1.Hexapod gait and kinematics

1. Hexapod robot

Hexapod robots are robots that imitate arthropods such as insects or spiders. They have six legs and can walk on complex terrain. Hexapod robots have great flexibility in the way they move. If the legs become disabled, the robot may still be able to walk. Furthermore, not all robot legs require stability. The other legs are free to reach new foot positions or maneuver payloads.

Many hexapod robots are biologically inspired by the locomotion of hexapods. Hexapods can be used to test biological theories about insect locomotion, motor control and neurobiology.

2. Principle of six-legged robot

The structural design of a hexapod robot needs to consider factors such as the degree of freedom of the legs, joint type, driving method, and load capacity.

The control system of a hexapod robot needs to coordinate leg movements and adapt to the external environment, and usually adopts a hierarchical or distributed control architecture.

The sensors of the hexapod robot need to provide feedback on the robot's attitude, speed, position and terrain information. Commonly used sensors include gyroscopes, accelerometers, encoders, cameras and lidar.

3. Gait of six-legged robot

The gait of a hexapod robot can be divided into two categories: static stable gait and dynamic stable gait.

Static stable gait means that at least three legs are in contact with the ground at any time, ensuring that the center of gravity of the robot is within the support polygon, thereby ensuring the stability of the robot.

Dynamic stable gait means that less than three legs are in contact with the ground at certain moments, and the inertia and dynamic balance of the robot are used to ensure the stability of the robot.

Common static stable gaits include wave gait, triangle gait and quadrangular gait, etc. Common dynamic stable gaits include running gait, jumping gait and tumbling gait.

4. Kinematics solution of hexapod robot

Solve for the angle or angular velocity of each joint of each leg based on a given target position or velocity. This is the kinematics solution for a hexapod robot.

The kinematics solution of a hexapod robot can be divided into two types: forward kinematics and inverse kinematics.

Forward kinematics involves finding the position or velocity of the end of each leg based on the angle of each joint.

Inverse kinematics involves solving for the angle or angular velocity of each joint based on the position or velocity of the end of each leg.

The kinematics solution of hexapod robots is usually implemented using mathematical models or numerical methods, such as DH parameter method, Jacobian matrix method, Newton iteration method, etc.