Another Way to Swim: A Lightweight Bionic Frog Robot Based on Pneumatic System

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Bionic soft robot is an important branch in the field of robotics, allowing robots to use effective mechanical structure to maneuver in complex conditions. Among them, water surface robots with water maneuverability can provide an effective platform for water research. This thesis introduces a lightweight bionic frog robot based on a silicone inchworm-shaped soft pneumatic joint, which is small in size, and has good water surface maneuvering performance. For its structural design mimicking to the frog, it created less disturbance on the water surface, allowing sampling on the water to be more accurate. It consists of a control module located in the main body and motion modules located in the limbs. During its movement, the U-shaped silicone soft joints located in the limbs deform under high internal air pressure. The deformed joints can push the limbs and flippers backwards, allowing the robot to move forward and realize direction control. The silicone soft joints and flippers of this robot have gone through several rounds of iterations, and have been subjected to soft structural simulation of software SIMULIA Abaqus, component testing and complete machine testing. Its connection with intelligent mobile terminal is realized through Bluetooth, and the water surface movement. In the future, it is expected to realize intelligent transformation, autonomous cruise and unmanned patrol and other functions.

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