Single-Actuator Wave-Like Pipeline Robot

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In the pipelines, a long and narrow environment both inconvenient and unsafe for man to operate in, machines are often needed to assist in operation and repair. This project aims to develop a single-actuator wave-like pipeline robot with a simple integrated control system, which simulates simple harmonic motion according to snakes' wave-like motion, with high detachability, convenience in manipulation, simplicity in motion, high stability and efficiency in operation, changeability in direction. Structurally, the robot is divided into two parts, the control system, which consists of a single electric motor and a steering engine and etc., and the motor system, which consists of the spiral backbone and the wave-like motion device and etc. Functionally, the electric motor drives the conform and stable sine motion of the spiral backbone and thus the wave-like motor devices, whose start, end, and direction of movement can be remotely manipulated by the infrared remote control through programs and the Arduino panel. Moreover, to realize more complex motions such as going uphill and downhill, a smaller version is constructed with double steering engines and motion systems. The experiments find that the robot's motion is most stable without the wooden arms and that the robot moves faster in pipelines and on rough grounds. In the future, the robot is expected to be further improved in its motion functions and applicability.

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