

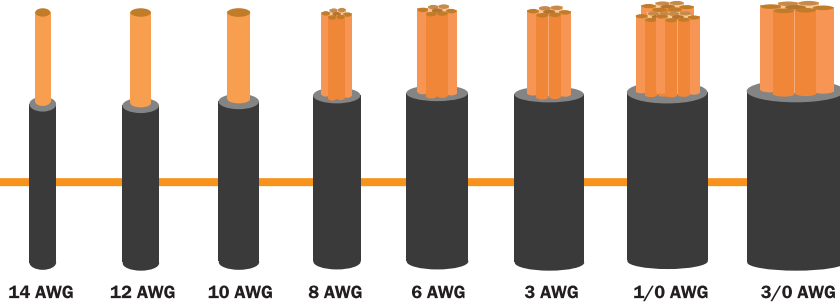
CONCEPT Electrical systems wiring refers to the process of connecting various electrical components within a robot, such as sensors, motors, power supplies and controllers, using wires and cables. This wiring is essential for the proper functioning of the robot and allows it to perform various tasks, such as movement, sensing and manipulation. Wiring in robotics involves following a specific set of guidelines and safety protocols to ensure the electrical components are connected correctly and safely. Done in a methodical way, it also aids in troubleshooting and warranted repairs.

BACKGROUND

Back to the mid-20th century when the first industrial robots were developed, these robots used simple wiring systems to connect their electrical components, which were mostly limited to relays and switches. In the 1970s, the advent of microprocessors and programmable logic controllers (PLCs) revolutionized the way robots were wired, allowing for more complex control systems and the ability to program robots to perform a wide range of tasks. The development of industrial Ethernet and other networking technologies in the 1980s and 1990s further improved the wiring systems used in robotics, enabling real-time communication and control of multiple robots from a central control system.

REAL WORLD CONNECTIONS

Education and workforce development are key to providing students and workers with the necessary skills to design, build and maintain advanced robotic systems. Whether developed on the job or via formal education, fundamental knowledge in the design, development and how a robotic system operates are crucial aspects when implementing and maintaining these systems. Skilled workers who can troubleshoot wiring diagrams, decipher complex logical flow charts and diagnose system errors will continue to be in high demand to support the industry's growth and development.

Make sure it measures up

DATA

WIRING GAUGE CHART: A chart that lists the wire gauge size and corresponding amperage rating for various wire types. For example, a 14-gauge wire has an amperage rating of 15 amps, while a 10-gauge wire has an amperage rating of 30 amps. This information is critical for selecting the appropriate wire size for a given application, ensuring the wire can handle the necessary current without overheating or causing damage.

WIRE BUNDLING GUIDELINES: Guidelines for bundling wires and cables in a way that minimizes electromagnetic interference (EMI) and ensures proper airflow to prevent overheating. These guidelines typically recommend spacing wires at a specific distance, using wire ties or conduits to organize and protect the wires, and avoiding sharp bends or kinks in the wire.

EXAMPLES

WIRING HARNESES: Bundles of wires and cables that are organized and routed in a specific way to connect various components of the robot.

CONNECTORS: Devices used to join wires and cables together, which are essential for making secure and reliable electrical connections.

TERMINAL BLOCKS: Connectors used to connect multiple wires at a single point, providing a convenient and organized method for wiring.

CRIMPING TOOLS: Used to attach connectors to wires by compressing them to form a secure, reliable connection.

CABLE TIES: Used to organize and secure cables and wires to prevent tangling and ensure a neat, clean installation.

APPLICATION

The National Electric Code Handbook's first and foremost purpose is to ensure the safety of the public and minimize property loss/damage. It is stressed that all work should be conducted in a neat and workmanlike manner. Any work in the electrical field, especially when working on/with complex robotic systems, should be performed in such a manner. Detailed documentation pertaining to a robot's electrical systems wiring should be referenced in its manual and include detailed wiring diagrams. This information aids a technician in installing and maintaining robotic systems.



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