

# **Understanding Surveillance Technologies**

**Spy Devices,  
Their Origins  
& Applications**



**Julie K. Petersen**

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# PREFACE

This book was designed to set the groundwork for learning about surveillance technologies. The basic stepping stones presented here will make it easier to understand more advanced texts devoted to individual technologies such as radar, sonar, video cameras, and genetic profiling.

*Understanding Surveillance Technologies* is the first comprehensive, introductory overview of the field of surveillance devices. It comprises 18 chapters and includes more than 700 photos and illustrations. It is suitable for college surveillance courses, professional recruiting programs, and as a reference for beginning professionals in the fields of law enforcement, forensics, and military surveillance. It has been designed with a flexible, modular format. The chapters can be read in almost any order and chapters that share common topics are cross-referenced to alert the reader.

Everyone needs to understand surveillance technologies. Surveillance devices are now everywhere and many people don't even realize they're being surveilled, cataloged, and stored in a multitude of databases without their knowledge. Here are some examples that show how important it is to get a better understanding of how we are being observed:

- It is now possible to locate extensive detailed information on the Internet about people who have never even logged on to the Net nor even used a computer. It is even possible to quickly find out the names, addresses, and phone numbers of their neighbors, providing the data to create a composite picture of a neighborhood's residents and their social and economic characteristics. This book provides a better understanding of who is collecting this information, how they are doing it, and what they are doing with that data once they have it.
- Some hospitals now routinely take DNA samples of newborn babies and the U.S. armed forces require mandatory submission of a DNA sample. This book explains the background and origins of DNA matching and the possible social consequences of its use. In many instances, your DNA can reveal your gender, race, medical tendencies, and physical characteristics.

- Semi-nude and nude photos of unwary victims are being sold on the Internet without their knowledge or permission. How is this possible? This book explains how these technologies work and why bootleg images may not yet be illegal. It further describes ethical and social consequences of these new forms of exploitation.
- Gaming centers, hotels, and trade shows are now using magnetic access cards to keep track of their guests. In casinos they can tell how often patrons play, how much they spend, and how frequently they visit the establishment. Even universities are beginning to issue student cards that are also access cards. They work in vending machines, copy machines, and in various retail outlets on campus. In some instances, this information is stored in sophisticated databases. This text describes a variety of types of access and article surveillance technologies that provide travel suppliers, casinos, hotels, and retail outlets with detailed information on their patrons.
- Law enforcement agencies are consolidating their forensic and criminal databases and providing Internet access from any part of the country. This is providing new ways to solve serial murders and to catch felons who move from state to state, but it also makes a criminal less distinguishable from a law-abiding citizen in a computer database. However good the intentions of the law enforcement personnel may be, there are good ways and bad ways to structure databases so they don't violate the rights of honest people and not all programmers who create the software are aware of the ethical consequences of their software design strategies. This text looks at some of the various databases that are being used to fight crime and how we can take steps to support the efforts of law enforcement officials without turning the country into a repressive Big Brother society.

This is just a handful of the significant issues discussed in this book. There are also notes on the history and current state of intelligence-gathering in America, concerns about chemical and nuclear treaty surveillance and enforcement, and information about new technologies that are allowing us to surveil space and other planets.

Surveillance devices are used in virtually every field of endeavor, from handheld magnifying glasses to sophisticated magnetic resonance imaging machines, 'spy' devices allow us to see beyond the basic senses that nature gave us in ways we wouldn't have imagined two hundred or even fifty years ago. This book is a fascinating journey through technology and provides more than a little food for thought as to how we can and should use these new devices.

# ABOUT THE AUTHOR

The author has been a technologist and writer since 1980 and has had a life-long fascination with gadgets, codes, and machines. Julie Petersen chose to write this book because she couldn't find a reference that covered all the different emerging surveillance technologies that microelectronics were making possible. She felt that a 'one-stop' sourcebook was needed to pull together all the diverse threads that make up this fascinating field and to present some of the history and social evolution that brought us to where we are now.

The author offered this further comment:

“Another motivation for writing this book was that I noticed the technology was being developed and implemented faster than society could assimilate the information and establish safeguards for its positive use. Surveillance devices are gradually being installed in every office, shopping mall, school, and public area in the country, yet the general public is only barely aware that it is happening and most employees are not given a vote or a choice as to whether they want to be constantly monitored in the workplace.

Because the technology is being put in place without any broad plan or consensus, we need to take steps to ensure that this is a positive change. This book presents information that can aid in better decision-making. It can help individuals communicate more coherently with elected representatives. It can help elected representatives understand how quickly these technologies are proliferating and how legal protections relate to the new technologies. It can help professionals decide on a branch of surveillance to pursue as a professional career. My overall hope is that the knowledge presented here will make it not only more enjoyable to learn about surveillance devices but will make it easier for us to enlist the technology to enhance our lives rather than allow it to take away our hard-won freedoms.”

When she's not writing technology references, the author enjoys fiction writing, outdoor activities, playing and composing music, gourmet cooking, strategy games, and computer graphics.



# THE FORMAT OF THIS BOOK

This book is modular. Each chapter has the same basic format. It starts with an introduction, then describes some of the various types of devices within a category, followed by the context in which the devices are usually used. This is followed by a historical overview of the major milestones associated with the technology. After the history and evolution is a description of basic functions that have not already been covered in the first three sections. The common applications for the technology are then described, followed by a discussion of some of the legal and ethical implications. At the end of each chapter, there is an extensive annotated list of resources for further study. The resources include bibliographies and selected media and online resources, chosen for their relevance to the chapter. Web addresses are provided for many of the important organizations and educational sites associated with the topic of each chapter.

With the exception of Chapter 1, which should probably be scanned or read in its entirety first, the chapters can be read in any order. There are cross-references to alert the reader or instructor to information in related chapters. Some groups of chapters make more sense if they are read together. These include

*Acoustic Surveillance* - These three chapters can be read together as they are strongly interrelated. It is a good idea to read Infra/Ultrasound Surveillance before reading Sonar Surveillance, as sonar is a specialized adaptation of acoustics that relies heavily on ultrasound.

The history section in the *Introduction & Overview* and the history section in the *Audio Surveillance* chapter describe a number of the controversies over wiretapping and other methods of surveillance that are being heavily debated. These sections make more sense if they are cross-referenced and read in the above order.

*Electromagnetic Surveillance* - It is a good idea to cross-reference the Infrared, Visual, and Ultraviolet chapters as together they comprise Light Surveillance. The Visual and Aerial Surveillance chapters make more sense if they are read together and much of the information in the Infrared Surveillance chapter is relevant to Aerial Surveillance.

*Radar Surveillance* uses radio waves, so it helps to read the Radio and Radar Surveillance chapters together.

*Chemical & Biological Surveillance* - The Biometric Surveillance chapter is really a specialized subset of Chemical Surveillance, so it helps to read these chapters together and Genetic Surveillance is a subset of Biometrics.



*This is the first comprehensive text to cover this fascinating field from origins to present-day practices.* Secret agents are no longer the only people using spycams, radio beacons, and tiny audio listening devices called 'bugs.' Spy devices are now an important part of almost every investigation, office environment, phone system, traffic advisory, and newscast, and are being incorporated into consumer devices in almost every home. Never before has it been so important to learn about these technologies and understand how they can affect your life, your government, your children, and your work.

*This book is designed to be modular.* Select the chapters that interest you, and follow the cross-references to find out more about related topics. Learn how one-meter-resolution satellites can see into your back yard; find out how search and rescue professionals find lost hikers and victims of natural disasters. Learn how forensic experts solve cases using chemicals, microscopes, and minute traces of fibers and blood. Discover the history and progress of DNA research and how a simple cheek swab can identify an adoptee's biological relatives or establish a deadbeat parent's financial responsibilities.

*This text is an excellent introduction for beginning surveillance professionals, including surveillance consultants, forensic investigators, law enforcement agents, and military recruits.* It can also serve as a text for political science, sociology, and graduate business courses, laying a foundation for further study and professional development. The text is extensively illustrated with more than seven hundred photos, diagrams, and charts that clarify the concepts, illustrate how the technologies are used, and provide examples of actual surveillance devices.

Over 900 pages organized into 18 chapters that include

- Acoustic Surveillance: Audio, Infrasound, Ultrasound, and Sonar
- Electromagnetic Surveillance: Radio, Radar, Infrared, Visual, Aerial, Ultraviolet, and X-Ray
- Chemical/Biological Surveillance: Biometrics, Animal, and Genetic (DNA)
- Magnetic Surveillance
- Cryptologic Surveillance
- Computer Surveillance

In addition to practical information on products and applications, this book provides extensive histories and information on legal debates and political decisions related to surveillance, privacy, and the protection of individual freedoms.

*Understanding Surveillance Technologies* includes a glossary of common terms and references in each chapter, and carefully annotated lists of books, articles, journals, Web sites, and films. For the emerging field of surveillance, professionals are predicting this reference will be the industry standard introductory text.

