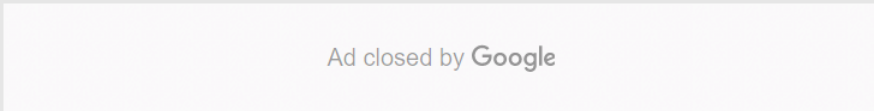


EXHIBIT A



Home > Technology > Engineering > Civil Engineering

Computer security

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Computer security, the protection of computer systems and information from harm, theft, and unauthorized use. Computer hardware is typically protected by the same means used to protect other valuable or sensitive equipment, namely, serial numbers, doors and locks, and alarms. The protection of information and system access, on the other hand, is achieved through other tactics, some of them quite complex.

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The security precautions related to computer information and access address four major threats: (1) theft of data, such as that of military secrets from government computers; (2) vandalism, including the destruction of data by a computer virus; (3) fraud, such as employees at a bank channeling funds into their own accounts; and (4) invasion of privacy, such as the illegal accessing of protected personal financial or medical data from a large database. The most basic means of protecting a computer system against theft, vandalism, invasion of privacy, and other irresponsible behaviours is to electronically track and record the access to, and activities of, the various users of a computer system. This is commonly done by assigning an individual password to each person who has access to a system. The computer system itself can then automatically track the use of these passwords, recording such data as which files were accessed under particular passwords and so on. Another



Computer security

RELATED TOPICS

- Computer
- Security and protection system

then automatically track the use of these passwords, recording such data as which files were accessed under particular passwords and so on. Another security measure is to store a system's data on a separate device, or medium, such as magnetic tape or disks, that is normally inaccessible through the computer system. Finally, data is often encrypted so that it can be deciphered only by holders of a singular encryption key. (See data encryption.)

Computer security has become increasingly important since the late 1960s, when modems (devices that allow computers to communicate over telephone lines) were introduced. The proliferation of personal computers in the 1980s compounded the problem because they enabled hackers (irresponsible computerphiles) to illegally access major computer systems from the privacy of their homes. The development of advanced security techniques continues to diminish such threats, though concurrent refinements in the methods of computer crime (q.v.) pose ongoing hazards.

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data encryption

Data encryption, the process of disguising information as "ciphertext," or data unintelligible to an unauthorized person. Conversely, decryption, or decipherment, is the process of converting ciphertext back into its original format. Manual encryption has been used since Roman times, but the term has become associated...



modem

Modem, (from "modulator/demodulator"), any of a class of electronic devices that convert digital data signals into modulated analog signals suitable for transmission over analog telecommunications circuits. A modem also receives modulated signals and demodulates them, recovering the digital signal for us...



Computer

Computer, device for processing, storing, and displaying information. Computer once meant a person who did computations, but now the term almost universally refers to automated electronic machinery. The first section of this article focuses on modern digital electronic computers and their design,...



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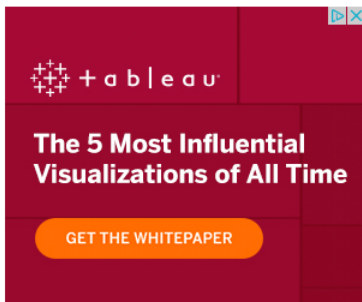
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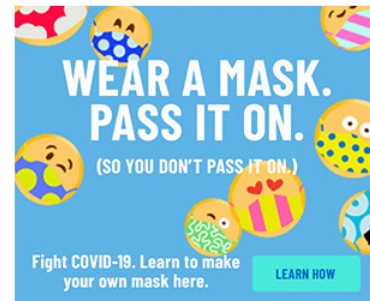
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Security and protection system, any of various means or devices designed to guard persons and property against a broad range of hazards, including **crime**, fire, accidents, espionage, sabotage, subversion, and attack.

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Most security and protection systems emphasize certain hazards more than others. In a retail store, for example, the principal security concerns are shoplifting and employee dishonesty (e.g., pilferage, embezzlement, and fraud). A typical set of categories to be protected includes the personal **safety** of people in the organization, such as employees, customers, or residents; **tangible** property, such as the plant, equipment, finished products, cash, and securities; and



Security and protection system

QUICK FACTS

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- Goggles
- Key
- Fire extinguisher
- Bulletproof vest

SECURITY AND PROTECTION SYSTEM

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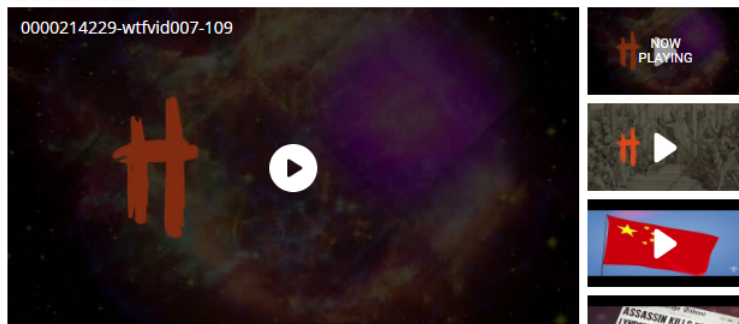
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- Physical security.

Includes the personal [safety](#) of people in the organization, such as employees, customers, or residents; [tangible](#) property, such as the plant, equipment, finished products, cash, and securities; and intangible property, such as highly classified national-security information or “proprietary” information (*e.g.*, trade secrets) of private organizations. An important distinction between a security and protection system and public services such as [police](#) and [fire](#) departments is that the former employs means that emphasize passive and preventive measures.

Security systems are found in a wide variety of organizations, ranging from government agencies and industrial plants to apartment buildings and schools. Sufficiently large organizations may have their own [proprietary](#) security systems or may purchase security services by contract from specialized security organizations.

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Development Of Security Systems.

The origins of security systems are obscure, but techniques for protecting the household, such as the use of locks and barred windows, are very ancient. As civilizations developed, the distinction between passive and active security was recognized, and responsibility for active security measures was vested in police and fire-fighting agencies.

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By the mid-19th century, private organizations such as those of Philip Sorensen in Sweden and [Allan Pinkerton](#) in the United States had also begun to build efficient large-scale security services. Pinkerton’s

- Goggles
- Key
- Fire extinguisher
- Bulletproof vest
- Vehicular safety devices
- Fire engine

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- Types of security systems.
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Sorensen in Sweden and [Allan Pinkerton](#) in the United States had also begun to build efficient large-scale security services. Pinkerton's organization offered [intelligence](#), counterintelligence, internal security, investigative, and law enforcement services to private business and government. Until the advent of [collective bargaining](#) in the United States, strikebreaking was also a prime concern. The Sorensen organization, in contrast, moved toward a loss-control service for [industry](#). It provided personnel trained to prevent and deal with losses from crime, fire, [accident](#), and flood and established the pattern for security services in the United Kingdom and elsewhere in western Europe.

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World Wars I and II brought an increased awareness of security systems as a means of protection against military espionage, sabotage, and subversion; such programs in effect became part of a country's [national-security](#) system. After [World War II](#) much of this apparatus was retained as a result of international tensions and defense-production programs and became part of an increasingly professionalized complex of security functions.

The development and [diffusion](#) of security systems and hardware in various parts of the world has been an uneven process. In relatively underdeveloped countries, or the underdeveloped parts of recently industrializing countries, security [technology](#) generally exists in [rudimentary](#) form, such as barred windows, locks, and elementary personnel security measures. In many such regions, however, facilities of large international corporations and sensitive government installations employ sophisticated equipment and techniques.

Since the 1960s, crime-related security systems have grown especially rapidly in most countries. Among contributing factors have been the increase in number of security-sensitive businesses; development of new security functions, such as protection of

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especially rapidly in most countries. Among contributing factors have been the increase in number of security-sensitive businesses; development of new security functions, such as protection of proprietary information; increasing computerization of sensitive information subject to unique vulnerabilities; improved reporting of crime and consequent wider awareness; and the need in many countries for security against violent demonstrations, bombings, and hijackings.

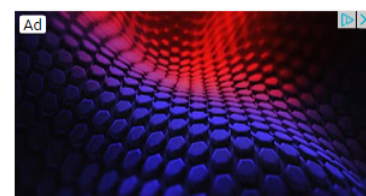
Security systems are becoming increasingly automated, particularly in sensing and communicating hazards and vulnerabilities. This situation is true in both crime-related applications, such as intrusion-detection devices, and fire-protection alarm and response (extinguishing) systems. Advances in miniaturization and electronics are reflected in security equipment that is smaller, more reliable, and more easily installed and maintained.

Types Of Security Systems.

Security systems can be classified by type of production enterprise, such as industrial, retail (commercial), governmental, government contractor, or hospital; by type of organization, such as contract security or proprietary; by type of security process, such as personnel or physical security; or by type of security function or emphasis, such as plant protection (variously defined), theft control, fire protection, accident prevention, protection of sensitive (national security or business proprietary) information. Some of these categories obviously overlap.

Security for small businesses constitutes a special situation. Because small firms cannot afford specialized proprietary security staffs, measures must be incorporated into regular routines and staff training or be purchased from outside organizations. Theft, both internal and external, is a prime concern.

Residential security constitutes another special category. Sizable [housing](#) or apartment complexes, especially if under one management, can employ sophisticated security measures, including, for example, closed-circuit television monitoring of elevators and hallways and trained security guards. Relatively simple equipment for houses or small apartment buildings, as, for example, exterior [lighting](#) and alarms, is increasingly used. Some neighbourhoods of large cities cooperatively employ patrol services or organize resident volunteer patrols



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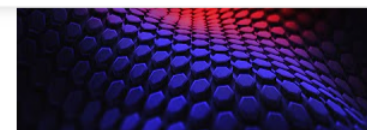
Physical Security.

Some of the most effective advances in security technologies during the past few decades have been in the area of physical security—*i.e.*, protection by tangible means. Physical security has two main components: building architecture and appurtenances; equipment and devices.

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A building can be designed for security by such means as planning and limiting the number and location of entrances and by careful attention to exits, traffic patterns, and loading docks.

Equipment and devices may be classified in various categories depending on the criteria used. If the criterion is purpose, some of the principal categories are record containers, including safes and files; communications, such as two-way radios and scrambler telephones; identification, including badges and automatic access-control systems requiring the use of a code; investigation and detection (*e.g.*, lie detectors) and intrusion-detection devices, such as photoelectric cells and ultrasonic-wave-propagating equipment; observation and surveillance, including listening and recording devices, cameras, closed-circuit television, and one-way mirrors;



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