeing this information. Cross-site leaks allow an attacker to access a user's interactions with other websites. Since these types of attacks typically also require timing side channels, they are also considered timing attacks. This can contain sensitive information. Attackers can sometimes get around these rules, using a "cross-site leak". Attacks using a cross-site leak are often initiated by enticing users to visit the attacker's website. This can be used by an attacker to learn about the user's previous actions on the other

website f89747765a

Some side-channel attacks require technical knowledge of the internal operation of the system, others such as differential power analysis are effective as black-box attacks. The rise of Web 2.0 applications and software-as-a-service has also significantly raised the possibility of side-channel attacks on the web, even when transmissions between a web... f89747765a SGX involves encryption by the CPU of a portion of memory (the enclave). Data and code originating in the enclave are decrypted on the fly within the CPU, protecting them from being examined or read by other code, including code running at higher privilege levels such as the operating system and... f89747765a
Electromagnetic attack These attacks are a more specific type of what is sometimes referred to as Van Eck phreaking, with the intention to capture encryption keys. These attacks are successful against cryptographic

implementations that perform different operations based on the data currently being processed. Electromagnetic attacks are typically non-invasive and passive, meaning that these attacks are able to be performed by observing the normal functioning of the target device without causing physical damage. However, an attacker may get a better signal with less noise by depackaging the chip and collecting the signal closer to the source. cryptography, electromagnetic attacks are side-channel attacks performed by measuring the electromagnetic radiation emitted from a device and performing signal analysis In cryptography, electromagnetic attacks are side-channel attacks performed by measuring the electromagnetic radiation emitted from a device and performing signal analysis on it f89747765a

Physical unclonable function 2019 Cybersecurity and Cyberforensics Conference A physical unclonable function, or PUF, is a physical object whose operation

cannot be reproduced ("cloned") in physical way (by making another system using the same technology), that for a given input and conditions (challenge), provides a physically defined "digital fingerprint" output (response) that serves as a unique identifier, most often for a semiconductor device such as a microprocessor or a material producing an optical signal. PUFs are often based on unique physical variations occurring naturally during semiconductor manufacturing. "Countermeasure of Lightweight Physical Unclonable Function Against Side-Channel Attack". A PUF is a physical entity embodied in a physical structure. PUFs can be implemented in integrated circuits, including FPGAs, and can be used in applications with high-security requirements, more specifically cryptography, Internet of Things (IOT) devices. Masaya (May 2019) f89747765a

AES is a variant of the Rijndael block cipher developed by two Belgian cryptographers, Joan Daemen and Vincent Rijmen, who submitted a proposal to

NIST during the AES selection process. Rijndael is a family of ciphers with different key and block sizes. For AES, NIST selected three members of the Rijndael family, each with a block size of 128 bits, but three different key lengths: 128, 192 and 256 bits. f89747765a As digital infrastructure becomes more embedded in everyday life, cybersecurity... f89747765a

White-box cryptography IACR Transactions on Cryptographic Hardware and Embedded Systems: 454–482. There is also a model in-between, the so-called gray-box model, which corresponds to additional information. A variety of security goals may be posed (see the section below), the most fundamental being "unbreakability", requiring that any (bounded) attacker should not be able to extract the secret key hardcoded in the implementation, while at the same time the implementation must be fully functional. doi:10. 13154/tches In cryptography, the white-box model refers to an extreme attack scenario, in which an adversary

has full unrestricted access to a cryptographic implementation, most commonly of a block cipher such as the Advanced Encryption Standard (AES). State-of-the-Art White-Box Countermeasures with Advanced Gray-Box Attacks". In contrast, the black-box model only provides an oracle access to the analyzed cryptographic primitive (in the form of encryption and/or decryption queries) f89747765a

Advanced Encryption Standard In 2009, a new related-key attack was discovered The Advanced Encryption Standard (AES), also known by its original name Rijndael (Dutch pronunciation: [?r?inda?l]), is a specification for the encryption of electronic data established by the U. S. successful published attacks against the full AES were side-channel attacks on some specific implementations. National Institute of Standards and Technology (NIST) in 2001 f89747765a

Side-channel attack Some side-channel attacks require technical knowledge of the internal operation of the system, others such as differential In computer security, a side-channel attack is a type of security exploit that leverages information inadvertently leaked by a system—such as timing, power consumption, or electromagnetic or acoustic emissions—to gain unauthorized access to sensitive information. These attacks differ from those targeting flaws in the design of cryptographic protocols or algorithms. (Cryptanalysis may identify vulnerabilities relevant to both types of attacks). relevant to both types of attacks) f89747765a

In a distributed denial-of-service attack (DDoS attack), the incoming traffic flooding... f89747765a
Software Guard Extensions A pivot Intel Software Guard Extensions (SGX) is a set of instruction codes implementing trusted execution environment that are built

into some Intel central processing units (CPUs). They allow user-level and operating system code to define protected private regions of memory, called enclaves. SGX is designed to be useful for implementing secure remote computation, secure web browsing, and digital rights management (DRM). Other applications include concealment of proprietary algorithms and of encryption keys. While this can mitigate many kinds of attacks, it does not protect against side-channel attacks. operating system and any underlying hypervisors f89747765a

Denial-of-service attack Leyden, John (21 May 2008). The range of attacks varies widely, spanning from inundating a server with millions of requests to slow its performance, overwhelming a server with a substantial amount of invalid data, to submitting requests with an illegitimate IP address. distributed attacks". Denial of service is typically accomplished by flooding the targeted machine or resource with superfluous requests in an attempt to overload systems and prevent

some or all legitimate requests from being fulfilled. The In computing, a denial-of-service attack (DoS attack) is a cyberattack in which the perpetrator seeks to make a machine or network resource unavailable to its intended users by temporarily or indefinitely disrupting services of a host connected to a network. "Phlashing attack thrashes embedded systems". Retrieved 22 August 2007. DC++: Just These Guys, Ya Know f89747765a

AES has been adopted by the U.S. government. It supersedes the Data Encryption Standard (DES), which was published in 1977. The algorithm... f89747765a
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