Biometrics

Identity Verification in a Networked World

A Wiley Tech Brief

Samir Nanavati
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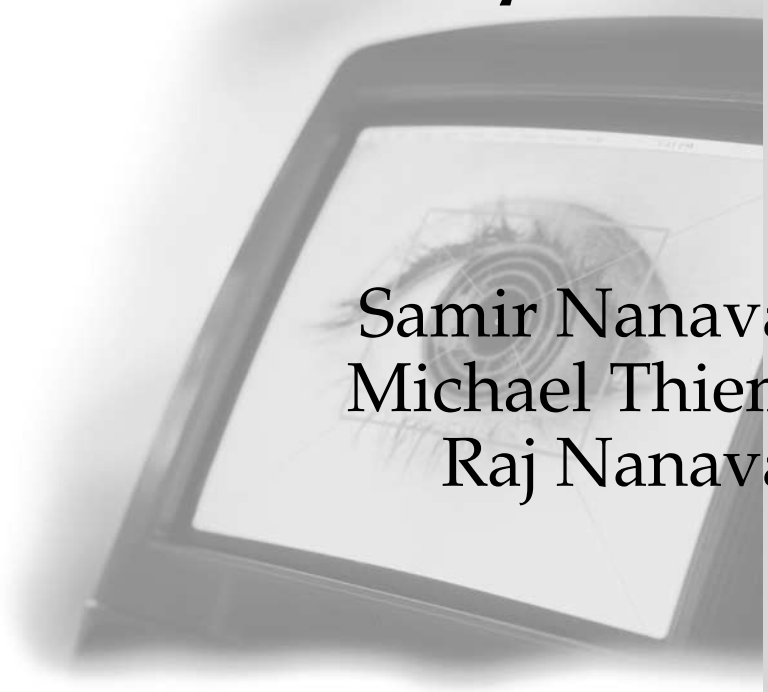

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Introduction

Authentication is a fundamental component of human interaction with computers. Traditional means of authentication, primarily passwords and personal identification numbers (PINs), have until recently dominated computing, and are likely to remain essential for years to come. However, stronger authentication technologies, capable of providing higher degrees of certainty that a user is who he or she claims to be, are becoming commonplace. Biometrics are one such strong authentication technology.

Biometric technologies as we know them today have been made possible by explosive advances in computing power and have been made necessary by the near universal connectedness of computers around the world. The increased perception of data and information as near equivalents of currency, in conjunction with the opportunities for access provided by the Internet, is a paradigm shift with significant repercussions for authentication. If data is currency, then server-based or local hard drives are our new vaults, and information-rich companies will be held responsible for their security. Because of this, passwords and PINs are nearing the end of their life cycle for many applications.

Since early 1999, four factors (reduced cost, reduced size, increased accuracy, and increased ease of use) have combined to make biometrics an increasingly feasible solution for securing access to computers and networks. But biometrics are much more than a replacement for passwords. Millions of people around the world use biometric technology in applications as varied as time and attendance, voter registration, international travel, and benefits dispersal. Depending on the application, biometrics can be used for security, for convenience, for fraud reduction, even as an empowering technology.

This book teaches you the fundamentals of leading biometric technologies: how they work, their strengths and weaknesses, where they can be effectively

deployed. It helps you understand how biometrics are associated with technologies such as public key infrastructure (PKI) and smart cards. It defines how biometric deployments can be privacy enhancing or privacy invasive. It dispels various myths surrounding biometric technology. Finally, it provides guidelines for successful deployment of biometrics in today's enterprise environment.

How This Book Is Organized

There are many misconceptions about biometric technology that have taken hold in the general public. In order to provide you with a solid understanding of the technology, the industry, the applications, and the challenges that define biometrics, this book is divided into four parts.

Part One: Biometric Fundamentals

Part One provides you with a detailed understanding of the central concepts involved in biometrics, including reasons why the technology is deployed, how the technology operates, the key processes involved in biometric authentication, and how accuracy is defined in biometric systems.

Chapter 1, "Why Biometrics?," discusses why biometrics are of such interest to institutions looking to authenticate employees, customers, and citizens. This chapter also details the benefits that biometric technologies can provide when deployed correctly. Chapter 2, "Key Biometric Terms and Processes," digs deeper into biometric functionality, defining and explaining the variety of terms, both technical and nontechnical, used in the biometric industry. This chapter also discusses the biometric concepts essential to understanding how and why biometrics are deployed today. Chapter 3, "Accuracy in Biometric Systems," defines the categories used to determine how well biometric systems work and examines why most discussions of biometric accuracy are highly misleading.

Part Two: Leading Biometric Technologies

Part Two provides detailed discussions of leading biometric technologies. The information in Part Two is based on real-world experience in deploying and testing systems in operational environments. For each biometric discipline, Part Two addresses in full topics such as system components, data acquisition, template generation and matching, deployments, and strengths and weaknesses. Technologies discussed include finger-scan, facial-scan, iris-scan, retina-scan, signature-scan, keystroke-scan, hand-scan, AFIS, and biometric middleware.

Part Three: Biometric Applications and Markets

Part Three discusses the applications in which biometrics are used and the markets and industries in which they are most effectively deployed. Biometric solutions have emerged in a range of applications, including Citizen ID, Network/PC Access, Surveillance, and e-Commerce/Telephony. These applications can differ substantially in terms of technology selection, privacy impact, and performance requirements. Furthermore, biometrics have emerged as viable solutions in a handful of vertical markets, including government and financial sectors.

Part Four: Privacy and Standards In Biometric System Design

Part Four discusses critical factors related to standards and privacy that institutions must consider when designing, deploying, and maintaining biometric systems for customers, employees, or citizens. Privacy has long been a major issue in biometrics; the emergence of a framework for evaluating the privacy impact of biometric technologies and deployments should help address this central problem. In addition, the emergence of biometric standards has reduced the levels of risk involved in deploying biometric systems.

Who Should Read This Book

This book provides public- and private-sector professionals with a real-world understanding of biometric technologies and applications, helping them make informed decisions on the role that biometrics can play in their organization. No background in biometrics is required, but those with biometrics experience will benefit from the detailed discussion of concepts not often presented from a deployer's perspective, such as accuracy, privacy, and technology strengths and weaknesses. Although some of the discussions may go into detail about biometric processes or functions, the book is not intended to be highly technical.

Those new to biometrics are strongly encouraged to read from the beginning, as an understanding of biometrics requires familiarity with the reasons why biometrics are deployed and the key terms involved in biometrics. Those more experienced with biometrics can begin with the technologies of interest to them and move into privacy and system design. However, even those with biometrics experience are encouraged to read the entire book(many basic concepts in the biometrics industry have often been poorly defined or overlooked, a problem that this book addresses.

Looking Forward

Biometric technology has emerged as a viable solution for a range of applications where a person's identity must be verified or determined. No longer a science-fiction solution, biometrics are being deployed to solve security problems, to help companies generate revenues, and to protect personal information. The challenge is to ensure that biometrics are used intelligently and responsibly as the technology moves into the mainstream; the repercussions of unintelligent and irresponsible use could be severe.

Acknowledgments

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