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by Santosh Das | Last Updated On February 10, 2025 Understand fundamentals of top 50 basic electronic components and their functions. Learn about resistors, capacitors, diodes and more. In electronics, every circuit or device is built using a variety of basic electronic components that work together to perform specific tasks. Understanding these components, their functions, and how they work is essential for anyone looking to design, build, or repair electronics. This comprehensive guide will help you understand fundamentals of top 50 basic electronic components and their functions. You can learn about resistors, capacitors, diodes, Integrated Circuits, Semiconductors and more. What are Electronic Components? Electronic components are individual physical parts that manipulate electrical signals in a circuit. These components can be thru-hole or SMD and are categorized as active, passive, or electromechanical, and they form the building blocks of all electronic circuits. Understanding their roles, functions and applications is crucial for designing, building, and troubleshooting circuits. These components are basic building blocks for designing circuits and devices like smartphones, computers, televisions, electronic gadgets, etc. Active and Passive Electronic Components: What is the Difference Between the Two? All basic electronic components can be classified as Active or Passive. These components work together to control the flow of electricity in a circuit. Let us understand the difference between the two: What Are Active Components? Active components are parts of a circuit that need a power source to work. They can control the flow of electricity, amplify signals, or perform other important tasks. Active components cannot function without electricity from an external source like a battery or a power supply. Active Electronic Components Examples of Active Components: Key Features of Active Components: They need a power source to work. They can increase the energy of a signal (amplify it). They control the flow of electric current in a circuit. What Are Passive Components? Passive components are parts of a circuit that do not need a power source to work. They simply store energy, dissipate energy, or resist the flow of electricity. These components do not amplify or control signals on their own. Passive Electronic Components Examples of Passive Components: Resistors: Control or reduce the flow of current. Capacitors: Store electrical energy temporarily. Inductors: Store energy in a magnetic field. Key Features of Passive Components: They do not need a power source to function. They cannot amplify a signal. They are simpler and often smaller in size compared to active components Main Differences Between Active and Passive Components The main difference is that active components need external power to function and can control or amplify signals, while passive components work without any external power and only store or resist electricity. Both types of components are essential to make any electronic device work. Feature Active Components Passive Components Power Source Needed Yes No Can Amplify Signals Yes No Examples Transistors, Diodes, ICs Resistors, Capacitors, Inductors Function Control and amplify signals Store or resist energy Read in Detail: Active and Passive Electronic Components List of Top 50 Basic Electronic Components and Their Functions # Component Category Function 1. Resistor Passive Resists or limits flow of electric current and adjusts voltage. 2. Capacitor Passive To store and release electrical energy in a circuit. 3. Inductor Passive Stores energy in a magnetic field. 4. Diode Passive To allow electric current to flow in one direction, while blocking it in the opposite direction. 5. Transistor Active Acts as a switch or amplifier. 6. Light Emitting Diode (LED) Active To produce light when an electrical current passes through it. 7. Integrated Circuit (IC) Active Combines multiple electronic functions into a single chip. 8. Transformer Electromechanical Transfers electrical energy between circuits via induction. 9. Relay Electromechanical Controls high-power circuits with low-power signals. 10. Switch Electromechanical Opens and closes circuits to allow or interrupt current flow. 11. Potentiometer Passive A variable resistor for adjusting voltage and resistance in a circuit. 12. Photodiode Active Converts light into electrical signals. 13. Phototransistor Active Detects light and amplifies the resulting signal. 14. Zener Diode Active To regulate and maintain constant voltage across a circuit despite voltage fluctuation. 15. Schottky Diode Active Diode with low forward voltage drop. 16. Varistor (MOV) Passive Protects circuits from voltage spikes by changing resistance. 17. Thermistor Passive Changes resistance with temperature changes. 18. Crystal Oscillator Active Generates stable and precise clock signals. 19. Piezoelectric Crystal Passive Converts mechanical pressure into electrical signals and vice versa. 20. Fuse Passive Protects circuits from over current by breaking the circuit. 21. Voltage Regulator Active Provides a stable output voltage regardless of input voltage variations. 22. Resistor Network Passive Combines multiple resistors in a single package for compact circuits. 23. Capacitor Network Passive Combines multiple capacitors in a single package for compact designs. 24. Dip Switch Electromechanical A manually operated switch for multiple circuit configurations. 25. Heat Sink Passive Dissipates heat from components like transistors and ICs. 26. Buzzer Output Produces sound signals when powered. 27. Speaker Output Converts electrical signals into sound waves. 28. Microphone Input Converts sound waves into electrical signals. 29. Antenna Passive Transmits or receives electromagnetic waves. 30. Battery Power Source Provides electrical energy for circuits. 31. Solar Cell Power Source Converts sunlight into electrical energy. 32. Breadboard Passive Used for prototyping and testing electronic circuits without soldering. 33. Connector Passive Connects wires or devices in a circuit. 34. Jumper Wire Passive Connects components on a breadboard or PCB. 35. LDR (Light Dependent Resistor) Passive Changes resistance based on light intensity. 36. Push Button Electromechanical A momentary switch for user input. 37. Trimmer Capacitor Passive A small adjustable capacitor for tuning circuits. 38. Trimmer Resistor Passive A small adjustable resistor for precise resistance adjustments. 39. Oscilloscope Probe Test Equipment Connects circuits to an oscilloscope for signal monitoring. 40. PCB (Printed Circuit Board) Passive Provides a platform for mounting and interconnecting components. 41. Logic Gates Active Performs basic digital operations like AND, OR, and NOT. 42. Signal Generator Test Equipment Produces electrical signals of varying frequencies and amplitudes. 43. Power Supply Power Source Supplies regulated electrical power to circuits. 44. Op-Amp Active Amplifies weak signals with high precision. 45. Programmable Logic Device Active Customizable ICs that perform user-defined logic operations. 46. Resistor-Capacitor (RC) Circuit Passive Provides filtering or timing functions in circuits. 47. Inductor-Capacitor (LC) Circuit Passive Generates oscillations and filters signals in tuned circuits. 48. Voltage Divider Circuit Passive Divides input voltage into smaller, proportional outputs. 49. SCR (Silicon Controlled Rectifier) Active Controls power flow in high-voltage circuits. 50. Digital Display (7-Segment) Output Displays numeric or alphanumeric information. Also Understand: Types of SMD Components List, Functions and Identification Functions and Applications of Top 20 Basic Electronics Components 1. Resistor Different Types of Resistor Function: Resistors are passive components that limit the flow of current in a circuit and divide voltage. They are essential for controlling the amount of current and ensuring proper voltage levels across other components. Applications: Used in almost all electronic devices, including voltage regulators, LEDs, and audio equipment. 2. Capacitor Different Types of Capacitors Function: Capacitors store and release electrical energy, filter noise, and stabilize voltage. They are used for coupling signals, energy storage, and frequency tuning. Applications: Found in power supplies, audio systems, and motor starters. 3. Inductor Different Types of Inductors Function: Inductors store energy in a magnetic field when current flows through them. They are used for filtering, energy storage, and creating oscillatory circuits. Applications: Used in power supplies, transformers, and RF circuits. 4. Diode Diode Function: Diodes allow current to flow in only one direction, acting as one-way switches. They are commonly used for rectification and signal demodulation. Applications: Found in power converters, signal rectifiers, and LED lighting. 5. Transistor Function: Transistors are active components that act as switches or amplifiers. They control the flow of electrical signals and are integral to all digital and analog electronic circuits. Applications: Used in microprocessors, power amplifiers, and switching circuits. 6. Light Emitting Diode (LED) LED (Light Emitting Diode) Function: LEDs emit light when current flows through them. They are energy-efficient and durable compared to traditional light bulbs. Applications: Widely used in display screens, indicator lights, and decorative lighting. 7. Integrated Circuit (IC) Function: ICs integrate multiple electronic components like transistors, diodes, and resistors into a single chip. They perform complex functions such as processing, amplifying, and memory storage. Applications: Used in computers, smartphones, and all advanced electronic devices. 8. Transformer Different Types of Transformer Function: Transformers transfer electrical energy between two circuits through electromagnetic induction. They step up or step down voltage levels as required. Applications: Found in power supplies, audio systems, and electrical distribution systems. 9. Relay Different Types of Relays Function: Relays are electrically operated switches that allow low-power circuits to control high-power devices. Applications: Used in automation systems, motor controllers, and household appliances. 10. Switch Different Types of Switches Function: Switches are electromechanical components that open or close circuits, allowing or stopping the flow of electricity. Applications: Commonly used in electrical panels, appliances, and consumer electronics. 11. Potentiometer Potentiometer Function: Potentiometers are adjustable resistors that control voltage and current in circuits. They are often used for tuning and calibration. Applications: Found in audio controls, volume knobs, and tuning circuits. 12. Zener Diode Function: Zener diodes allow current to flow in reverse when the voltage exceeds a certain threshold, making them ideal for voltage regulation. Applications: Used in voltage regulators and circuit protection systems. 13. Schottky Diode Function: Schottky diodes have a low forward voltage drop and fast switching speed, making them ideal for high-frequency applications. Applications: Used in power supplies, RF circuits, and solar panel systems. 14. Thermistor Function: Thermistors are temperature-sensitive resistors that change resistance with temperature variations. Applications: Commonly used in temperature sensors, heaters, and power supply protection. 15. Voltage Regulator Function: Voltage regulators maintain a stable output voltage regardless of input voltage fluctuations. Applications: Used in power supplies, battery chargers, and voltage-sensitive circuits. 16. Oscillator Function: Oscillators produce repetitive signals, such as sine waves, square waves, or clock pulses, for timing and synchronization. Applications: Found in clocks, microprocessors, and communication devices. 17. Light Dependent Resistor (LDR) LDR (Photoresistor) Function: LDRs change resistance based on light intensity, making them suitable for light-sensing applications. Applications: Used in streetlights, alarm systems, and cameras. 18. Fuse Function: Fuses protect circuits from overcurrent / overload by breaking the connection when current exceeds a safe level. Applications: Found in home electrical systems, automotive circuits, and industrial equipment. 19. Crystal Oscillator Function: Crystal oscillators generate precise and stable frequency signals for clocking purposes. Applications: Used in watches, microprocessors, and communication systems. 20. Heat Sink Function: Heat sinks dissipate heat from high-power components like transistors and ICs to prevent overheating. Applications: Found in CPUs, power amplifiers, and LED drivers. Applications of Major Electronic Components Consumer Electronics: Smartphones, TVs, and home appliances use LEDs, resistors, and capacitors for power regulation and signal control. Industrial Automation: Relays, transformers, and ICs play critical roles in IoT and Automation. Medical Devices: Crystal oscillators and transistors are used in ECG machines and monitoring equipment. Automotive Systems: Zener diodes, fuses, sensors and MUUs are essential for automotive applications like engine control and safety features. Circuit Symbols of Electronic Components Circuit symbols are used to represent electronic components in schematic diagrams. These standardized symbols simplify the understanding and design of complex circuits by providing a visual shorthand for basic components like resistors, capacitors, diodes, transistors, etc. Circuit Symbols of Electronic Components Video: Basic Electronic Components and their Function Conclusion These top 50 basic electronic components components, whether active, passive, or electromechanical, form the foundation of modern technology and electronics manufacturing and assembly. By familiarizing yourself with their characteristics, functions and applications, you can design and troubleshoot circuits with ease and confidence. FAQs: Top 50 Electronic Components The most commonly used electronic components include resistors, capacitors, diodes, transistors, ICs, LEDs, inductors, and relays. A resistor limits current flow and controls voltage levels in a circuit. Capacitors store and release electrical energy, filter signals, and stabilize voltage in circuits. Transistors are used as switches or amplifiers in electronic circuits. A diode allows current to flow in one direction while blocking it in the opposite direction. An inductor stores energy in a magnetic field and is used in filters, oscillators, and transformers. Integrated circuits combine multiple electronic components into a single chip, making devices smaller and more efficient. Related Posts: Tags: 20 electrical components50 electronic componentsActive ComponentsBasic Electronic ComponentsBasic electronic components and their functions PDFBasic Electronic Components ListBasic electronic components list pdfBasic electronic components list with imagesBasic Electronics Components ListBasic electronics components list and their functionsBasic electronics components list pdfBasic electronics components symbolsBeginner Electronics GuideCapacitordiodeElectronic ComponentsElectronic components list with images PDFElectronics Circuit Design BasicsElectronics ComponentsElectronics Functions ExplainedICIntegrated CircuitPassive ComponentsResistorsemiconductorTop 50 electronic componentsTop Electronic Components for ProjectsTransistor The world of electronic components can be summarized with a short list of items. Here are more details on these essential parts of modern electronics. What are the electronic components? The following components are among the most common found in electronic devices: Microcontroller Transformer Battery Fuse Relays Switches Motors Circuit Breakers What are electronic components used for? Microcomputers are small computers used to control a multitude of devices, such as power tools, remote controls, medical equipment and office machines. Batteries convert chemical energy to electrical energy. The two different cells of a battery are anode (+) and cathode (-). Fuses help preserve components from overloading with excessive current. A fuse consists of connection body, support, contacts and metal-fuse material such as Zinc or copper. As a protective device, a circuit breaker can be controlled with a remote switch. It is designed to protect the circuit from overloading or a short circuit. Switches interrupt current. The four types of switches are: single pole single throw (SPST), single pole double throw (SPDT), double pole single throw (DPST) and double pole double throw (DPDT). Relays are electromechanical switches that shut power on or off. A relay includes an electromagnet, an armature, a series of electrical contacts, and a spring. Motors convert electrical energy into mechanical energy. Key components include a rotor, stator, bearings, conduit box, enclosure, and eye bolt. From watches, to home entertainment equipment, to vehicles; motors can power a wide array of devices. What are active and passive components in electronics? Active components include transistors, while passive components include transformers, inductors, resistors, capacitors. Transformers are commonly used to step up or step down power. A resistor restricts current flow. It is used in thermistors and potentiometers. Similar to a low capacity battery, a capacitor allows delays to occur in circuits. Inductors are used to control frequencies. When building electronic circuits, you will work with a number of basic electronic components, including resistors, capacitors, diodes, transistors, inductors and integrated circuits. Below is a brief overview of the components and their functions. Resistors: A resistor is one of the components you will come across in an integrated circuit. Like the name suggests, the device resists the flow of current. Resistors are graded based on their power ratings (amount of power they can handle without exploding) and resistance values (capacity to resist current). The measurement is done in units know as ohms. The electronic symbol of the unit is O. Capacitors: These components can store electric charge temporarily. The components come in different varieties, with the most common ones being electrolytic and ceramic disk. The capacity of a component is usually measured in microfarads (ÂµF). Diodes: Diodes allow electric current to flow in a single direction only. Each diode has two terminals known as the anode and cathode. When the anode is charged with positive voltage and the cathode with a negative one, electric current can flow. Reversing these voltages will prevent the current from flowing. Transistors: These components are easy to identify through their three terminals. For the components to work, voltage has to be applied to one of them; the base terminal. The base can then control current flow in the two other terminals (the emitter and collector). Inductors: These are passive components that store energy in form of a magnetic field. An inductor simply consists of a coil of wire wound around some kind of core. The core could be a magnet or air. When current passes through the inductor, a magnetic field is created around it. The magnetic field is stronger if a magnet is used as the core. Related Post: Inductors and Transformers: Similarities & Differences Integrated Circuits: An integrated circuit refers to a special device that has all the components required in an electronic circuit. The component has diodes, transistors, and other devices, all of which are etched on a tiny piece of silicon. The components are used in many electronic devices, including watches and computers. Microcontrollers: Microcontrollers are small computers used to control a multitude of devices, such as power tools, remote controls, medical equipment and office machines. Transformers: Built with two coils of wire, transformers are commonly used to step up or step down power. Batteries: Batteries convert chemical energy to electrical energy. The two different cells of a battery are anode (+) and cathode (-). Fuses: Fuses help preserve components from overloading with excessive current. A fuse consists of connection body, support, contacts, and metal-fuse material such as zinc or copper. Relays: These electromechanical switches shut power on or off. A relay includes an electromagnet, an armature, a series of electrical contacts and a spring. Switches: Switches interrupt current. The four types of switches are: single pole single throw (SPST), single pole double throw (SPDT), double pole single throw (DPST), and double pole double throw (DPDT). Motors: Motors convert electrical energy into mechanical energy. Key components include a rotor, stator, bearings, conduit box, enclosure, and eye bolt. Circuit Breakers: As a protective device, a circuit breaker can be controlled with a remote switch. It is designed to protect the circuit from overloading or a short circuit. Electronics is the branch of physics and technology that deals with circuits, transistors, microchips, and the behaviour and movement of electrons. It handles electric circuits containing active and passive elements and uses underlying techniques. It is an important part of engineering.Technologies are growing at a very fast rate in the world, and it is important for technology enthusiasts to pace up with the latest changes in society.Electronic devices have become an important part of our day-to-day life. It has become difficult for us to do work without using electronic devices.We live in a generation that uses electronics and technologies where robots and artificial intelligence are capable of doing human work with more ease and efficiency.Electronics in our daily life are made up of active and passive electric elements and smaller integrated circuits (IC). The ICs, transistors, and diodes are made of semiconductor materials, which work when current flows through them.History of Electronics The first electronic device was introduced by an American scientist, Sir Joseph Henry, in the year 1835. He invented a remote switch that was controlled by electricity. However, the credit for this invention was given to an English inventor Edward Davy in his electric telegraph c. 1835.Some Other Inventions areVacuum Diode – It was invented by John Ambrose Fleming (1897). After that, Lee De Forest invented the Vacuum Triode which was used to amplify electrical signals. And that paved the way for tetrode as well as pentode tubes. Transistor – It was invented by the combined effort of John Bardeen, Walter Brattain, and William Shockley. The invention of the junction transistor in 1948 led to the transistor era. IC (Integrated Circuit) – Jack Kilby invented this. A precursor concept to the integrated circuit was proposed by Kilby to the US Army in 1957. But soon as that project of his started gaining momentum, he came up with the revolutionary design of an integrated circuit. Functions of Electronics Electronic devices tend to perform the following main functions: The process of converting an alternating current (A.C.) to a direct current (D.C.) is known as rectification. Electronic devices can convert A.C. power into D.C. power which has various uses like charging storage batteries, electroplating, etc., with great ease as well as efficiency. A weak signal can be strengthened through the process of amplification and this process can be very easily achieved by electronic devices. A good example would be the usage of an amplifier in a radio set so that it is heard more loudly. Electronic devices tend to find quite a wide range of applications when it comes to automatic control. For instance, the voltage across a refrigerator can be controlled with said devices. Electronic devices are also capable of converting A.C. power into D.C. power of any given frequency. And when these devices perform this particular function, they are commonly referred to as oscillators. Applications of Electronics in Daily Life1. Consumer ElectronicsCommon people are highly benefited by this industry. Consumer electronics are electric devices meant for everyday use. Consumer electronics are further categorized as:Office Gadgets like calculators, scanners, personal computers, printers, fax machines, front projectors, etc.Home appliances such as refrigerators, a/c, washing machine, vacuum cleaner, microwave oven, etc.Audio and Video Systems like headphones, DVD players, VCRs, microphones, colour TVs, loudspeakers, video game consoles, etc.Advanced consumer devices like setup box, dishwasher, ATM, PDA(personal digital assistant), smartphones, barcode scanners, POS-terminals, etc.Storage devices like DVDs, HDD jukebox, mp3 players, memory cards, etc.2. Industrial ElectronicsThis industry basically focuses on making real-time automation. This includes:Industrial automation and motion control, motor drive control, machine learning, robotics and mechatronics, the power converting technologies, renewable energy applications, photovoltaic systems, power electronics, and biomechanics.3. Smart Grid SystemsSmart electric systems take information from communication technology and work accordingly based on the desired power consumption. It is an application of artificial intelligence, computing, and networked electric system. Smart meters are the best example of a smart grid system.Features of Smart GridThey are based on two-way communication.They have interactive sensors.They are Self-monitoring and Debugging.Electricity is distributed validly.4. Industrial Automation and Motion ControlMachines have increased productivity and efficiency, and hence are saving time and cost. Machines are also safe to use in unmanageable works. That's why the delegation of human-automation has become a preferable choice in industries.5. Image Processing3D images have evolved from multiple 2D images. Algorithms are developed to extract 3D information from 2D patterns.6. Medical ApplicationsAdvanced medical instruments are being developed for data recording and physiological analysis. They are mainly used to diagnose diseases and other healing purposes.Daily usage of Electronic Devices1. Mobile phones, iPod and TabletsWhen mobile or cellular phones were introduced to the public for the first time, with the main purpose of immediate communication, this technology hugely gained popularity and demand. The iPods and Tablets also followed the same pattern for the people.2. Wi-Fi and the InternetThe Internet is one of the greatest breakthroughs in the technology of our generation. It is the only thing by which the transfer of data from a server to the computers and from computers to servers is possible. This is why you can send messages, documents, and files on your Facebook, WhatsApp, and Instagram accounts.3. Digital sound or MusicTraditional devices like cassette tapes used to contain only a few numbers of songs. Nowadays, MP3, MP4, smartphones, and iPods are able to store thousands of songs, and they even play the songs much more smoothly.4. Digital CameraThe camera is a significant device as it really preserves unforgettable memories in a frame.Smartphones, iPods, mobile phones, tablets, and other devices are equipped with cameras to capture photos and shoot videos. Presently, all the major smartphone brands are competing with each other to provide the best camera and image quality of the highest resolution.5. Food IndustryThe use of electronic devices in daily life have seen a major sector in the food industry. Without food, we won't be able to live and survive, as it is necessary for body function. Modern machines produce food in high quantities every day.What is the Importance of Electronics? From the wide range of applications of electronics that have been mentioned above, we know that electronic applications tend to play a major role in everyone’s lives. However, it isn’t only because of its uses that it’s imperative. Electronics make our lives more convenient and efficient; they are one of the best ways to save time and increase our efficiency. Electronics not only help to fulfill our individual needs, but they also help with the growth of our economy as a whole because with the growing advent of technology, also comes innovation and modernity, and that’s where electronics play a huge role. Do you Know? Electricity tends to travel at the same speed as light, which is 186,000 miles per second. Some capsules and tablets consist of wireless sensors, which are used to collect information from the body of a person. Transparent smartphones are also expected in the coming days. We can see through them. There can also be windows and mirrors which can be used on a PC screen and monitors. Sensors are imparted in plants to know if they are in a shortage of water.Merely walking across a carpet can end up generating about 35,000 V of electricity. The world’s biggest-ever light bulb weighs about 8 tonnes, is 14 feet tall, and is located in Edison, New Jersey. There’s electricity present even in our bodies! The signals that our nerve cells tend to deliver to our muscles are sent to them through the utilization of electricity. Water, wind, the sun, and even animal waste can all be used to generate electricity. ECT or electroconvulsive therapy is a type of therapy that is used to give severely mentally ill patients electrically induced seizures as a way of treating their psychiatric illnesses. Printed circuit boards are made from a glass epoxy which happens to be naturally green in color. That is why PCBs are almost always green. List of Types of Basic Electronic Components, Functions, Symbols. Basic Electronic Components are electronic devices or parts usually packaged in a discrete form with two or more connecting leads or metallic pads. These devices are intended to be connected together, usually by soldering to a Printed Circuit Board (PCB), to create an electronic circuit with a particular function (for example an amplifier, radio receiver, oscillator, wireless). Some of the Basic Electronic Components are: resistor, capacitor, transistor, diode, operational amplifier, resistor array, logic gate etc. Types of Electronic Components These are of 2 types: Passive and Active Components. Both these types of components can be either Through-Hole or SMD. 1. Passive Components These components are those that do not have gain or directionality. They are also called Electrical elements or electrical components. Example: Resistors, Capacitors, Diodes, Inductors. 2. Active Components These components are those that have gain or directionality. Example: Transistors, Integrated Circuits or ICs, Logic Gates. Basic Passive Electronic Components 1. Resistor Different Types of Resistor A Resistor is an electrical device that resists the flow of electrical current. It is a passive device used to control, or impede the flow of, electric current in an electric circuit by providing resistance, thereby developing a drop in voltage across the device. There are two basic types of resistors: Linear Resistors: Resistors whose value changes with the applied voltage and temperature. Linear resistors are further classified as Fixed and Variable resistors. Non Linear Resistors: When resistance do not behave linearly with parameters such as voltage, current or temperature (Ohm’s Law). 2. Capacitor Capacitor A capacitor is a device used to store and release electricity, usually as the result of a chemical action. Also referred to as a storage cell, a secondary cell, a condenser or an accumulator. A Leyden Jar was an early example of a capacitor. Capacitors are further divided into two mechanical groups: Capacitors with Fixed-capacitance and variable capacitors. Read in Detail: What is Capacitor – Types, Formula, Symbol 3. Diode Diode A Diode is an electronic component that allows electric current to flow in one direction only. It is a semiconductor device that consists of a p-n junction. It can be either forward biased or reverse biased. They are most commonly used to convert AC to DC, because they pass the positive (+) part of the wave, and block the negative (–) part of the AC signal, or, if they are reversed, they pass only the negative part and not the positive part. Types of a diode: Light Emitting Diode: Light is generated when electric current flows through it. Laser diode: Generates coherent light. It is widely utilized in CD drives, DVD players, laser printers etc. Photodiode: Current flow when exposed to light. Schottky Diode: Diode with low voltage drop. Tunnel Diode: Diode in which electric current decreases with increase in voltage. Varactor / Varicap Diode: Diode with Variable capacitance. Zener Diode: Current flows in one direction, but also can flow in the reverse direction when above breakdown voltage. Read in Detail: Diode Electronic Component 4. Inductor Different Types of Inductors An inductor is a passive electrical device (typically a conducting coil) that introduces inductance into a electric circuit. It is basically a coil of wire with many winding, often wound around a core made of a magnetic material, like iron. Simplest form of an inductor is made up of a coil of wire. The inductance measured in henrys, is proportional to the number of turns of wire, the wire loop diameter and the material or core the wire is wound around. Inductors are categorized into different types based on their core material and mechanical construction: Air Cored Inductor Iron Cored Inductor Ferrite Cored Inductor Iron Power Inductor Bobbin Based Inductors Toroidal Inductors Multilayer Ceramic Inductors Film Inductors Variable Inductors Coupled Inductors Molded Inductors Read in Detail: Inductor Basics Basic Active Electronic Components 1. Transistor A transistor is a semiconductor device that acts as an amplifier, a switch, or a signal modulator. It consists of three layers – the emitter, base, and collector – each doped with different materials to create either a positive (P-type) or negative (N-type) charge. This ingenious design enables transistors to control the flow of current and amplify weak signals with remarkable precision. There are two primary types of transistors: Bipolar junction transistors (BJTs); and Field-effect transistors (FETs). Read in Detail: Transistor: Building Blocks of Modern Electronics 2. IC or Integrated Circuit Integrated Circuit)IC) Integrated Circuit or IC is an SMD Electronic Component made up of combination of several transistors, diode, resistor, capacitors in a tiny semiconductor chip. Integrated Circuit Electronic Components or IC are of small size and very light weight. They produce excellent results at low power. Types of IC on the basis of technology: Linear IC: This type of IC works on analog signal. Digital IC: This type of IC works on digital signal. Types of IC on the basis of external structure: Single in-line pin package (SIPP). Dual in-line pin package (DIPP). Quard pin package (QPP). Pin Grid Array Package (PGA). Ball Grid Array Package (BGA). Leadless Chip Carrier (LCC) Package. 3. Logic Gates A Simple Digital Electronic Circuit Logic gates are fundamental building blocks of digital circuits, used in computers and electronic devices to perform logical operations. They manipulate binary values, representing true (1) or false (0) states, through Boolean algebra. Common types of logic include: AND, OR, NOT, NAND, NOR, XOR, and XNOR gates, each executing specific logical functions. Read in Detail: Digital Circuit List of Active and Passive Electronic Components Here is list of all the most commonly used basic electronic components: Active Components Passive Components Light Emitting Diode (LED) Resistor Transistor Capacitor Integrated Circuit (IC) Inductor Battery Circuit Breaker Relay (Can also be used as Passive) Fuse Diode Switch Solar Cell Transformer Current Sensor Electrical Wires & Power Cables SMD Components Motor Function of Basic Electronic Components Terminals and Connectors: Components to make electrical connection. Resistors: Components used to resist current. Switches: Components that may be made to either conduct (closed) or not (open). Capacitors: Components that store electrical charge in an electrical field. Magnetic or Inductive Components: These are Electrical components that use magnetism. Network Components: Components that use more than 1 type of Passive Component. Piezoelectric devices, crystals, resonators: Passive components that use piezoelectric. effect. Semiconductors: Electronic control parts with no moving parts. Diodes: Components that conduct electricity in only one direction. Transistors: A semiconductor device capable of amplification. Integrated Circuits or ICs: A microelectronic computer circuit incorporated into a chip or semiconductor; a whole system rather than a single component. Circuit Symbols of Electronic Components Basic Electronic Parts and their Function Conclusion: I hope you found this article useful.Please share with other so that everybody can gain knowledge. Please share your thoughts and ideas via comments below. FAQs: Electronic Components Basic electronic components are fundamental building blocks used in electronic circuits to perform specific functions. These components include resistors, capacitors, inductors, diodes, and transistors, etc. A capacitor stores and releases electrical energy. It is often used to filter signals, smooth voltage fluctuations, and store charge for various applications. A diode allows current to flow in one direction only. It is used for rectification (converting AC to DC), voltage regulation, and signal demodulation in various electronic devices. A transistor acts as an amplifier or a switch in electronic circuits. It can amplify weak signals, control larger currents, and perform logical operations, making it a versatile component in modern electronics. Related Posts: Devices that use electricity for functioning Electrical devices or electric devices are devices that functionally rely on electric energy (AC or DC) to operate their core parts (electric motors, transformers, lighting, rechargeable batteries, control electronics). They can be contrasted with traditional mechanical devices which depend on different power sources like fuels or human physical strength. Electronic devices are a specialized kind of electrical devices in which electric power is predominantly used for data processing rather than the generation of mechanical forces. To better differentiate between both classes, electric devices that emphasize physical work are also called electromechanical. Mechatronics accentuates the intersection of both fields. Together, electronic and electric devices, their development, maintenance, and power supply comprise the subject of electrical engineering. The majority of electric devices in households is stationary and — due to their considerable power consumption — relies on electrical installation, especially electric outlets instead of small electric generators, batteries, rechargeable or not.[1][2][3] Due to their dependence on electric power sources, in general well-evolved power grids, electric devices and their power consumption pattern have moved into the focus of smart metering.[4] Electrical equipment part of the distribution system in a large building Electrical equipment includes any machine powered by electricity. It usually consists of an enclosure, a variety of electrical components, and often a power switch. Examples of these include: Lighting Major appliance Small appliances IT equipment (computers, printers etc.) Motors, pumps and HVAC Systems More specifically, electrical equipment refers to the individual components of an electrical distribution system. These components may involve: Electric switchboards Distribution boards Circuit breakers and disconnects Transformers Electricity meter Energy portal Wikimedia Commons has media related to Electrical devices. Electrical equipment in hazardous areas Electrical equipment Home appliance Power transmission Electrical room Grounding kit List of largest manufacturing companies by revenue Grondzik, Walter T. (2010). Mechanical and electrical equipment for buildings (11 ed.). Wiley. ISBN 9780470195659. ^ "Equipment of households with electrical household appliances and others (Germany)". Federal Statistical Office. 2019-10-29. Retrieved 2021-07-10. ^ "Power Consumption of Typical Household Appliances". Daft Logic. Retrieved 2021-07-10. ^ Mechanical, American (2014-04-25). "Appliance Outlet Specifications". American Mechanical, Inc. Archived from the original on 2021-12-29. 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They range from simple gadgets like calculators to complex systems like computers and smartphones. These devices have become an integral part of our daily lives, powering everything from entertainment and communication to transportation and healthcare.Semiconductors: These are the fundamental building blocks of most electronic devices. They control the flow of electrical current, enabling devices to perform various functions. Common semiconductors include transistors, diodes, and integrated circuits. Passive Components: These components do not require an external power source to function. They include resistors, capacitors, and inductors, which are used to control the flow of current and store electrical energy. Integrated Circuits (ICs): ICs are tiny chips that contain millions of transistors and other components interconnected to perform specific tasks. They are the heart of modern electronic devices. Power Sources: Batteries, power adapters, and solar panels are common power sources for electronic devices. They provide the electrical energy needed for operation.Consumer Electronics: These devices are designed for personal use and entertainment. Examples include televisions, smartphones, laptops, and gaming consoles. Industrial Electronics: These devices are used in industrial settings to control machinery, automate processes, and monitor production. Examples include PLCs (Programmable Logic Controllers), sensors, and robots. Medical Electronics: These devices are used in healthcare to diagnose, treat, and monitor patients. Examples include electrocardiograms (ECGs), MRI machines, and hearing aids. Automotive Electronics: These devices are used in vehicles to control various functions, such as engine management, braking, and entertainment systems.Electronic devices have revolutionized various industries and aspects of our lives. Some key applications include:Communication: Smartphones, computers, and tablets have transformed the way we communicate with each other. Entertainment: Televisions, gaming consoles, and streaming devices provide endless entertainment options. Education: Computers and tablets are used for online learning, research, and educational software. Healthcare: Medical devices assist in diagnosing diseases, performing surgeries, and monitoring patient health. Transportation: Electronic controls are used in vehicles to improve fuel efficiency, safety, and performance. Industry: Industrial electronics automate processes, improve efficiency, and enhance quality control.As technology continues to advance, we can expect to see even more innovative and sophisticated electronic devices. Emerging trends include:Internet of Things (IoT): Connecting everyday objects to the internet, enabling remote control and data collection. Artificial Intelligence (AI): Integrating AI into devices to make them more intelligent and responsive. Wearable Technology: Devices that can be worn on the body, such as smartwatches and fitness trackers. Quantum Computing: Harnessing the power of quantum mechanics to solve complex problems that are beyond the capabilities of classical computers.A Comprehensive Guide to Electronic Devices – Electronic devices have become an indispensable part of our modern world. Their versatility, functionality, and continuous evolution have transformed the way we live, work, and interact with each other. As technology progresses, we can anticipate even more exciting and groundbreaking developments in the field of electronics.Home | Join us on Facebook, Twitter, YouTube, Instagram, Quora, Reddit, LinkedIn, Pinterest, Blogger. Calculators, digital watches, mobile phones, laptops, and computers are some of the essential devices that we use in our daily lives. Apart from these devices, we use appliances like television, refrigerators, air conditioners, micro ovens, mixers, blenders, grinders, and many more. These devices or appliances operate upon the supply of electricity. Electricity is defined as the flow of electrons. Electricity is an essential part of life, and is one of the most widely used forms of energy. The branch of Physics that helps to study the emission, and behaviour of electrons with electronic devices is known as electronics. In this session, let us learn about electronics and the applications of electronics. The term electronics is derived from the word “electrons”. Electronics is a branch of Physics that deals with the theory and use of devices in which the electrons travel through a vacuum, gas, or a semiconductor medium. The motion of electrons takes place under the influence of applied electric and/or magnetic fields. Electronics is a vast field that is classified as: Physical Electronics Electronics Engineering Physical electronics helps to understand the motion of electrons in mediums like vacuum, gas, or semiconductor. Electronics engineering concentrates on the design, fabrication, and application of electronic devices. Electronics have developed rapidly from large circuits to small and powerful integrated circuits. Let us know in detail about various inventions in electronics and applications of electronics. Understand the flow of electrons by watching the video below. Electronics have evolved around three components like vacuum tubes, transistors, and integrated circuits. In 1883, the great Physicist Thomas Alva Edison found that electrons flow from one metal to another through a vacuum. This theory was known as the Edison Effect and it deals with conductors. John Fleming in 1897 applied the Edison Effect to invent a two-element electron tube known as a diode. The device used for amplification and transmission of electrical energy, known as triode, was discovered in the year 1906 by Lee de Forest. Triode is a three-element tube that was developed using the Edison Effect. Later in 1948, scientists Walter Brattain, John Bardeen, and William Shockley developed a device known as a transistor at Bell Laboratories. This invention was awarded the Nobel Prize. Vacuum tubes were replaced by metal transistors since they offer longer life, low cost, efficiency, are light in weight, have less power consumption, and are smaller in size. The concept of an integrated circuit was put forth in 1952 by Geoffrey W. A. Dummer. Later in the 1960s, the full swing production of integrated circuits started. Some of the devices that use integrated circuits are video cameras, microcomputers, medical equipment, and communication satellites. After understanding what is electronics and the evolution of electronic devices, let us now know about its applications. In our day-to-day life, we witness electronics playing a major role around us. If you look around, any time you can definitely spot one or another device that works with electricity. Hence, electronics have become part of our living. Let us know some of the applications of electronics. Electronics are widely used in the automobile industry in engine control and car-entertainment systems. It is used in utility systems like boiler feed pumps, high voltage DC transmission, static circuit breakers, and smart grid systems. Electronics plays an important role in the aerospace industry. Health care is one of the vital sectors which uses electronics in all activities. Electrocardiogram (ECG), ultrasound, X-ray, NMR, and many more procedures use electricity. The advancement of technology has become possible due to electronics. Robotic checkups are possible due to electronics. Office spaces use electronics to power appliances like air conditioners, elevators, lights, laptops, printers, fax machines, and desktops. The backbone of our country, agriculture is also dependent on electricity for watering crops using motors, and it is also used in remote monitoring of crops and soil moisture. A concept which revolutionised the world is the internet, electricity is the key for internet operation. Transfer of data from a server to the computers and from computers to servers takes place with the help of electricity. In the food industry, electronics are used to store food in temperature-controlled storage. Entertainment is one of the sectors which is largely dependent on electricity. Projector screens, televisions, radio, cameras, MP3 or MP4 portable players, smartphones, and iPods use electricity to operate. In the image processing field, 3D images and 2D images are developed with electronic media. Read more: Electronics in daily life Electricity is a phenomenon observed with moving or stationary electric charges. The branch of Physics that helps to study the emission, and behaviour of electrons with electronic devices is known as electronics. Types of electric current are: Direct Current (DC) Alternate Current (DC) Sectors which use electronics are aerospace, commercial spaces, imaging, agriculture, food and entertainment. Electronics is classified into: Physical Electronics Electronics Engineering Put your understanding of this concept to test by answering a few MCQs. Click Start Quiz to begin! Select the correct answer and click on the "Finish" buttonCheck your score and explanations at the end of the quiz Visit BYJU'S for all Physics related queries and study materials 0 out of 0 arewrong 0 out of 0 are correct 0 out of 0 are Unattempted View Quiz Answers and Analysis Branch of physics and electrical engineering This article is about the technical field. For personal/home-use electronic devices, see consumer electronics. For the journal, see Electronics (magazine). Modern surface-mount electronic components on a printed circuit board, with a large integrated circuit at the top Electronics is a scientific and engineering discipline that studies and applies the principles of physics to design, create, and operate devices that manipulate electrons and other electrically charged particles. It is a subfield of physics[1][2] and electrical engineering which uses active devices such as transistors, diodes, and integrated circuits to control and amplify the flow of electric current and to convert it from one form to another, such as from alternating current (AC) to direct current (DC) or from analog signals to digital signals. Electronic devices have significantly influenced the development of many aspects of modern society, such as telecommunications, entertainment, education, health care, industry, and security. The main driving force behind the advancement of electronics is the semiconductor industry, which continually produces ever-more sophisticated electronic devices and circuits in response to global demand. The semiconductor industry is one of the global economy's largest and most profitable industries, with annual revenues exceeding $481 billion in 2018. The electronics industry also encompasses other branches that rely on electronic devices and systems, such as e-commerce,[citation needed] which generated over $29 trillion in online sales in 2017. See also: History of electronic engineering and Timeline of electrical and electronic engineering One of the earliest Audion radio receivers, constructed by De Forest in 1914 Karl Ferdinand Braun´s development of the crystal detector, the first semiconductor device, in 1874 and the identification of the electron in 1897 by Sir Joseph John Thomson, along with the subsequent invention of the vacuum tube which could amplify and rectify small electrical signals, inaugurated the field of electronics and the electron age.[3][4] Practical applications started with the invention of the diode by Ambrose Fleming and the triode by Lee De Forest in the early 1900s, which made the detection of small electrical voltages, such as radio signals from a radio antenna, practicable. Vacuum tubes (thermionic valves) were the first active electronic components which controlled current flow by influencing the flow of individual electrons, and enabled the construction of equipment that used current amplification and rectification to give us radio, television, radar, long-distance telephony and much more. The early growth of electronics was rapid, and by the 1920s, commercial radio broadcasting and telecommunications were becoming widespread and electronic amplifiers were being used in such diverse applications as long-distance telephony and the music recording industry.[5] The next big technological step took several decades to appear, when the first working point-contact transistor was invented by John Bardeen and Walter Houser Brattain at Bell Labs in 1947.[6] However, vacuum tubes continued to play a leading role in the field of microwave and high power transmission as well as television receivers until the middle of the 1980s.[7] Since then, solid-state devices have all but completely taken over. Vacuum tubes are still used in some specialist applications such as high power RF amplifiers, cathode-ray tubes, specialist audio equipment, guitar amplifiers and some microwave devices. In April 1955, the IBM 608 was the first IBM product to use transistor circuits without any vacuum tubes and is believed to be the first all-transistorized calculator to be manufactured for the commercial market.[8][9] The 608 contained more than 3,000 germanium transistors. Thomas J. Watson Jr. ordered all future IBM products to use transistors in their design. From that time on transistors were almost exclusively used for computer logic circuits and peripheral devices. However, early junction transistors were relatively bulky devices that were difficult to manufacture on a mass-production basis, which limited them to a number of specialised applications.[10] The MOSFET was invented at Bell Labs between 1955 and 1960.[11][12][13][14][15][16] It was the first truly compact transistor that could be miniaturised and mass-produced for a wide range of uses.[10] Its advantages include high scalability,[17] affordability,[18] low power consumption, and high density.[19] It revolutionized the electronics industry,[20][21] becoming the most widely used electronic device in the world.[22][23] The MOSFET is the basic element in most modern electronic equipment.[24][25] As the complexity of circuits grew, problems arose.[26] One problem was the size of the circuit. A complex circuit like a computer was dependent on speed. If the components were large, the wires interconnecting them must be long. The electric signals took time to go through the circuit, thus slowing the computer.[26] The invention of the integrated circuit by Jack Kilby and Robert Noyce solved this problem by making all the components and the chip out of the same block (monolith) of semiconductor material. The circuits could be made smaller, and the manufacturing process could be automated. This led to the idea of integrating all components on a single-crystal silicon wafer, which led to small-scale integration (SSI) in the early 1960s, and then medium-scale integration (MSI) in the late 1960s, followed by VLSI. In 2008, billion-transistor processors became commercially available.[27] Analog electronics Audio electronics Avionics Bioelectronics Circuit design Digital electronics Electronic components Embedded systems Integrated circuits Microelectronics Nanoelectronics Optoelectronics Power electronics Printed circuit boards Semiconductor devices Sensors Telecommunications Main article: Electronic component Various electronic components An electronic component is any component in an electronic system either active or passive. Components are connected together, usually by being soldered to a printed circuit board (PCB), to create an electronic circuit with a particular function. Components may be packaged singly, or in more complex groups as integrated circuits. Passive electronic components are capacitors, inductors, resistors, whilst active components are such as semiconductor devices; transistors and thyristors, which control current flow at electron level.[28] Electronic circuit functions can be divided into two function groups: analog and digital. A particular device may consist of circuitry that has either or a mix of the two types. Analog circuits are becoming less common, as many of their functions are being digitized. Main article: Analog electronics Analog circuits use a continuous range of voltage or current for signal processing, as opposed to the discrete levels used in digital circuits. Analog circuits were common throughout an electronic device in the early years in devices such as radio receivers and transmitters. Analog electronic computers were valuable for solving problems with continuous variables until digital processing advanced. As semiconductor technology developed, many of the functions of analog circuits were taken over by digital circuits, and modern circuits that are entirely analog are less common; their functions being replaced by hybrid approach which, for instance, uses analog circuits at the front end of a device receiving an analog signal, and then use digital processing using microprocessor techniques thereafter. Sometimes it may be difficult to classify some circuits that have elements of both linear and non-linear operation. An example is the voltage comparator which receives a continuous range of voltage but only outputs one of two levels as in a digital circuit. Similarly, an overdriven transistor amplifier can take on the characteristics of a controlled switch, having essentially two levels of output. Analog circuits are still widely used for signal amplification, such as in the entertainment industry, and conditioning signals from analog sensors, such as in industrial measurement and control. Main article: Digital electronics Digital circuits are electric circuits based on discrete voltage levels. Digital circuits use Boolean algebra and are the basis of all digital computers and microprocessor devices. They range from simple logic gates to large integrated circuits, employing millions of such gates. Digital circuits use a binary system with two voltage levels labelled "0" and "1" to indicated logical status. Often logic "0" will be a lower voltage and referred to as "Low" while logic "1" is referred to as "High". However, some systems use the reverse definition ("0" is "High") or are current based. Quite often the logic designer may reverse these definitions from one circuit to the next as they see fit to facilitate their design. The definition of the levels as "0" or "1" is arbitrary.[29] Ternary (with three states) logic has been studied, and some prototype computers made, but have not gained any significant practical acceptance.[30] Universally, Computers and Digital signal processors are constructed with digital circuits using Transistors such as MOSFETs in the electronic logic gates to generate binary states. A selection of logic gates, used extensively in digital electronics Logic gates Adders Flip-flops Counters Registers Multiplexers Schmitt triggers Highly integrated devices: Memory chip Microprocessors Microcontrollers Application-specific integrated circuit (ASIC) Digital signal processor (DSP) Field-programmable gate array (FPGA) Field-programmable analog array (FPAA) System on chip (SOC) Electronic systems design deals with the

multi-disciplinary design issues of complex electronic devices and systems, such as mobile phones and computers. The subject covers a broad spectrum, from the design and development of an electronic system (new product development) to assuring its proper function, service life and disposal.[31] Electronic systems design is therefore the process of defining and developing complex electronic devices to satisfy specified requirements of the user. Due to the complex nature of electronics theory, laboratory experimentation is an important part of the development of electronic devices. These experiments are used to test or verify the engineer's design and detect errors. Historically, electronics labs have consisted of electronics devices and equipment located in a physical space, although in more recent years the trend has been towards electronics lab simulation software, such as CircuitLogix, Multisim, and PSpice. Main article: Electronic design automation Today's electronics engineers have the ability to design circuits using premanufactured building blocks such as power supplies, semiconductors (i.e. semiconductor devices, such as transistors), and integrated circuits. Electronic design automation software programs include schematic capture programs and printed circuit board design programs. Popular names in the EDA software world are NI Multisim, Cadence (ORCAD), EAGLE PCB[32] and Schematic, Mentor (PADS PCB and LOGIC Schematic), Altium (Protel), LabCentre Electronics (Proteus), gEDA, KiCad and many others. Main article: Thermal management of electronic devices and systems Heat generated by electronic circuitry must be dissipated to prevent immediate failure and improve long term reliability. Heat dissipation is mostly achieved by passive conduction/convection. Means to achieve greater dissipation include heat sinks and fans for air cooling, and other forms of computer cooling such as water cooling. These techniques use convection, conduction, and radiation of heat energy. Main article: Electronic noise Electronic noise is defined[33] as unwanted disturbances superposed on a useful signal that tend to obscure its information content. Noise is not the same as signal distortion caused by a circuit. Noise is associated with all electronic circuits. Noise may be electromagnetically or thermally generated, which can be decreased by lowering the operating temperature of the circuit. Other types of noise, such as shot noise cannot be removed as they are due to limitations in physical properties. Main article: Electronic packaging Many different methods of connecting components have been used over the years. For instance, early electronics often used point to point wiring with components attached to wooden breadboards to construct circuits. Cordwood construction and wire wrap were other methods used. Most modern day electronics now use printed circuit boards made of materials such as FR4, or the cheaper (and less hard-wearing) Synthetic Resin Bonded Paper (SRBP, also known as Paxoline/Paxolin (trade marks) and FR2) – characterised by its brown colour. Health and environmental concerns associated with electronics assembly have gained increased attention in recent years, especially for products destined to go to European markets. Through-hole devices mounted on the circuit board of a mid-1980s home computer. Axial-lead devices are at upper left, while blue radial-lead capacitors are at upper right. Electrical components are generally mounted in the following ways: Through-hole (sometimes referred to as 'Pin-Through-Hole') Surface mount Chassis mount[clarification needed] Rack mount LGA/BGA/PGA socket Main article: Electronics industry Further information: Consumer electronics, List of best-selling electronic devices, and Semiconductor industry The electronics industry consists of various branches. The central driving force behind the entire electronics industry is the semiconductor industry,[34] which has annual sales of over $481 billion as of 2018.[35] The largest industry sector is e-commerce,[citation needed] which generated over $29 trillion in 2017.[36] The most widely manufactured electronic device is the metal-oxide-semiconductor field-effect transistor (MOSFET), with an estimated 13 sextillion MOSFETs having been manufactured between 1960 and 2018.[37] In the 1960s, U.S. manufacturers were unable to compete with Japanese companies such as Sony and Hitachi who could produce high-quality goods at lower prices. By the 1980s, however, U.S. manufacturers became the world leaders in semiconductor development and assembly.[38] However, during the 1990s and subsequently, the industry shifted overwhelmingly to East Asia (a process begun with the initial movement of microchip mass-production there in the 1970s), as plentiful, cheap labor, and increasing technological sophistication, became widely available there.[39][40] Over three decades, the United States' global share of semiconductor manufacturing capacity fell, from 37% in 1990, to 12% in 2022.[40] America's pre-eminent semiconductor manufacturer, Intel Corporation, fell far behind its subcontractor Taiwan Semiconductor Manufacturing Company (TSMC) in manufacturing technology.[39] By that time, Taiwan had become the world's leading source of advanced semiconductors[40][39]—followed by South Korea, the United States, Japan, Singapore, and China.[40][39] Important semiconductor industry facilities (which often are subsidiaries of a leading producer based elsewhere) also exist in Europe (notably the Netherlands), Southeast Asia, South America, and Israel.[39] Electronics portal Index of electronics articles Outline of electronics Atomtronics Audio engineering Biodegradable electronics Broadcast engineering Computer engineering Electronics engineering Electronics engineering technology Fuzzy electronics Go-box Marine electronics Photonics Robotics ^ française, Académie. "électronique | Dictionnaire de l'Académie française | 9e édition". www.dictionnaire-academie.fr (in French). Retrieved 26 May 2024. ^ "Definition of ELECTRONICS". www.merriam-webster.com. 21 May 2024. Retrieved 26 May 2024. ^ [bare URL PDF] ^ "This Month in Physics History - October 1897: The Discovery of the Electron". American Physical Society. Archived from the original on 19 September 2018. Retrieved 19 September 2018. ^ Guarnieri, M. (2012). "The age of vacuum tubes: Early devices and the rise of radio communications". IEEE Ind. Electron. M. 6 (1): 41–43. doi:10.1109/MIE.2012.2182822. S2CID 23351454. ^ "1947: Invention of the Point-Contact Transistor". Computer History Museum. Archived from the original on 30 September 2021. Retrieved 10 August 2019. ^ Sōgo Okamura (1994). History of Electron Tubes. IOS Press. p. 5. ISBN 978-9051991451. Archived from the original on 31 December 2013. Retrieved 5 December 2012. ^ Bashe, Charles J.; et al. (1986). IBM's Early Computers. 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Wikibooks has more on the topic of: Electronics Wikibooks has a book on the topic of: Electrical engineering Wikisource has original text related to this article: Category:Electronics Wikiversity has learning resources about School:Electronics Wikimedia Commons has media related to Electronics. Navy 1998 Navy Electricity and Electronics Training Series (NEETS) Archived 2 November 2004 at the Wayback Machine DOE 1998 Electrical Science, Fundamentals Handbook, 4 vols. Vol. 1, Basic Electrical Theory, Basic DC Theory Vol. 2, DC Circuits, Batteries, Generators, Motors Vol. 3, Basic AC Theory, Basic AC Reactive Components, Basic AC Power, Basic AC Generators Vol. 4, AC Motors, Transformers, Test Instruments & Measuring Devices, Electrical Distribution Systems Portals: Electronics Physics Technology Chemistry Television History of science Science Telecommunication Spaceflight Retrieved from "