

Title:

Development of Automatic Ladder Climbing Inspection Robot Using Extension Type Flexible Pneumatic Actuators

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Abstract:

Recently, old and dilapidated infrastructures such as bridges, chimneys and tunnels have become very serious in Japan. Inspection of the infrastructure was done by climbing the ladders that were set up. However, the inspection becomes dangerous as it is necessary to climb into very high areas and unpredictable weather and conditions. In this study, a lightweight inspection robot that can climb ladders in adverse weather conditions was proposed and tested. To grasp a ladder pillar without hurting, the wrapping motion is required. Therefore, the flexible robot arm that can grasp the ladder pillar while approaching and release it while going away was also proposed and tested. The automatic ladder-climbing inspection robot that consists of two pillar grasping flexible robot arms and a lifting robot arm was proposed and tested. The control system of the robot, driven by four on/off valves and an embedded controller, was also constructed. The ladder climbing experiment using the tested robot was carried out. As a result, it could be confirmed that the robot can climb up and down a ladder with soft gripping the ladder, and the soft robot can be also operated by using only four valves