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ELECTRONICS SYSTEMS

SYSTEM COMPONENTS

CONCEPT The main purpose of robotics systems is to automate tasks that are difficult, dangerous, or tedious for humans to perform, or to perform tasks that require high precision, speed, or accuracy.

System components include a variety of components that work together to control the robot's movements and interactions with the environment. These components include microcontrollers and processors, sensors, actuators, power management systems, circuit boards and wiring, software and algorithms, and communication systems.

BACKGROUND

The first industrial robots were developed for manufacturing processes in the 1960s. These early robots used simple electronic components such as relays and switches to control their movements. In the 1970s and 1980s, the development of microprocessors and sensors allowed for the creation of more advanced robotics systems.

Advances in electronics and computing technology during the 1990s and 2000s led to the development of more sophisticated robotics systems that could perform complex tasks with greater precision and speed. Today, robotics technology continues to advance rapidly, with ongoing research and development in areas such as machine learning, artificial intelligence, and the Internet of Things (IoT) to create even more capable and intelligent robotics systems.

DATA

SENSOR DATA: Sensors on the robot collect data about the environment and the robot's internal state, such as temperature, pressure, humidity, and position.

ACTUATOR DATA: Actuators generate data related to the movements and forces exerted by the robot, such as the speed and direction of movement, torque, and power consumption.

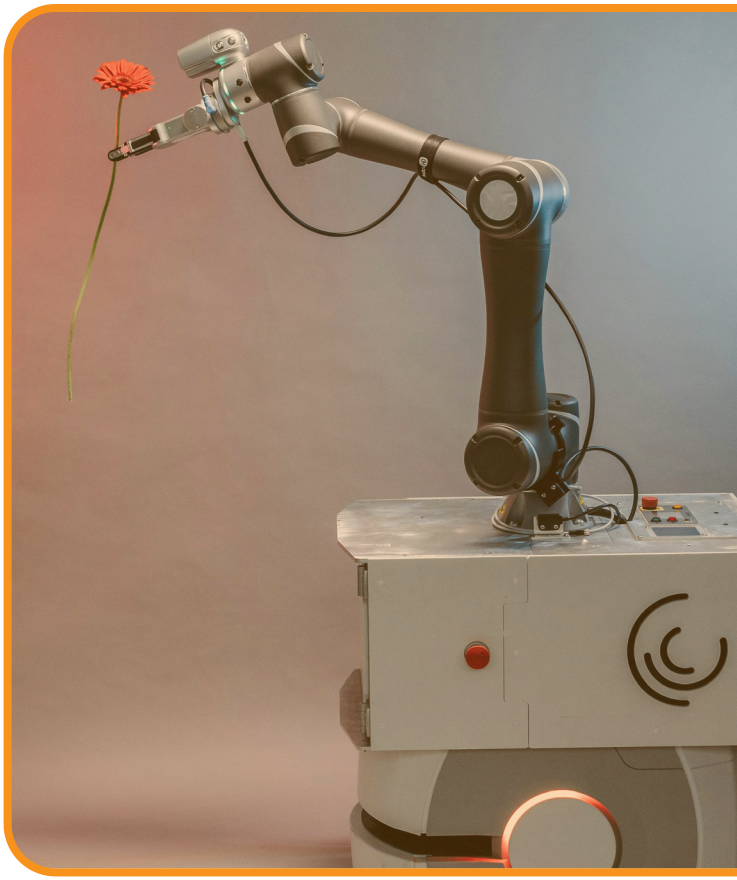
POWER MANAGEMENT DATA: Power management systems collect data related to the power requirements and consumption of the electronic components, such as voltage, current, and battery charge level.

Make sure it measures up

EXAMPLES

Microcontrollers and processors serve as the robot's central processing units, which control its behavior and movements. Sensors gather data about the robot's environment and internal state, while actuators enable the robot to move and interact with its environment. Power management systems manage the power requirements of the electronic components. Circuit boards and wiring connect the various electronic components and provide a pathway for electrical signals.

Software and algorithms are essential for controlling the robot's movements and behaviors, and they include programming languages, operating systems, and control algorithms. Communication systems enable the robot to communicate with other robots or with humans and include wireless communication protocols such as Wi-Fi, Bluetooth, and cellular networks.



APPLICATION

Waymo, a self-driving car company owned by Alphabet Inc., uses a range of system components in their autonomous vehicles, including lidar sensors, radar sensors, cameras, and a powerful onboard computer. These components work together to gather data about the vehicle's surroundings, identify obstacles, and make decisions about how to safely navigate the environment.

The lidar sensors use lasers to create a 3D map of the vehicle's environment, while the radar sensors detect objects and obstacles in the car's path. The cameras provide additional visual data, such as traffic lights, road signs, and lane markings, that help the vehicle navigate complex intersections and highways.

All of this data is processed by a powerful onboard computer that uses advanced algorithms and machine learning techniques to make decisions about how to operate the vehicle. The system components work together to enable the vehicle to drive itself safely and efficiently, without the need for human intervention.

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