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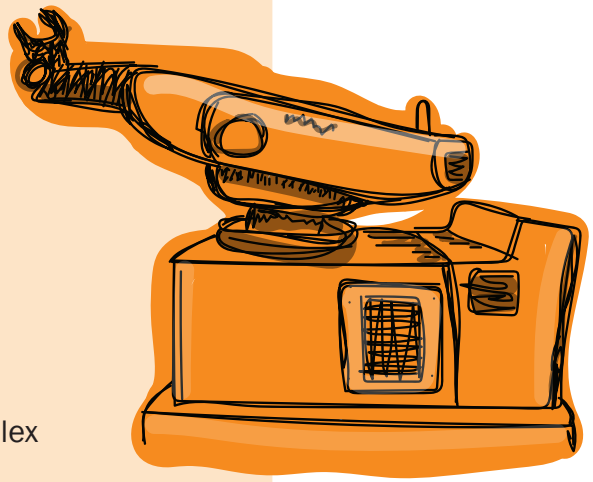
THREE LEVELS OF I/O LOGIC

MACHINE/DIGITAL LOGIC

CONCEPT Machine/digital logic provides a systematic and logical way to program robots to perform tasks. Digital logic enables the creation of precise, complex, and automated systems that are capable of executing actions with high accuracy and consistency. The use of digital logic in robotics allows for the integration of sensors and actuators that can perceive and respond to the environment, making robots more adaptable to changing conditions. It also makes it possible to program robots to execute multiple tasks simultaneously, leading to increased productivity.

BACKGROUND

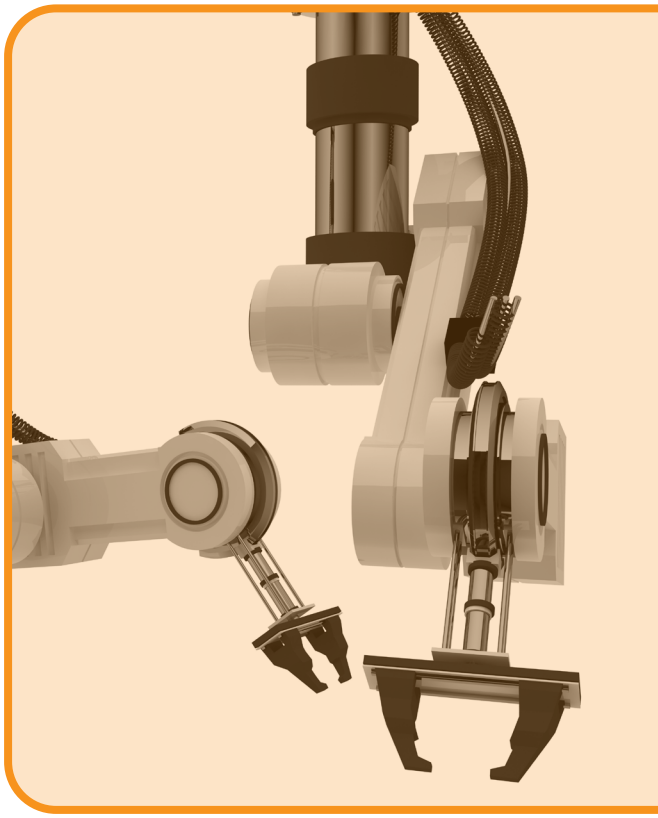
In 1954, George Devol and Joseph Engelberger developed the first industrial robot, the Unimate, which utilized digital logic and was controlled by a computer. In the late 1960s & 70s, digital logic was used to control robots in space exploration, such as the Soviet Union's Lunokhod lunar rover. In the 1970s, the first microprocessors were developed, allowing for the creation of smaller, more complex robots with greater computational capabilities. The 1980s saw the development of the first autonomous mobile robots, such as the Stanford Cart, which used digital logic to navigate and avoid obstacles. Since then, advancements in digital logic, including the use of artificial intelligence and machine learning algorithms, have led to the development of sophisticated robots capable of performing complex tasks, such as autonomous cars and drones.



Make sure it measures up

APPLICATION

Cobots, short for “collaborate robots”, are robots that are designed to work alongside human operators, performing tasks that are repetitive, dangerous, or require a high degree of precision. They use digital logic and advanced algorithms to interact with their human counterparts and perform their tasks with a high degree of accuracy and safety.

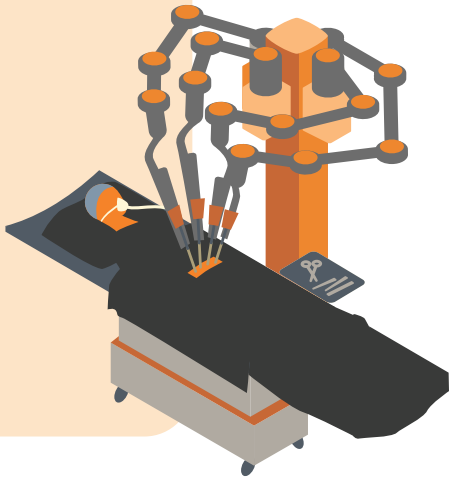


Cobots are equipped with sensors that allow them to detect the presence of humans and avoid collisions. They also use machine learning algorithms to learn from their human operators and improve their own performance over time. Cobots are often used in manufacturing processes that require the assembly of small parts, such as electronics or medical devices, where their precision and accuracy are critical.

Lincoln Electric’s Cooper welding cobot system is equipped with advanced sensors and a welding torch to perform welding tasks alongside human operators. The cobot’s digital logic and algorithms allow it to work collaboratively with humans, making the welding process faster, more efficient, and safer. It also allows manufacturers to address workforce shortages to ensure day to day operations continue to make progress.

REAL WORLD CONNECTIONS

Surgical robots used in hospitals, such as the da Vinci Surgical System, utilize digital logic and advanced algorithms to provide surgeons with a high degree of precision and control during surgical procedures. The da Vinci system consists of several robotic arms controlled by a surgeon, who uses a console to manipulate the instruments. The robot’s sensors provide feedback to the console, allowing the surgeon to view a 3D image of the surgical site and operate the instruments with high accuracy. The use of machine/digital logic in surgical robotics has led to improved patient outcomes, reduced hospital stays, and shorter recovery times.



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