Power Analysis Attacks Revealing the Secrets of Smart Cards

Stefan Mangard Elisabeth Oswald Thomas Popp



Dieter Gollmann, Jean-Louis
Lanet, Julien Iguchi-Cartigny

Understanding Cryptography Christof Paar, Jan Pelzl, 2009-11-27 Cryptography is now ubiquitous moving beyond the traditional environments such as government communications and banking systems we see cryptographic techniques realized in Web browsers e mail programs cell phones manufacturing systems embedded software smart buildings cars and even medical implants Today s designers need a comprehensive understanding of applied cryptography After an introduction to cryptography and data security the authors explain the main techniques in modern cryptography with chapters addressing stream ciphers the Data Encryption Standard DES and 3DES the Advanced Encryption Standard AES block ciphers the RSA cryptosystem public key cryptosystems based on the discrete logarithm problem elliptic curve cryptography ECC digital signatures hash functions Message Authentication Codes MACs and methods for key establishment including certificates and public key infrastructure PKI Throughout the book the authors focus on communicating the essentials and keeping the mathematics to a minimum and they move quickly from explaining the foundations to describing practical implementations including recent topics such as lightweight ciphers for RFIDs and mobile devices and current key length recommendations The authors have considerable experience teaching applied cryptography to engineering and computer science students and to professionals and they make extensive use of examples problems and chapter reviews while the book s website offers slides projects and links to further resources This is a suitable textbook for graduate and advanced undergraduate courses and also for self study by engineers Smart Card Research and Advanced Applications Stefan Mangard, 2013-03-14 This book constitutes the thoroughly refereed post conference proceedings of the 11th International Conference on Smart Card Research and Advanced Applications CARDIS 2012 held in Graz Austria in November 2012 The 18 revised full papers presented together with an invited talk were carefully reviewed and selected from 48 submissions. The papers are organized in topical sections on Java card security protocols side channel attacks implementations and implementations for resource Secure Smart Embedded Devices, Platforms and Applications Konstantinos Markantonakis, Keith constrained devices Mayes, 2013-09-14 New generations of IT users are increasingly abstracted from the underlying devices and platforms that provide and safeguard their services As a result they may have little awareness that they are critically dependent on the embedded security devices that are becoming pervasive in daily modern life Secure Smart Embedded Devices Platforms and Applications provides a broad overview of the many security and practical issues of embedded devices tokens and their operation systems platforms and main applications It also addresses a diverse range of industry government initiatives and considerations while focusing strongly on technical and practical security issues The benefits and pitfalls of developing and deploying applications that rely on embedded systems and their security functionality are presented A sufficient level of technical detail to support embedded systems is provided throughout the text although the book is quite readable for those

seeking awareness through an initial overview of the topics This edited volume benefits from the contributions of industry and academic experts and helps provide a cross discipline overview of the security and practical issues for embedded systems tokens and platforms It is an ideal complement to the earlier work Smart Cards Tokens Security and Applications Security of Information and Networks Atilla Eli, S. Berna Ors, Bart Preneel, 2008 This book is a from the same editors select collection of edited papers from the International Conference on Security of Information and Networks SIN 2007 on the main theme of Information Assurance Security and Public Policy SIN 2007 was hosted by the Eastern Mediterranean University in Gazimagusa North Cyprus and co organized by the Istanbul Technical University Turkey While SIN 2007 covered all areas of information and network security the papers included here focused on the following topics cryptology design and analysis of cryptographic algorithms hardware and software implementations of cryptographic algorithms and steganography network security authentication authorization and access control privacy intrusion detection grid security and mobile and personal area networks IT governance information security management systems risk and threat analysis and information security policies They represent an interesting mix of innovative academic research and experience reports from practitioners This is further complemented by a number of invited papers providing excellent overviews Elisabeth Oswald University of Bristol Bristol UK Power Analysis Attack A Very Brief Introduction Marc Joye Thomson R Bart Preneel Katholieke Universiteit Leuven Leuven Belgium Research Challenges in Cryptology Mehmet Ufuk Caglayan Bogazici University Turkey Secure Routing in Ad Hoc Networks and Model Checking The papers are organized in a logical sequence covering Ciphers Mobile Agents Access Control and Security Assurance Attacks Intrusion Detection and Security Recommendations and Security Software Performance and Experience Power Analysis Attacks Stefan Mangard, Elisabeth Oswald, Thomas Popp, 2008-01-03 Power analysis attacks allow the extraction of secret information from smart cards Smart cards are used in many applications including banking mobile communications pay TV and electronic signatures In all these applications the security of the smart cards is of crucial importance Power Analysis Attacks Revealing the Secrets of Smart Cards is the first comprehensive treatment of power analysis attacks and countermeasures Based on the principle that the only way to defend against power analysis attacks is to understand them this book explains how power analysis attacks work Using many examples it discusses simple and differential power analysis as well as advanced techniques like template attacks Furthermore the authors provide an extensive discussion of countermeasures like shuffling masking and DPA resistant logic styles By analyzing the pros and cons of the different countermeasures this volume allows practitioners to Constructive Side-Channel Analysis and Secure Design Stefan Mangard, Axel Y. decide how to protect smart cards Poschmann, 2015-07-16 This book constitutes the thoroughly referred post conference proceedings of the 6th International Workshop COSADE 2015 held in Berlin Germany in April 2015 The 17 revised full papers presented were carefully selected from 48 submissions the focus of this workshop was on following topics side channel attacks FPGA countermeasures timing

attacks and countermeasures fault attacks countermeasures and Hands on Side channel analysis **Introduction to** Cryptography Sahadeo Padhye, Rajeev A. Sahu, Vishal Saraswat, 2018-09-04 Electronic communication and financial transactions have assumed massive proportions today But they come with high risks Achieving cyber security has become a top priority and has become one of the most crucial areas of study and research in IT This book introduces readers to perhaps the most effective tool in achieving a secure environment i e cryptography This book offers more solved examples than most books on the subject it includes state of the art topics and discusses the scope of future research Devices and Internet of Things Adesh Kumar, Surajit Mondal, Gaurav Verma, Prashant Mani, 2024-09-11 The text comprehensively discusses machine to machine communication in real time low power system design and estimation using field programmable gate arrays PID hardware accelerators and software integration for service applications It further covers the recent advances in embedded computing and IoT for healthcare systems The text explains the use of low power devices such as microcontrollers in executing deep neural networks and other machine learning techniques This book Discusses the embedded system software and hardware methodologies for system on chip and FPGA Illustrates low power embedded applications AI based system design PID control design and CNN hardware design Highlights the integration of advanced 5G communication technologies with embedded systems Explains weather prediction modeling embedded machine learning and RTOS Highlights the significance of machine learning techniques on the Internet of Things IoT real time embedded system design communication and healthcare applications and provides insights on IoT applications in education fault attacks security concerns AI integration banking blockchain intelligent tutoring systems and smart technologies It is primarily written for senior undergraduates graduate students and academic researchers in the fields of electrical engineering electronics and communications engineering and computer engineering Smart Card Security Brij B. Gupta, Megha Quamara, 2019-08-08 Smart Card Security Applications Attacks and Countermeasures provides an overview of smart card technology and explores different security attacks and countermeasures associated with it It covers the origin of smart cards types of smart cards and how they work It discusses security attacks associated with hardware software data and users that are a part of smart card based systems The book starts with an introduction to the concept of smart cards and continues with a discussion of the different types of smart cards in use today including various aspects regarding their configuration underlying operating system and usage It then discusses different hardware and software level security attacks in smart card based systems and applications and the appropriate countermeasures for these security attacks It then investigates the security attacks on confidentiality integrity and availability of data in smart card based systems and applications including unauthorized remote monitoring communication protocol exploitation denial of service DoS attacks and so forth and presents the possible countermeasures for these attacks The book continues with a focus on the security attacks against remote user authentication mechanisms in smart card based applications and proposes a possible countermeasure for these attacks Then

it covers different communication standards for smart card based applications and discusses the role of smart cards in various application areas as well as various open source tools for the development and maintenance of smart card based systems and applications. The final chapter explains the role of blockchain technology for securing smart card based transactions and quantum cryptography for designing secure smart card based algorithms Smart Card Security Applications. Attacks and Countermeasures provides you with a broad overview of smart card technology and its various applications. Smart Card Research and Advanced Applications VI Jean-Jacques Quisquater, Pierre Paradinas, Yves Deswarte, 2014-01-15

A Security Assessment of Modern Smart Cards Under Differential Power Analysis Attacks Using a Field Programmable Gate Array Implementation of a Side Channel Analysis Test Platform Andrew M. Armstrong (2LT, Smart Card Research and Advanced Applications Aurélien Francillon, Pankaj Rohatgi, 2014-06-26 This book constitutes the thoroughly refereed post conference proceedings of the 12th International Conference on Smart Card Research and Advanced Applications CARDIS 2013 held in Berlin Germany in November 2013 The 17 revised full papers presented in this book were carefully reviewed and selected from 47 submissions. The papers are organized in topical sections on security technologies attacks on masking side channel attacks software and protocol analysis side channel countermeasures and side channel and fault attacks Smart Card Research and Advanced Applications VI Jean-Jacques Quisquater, Pierre Paradinas, Yves Deswarte, Anas Abou El Kalam, 2006-04-11 In the Information Society the smart card or smart device with its processing power and link to its owner will be the potential human representation or delegate in Ambient Intelligence Pervasive Computing where every appliance or computer will be connected and where control and trust of the personal environment will be the next decade challenge Smart card research is of increasing importance as the need for information security grows rapidly Smart cards will play a very large role in ID management in secure systems In many computer science areas smart cards introduce new dimensions and opportunities Disciplines like hardware design operating systems modeling systems cryptography and distributed systems find new areas of applications or issues smart cards also create new challenges for these domains CARDIS the IFIP Conference on Smart Card Research and Advanced Applications gathers researchers and technologists who are focused in all aspects of the design development deployment validation and application of smart cards or smart personal devices This volume contains the 20 papers that have been selected by the CARDIS Program Committee for presentation at the 6th International Conference on Smart Card Research and Advanced Applications CARDIS 2004 which was held in conjunction with the IFIP 18th World Computer Congress in Toulouse France in August 2004 and sponsored by the International Federation for Information Processing IFIP With 20% of the papers coming from Asia 20% from America and 60% from Europe the competition was particularly severe this year with only 20 papers selected out of 45 very good submissions Smart Card Research and Advanced Applications VI presents the latest advances in smart card research and applications and will be essential reading for developers of smart cards and smart card applications

Tokens, Security and Applications Keith Mayes, Konstantinos Markantonakis, 2017-05-18 This book provides a broad overview of the many card systems and solutions that are in practical use today This new edition adds content on RFIDs embedded security attacks and countermeasures security evaluation javacards banking or payment cards identity cards and passports mobile systems security and security management A step by step approach educates the reader in card types production operating systems commercial applications new technologies security design attacks application development deployment and lifecycle management By the end of the book the reader should be able to play an educated role in a smart card related project even to programming a card application This book is designed as a textbook for graduate level students in computer science It is also as an invaluable post graduate level reference for professionals and researchers This volume offers insight into benefits and pitfalls of diverse industry government financial and logistics aspects while providing a sufficient level of technical detail to support technologists information security specialists engineers and researchers

Smart Card Security and Applications, Second Edition Mike Hendry, 2001 This extensively updated edition of the popular book offers a current overview of the ways smart cards address the computer security issues of today s varied applications Brand new discussions on multiapplication operating systems computer networks and the Internet are included to keep technical and business professionals abreast of the latest developments in this field **Smart Card Research and** Advanced Applications Dieter Gollmann, Jean-Louis Lanet, Julien Iguchi-Cartigny, 2010-04-09 This book constitutes the refereed proceedings of the 9th IFIP WG 8 8 11 2 International Conference on Smart Card Research and Advanced Application CARDIS 2010 held in Passau Germany in April 2010 The 16 revised full papers presented were carefully reviewed and selected from numerous submissions The papers are organized in topical sections on mathematical algorithms side channel analysis systems logical attacks fault analysis and privacy Smart Card Research and Advanced Applications Dieter Gollmann, Jean-Louis Lanet, Julien Iguchi-Cartigny, 2010-04-11 This book constitutes the refereed proceedings of the 9th IFIP WG 8 8 11 2 International Conference on Smart Card Research and Advanced Application CARDIS 2010 held in Passau Germany in April 2010 The 16 revised full papers presented were carefully reviewed and selected from numerous submissions The papers are organized in topical sections on mathematical algorithms side channel analysis systems logical attacks fault analysis and privacy Smart Card Research and Advanced Applications Emmanuel Prouff, 2011-12-13 This book constitutes the thoroughly refereed post conference proceedings of the 10th IFIP WG 8 8 11 2 International Conference on Smart Card Research and Advanced Applications CARDIS 2011 held in Leuven Belgium in September 2011 The 20 revised full papers presented were carefully reviewed and selected from 45 submissions. The papers are organized in topical sections on smart cards system security invasive attacks new algorithms and protocols implementations and hardware security non invasive attacks and Java card security Smart Card Research and Advanced Applications Naofumi Homma, Marcel

Medwed, 2016-03-18 This book constitutes the thoroughly refereed post conference proceedings of the 14th International Conference on Smart Card Research and Advanced Applications CARDIS 2015 held in Bochum Germany in November 2015 The 17 revised full papers presented in this book were carefully reviewed and selected from 40 submissions. The focus of the conference was on all aspects of the design development deployment validation and application of smart cards and secure elements in secure platforms or systems. Smart Card Research and Advanced Applications. Thomas Eisenbarth, Yannick Teglia, 2018-01-24. This book constitutes the thoroughly refereed post conference proceedings of the 16th International Conference on Smart Card Research and Advanced Applications CARDIS 2017 held in Lugano Switzerland in November 2017. The 14 revised full papers presented together with 2 abstracts of invited talks in this book were carefully reviewed and selected from 48 submissions CARDIS has provided a space for security experts from industry and academia to exchange on security of smart cards and related applications.

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