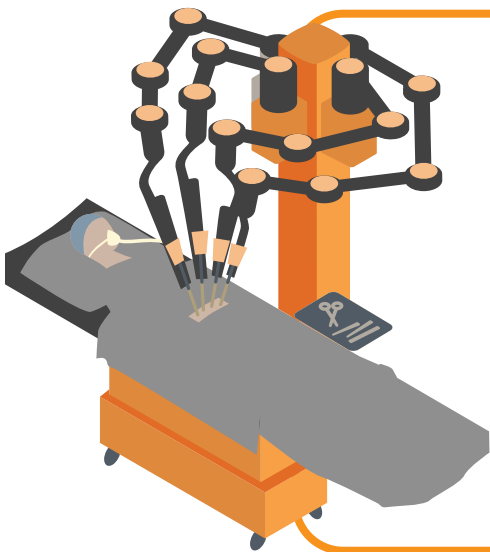


CONCEPT Measuring motion is critical in robotics for accurate positioning, precise movement control, safety, and efficiency. Accurate measurement enables robots to navigate, interact, and perform their tasks effectively, while optimizing energy consumption and reducing costs.

BACKGROUND

In the 1980s, the use of microprocessors enabled the integration of motion control and sensing systems, which allowed for more precise movement and control of robots. This led to the development of new sensors such as gyroscopes and optical encoders, which provided more accurate measurements of motion.

In the 1990s, the development of Inertial Measurement Units (IMUs) enabled the measurement of both linear and rotational motion, providing a more comprehensive view of the robot's movement. In the early 2000s, computer vision and machine learning techniques were incorporated into motion sensing, allowing for the use of cameras and image processing algorithms to track the movement of robots.



APPLICATION

The da Vinci Surgical System uses advanced motion sensors and optical tracking systems to enable the robot to move with high precision and accuracy. The robot's arms are equipped with encoders and sensors that measure the position, speed, and force of the robot's movements, allowing it to perform delicate surgical procedures with extreme accuracy. The System also uses a camera system that provides the surgeon with a high-resolution 3D view of the surgical field, allowing them to see the anatomy in greater detail and make more precise movements with the robot.

Make sure it measures up

EXAMPLES

ENCODERS: Sensors that measure the position and speed of a rotating shaft or wheel. They provide precise feedback on the position and movement of the robot.

ACCELEROMETERS: Sensors that measure acceleration and changes in velocity. They are used to determine the orientation and movement of the robot.

OPTICAL AND MAGNETIC ENCODERS: Sensors that use light or magnetic fields to determine the position and movement of the robot.

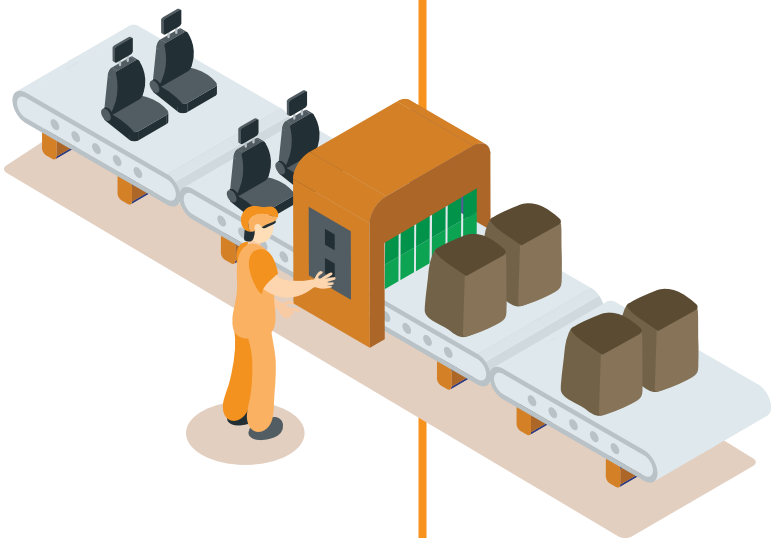
COMPUTER VISION: Cameras and image processing algorithms that track the movement of the robot.

DATA

POSITION DATA: Information on the location and orientation of the robot, which is critical for navigation and interaction with the environment.

SPEED AND VELOCITY DATA: Robot's speed and direction of movement, which is essential for precise control and optimization of movement.

ENERGY CONSUMPTION DATA: Amount of energy used by the robot to perform its tasks, which is important for optimizing energy efficiency and reducing costs.



REAL WORLD CONNECTIONS

Companies such as Berkshire Hathaway's Nebraska Furniture Mart and Oriental Trading Company have implemented robots to automate tasks such as picking, packing, and sorting goods in their warehouses. To ensure precise movement and control of these robots, sensors such as optical encoders are used to measure the position and speed of the robot's movement which enables the robot to navigate and interact with objects in the warehouse environment. Computer vision is used to identify objects in the warehouse, allowing the robot to locate and pick them up without error.



powered by:

**Nebraska Public Power District***Always there when you need us*